

Graduate School of Arts and Sciences

Programs and Policies

2020—2021



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Series 116 Number 5 July 15, 2020

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THE PRESIDENT AND FELLOWS OF YALE UNIVERSITY

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Her Honor the Lieutenant Governor of Connecticut, *ex officio*

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THE OFFICERS OF YALE UNIVERSITY

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Jessica Davis, Senior Executive Assistant to the Dean

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Jasmina Besirevic Regan, Ph.D., Associate Dean for Partnerships and Special Projects
Ann Gaylin, Ph.D., Associate Dean for Graduate Education
Richard G. Sleight, Ph.D., Associate Dean for Graduate Student Advising and Academic Support
Robert Harper-Mangels, Ph.D., Assistant Dean
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Jennifer Mendelsohn, M.S., Associate Director, Graduate Student Life, McDougal Graduate Student Center

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Jennifer Medina, M.B.A., Operations Manager

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Peter Salovey, Ph.D., President
Scott Strobel, Ph.D., Provost
Tamar S. Gendler, Ph.D., Dean of the Faculty of Arts and Sciences

SCHEDULE OF ACADEMIC DATES AND DEADLINES

The following dates are subject to change as the University makes decisions regarding the 2020–2021 academic year. Changes will be posted online on the Graduate School's website.

FALL TERM 2020

Aug. 10	M	Pre-registration and online course selection begin Student advising begins
Aug. 21	F	Pre-registration and online course selection end
Aug. 24	M	New Student Orientation Week begins (required)
Aug. 27	TH	Teaching @ Yale Day for all new Teaching Fellows
Aug. 31	M	Fall-term GSAS classes begin Course Add/Drop begins
Sept. 7	M	Labor Day. Classes meet
Sept. 11	F	Course Add/Drop ends
Oct. 30	F	Midterm (tentative)
Nov. 20	F	November recess begins at night
Nov. 30	M	Classes resume online*
Dec. 10	TH	Final examinations begin online*
Dec. 18	W	Online examinations end. Winter recess begins

* From November 21 through December 18, online/remote instruction is the default mode for GSAS and Yale College classes; in-person classes only with special permission.

SPRING TERM 2021

All spring 2021 dates are forthcoming.

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 faculty and students from around the world and with diverse backgrounds who share a common interest in advancing a particular discipline. 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 through the McDougal Graduate Student Center, the Office for Graduate Student Development and Diversity, the Office of Career Strategy, and the Poorvu 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 comprising Yale University and the only one that awards the degrees of Doctor of Philosophy, Master of Philosophy, Master of Arts, Master of Science, and Master of Advanced Study. The work of the Graduate School is carried on in the divisions of the Humanities, Social Sciences, and Biological and Physical Sciences. Fifty-seven departments and programs offer courses of study leading to the Ph.D. degree. Nineteen departments and programs offer terminal master's degrees.

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 nearly 1,000 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 650 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 Graduate School of Arts and Sciences educates graduate students to seek answers to life's most challenging questions by leading in the advancement, application, and preservation of knowledge. We carry out this mission by investing in and drawing upon the strengths of a collaborative, diverse, and inclusive community of scholars and researchers.

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.

A GLOBAL UNIVERSITY

Global engagement is core to Yale's mission as one of the world's great universities. Yale aspires to:

- Be the university that best prepares students for global citizenship and leadership
- Be a worldwide research leader on matters of global import
- Be the university with the most effective global networks

Yale's engagement beyond the United States dates from its earliest years. The University remains 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.

Yale's globalization is guided by the vice president for global strategy, who is responsible for ensuring that Yale's broader global initiatives serve its academic goals and priorities, and for enhancing Yale's international presence as a leader in liberal arts education and as a world-class research institution. The vice president works closely with academic colleagues in all of the University's schools and provides support and strategic guidance to the many international programs and activities undertaken by Yale faculty, students, and staff.

Teaching and research at Yale benefit from the many collaborations underway with the University's international partners and the global networks forged by Yale across the globe. International activities across all Yale schools include curricular initiatives that enrich classroom experiences from in-depth study of a particular country to broader comparative studies; faculty research and practice on matters of international importance; the development of online courses and expansion of distance learning; and the many fellowships, internships, and opportunities for international collaborative research projects on campus and abroad. Together these efforts serve to enhance Yale's global educational impact and are encompassed in the University's global strategy.

The Office of International Affairs (<https://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 (<https://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 Alumni Association (<https://alumni.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" website (<https://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.

Deputy Dean

Pamela Schirmeister, Deputy Dean and Dean for Strategic Initiatives, Graduate School;
Dean of Undergraduate Education and Senior Associate Dean, Yale College;
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Associate and Assistant Deans for Academic Affairs

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Robert Harper-Mangels, Assistant Dean; robert.harper-mangels@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.

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 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, Senior 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 (OGSDD) is committed to expanding the diversity of the student body and to enhancing the intellectual experience of the entire scholarly community. The OGSDD coordinates efforts to recruit and retain students at the Graduate School. The associate dean works collaboratively with departments and programs to support the needs of all students as they pursue graduate study and prepares reports on the Graduate School's progress in recruiting and retaining diverse students. The following programs and activities fall under the purview of the OGSDD: informal advising of prospective and current graduate students, the Summer Undergraduate Research Fellowship (SURF) Program, the Post-Baccalaureate Research Education Programs, Diversity Recruitment Days, Diversity Orientation Day, Diversity Preview Days, Transitions First Year Experience, and the Annual Yale Bouchet Conference on Diversity and Graduate Education. A full-time assistant director of diversity and annually appointed graduate student diversity fellows assist with the development and implementation of these programs, as well as virtual recruitment fairs and webinars, social justice discussion seminars, mentoring programs, workshops and lectures presented by diverse scholars, and social and professional development events.

McDougal Graduate Student Center

Founders Hall, 135 Prospect St., upper level, 203.432.BLUE (2583),
mcdougal.center@yale.edu
<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 sixty McDougal Fellows in five offices who create programs and services for the graduate community through five collaborating offices of Development and Diversity, Career Strategy, Graduate Student

Life, and the Poorvu Center for Teaching and Learning's Graduate Writing Lab and Graduate Teaching Program.

GRADUATE STUDENT LIFE

Lisa Brandes, Assistant Dean for Student Affairs and Director, McDougal

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Jennifer Mendelsohn, Associate Director, McDougal Center; Founders Hall, 135

Prospect St., upper level, Rm. 186, 203.432.2583, jennifer.mendelsohn@yale.edu
<http://gsas.yale.edu/life-yale/graduate-student-life-office>
<http://yaleconnect.yale.edu>

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 Student Life Fellows and staff produce a wide array of student life programs annually, including concerts; arts, literary, music, sports, and cultural events; health and wellness programs; outings; family activities and resources; international student events; public service opportunities; and dances and other social events. Graduate Student Life advises and supports more than seventy graduate student organizations, which sponsor events at the center, on and off campus. Activities are announced in the weekly e-mail McDougal Graduate Student Life Notes, on social media, and on the Yale Connect site listed above. This office also oversees the facilities and general services of the McDougal Center.

In collaboration with the Office of the Vice President for University 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 and GS Dean's social events. GSL staff help coordinate other events for the Graduate School community, including the Graduate School's participation in the University's Commencement exercises.

Admissions

Leah Phinney, 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 supports the work of the faculty, programs, and deans of the Graduate School by providing a centralized admissions process for attracting, admitting, and recruiting talented and diverse scholars and researchers to Yale. The office also assists applicants with the application and onboarding process.

Business Operations

Mary Magri, Lead Administrator for the Dean's Administration; Warner House, 1 Hillhouse Ave., 203.432.6346, mary.magri@yale.edu
Jennifer Medina, Operations Manager; 1 Hillhouse Ave., 203.436.9376, jennifer.medina@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

Sara Estrom, Director; 246 Church St., 203.432.7980, gradfinaid@yale.edu
<http://gsas.yale.edu/funding-aid/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

Kory Riddle, Associate University Registrar for Student Support; 246 Church St., 203.432.8649, registrar.gsas@yale.edu
Claudia Schiavone, Assistant University Registrar; 246 Church St., 203.432.2743, registrar.gsas@yale.edu

The Registrar's Office 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 <https://www.yale.edu/sis>.

Teaching Fellow Program

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Howard el-Yasin, Program Manager; 203.432.2757, howard.el-yasin@yale.edu
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 program manager of the Teaching Fellow Program or the deputy dean.

Affiliated Offices

OFFICE OF CAREER STRATEGY

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Services; brian.frenette@yale.edu

55 Whitney Ave., 3rd floor; and McDougal Center, Founders Hall, 135 Prospect St., Rm. 187B

<https://ocs.yale.edu>

The Office of Career Strategy (OCS) supports currently enrolled degree students in the Graduate School of Arts and Sciences, postdocs, and alumni interested in non-academic careers. Offerings are designed to assist with every stage of career development and include one-on-one advising appointments and daily drop-in hours; résumé and cover letter review via e-mail; career education and job search workshops, programs, and webinars; employer recruiting events and information sessions; alumni networking tools and opportunities; an employer database with 10,000+ registered employers; an online jobs board with postings by employers seeking Yale talent; an interactive mock interview system; and extensive web-based resources. OCS, together with a team of McDougal Career Fellows, collaborates with faculty, campus partners, student organizations, alumni associations, and employers to expand and enrich its programming. All degree students in the Graduate School of Arts and Sciences receive regular communication and program updates from OCS via its weekly e-newsletter. In addition, degree students can view its calendar of events and make appointments with a career adviser via the Yale Career Link, the office's career services management system.

POORVU CENTER FOR TEACHING AND LEARNING

Jennifer Frederick, Executive Director; jennifer.frederick@yale.edu

Sterling Memorial Library, 301 York St. entrance

<https://poorvucenter.yale.edu>

The Poorvu Center supports teaching and learning excellence across the campus integrating support for faculty, graduate students and postdocs, and undergraduates. Several Poorvu Center units are focused exclusively on professional development and skill-based training for graduate and professional school students.

Graduate and Postdoctoral Teaching Development

Suzanne Young, Ph.D., Director; suzanne.young@yale.edu

Gina Hurley, Ph.D., Assistant Director; gina.hurley@yale.edu

301 York St.

<https://poorvucenter.yale.edu/teaching/graduate-student-professional-student-and-postdoctoral-teaching-development>

This Poorvu Center unit offers a full range of training, consultation, and teacher development services to teaching fellows and postdoctoral fellows at Yale. The professional staff and McDougal Graduate Teaching Fellows are available throughout the year to provide training in effective teaching methods and support for teaching challenges. For first-time teaching fellows in the GSAS, the Poorvu Center provides a required training, Teaching at Yale Day, that equips graduate teaching fellows with knowledge of University policies and effective teaching practices. The center also offers Fundamentals of Teaching courses for specific departments, such as Chemistry, Physics, and Music. (Departments and programs seeking their own discipline-centered program should contact the Poorvu Center.) In addition, the center offers Fundamentals of Teaching courses in the humanities, social sciences, and sciences. For more advanced graduate teachers, the center offers workshops on topics such as inclusive teaching, course design, assessment, teaching with technology, and active learning. It also offers upper-level programs to help graduate students prepare for the academic job market, including workshops on writing the teaching statement, preparing the teaching portfolio, and designing a syllabus. The center offers classroom teaching observations, as well as one-on-one consultations on any teaching topic, including reviewing job market materials or designing a new course. All Poorvu Center programs and consultations are strictly confidential.

The Poorvu Center offers several programs for graduate students who wish to deepen their teaching skills. Graduate students may earn the Certificate of College Teaching Preparation (CCTP), a certificate that signals commitment to teaching. Graduate students and postdocs may participate in the Spring Teaching Forum, a venue for members of the Yale community to discuss contemporary issues in pedagogy and higher education. Graduate students may apply to the Associates in Teaching program, which allows graduate students to co-teach a course with a faculty mentor, or to the Digital Education Innovation Grant program, which supports the creation of digital teaching tools. Finally, graduate students may wish to participate in online teaching courses and workshops available through the Center for the Integration of Research, Teaching and Learning (CIRTL). This consortium leverages the expertise of multiple research institutions to offer a diverse array of teacher training opportunities.

On the Poorvu Center website, graduate students will find a variety of teaching resources, including descriptions of the center's programs, a teaching guide for new and returning teachers, and modules on important teaching topics. All graduate students receive a weekly newsletter about upcoming programs and events.

Graduate Writing Laboratory

Elena D. Kallestinova, Ph.D., Assistant Dean and Director; elena.kallestinova@yale.edu

Julia Istomina, Ph.D., Assistant Director; julia.istomina@yale.edu

Sterling Memorial Library, 301 York St., mezzanine floor

<https://poorvucenter.yale.edu/writing/graduate>

The Graduate Writing Laboratory (GWL), a unit of the Poorvu Center, offers resources to all currently enrolled GSAS and professional school students who want to grow as successful academic writers. The GWL provides support through individual consultations, workshops on written and oral communication, a public speaking studio, writing groups, and online resources. Graduate students are encouraged to schedule individual writing consultations with Graduate Writing Consultants, available throughout the academic year to meet in the Poorvu Center, the Marx Science and Social Science Library, and the Cushing/Whitney Medical Library. During these consultations, students can discuss their written and oral academic work, grant proposals, fellowship applications, conference presentations, research papers, prospectuses, and dissertation chapters. In addition, the GWL offers workshops, information sessions, and discussion panels led by the professional staff, McDougal Graduate Writing Fellows, and invited speakers. These programs relate to topics of academic research, writing, communication, and publishing and take place at campus locations convenient for graduate students. The GWL has recently opened a Public Speaking Studio where graduate students can schedule a session with PitchVantage innovative software to improve their public speaking skills, master different aspects of presentation delivery techniques, and evaluate their performance in real time. Finally, the GWL organizes regular writing groups including working groups and full-day and half-day retreats, which help students with the process of writing and provide accountability and peer support. A complete list of programs is available through the GWL website and a weekly 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

James Tierney, Director, English Language Program; james.tierney@yale.edu
Dow Hall, 370 Temple St.
<https://cls.yale.edu>

The Center for Language Study (CLS) supports language teaching and learning across the University, including support for nonnative speakers of English through its English Language Program (see below). For graduate students in language and literature programs, it offers a Certificate in Second Language Acquisition (SLA) that includes pedagogy workshops, a capstone course in language teaching methodology, and a series of professional development workshops that, taken together, give graduate students grounding in the theory and practice of language education. 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. 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 as well as for fellowship applications. For more information, contact Vee Cangiano (vee.cangiano@yale.edu).

English Language Program

James Tierney, Director; james.tierney@yale.edu
Dow Hall, 370 Temple St.
<https://cls.yale.edu/programs/english-language-program>

The English Language Program (ELP), a unit of the Center for Language Study, provides language and communication support for graduate and professional students and faculty. It serves multilingual students at all stages of their academic careers, from orientation through dissertation and job search. ELP faculty help students in all areas of academic communication, especially writing, vocabulary development, presentation skills, and pronunciation. The program offers a wide range of courses, workshops, and individual instruction, as well as an intensive Summer Program for those entering doctoral programs. The ELP is also responsible for conducting assessments certifying graduate students and others teaching at Yale. In addition, the program provides consultations across Yale departments and units on issues relating to language, culture, and communication. The overall aim is to advance the capacities of students for greater success at Yale and beyond. ELP programs are open to students of all levels and to all Yale constituents, including graduate and professional school students, postdocs, and visiting faculty. For more information, contact James Tierney at james.tierney@yale.edu.

Committees

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

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

The Degree Committee The Degree Committee, composed of two senior faculty members from each division (Humanities, Sciences, and Social Sciences) and chaired by the dean, meets twice a year and is responsible to the faculty of the Graduate School for maintaining standards of graduate education in the School and for recommending candidates for degrees. The committee reviews 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 Academic Regulations, under Policies and Regulations).

The Graduate School of Arts and Sciences Climate and Inclusion

Committee Composed of faculty, students, and staff, this committee advises the dean on matters of diversity, equity, and inclusion.

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 Academic Regulations, under Policies and Regulations).

Graduate Student Assembly (GSA)

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

<https://gpsenate.yale.edu>

The Graduate and Professional Student Senate (GPSS or “Yale G&P 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 Gryphon, a graduate and professional student center, located at 204 York Street. The center provides office and event space for GPSS and other student organization activities, funds student groups, and houses Gryphon’s Pub, open nightly.

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' websites. General changes to degree requirements will be posted on the Graduate School's website (<https://gsas.yale.edu>).

The course listings and instructors reflect information received by the registrar as of the publication date and are subject to change without notice. Students are advised to consult <https://courses.yale.edu> 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." A course designated "a or b" is the same course given in both terms. Yearlong courses list both "a" and "b." 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

Director of Graduate Studies

Daphne Brooks (81 Wall St., daphne.brooks@yale.edu)

Professors Elijah Anderson, David Blight, Daphne Brooks, Hazel Carby (*Emerita*), Roderick Ferguson, Jacqueline Goldsby, Emily Greenwood, Matthew Jacobson, Gerald Jaynes, Kobena Mercer, Christopher Miller, Tavia Nyong'o, Claudia Rankine, Robert Stepto (*Emeritus*), Michael Veal

Associate Professors Aimee Cox, Crystal Feimster, Elizabeth Hinton, Edward Rugemer

Assistant Professor Carolyn Roberts

Lecturers Aaron Carico, Thomas Allen Harris

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, History of Science and Medicine, Music, 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.

This is a combined degree program. To be considered for admission to this program, applicants must indicate both African American Studies and one of the participating departments/programs listed above.

REQUIREMENTS FOR TRANSFER INTO THE AFRICAN AMERICAN STUDIES COMBINED PH.D. PROGRAM

1. Students applying for transfer into the combined Ph.D. program must already have taken AFAM 505 or be taking it in the term of application; must provide a

plan outlining the AFAM courses already taken and those they will take; and must submit a research statement that explains how the combined Ph.D. will advance their research interests.

2. Students must provide two letters of recommendation: one from their adviser in the joint department or program, unless that adviser is jointly appointed with African American Studies, in which case a letter from the student's DGS in the joint department or program is required; *and* a second letter from a faculty member in African American Studies who commits to being the student's adviser throughout the completion of the dissertation.
3. Students cannot apply sooner than the second term of the first year and must apply by January 3, which is the deadline for African American Studies' annual admissions cycle. Preference will be given to students in the second year of their Ph.D. program. Applications will receive a faculty vote early in the spring term to approve or reject, and results will be communicated to the student no later than spring break.

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 505), which is a required course for all first-year graduate students in the combined program, and (2) *Dissertation Prospectus Workshop* (AFAM 895 and AFAM 896), 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 the 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. The number of courses that will count depends on the joint department or program. For details of these requirements, see the special requirements of the combined Ph.D. for the particular department or program 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. A student who intends to apply for this combined Ph.D. in African American Studies and another department or program 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 website, <http://afamstudies.yale.edu>.

COURSES

For course offerings in African languages, see African Studies.

AFAM 505a, Theorizing Racial Formations Staff

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.

AFAM 626b / HIST 721b / RLST 626b, African American Religious History

Nicole Turner

African American religions have been central to the African American experience since Africans arrived in North America. An amalgam of traditional African religions, Christianity, Islam, Judaism, and African American ingenuity, African American religions are dynamic and multifaceted. Although they are often depicted as sources of black resilience and emblems of black resistance, they have also been critiqued for marginalizing and racializing black people, as well as encoding archaic gender paradigms and reinforcing class divisions. This course explores the ways histories of African American religions have produced these various interpretive frames. Questions that animate the course include: What role have African American religions played in African American life? How have scholars studied the history of African American religions and ultimately shaped the discourse about African American religious life, and by extension African American history? The course engages foundational works, such as Albert Raboteau's *Slave Religion* and Evelyn Brooks Higginbotham's *Righteous Discontent*, as well as newer works like Judith Weisenfeld's *New World A-Coming* and Matthew Harper's *The End of Days*.

AFAM 716a / AMST 910a / HIST 764a, Working Group on Latina/o Studies I

Stephen Pitti and 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.

AFAM 763b / AMST 731b / HIST 747b, Methods and Practices in U.S. Cultural History Matthew Jacobson

This sampling of U.S. cultural history from the early national period to the present is designed to unfold on two distinct planes. The first is a rendering of U.S. culture itself—a survey, however imperfect, of the major currents, themes, and textures of U.S. culture over time, including its contested ideologies of race and gender, its organization of productivity and pleasure, its media and culture industries, its modes of creating and disseminating “information” and “knowledge,” its resilient subcultures, and its reigning nationalist iconographies and narratives. The second is a sampling of scholarly methods and approaches, a meta-history of “the culture concept” as it has informed historical scholarship in the past few decades. The cultural turn in historiography since the 1980s has resulted in a dramatic reordering of “legitimate” scholarly topics, and hence a markedly different scholarly landscape, including some works that seek to narrate the history of the culture in its own right (Kasson’s history of the amusement park, for instance, and others that resort to cultural forms and artifacts to answer questions regarding politics, nationalism, and power relations (Melani McAlister’s *Epic Encounters*). In addition to providing a background in U.S. culture, then, this seminar seeks to trace these developments within the discipline, to understand their basis, to sample the means and methods of “the cultural turn,” and to assess the strengths and shortcomings of culture-based historiography as it is now constituted.

AFAM 771b / AMST 830b / HIST 729b, The American Carceral State

Elizabeth Hinton

This readings course examines the historical development of the U.S. carceral state, focusing on policing practices, crime control policies, prison conditions, and the production of scientific knowledge. Key works are considered to understand the connections between race and the development of legal and penal systems over time, as well as how scholars have explained the causes and consequences of mass incarceration in America.

AFAM 777b / AMST 707b / WGSS 741b, Race, Colorblindness, and the Academic Disciplines Daniel HoSang

Examines the ways that academic disciplines in the social sciences, humanities, and natural sciences have developed in relation to white supremacy and colonialism, and their imbrication in theories of racial hierarchy and conquest. Foregrounds the racial histories and colorblind defenses of race neutrality in fields as diverse as social psychology, the law, musicology, literary studies, sociology, and gender studies to reveal the contradictory role of the academy in constructing, naturalizing, and reproducing frameworks of racial domination. Considers the ways that insurgent scholars and formations have contested these traditions to discredit these traditions and deploy disciplinary methods and theorizations toward emancipatory ends. Engages work by Kimberlé Crenshaw, George Lipsitz, Toni Morrison, Roderick Ferguson, and others.

AFAM 803a / AFST 828a / AMST 831a / MUSI 833a, Musical Afrofuturisms

Michael Veal

A survey of the Afrofuturist theme as it has been articulated in African American music of the post-World War II era, with additional references to its concurrent manifestations in film, literature, and visual arts. The introductory meetings lay historical, political, technological, and cultural foundations, before proceeding with a series of work-based (i.e., album-based case studies for the remainder of the term.

AFAM 880a or b, Directed Reading Staff

By arrangement with faculty.

AFAM 895a and AFAM 896b, 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. o Course cr per term

African Studies

Council on African Studies
The MacMillan Center
137 Rosenkranz Hall, 203.432.1425
<http://african.macmillan.yale.edu>
M.A.

Chair

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

Director of Graduate Studies

Stephanie Newell (203.432.2246, stephanie.newell@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*), Richard Bucala (*Internal Medicine*), Theodore Cohen (*Epidemiology*), John Darnell (*Near Eastern Languages & Civilizations*), Owen Fiss (*Law*), Gerald Friedland (*Internal Medicine; Epidemiology*), Robert Harms (*History*), Ann Kurth (*Nursing*), Daniel Magaziner (*History*), Roderick McIntosh (*Anthropology*), Stephanie Newell (*English*), Elijah Paintsil (*Pediatrics; Epidemiology; Pharmacology*), Catherine Panter-Brick (*Anthropology*), Curtis Patton (*Emeritus, Epidemiology*), David Post (*Ecology & Evolutionary Biology*), Asghar Rastegar (*Internal Medicine*), Ian Shapiro (*Political Science*), Michael Veal (*Music*), Sten Vermund (*Epidemiology; Pediatrics*), David Watts (*Anthropology*), Elisabeth Wood (*Political Science*)

Associate Professors Cécile Fromont (*History of Art*), Kaveh Khoshnood (*Epidemiology*), Louisa Lombard (*Anthropology*), Urania Magriples (*Obstetrics, Gynecology, & Reproductive Sciences*), Frank Minja (*Radiology & Biomedical Imaging*), Sunil Parikh (*Public Health; Internal Medicine*), Carla Staver (*Ecology & Evolutionary Biology*), Jonathan Wyrzten (*Sociology*)

Assistant Professors Katharine Baldwin (*Political Science*), Jill Jarvis (*French*), Hani Mowafi (*Emergency Medicine*), Christine Ngaruiya (*Emergency Medicine*), Oluwatosin Onibokun (*Obstetrics, Gynecology, & Reproductive Sciences*), Tracy Rabin (*Internal Medicine*), Jeremy Schwartz (*Internal Medicine*), Sheela Shenoi (*Internal Medicine*)

Lecturers Adalgisa Caccone (*Ecology & Evolutionary Biology*), W. Casey King (*Public Health*), Sarah Ryan (*Law*), David Simon (*Political Science*), Veronica Waweru (*African Languages*)

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

Senior Lector 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 Council on African Studies, 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 the Environment, 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 catalogs, photographs, manuscripts, correspondence, and theses, many published in Africa.

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: one compulsory interdisciplinary seminar, Gateway to Africa (AFST 505); a second course employing an interdisciplinary approach to African Studies, approved 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 590 and AFST 900) during which students will complete the required thesis; with permission of the DGS, AFST 951 may be substituted for AFST 590. 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 five major languages from sub-Saharan Africa: Kiswahili (eastern and central Africa, Twi, Wolof, 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 website, <http://african.macmillan.yale.edu>.

COURSES

AFST 505a, Gateway to Africa Michael Cappello and Veronica Waweru

This multidisciplinary seminar highlights the study of contemporary Africa through diverse academic disciplines. Each session features a Yale faculty scholar or guest speaker who shares their unique disciplinary perspective and methodological approach to studying Africa. Topics include themes drawn from the humanities, social sciences, and public health, with faculty representing expertise from across Yale's graduate and professional school departments. The course is intended to introduce graduate students and upper-level undergraduates to the breadth and depth of Yale scholarship on Africa, facilitating the identification of future topics and mentors for thesis or senior paper research. Each weekly seminar focuses on a specific topic or region, and students are exposed to various research methods and techniques in archival research, data collection, and analysis. A specific goal of the course is to impart students with knowledge of how research across diverse disciplines is carried out, as well as to demonstrate innovative methodology, fieldwork procedures, presentation of results, and ethical issues in human subjects research.

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.

AFST 828a / AFAM 803a / AMST 831a / MUSI 833a, Musical Afrofuturisms

Michael Veal

A survey of the Afrofuturist theme as it has been articulated in African American music of the post-World War II era, with additional references to its concurrent manifestations in film, literature, and visual arts. The introductory meetings lay historical, political, technological, and cultural foundations, before proceeding with a series of work-based (i.e., album-based case studies for the remainder of the term.

AFST 836a / HIST 836a, Histories of Postcolonial Africa: Themes, Genres, and the Phantoms of the Archive Benedito Machava

This course is both historiographic and methodological. It is meant as an introduction to the major themes that have dominated the study of postcolonial Africa in recent years, and the material circumstances in which they were produced. We pay close attention to the kinds of sources and archives that scholars have employed in their works, and how they addressed the challenges of writing contemporary histories in Africa. We center our weekly meetings around one key text and one or two supplementary readings. We engage with works on politics, violence, environment and technology, women and gender, affect, fashion, leisure, and popular culture.

AFST 837a / HIST 837a, 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.

AFST 885b / CPLT 735b / FREN 885b, Modern French Poetry in the Maghreb

Thomas Connolly

A survey of twentieth- and twenty-first-century poetry written in French by authors from North Africa, including works by Amrouche, Sénac, Khaïr-Eddine, Laâbi, Nissaboury, Djaout, Jabès, Farès, Ben Jelloun, Meddeb, Acherchour, Negrouche, Dib, and Bekri. Readings in French, discussion in English. Prerequisite: reading knowledge of French.

SWAH 610a, Beginning Kiswahili I John 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 620.

SWAH 620b, Beginning Kiswahili II John Wa’Njogu

Continuation of SWAH 610. Texts provide an introduction to the basic structure of Kiswahili and to the culture of the speakers of the language. Prerequisite: SWAH 610.

SWAH 630a, 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 620.

SWAH 640b, Intermediate Kiswahili II Veronica Waweru

Continuation of SWAH 630.

SWAH 650a, Advanced Kiswahili I John 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 640.

SWAH 660b, Advanced Kiswahili II John Wa’Njogu

Continuation of SWAH 650.

SWAH 670a, Topics in Kiswahili Literature John 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.

YORU 610a, 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 620.

YORU 620b, 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 610.

YORU 630a, 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 620.

YORU 640b, 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 630.

YORU 650a, 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 (*ewé*); and music. Prerequisite: YORU 640.

YORU 660b, 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 650.

YORU 670a, 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.

ZULU 610a, Beginning isiZulu I Staff

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 620.

ZULU 620b, Beginning isiZulu II Staff

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 610.

ZULU 630a, Intermediate isiZulu I Staff

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 620.

ZULU 640b, Intermediate isiZulu II Staff

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 630.

ZULU 650a, Advanced isiZulu I Staff

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 640.

ZULU 660b, Advanced isiZulu II Staff

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 650.

American Studies

Arnold Hall, 304 Elm Street, 203.432.1186
<http://americanstudies.yale.edu>
 M.A., M.Phil., Ph.D.

Chair

Michael Denning (A25 Arnold Hall, 203.432.1186)

Director of Graduate Studies

Lisa Lowe (A25 Arnold Hall, 203.432.1186)

Professors Jean-Christophe Agnew (*Emeritus*), Ned Blackhawk, David Blight, Daphne Brooks, Hazel Carby (*Emerita*), Edward Cooke, Jr., Michael Denning, Wai Chee Dimock, Kathryn Dudley, John Mack Faragher (*Emeritus*), Roderick Ferguson, Beverly Gage, Glenda Gilmore (*Emerita*), Inderpal Grewal (*Emerita*), Matthew Jacobson, Kathryn Lofton, Lisa Lowe, Mary Lui, Joanne Meyerowitz, Charles Musser, Tavia Nyong'o, Stephen Pitti, Sally Promey, Ana Ramos-Zayas, Marc Robinson, Paul Sabin, Alicia Schmidt Camacho, Caleb Smith, Robert Stepto (*Emeritus*), Harry Stout, Michael Veal, John Harley Warner, Michael Warner, Laura Wexler

Associate Professors Rene Almeling, Laura Barraclough, Crystal Feimster, Zareena Grewal, Daniel HoSang, Albert Laguna, Greta LaFleur, Joanna Radin, Elihu Rubin, Tisa Wenger

Senior Lecturer James Berger

FIELDS OF STUDY

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

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 600, 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 902). 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. For further details, see African American Studies.

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. 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. For further details, see Film and Media Studies.

PUBLIC HUMANITIES CERTIFICATE

The Certificate in Public Humanities is granted upon the completion of all requirements. For more details on these requirements, as well as information on courses, projects, and teaching opportunities, see Public Humanities under Non-Degree Granting Programs, Councils, and Research Institutes.

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.

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 website, <http://americanstudies.yale.edu>.

COURSES

AMST 600a, American Scholars Greta LaFleur

"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.

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

A continuing yearlong collective research project, a cultural studies "laboratory." The group, drawing on several disciplines, meets regularly to discuss common readings, develop collective and individual research projects, and 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.

AMST 626a / FILM 644a / WGSS 678a, *Visuality, Embodiment, Performance: Seeing with Companions* Laura Wexler

This co-taught interuniversity seminar offers in-depth engagements with recent works by leading feminist theorists and artists committed to anti-racist, anti-imperialist, activist ways of seeing, knowing, thinking, and doing. Forging a participatory, collaborative, critical practice of “seeing with companions,” it responds to provocations posed by the course materials to go beyond critique, to reconceive feminist and queer epistemologies and pedagogies, and to imagine different ways of being in the world. Readings include recent works by Ariella Azoulay, Judith Butler, Saidiya Hartman, and Diana Taylor, as well as visual artworks, performances, and films by Regina José Galindo, Arthur Jafa, Simone Leigh, Doris Salcedo, and Kara Walker, among others. Permission of instructors required.

AMST 629b / WGSS 612b, *Racial and Economic Justice in Transgender Health* Staff

What kind of access and exposure do transgender people have to health care services, policing, mental health, education, and public spaces, and what kind of access *should* trans people have? How do we work to close the gap between what is available, and what should be? This course considers the diverse range of health care and other basic needs of transgender and nonbinary people in a number of different institutional settings and medical contexts – prisons to K-12 public schools, gender-affirming surgeries to fertility support – with a twinned focus on how institutions render trans people and their bodies illegible or even illegal, on the one hand, and what kind of knowledge, best practices, and interventions might be implemented to remove obstacles for trans and nonbinary people seeking the care that they need, on the other. At the heart of the course is the role of racial and economic justice – in health care, and in the world more broadly – in mitigating the health and health care disparities between transgender and non-transgender patients. Enrollment capped at twenty-five.

AMST 653b / FILM 653b, *Studies in Documentary Film* Charles Musser

This course examines key works, crucial texts, and fundamental concepts in the critical study of nonfiction cinema, exploring the participant-observer dialectic, the performative, and changing ideas of truth in documentary forms.

AMST 690a / SOCY 629a / WGSS 629a, *Politics of Reproduction* Rene Almeling

Reproduction as a process that is simultaneously biological and social, involving male and female bodies, family formation, and powerful social institutions such as medicine, law, and the marketplace. Sociological research on reproductive topics such as pregnancy, birth, abortion, contraception, infertility, reproductive technology, and aging. Core sociological concepts used to examine how the politics of reproduction are shaped by the intersecting inequalities of gender, race, class, and sexuality.

AMST 705a / HIST 582a / RLST 705a, *Readings in Religion in American Society, 1600–2018* Harry Stout and Kenneth Minkema

This seminar explores intersections of religion and society in American history from the colonial period to the present as well as methodological problems important to their study. It is designed to give graduate students a working knowledge of the field, ranging from major recent studies to bibliographical tools. In short, the seminar is a broad readings course surveying religion in American history from colonization to the present. It is not a specialized research seminar, but it does require a basic understanding of historiography.

AMST 707b / AFAM 777b / WGSS 741b, Race, Colorblindness, and the Academic Disciplines Daniel HoSang

Examines the ways that academic disciplines in the social sciences, humanities, and natural sciences have developed in relation to white supremacy and colonialism, and their imbrication in theories of racial hierarchy and conquest. Foregrounds the racial histories and colorblind defenses of race neutrality in fields as diverse as social psychology, the law, musicology, literary studies, sociology, and gender studies to reveal the contradictory role of the academy in constructing, naturalizing, and reproducing frameworks of racial domination. Considers the ways that insurgent scholars and formations have contested these traditions to discredit these traditions and deploy disciplinary methods and theorizations toward emancipatory ends. Engages work by Kimberlé Crenshaw, George Lipsitz, Toni Morrison, Roderick Ferguson, and others.

AMST 724b / PLSC 868b / WGSS 724b, Gender and Sexuality in American Politics and Policy Dara Strolovitch

This seminar familiarizes students with foundational work on and approaches to the study of gender and sexuality in American politics and public policy. It explores empirical work that addresses these topics, a range of theoretical and epistemological approaches to them, and the social scientific methods that have been used to examine them. It explores the history, findings, and controversies in research about gender and sexuality in American politics and political science, examining work within several subfields of American politics (e.g., political development; public law; political behavior; legislative studies; public policy; interest groups and social movements), important work from other disciplines, and research that does not fit neatly into traditional disciplinary categories, paying particular attention to the implications of this “messiness” for the study of gender, sexuality, and politics. We are attentive to the complicated histories of science and social science when it comes to the study of gender and sexuality and to the ways in which gender and sexuality intersect with other politically relevant categories, identities, and forms of marginalization, such as race, ethnicity, class, and ideological and partisan identification.

AMST 731b / AFAM 763b / HIST 747b, Methods and Practices in U.S. Cultural History Matthew Jacobson

This sampling of U.S. cultural history from the early national period to the present is designed to unfold on two distinct planes. The first is a rendering of U.S. culture itself—a survey, however imperfect, of the major currents, themes, and textures of U.S. culture over time, including its contested ideologies of race and gender, its organization of productivity and pleasure, its media and culture industries, its modes of creating and disseminating “information” and “knowledge,” its resilient subcultures, and its reigning nationalist iconographies and narratives. The second is a sampling of scholarly methods and approaches, a meta-history of “the culture concept” as it has informed historical scholarship in the past few decades. The cultural turn in historiography since the 1980s has resulted in a dramatic reordering of “legitimate” scholarly topics, and hence a markedly different scholarly landscape, including some works that seek to narrate the history of the culture in its own right (Kasson’s history of the amusement park, for instance), and others that resort to cultural forms and artifacts to answer questions regarding politics, nationalism, and power relations (Melani McAlister’s *Epic Encounters*). In addition to providing a background in U.S. culture, then, this seminar seeks to trace these developments within the discipline, to understand their basis, to

sample the means and methods of “the cultural turn,” and to assess the strengths and shortcomings of culture-based historiography as it is now constituted.

AMST 738a, Advanced Topics in Critical Human Geography Laura Barraclough

This course supports students in their exploration of more specialized literatures and debates in the field of human geography. Enrollment limited. Prerequisites: at least one graduate course in human geography, such as AMST 667 or its equivalent, and permission of the instructor.

AMST 746a / ANTH 503a, Ethnographic Writing Kathryn Dudley

This course explores the practice of ethnographic analysis, writing, and representation. Through our reading of contemporary ethnographies and theoretical work on ethnographic fieldwork in anthropological and interdisciplinary research, we explore key approaches to intersubjective encounters, including phenomenological anthropology, relational psychoanalysis, affect studies, and the new materialisms. Our inquiries coalesce around the poetics and politics of what it means to sense and sensationalize co-present subjectivities, temporalities, and ontologies in multispecies worlds and global economies. This is a core Anthropology graduate program course; others admitted only by permission of the instructor.

AMST 747b / ANTH 594b / WGSS 633b, Affect and Materiality Kathryn Dudley

Recent scholarship associated with the “affective turn” and “new materialisms” raises important questions about how we, as existents entangled in imperiled ecologies, know and collectively navigate our multispecies worlds. Refusing to accept classic oppositions between mind/body, self/other, and human/nonhuman, this work has inspired anthropologically inclined scholars to rethink the ways we analyze and write about the experiential regimes of settler colonialism, racialized capitalism, and heteronormativity. Rather than reifying divergent approaches to “affect” and “materiality” as discrete fields of knowledge, this course tracks these concepts across domains of inquiry in which they have long been urgently paramount: black, indigenous, and queer studies. Our goal is to recognize and navigate the alliances, interruptions, and aporias that emerge among fellow travelers committed to the project of feeling and producing anti-imperialist histories, geographies, and ontographies.

AMST 768b / HIST 768b, 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.

AMST 780b / HIST 734b, Class and Capitalism in the 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).

AMST 800a / HIST 733a, The United States in the Twentieth Century Beverly Gage
 An introduction to the historiography of the United States in the twentieth century. Emphasis on methodology and major interpretive problems. Readings include “classics” as well as exemplary recent works.

AMST 801a / HIST 700a, U.S. Colonial Present Lisa Lowe
 Settler colonialism, slavery, racialized immigration, and military empire have been integral to the emergence of the U.S. nation, state, and economy, and their historical consequences continue today. In this interdisciplinary seminar, we study the relevance of these historical and ongoing formations to the founding and development of the United States, giving attention to the independence of each, as well as to their differences, convergences, and contestations. We consider the strengths and limits of given analytic frames for understanding our current historical crises of public health, economic austerity, and racial state violence. Despite the differentiated histories of settler colonialism, slavery, and empire, contemporary struggles and solidarities can identify links and convergences that colonial logics may disallow. The seminar includes readings in history, anthropology, political theory, and literature, as well as films and other media. Enrollment limited. Permission of the instructor required.

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.

AMST 804a, Religion and U.S. Empire Tisa Wenger and Zareena Grewal
 This course interrogates the multiple intersections between religion and U.S. empire. It asks not only how Christianity and other religious traditions have facilitated and enabled empire, and how they have served as resources for resistance, but also how the categories of “religion” and the “secular” were assembled as imperial products alongside modern formations of race, class, gender, and sexuality. Students learn to see religion and the secular as historical formations alongside race, class, gender, and sexuality, and to critically interrogate their intersections with empire. In an online forum, seminar discussions, and two papers, students develop the analytical and writing skills that are the building blocks of all scholarship in the humanities.

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.

AMST 816a / HSAR 834 / RLST 859, Pilgrimage and Religious Tourism
 Sally Promey and Orgu Dalgic

This interdisciplinary seminar explores the subjects of pilgrimage and religious tourism. With few exceptions, case studies in class sessions focus on the United States and/or Christianities across time. Students are encouraged to select presentation topics across a broad range of religions, times, and spaces. Theoretical and methodological reading assignments reflect this larger content.

AMST 829b, Methods for Critical Spatial Analysis Laura Barraclough

Survey of methodologies for the critical analysis of space, place, landscape, and region, with the goal of understanding how power relations are produced and contested spatially. Methods include visual culture analysis; mapping (including counter-mapping, mental/cognitive mapping, and Geographic Information Systems [GIS]; architectural design and building practices; policy and planning; and ethnography, especially interviews, participant observation, and walking/mobile ethnography. Students read exemplary scholarship employing these methods and engage in applied exercises to explore the utility of those methods for their own work.

AMST 830b / AFAM 771b / HIST 729b, The American Carceral State

Elizabeth Hinton

This readings course examines the historical development of the U.S. carceral state, focusing on policing practices, crime control policies, prison conditions, and the production of scientific knowledge. Key works are considered to understand the connections between race and the development of legal and penal systems over time, as well as how scholars have explained the causes and consequences of mass incarceration in America.

AMST 831a / AFAM 803a / AFST 828a / MUSI 833a, Musical Afrofuturisms

Michael Veal

A survey of the Afrofuturist theme as it has been articulated in African American music of the post-World War II era, with additional references to its concurrent manifestations in film, literature, and visual arts. The introductory meetings lay historical, political, technological, and cultural foundations, before proceeding with a series of work-based (i.e., album-based) case studies for the remainder of the term.

AMST 832a / FILM 735a and FILM 736b, 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.

AMST 835a / HIST 731a, Research in Recent U.S. History Joanne Meyerowitz

Students conduct research in primary sources and write original essays on post-1945 U.S. history. Readings include scholarly articles that might serve as models for students' research projects.

AMST 836b / HIST 570b, American Religion in the Archives Tisa Wenger

An advanced seminar on archival research methods for historians of American religion. The class begins with readings that theorize the archive, particularly for the study of American religion. What counts as an archive? How are archives constituted and by whom? What are the limits and pitfalls of archives—and the construct of “the archive”—for research in this field? Over the course of the term, students are guided through the process of writing an archivally grounded research paper using Yale Divinity School Library Special Collections and the Beinecke Rare Book and Manuscript Library. Enrollment capped at fifteen; meets at YDS Library L104.

AMST 838a / HIST 749a / HSHM 753a, Research in Environmental History

Paul Sabin

Students conduct advanced research in primary sources and write original essays over the course of the term. Readings and library activities inform students' research projects. Interested graduate students should contact the instructor with proposed research topics.

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). 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.

AMST 866b / HIST 775b / WGSS 712b, Readings in the History of Sexuality

Joanne Meyerowitz and Regina Kunzel

Selected topics in the history of sexuality. Emphasis on key theoretical works and recent historical literature.

AMST 877a / HIST 926a / HSHM 703a, Problems in the History of Medicine and Public Health John Warner

An examination of the variety of approaches to the social, cultural, 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 vernacular and professional understandings of the body; the role of the marketplace in shaping professional identities and patient expectations; health activism and social justice; citizenship, nationalism, and imperialism; and the visual cultures of medicine.

AMST 888b / ENGL 832, Food in Literature, Culture, and Science Wai Chee Dimock

From the global histories of sugar and salt to the latest research on chicken and antibiotics, this course explores some key texts – by Gabriel García Márquez, Sinclair Lewis, Ruth Ozeki, Monique Truong, Jonathan Safran Foer, Octavia Butler, and Margaret Atwood – both as works of luminous imagination and as entry points to deeper scientific knowledge, encouraging cross-pollination among disciplines.

AMST 900a or b, Independent Research Staff**AMST 901a or b, Directed Reading** Staff**AMST 902a or b, Prospectus Workshop** Lisa Lowe

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.

AMST 903b / HIST 746b / PHUM 903b, Introduction to Public Humanities

Karin Roffman

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 website, a documents collection for use in public schools.

AMST 904a or b / PHUM 904a or b, Practicum Staff

Public Humanities students are required to complete a one-term internship with one of our partnered affiliates (to be approved by the Public Humanities DGS or assistant DGS) for practical experience in the field. Potential internships include in-house opportunities at the Beinecke Library, Sterling Memorial Library, or one of Yale's museums, or work at a regional or national institution such as a media outlet, museum, or historical society. In lieu of the internship, students may choose to complete a "micro-credential." Micro-credentials are structured as workshop series (3–5 daylong meetings over the course of a year) rather than as term courses, and include revolving offerings in topics such as oral history, collections and curation, writing for exhibits, podcast production, website design, scriptwriting from the archive, or grant writing for public intellectual work.

AMST 905a / PHUM 905a, Public Humanities Capstone Project Staff

The course work and practicum/micro-credential lead to a significant project to be approved by the DGS or assistant DGS (an exhibition, documentary, research paper, etc.) and to be presented in a public forum on its completion.

AMST 910a / AFAM 716a / HIST 764a, Working Group on Latina/o Studies I

Stephen Pitti and 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.

AMST 917a, American Studies Professionalization Workshop Greta LaFleur

This seminar is designed for advanced Ph.D. candidates who are going on the job market. Students draft and revise three full rounds of the five standard genres of job market materials: job letter, CV, dissertation abstract, teaching portfolio, and diversity statement. Students also participate in mock interviewing skills, developing a job talk, and preparing applications for postdoctoral fellowships. Graded Satisfactory/Unsatisfactory.

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, Michael Dove (*School of the Environment*), Kathryn Dudley (*American Studies*), J. Joseph Errington, Eduardo Fernandez-Duque, Marcia Inhorn (*Middle East Studies*), William Kelly (*Emeritus*), Paul Kockelman, Roderick McIntosh, Catherine Panter-Brick, Douglas Rogers, Eric Sargis, James Scott (*Political Science*), Helen Siu, Kalyanakrishnan Sivaramakrishnan, Anne Underhill, Claudia Valeggia, David Watts

Associate Professors Oswaldo Chinchilla, Aimee Cox (*African American Studies*), Erik Harms, Yukiko Koga, Louisa Lombard, William Honeychurch

Assistant Professors Lisa Messeri, Jessica Thompson, Serena Tucci

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' courses. Admission to Ph.D. candidacy requires (1) completion of two years of course work (twelve term courses for students matriculating in fall 2018 and beyond; sixteen term courses

for students who matriculated earlier); (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.

The faculty consider teaching to be an important part of the professional preparation of graduate students. Therefore, students are expected to complete four terms of teaching as part of their graduate training. Depending on course schedules and the timing of fieldwork, this teaching typically occurs during the third, fourth, or fifth years of study.

COMBINED PH.D. PROGRAMS

The Anthropology department also offers a combined Ph.D. in Anthropology and Environment in conjunction with the School of the Environment, 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.

For more information on the combined-degree program in Anthropology and Environment, see Environment.

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 Dissertation Prospectus Workshop (AFAM 895 and AFAM 896). 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; website, <http://anthropology.yale.edu>.

COURSES

ANTH 500a, The Development of the Discipline: Contemporary Themes

Lisa Messeri

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.

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.

ANTH 503a / AMST 746a, Ethnographic Writing Kathryn Dudley

This course explores the practice of ethnographic analysis, writing, and representation. Through our reading of contemporary ethnographies and theoretical work on ethnographic fieldwork in anthropological and interdisciplinary research, we explore key approaches to intersubjective encounters, including phenomenological anthropology, relational psychoanalysis, affect studies, and the new materialisms. Our inquiries coalesce around the poetics and politics of what it means to sense and sensationalize co-present subjectivities, temporalities, and ontologies in multispecies worlds and global economies. This is a core Anthropology graduate program course; others admitted only by permission of the instructor.

ANTH 515a, 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.

ANTH 528a / ARCG 528a / EGYPT 528a, Magic and Ritual in Ancient Egypt and the Near East John Darnell

Introduction to ancient Egyptian and Near East magic and rituals with an overview on the use of magic and discussion of the different rituals and festivals.

ANTH 541a / ENV 836a / HIST 965a / PLSC 779a, Agrarian Societies: Culture, Society, History, and Development Kalyanakrishnan Sivaramakrishnan, Elisabeth Wood, and Marcela Echeverri Munoz

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.

ANTH 542a, Cultures and Markets: Asia Connected through Time and Space Helen Siu

Historical and contemporary movements of people, goods, and cultural meanings that have defined Asia as a region. Reexamination of state-centered conceptualizations of Asia and of established boundaries in regional studies. The intersections of transregional institutions and local societies and their effects on trading empires, religious traditions, colonial encounters, and cultural fusion. Finance flows that connect East Asia and the Indian Ocean to the Middle East and Africa. The cultures of capital and market in the neoliberal and postsocialist world.

ANTH 555b, China-Africa Encounters Helen Siu

The seminar focuses on layered structures that linked China and Africa in a broad 'Asian' context. It cuts through policy polemics to provide historically informed and ethnographically nuanced perspectives. The density and diversity of Chinese activities in Africa have grown dramatically in the past decade, colored by volatile markets and the global reach of China for oil and for agricultural and mineral commodities. Themes to explore include diasporic experiences (informal economies, cultural strategies, ethnic and religious tensions in migrant communities); land, finance, infrastructure, and daily lives (the intertwined worlds of state planners, global investors, and local communities); and the meaning of aid and development (comparisons between postcolonial, neoliberal and late-socialist models and long-term societal impact).

ANTH 559a / ARCG 559a, Introduction to Experimental Archaeology

Roderick McIntosh and Ellery Frahm

Experimental archaeology is one of the most important tools to develop and test models that link human behaviors and natural forces to the archaeological record. This class explores the elements of good experimental design and procedures.

ANTH 562b, Unity and Diversity in Chinese Culture Helen Siu

An exploration of the Chinese identity as it has been reworked over the centuries. Major works in Chinese anthropology and their intellectual connections with general anthropology and historical studies. Topics include kinship and marriage, marketing systems, rituals and popular religion, ethnicity and state making, and the cultural nexus of power.

ANTH 568b, Language, Culture, and Identity J. Joseph Errington

Introduction to the role of language in the constitution of gendered, class, ethnic, and national identities. Ethnographic and linguistic case studies are combined with theoretical and comparative approaches. Enrollment limited to forty.

ANTH 581a, 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 Environment/Anthropology doctoral program. Three hours lecture/seminar. Enrollment limited to thirty.

ANTH 588b, Politics of Culture in Southeast Asia Erik Harms

The course analyzes how Southeast Asian nations promote national culture as part of political and economic agendas. It also explores Southeast Asian cultural and political diversity to rescue the possibility for cultural difference within a global world.

ANTH 594b / AMST 747b / WGSS 633b, Affect and Materiality Kathryn Dudley

Recent scholarship associated with the “affective turn” and “new materialisms” raises important questions about how we, as existents entangled in imperiled ecologies, know and collectively navigate our multispecies worlds. Refusing to accept classic oppositions between mind/body, self/other, and human/nonhuman, this work has inspired anthropologically inclined scholars to rethink the ways we analyze and write about the experiential regimes of settler colonialism, racialized capitalism, and heteronormativity. Rather than reifying divergent approaches to “affect” and “materiality” as discrete fields of knowledge, this course tracks these concepts across domains of inquiry in which they have long been urgently paramount: black, indigenous, and queer studies. Our goal is to recognize and navigate the alliances, interruptions, and aporias that emerge among fellow travelers committed to the project of feeling and producing anti-imperialist histories, geographies, and ontographies.

ANTH 615b / HSHM 755, Anthropological Perspectives on Science and Technology

Lisa Messeri

The course focuses on ethnographic work on scientific and technical topics, ranging from laboratory studies to everyday technologies. Selected texts include canonical books as well as newer work from early scholars and the most recent work of established scholars. Divided into four units, this seminar explores the theme of “boundaries,” a perennial topic in anthropology of science that deals with the possibility and limits of demarcation. Each week, different kinds of boundaries are examined, and students learn to see their social constructedness as well as the power they carry. We begin by exploring where science is and isn’t, followed by the boundary between ourselves and technology, which is a specific example of the third boundary we examine: the one

artificially drawn between nature and culture. We end with readings on geopolitics and the technologies of delineating nation from nation as well as thinking about postnational scientific states. Class discussion guides each session. One or two students each week are responsible for precirculating a book review on the week's reading, and a third student begins class by reacting to both the texts and the review. The final assignment is a research paper or a review essay.

ANTH 632b, Politics of Language J. Joseph Errington

The course centers on aspects of language difference and inequality as often neglected but crucial shapers of the political dynamics and social change in plural societies. The first part of the course involves broad comparative and theoretical approaches to the politics of sociolinguistic difference. The second part is devoted to case studies that foreground specific issues: "problems" of substandard languages, bilingual identities, globalization and language shift, language death, and others.

ANTH 636b / ARCG 636b / EPS 636b, Geoarchaeology: Earth and Environmental Sciences in Archaeological Investigations Ellery Frahm

A survey of the numerous ways in which theories, approaches, techniques, and data from the earth and environmental sciences are used to address archaeological research questions. A range of interfaces between archaeology and the geological sciences are considered. Topics include stratigraphy, geomorphology, site formation processes, climate reconstruction, site location, and dating techniques.

ANTH 651a / WGSS 651a, 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.

ANTH 700b, The Development of the Discipline: Contemporary Themes

Kalyanakrishnan Sivaramakrishnan

Second term of yearlong core course on 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. Reserved for first-year doctoral students in Anthropology. Prerequisite: ANTH 500.

ANTH 756a / ARCG 756a, The Archaeology of Trade and Exchange Richard Burger

This seminar focuses on archaeological approaches to exchange and trade. As background, we review some of the principal theories of exchange from anthropology and sociology, such as those of Mauss, Malinowski, and Polanyi. The role of trade and exchange in different kinds of societies is examined by contextualizing these transactions within specific cultural configurations and considering the nature of production and consumption as they relate to movement of goods. We consider methods and models that have been used to analyze regions of interaction at different spatial scales and the theoretical arguments about the social impact of inter-regional and intra-regional interactions involving the transfer of goods, including approaches such as world systems, unequal development, and globalization. In addition, we examine the ways that have been utilized in archaeology to identify different kinds

of exchange systems, often through analogies to well-documented ethnographic and historic cases. Finally, we consider the range of techniques that have been employed in order to track the movement of goods across space. These sourcing techniques are evaluated in terms of their advantages and disadvantages from an archaeological perspective, and in terms of how the best technical analyses may vary according to the nature of natural or cultural materials under consideration (ceramics, volcanic stone, metals, etc.). The theme for this year's seminar is obsidian; students select some aspect of obsidian research for their final paper and presentation.

ANTH 771b / ARCG 771b, Early Complex Societies Richard Burger and 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.

ANTH 772a / ARCG 772a, Cities in Antiquity: The Archaeology of Urbanism

Anne Underhill and Oswaldo Chinchilla Mazariegos

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.

ANTH 773a / ARCG 773a / NELC 588a, Climate Change, Societal Collapse, and Resilience 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.

ANTH 779b / ARCG 779b, 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.

ANTH 812a, Current Topics in Anthropological Genetics

This course is a series of seminars on cutting-edge topics in the field of anthropological genetics. Topics include the use of modern and ancient DNA as powerful tools for studying human evolution, population history, and adaptation. The course also explores ethical and social implications of human genetic research and direct-to-consumer genetic testing. Students actively work through these topics, using readings, presentations, and class discussions. Students learn how genetic data can help us unlock our evolutionary past, how to interpret and communicate human genetic variation, and how to assess issues and challenges of conducting anthropological genetic research.

ANTH 824a, Politics of Memory

This course explores the role of memory as a social, cultural, and political force in contemporary society. How societies remember difficult pasts has become a contested site for negotiating the present. Through the lens of memory, we examine complex

roles that our relationships to difficult pasts play in navigating issues we face today. The course explores the politics of memory that takes place in the realm of popular culture and public space. It asks such questions as: How do you represent difficult and contested pasts? What does it mean to enable long-silenced victims' voices to be heard? What are the consequences of re-narrating the past by highlighting past injuries and trauma? Does memory work heal or open wounds of a society and a nation? Through examples drawn from the Holocaust, the atomic bombing in Hiroshima, the Vietnam War, genocide in Indonesia, and massacres in Lebanon, to debates on confederacy statues, slavery, and lynching in the United States, the course approaches these questions through an anthropological exploration of concepts such as memory, trauma, mourning, silence, voice, testimony, and victimhood.

ANTH 835b / E&EB 842, 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.

ANTH 857a / EPS 857a, Topics and Issues in Evolutionary Theory Eric Sargis and Jacques Gauthier

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.

ANTH 864a or b / ARCG 864, 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.

ANTH 880a, Evolutionary Biology of Infant Care Claudia Valeggia and

Eduardo Fernandez-Duque

Few aspects of the behavior of human and nonhuman primates are so intriguing, yet so poorly understood, as the prevalence of intense alloparental care in some primate species and human societies. Early hominoids probably evolved a social organization that, among other things, changed from involving loose male-female relationships to close dyadic partnerships requiring provisioning of offspring by other individuals besides the mother. Therefore, the development of extensive alloparental care and provisioning is considered a fundamental adaptation in the evolution of human life history patterns and in the differentiation of humans from other primates.

ANTH 950a or b, Directed Research: Preparation for Qualifying Exam Staff

By arrangement with faculty.

ANTH 951a or b, Directed Research in Ethnology and Social Anthropology Staff

By arrangement with faculty.

ANTH 952a or b, Directed Research in Linguistics Staff

By arrangement with faculty.

ANTH 953a or b, Directed Research in Archaeology and Prehistory Staff

By arrangement with faculty.

ANTH 954a or b, Directed Research in Biological Anthropology Staff

By arrangement with faculty.

ANTH 963a and ANTH 964b / HIST 963a and HIST 964b / HSAR 841a and HSAR 842b / HSHM 691a and HSHM 692b, Topics in the Environmental Humanities Paul Sabin and Tomo Sugimoto

This is the required workshop for the Graduate Certificate in Environmental Humanities. The workshop meets six times per term to explore concepts, methods, and pedagogy in the environmental humanities, and to share student and faculty research. Each student pursuing the Graduate Certificate in Environmental Humanities must complete both a fall term and a spring term of the workshop, but the two terms of student participation need not be consecutive. The fall term each year emphasizes key concepts and major intellectual currents. The spring term each year emphasizes pedagogy, methods, and public practice. Specific topics vary each year. Students who have previously enrolled in the course may audit the course in a subsequent year. Open only to students pursuing the Graduate Certificate in Environmental Humanities.

½ Course cr per term

ANTH 965a or b, Directed Research in Physical Anthropology Staff

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

Vladimir Rokhlin

Professors Andrew Barron (*Statistics & Data Science*), Joseph Chang (*Statistics & Data Science*), Ronald Coifman (*Mathematics; Computer Science*), Stanley Eisenstat (*Computer Science*), John Emerson (*Adjunct; Statistics & Data Science*), Thierry Emonet (*Molecular, Cellular, & Developmental Biology; Physics*), Michael Fischer (*Computer Science*), Jonathon Howard (*Molecular Biophysics & Biochemistry*), Peter Jones (*Mathematics*), Yuval Kluger (*Pathology*), Nicholas Read (*Physics; Applied Physics; Mathematics*), Vladimir Rokhlin (*Computer Science; Mathematics*), Wilhelm Schlag (*Mathematics*), Martin Schultz (*Emeritus, Computer Science*), Mitchell Smooke (*Mechanical Engineering & Materials Science; Applied Physics*), Daniel Spielman (*Computer Science; Mathematics*), Van Vu (*Mathematics*), Günter Wagner (*Ecology & Evolutionary Biology*), John Wettlaufer (*Earth & Planetary Sciences; Mathematics; Physics*), Huibin Zhou (*Statistics & Data Science*), Steven Zucker (*Computer Science; Biomedical Engineering*)

Associate Professors Josephine Hoh (*Public Health*), Sekhar Tatikonda (*Statistics & Data Science*)

Assistant Professors Smita Krishnaswamy (*Genetics; Computer Science*), Roy Lederman (*Statistics & Data Science*)

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 991, 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. Students who require additional support from the Graduate School will be required to teach additional terms, if needed, after they have fulfilled the academic teaching requirement.

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. An adviser is usually contacted not long after the student passes the qualifying examinations; students are encouraged to find an adviser sooner rather than later. A student is admitted to candidacy after completing requirements (1)–(5) and finding an adviser.

In addition to the above, all first-year 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.

M.D./PH.D. STUDENTS

With permission of the DGS, M.D./Ph.D. students may request a reduction in the program's academic teaching requirement to one term of teaching. Only students who teach are eligible to receive a University stipend contingent on teaching.

MASTER'S DEGREES

M.Phil. The minimum requirements for this degree are that a student shall have completed all requirements for the Applied Math Ph.D. program as described above except the required teaching, the prospectus, and the dissertation. Students will not generally have satisfied the requirements for the M.Phil. 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 after less than one year of residence in the Yale Graduate School of Arts and Sciences. See also Degree Requirements under Policies and Regulations.

M.S. (en route to the Ph.D.) Applications for a terminal master's degree are not accepted. Students who withdraw from the Ph.D. program may be eligible for the M.S. degree if they have completed ten graduate-level term courses, maintained a High Pass average, and met the Graduate School's Honors requirement for the Ph.D. program. Students who are eligible for or who have already received the M.Phil. will not be awarded the M.S.

More information is available on the program's website, <http://applied.math.yale.edu>.

COURSES

AMTH 525a or b, Seminar in Applied Mathematics Staff

This course consists of weekly seminar talks given by a wide range of speakers. Required of all first-year students.

AMTH 553a / CB&B 555a / CPSC 553a / GENE 555a, Unsupervised Learning for Big Data Smita Krishnaswamy

This course focuses on machine-learning methods well-suited to tackling problems associated with analyzing high-dimensional, high-throughput noisy data including: manifold learning, graph signal processing, nonlinear dimensionality reduction, clustering, and information theory. Though the class goes over some biomedical applications, such methods can be applied in any field. Prerequisites: knowledge of linear algebra and Python programming.

AMTH 640b / CPSC 640b, Topics in Numerical Computation Vladimir Rokhlin

This course discusses several areas of numerical computing that often cause difficulties to non-numericists, from the ever-present issue of condition numbers and ill-posedness to the algorithms of numerical linear algebra to the reliability of numerical software. The course also provides a brief introduction to “fast” algorithms and their interactions with modern hardware environments. The course is addressed to Computer Science graduate students who do not necessarily specialize in numerical computation; it assumes the understanding of calculus and linear algebra and familiarity with (or willingness to learn either C or FORTRAN). Its purpose is to prepare students for using elementary numerical techniques when and if the need arises.

AMTH 666a / ASTR 666a / EPS 666a / MATH 666a, Classical Statistical Thermodynamics John Wettlaufer

Classical thermodynamics is derived from statistical thermodynamics. Using the multi-particle 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 710a / MATH 710a, Harmonic Analysis on Graphs and Applications Ronald Coifman

This class covers basic methods of classical harmonic analysis that can be carried over to graphs and data analysis. We cover the fundamentals of nonlinear Fourier analysis, including functional approximations in high dimensions. We intend to cover foundational material useful for data organization and geometries.

AMTH 999a, Directed Reading Vladimir Rokhlin

Applied Physics

Becton Center, 203.432.2210

<http://appliedphysics.yale.edu>

M.S., M.Phil., Ph.D.

Chair

Charles Ahn

Director of Graduate Studies

Vidvuds Ozolins (305 BCT and ESI, West Campus, vidvuds.ozolins@yale.edu)

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

Associate Professors Michael Choma (*Biomedical Engineering*), Liang Jiang, Peter Rakich

Assistant Professors Yu He, Owen Miller

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.

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 a course of study in consultation with faculty advisers (the student's advisory committee). There are a minimum of five core courses, two electives, and two Special Investigations (APHY 990), for a total of nine graded term courses. Core courses will be chosen from four groups: two from the QM group, and one from each of the other groups. Quantum Mechanics I (PHYS 508), Quantum Mechanics II (PHYS 608), and Electromagnetic Theory I (PHYS 502) will be default courses from

their groups, with place-up option to others in the QM and E&M groups based on passing the Physics department exam. There will be no placing out of the required seven courses, except for incoming students with master's or equivalent degrees, who are allowed to place out of three core courses.

The core groups are as follows:

Group 1 (QM, two courses required): Quantum Mechanics I (PHYS 508)^{*}; Quantum Mechanics II (PHYS 608)^{*}; Quantum Information and Computation (APHY 601); Quantum Optics (APHY 691).

Group 2 (E&M, one course required): Electromagnetic Theory I (PHYS 502)^{*}; Principles of Optics with Applications (APHY 675); Techniques of Microwave Measurement and RF Design (APHY 816).

Group 3 (CM Physics, one course required): Solid State Physics I (APHY 548); Solid State Physics II (APHY 549); Statistical Physics I (PHYS 512); Introduction to Light-Matter Interactions (APHY 676).

Group 4 (one course required): Mathematical Methods of Physics (PHYS 506); Solid State Physics II (APHY 549); Principles of Optics with Applications (APHY 675); Noise, Dissipation, Amplification, and Information (APHY 677).

^{*} PHYS 508, PHYS 608, and PHYS 502 are default courses requiring place-up exam in order to choose other courses from these groups.

Any of the courses from these groups not taken to meet core requirements may be taken as electives. Students who place up from a required course and prefer not to take any of the other courses in that group to satisfy the core requirement may petition the director of graduate studies (DGS) to substitute a different elective. Electives may be widely chosen, but will typically come from the following: Mesoscopic Physics I (APHY 634); Introduction to Superconductivity (APHY 633); Quantum Many-Body Theory (APHY 610); Nonlinear Optics and Lasers (APHY 679); Biological Physics (PHYS 523). Students may also petition the DGS to substitute an elective not on the standard list. The required seven courses are just the minimum, and students are strongly encouraged to take additional courses that are centrally related to their Ph.D. research. The DGS will work with students and their advisers to ensure that students are prepared for success in their field of research.

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 nine-course requirement.

Each term, the faculty review the overall performance of the student and report their findings to the 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 who require additional support from the Graduate School must teach for up to an additional two terms, if needed, but will 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 third term of full-time study. An extension of one term may be granted on a case-by-case basis at the discretion of the DGS, in consultation with the student's committee.

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; website, <http://appliedphysics.yale.edu>.

COURSES

APHY 506a, Basic Quantum Mechanics Peter Rakich

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.

APHY 548a, Solid State Physics I Staff

A two-term sequence (with APHY 549) 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.

APHY 549b, Solid State Physics II Vidvuds Ozolins

A two-term sequence (with APHY 548) 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.

APHY 590a / PHYS 590a, Responsible Conduct in Research for Physical Scientists

Karsten Heeger and Rona Ramos

Required seminar for all first-year students.

APHY 607b, Modern Topics in Optics and Quantum Electronics Peter Rakich

This course provides a survey of modern topics involving integrated photonics, optomechanics, nonlinear optics, and laser physics for students interested in contemporary experimental optics research. Subjects include nonlinear wave phenomena, optomechanical interactions, phonon physics, light scattering, light emission and detection, cavities, systems of cavities, traveling-wave devices and interactions, perturbation theory, reciprocal and nonreciprocal systems, parametric interactions, laser oscillators and related technologies. Students are encouraged to explore these and related research topics through independent study and classroom presentations.

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.

APHY 628a / PHYS 628a, Statistical Physics II Benjamin Machta

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.

APHY 650a / PHYS 650, Theory of Solids I Sohrab Ismail-Beigi**APHY 660a, Quantum Information & Computation** Staff**APHY 677a / PHYS 677, 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.

APHY 679a, Nonlinear Optics and Lasers Owen Miller

Properties and origins of the nonlinear susceptibility; Sum-freq, diff-freq and 2nd-harmonic generation; Intensity-dependent refractive index; Optical phase conjugation; Self-focusing, self-phase modulation, solitons; Stimulated light scattering; Fixed points, bifurcations; Amplification; Rate equations; Relaxation oscillations, frequency pulling; Hole burning; Q-switching; Semiconductor and DFB lasers; Mode-locking; Injection-locking; Intense-field NLO and QM laser theory (time permitting)

APHY 725b / ENAS 725, 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.

APHY 816a / PHYS 816a, Techniques of Microwave Measurement and RF Design Robert Schoellkopf

An advanced course covering the concepts and techniques of radio-frequency design and their application in making microwave measurements. The course begins with a review of lumped element and transmission line circuits, network analysis, and design of passive elements, including filters and impedance transformers. We continue with a treatment of passive and active components such as couplers, circulators, amplifiers, and modulators. Finally, we employ this understanding for the design of microwave measurement systems and techniques for modulation and signal recovery, to analyze the performance of heterodyne/homodyne receivers and radiometers.

APHY 990a or b, Special Investigations Staff

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.

Archaeological Studies

10 Sachem Street, 203.432.3670
<http://archaeology.yale.edu>
 M.A.

Chair and Director of Graduate Studies

Richard Burger (*Anthropology*)

Professors Richard Burger (*Anthropology*), Edward Cooke, Jr. (*History of Art; American Studies*), John Darnell (*Near Eastern Languages & Civilizations*), Stephen Davis (*Religious Studies; History*), Eckart Frahm (*Near Eastern Languages & Civilizations*), Milette Gaifman (*History of Art; Classics*), Diana Kleiner (*Classics; History of Art*), J.G. Manning (*Classics; History*), Roderick McIntosh (*Anthropology*), Eric Sargis (*Anthropology; Ecology & Evolutionary Biology*), Ronald Smith (*Earth & Planetary Sciences; School of the Environment*), Anne Underhill (*Anthropology*), David Watts (*Anthropology*), Harvey Weiss (*Near Eastern Languages & Civilizations; School of the Environment*)

Associate Professors Oswaldo Chinchilla (*Anthropology*), William Honeychurch (*Anthropology*), Andrew Johnston (*Classics; History*)

Lecturers, Research Associates, and Research Scientists Ellery Frahm (*Anthropology*), Lucy Salazar (*Anthropology*), Catherine Skinner (*Earth & Planetary Sciences*)

The aim of the program is 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 enables 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, Earth & Planetary Sciences, History, History of Art, Near Eastern Languages & Civilizations, and Religious Studies.

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 archaeological 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) Earth & Planetary Sciences, Ecology & Evolutionary Biology, or Environment; 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 website, <http://archaeology.yale.edu>. 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, samantha.ware@yale.edu.

COURSES

ARCG 528a / ANTH 528a / EGYPT 528a, Magic and Ritual in Ancient Egypt and the Near East John Darnell

Introduction to ancient Egyptian and Near East magic and rituals with an overview on the use of magic and discussion of the different rituals and festivals.

ARCG 559a / ANTH 559a, Introduction to Experimental Archaeology

Roderick McIntosh and Ellery Frahm

Experimental archaeology is one of the most important tools to develop and test models that link human behaviors and natural forces to the archaeological record. This class explores the elements of good experimental design and procedures.

ARCG 636b / ANTH 636b / EPS 636b, Geoarchaeology: Earth and Environmental Sciences in Archaeological Investigations Ellery Frahm

A survey of the numerous ways in which theories, approaches, techniques, and data from the earth and environmental sciences are used to address archaeological research questions. A range of interfaces between archaeology and the geological sciences are considered. Topics include stratigraphy, geomorphology, site formation processes, climate reconstruction, site location, and dating techniques.

ARCG 702a / ANTH 702, Archaeological Approaches to Art and Iconography

Oswaldo Chinchilla Mazariegos

An examination of archaeological approaches to the study of artistic representations in archaeology, focusing on the analysis of style and iconographic interpretations. Case studies are drawn from Precolumbian art, particularly Moche art of Peru and Maya art of Mesoamerica.

ARCG 716La / ANTH 716L, Introduction to Archaeological Laboratory Sciences

Ellery Frahm and Roderick McIntosh

Introduction to techniques of archaeological laboratory analysis, with quantitative data styles and statistics appropriate to each. Topics include dating of artifacts, sourcing of ancient materials, remote sensing, and microscopic and biochemical analysis. Specific techniques covered vary from year to year.

ARCG 743a / ANTH 743, 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.

ARCG 755b / ANTH 755, Inca Culture and Society Richard Burger

The history and organization of the Inca empire and its impact on the nations and cultures conquered by it. The role of archaeology in understanding the transformation of Andean lifeways is explored, as is the interplay between ethnohistoric and archaeological approaches to the subject.

ARCG 756a / ANTH 756a, The Archaeology of Trade and Exchange Richard Burger

This seminar focuses on archaeological approaches to exchange and trade. As background, we review some of the principal theories of exchange from anthropology and sociology, such as those of Mauss, Malinowski, and Polanyi. The role of trade and exchange in different kinds of societies is examined by contextualizing these transactions within specific cultural configurations and considering the nature of production and consumption as they relate to movement of goods. We consider methods and models that have been used to analyze regions of interaction at different spatial scales and the theoretical arguments about the social impact of inter-regional and intra-regional interactions involving the transfer of goods, including approaches such as world systems, unequal development, and globalization. In addition, we examine the ways that have been utilized in archaeology to identify different kinds of exchange systems, often through analogies to well-documented ethnographic and historic cases. Finally, we consider the range of techniques that have been employed in order to track the movement of goods across space. These sourcing techniques are evaluated in terms of their advantages and disadvantages from an archaeological perspective, and in terms of how the best technical analyses may vary according to the nature of natural or cultural materials under consideration (ceramics, volcanic stone, metals, etc.). The theme for this year's seminar is obsidian; students select some aspect of obsidian research for their final paper and presentation.

ARCG 759a / ANTH 759, Social Complexity in Ancient China Anne Underhill

This seminar explores the variety of archaeological methods and theoretical approaches that have been employed to investigate the development and nature of social complexity in ancient China. The session meetings focus on the later prehistoric and early historic periods, and several geographic regions are included. They also consider how developments in ancient China compare to other areas of the world. Most of the readings emphasize archaeological remains, although relevant information from early historical texts is considered.

ARCG 771b / ANTH 771b, Early Complex Societies Richard Burger and 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.

ARCG 772a / ANTH 772a, Cities in Antiquity: The Archaeology of Urbanism Anne Underhill and Oswaldo Chinchilla Mazariegos

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.

ARCG 773a / ANTH 773a / NELC 588a, Climate Change, Societal Collapse, and Resilience 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.

ARCG 779b / ANTH 779b, 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.

Architecture

Rudolph Hall, 203.432.2288

<https://www.architecture.yale.edu/academics/programs/4-p-h-d>

M.Phil., Ph.D.

Dean

Deborah Berke

Director of Doctoral Studies

Joan Ockman (324 Rudolph, 203.432.6874, joan.ockman@yale.edu)

Professors Pier Vittorio Aureli, Deborah Berke, Anna Dyson, Keller Easterling, Peter Eisenman, Kurt Forster, Esther da Costa Meyer, Joan Ockman, Alan Plattus, Robert A.M. Stern

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

Assistant Professors Anthony Acciavatti, Joyce Hsiang

Lecturers, Critics, and Adjunct Faculty Sunil Bald, Phillip Bernstein, Kent Bloomer, Turner Brooks, Marta Caldeira, Kyle Dugdale, Alexander Garvin, Steven Harris, Elisa Iturbe, John Jacobson, Dana Karwas, Bimal Mendis, Joel Sanders, M. Surry Schlabs

FIELDS OF STUDY

The doctoral program in Architecture currently offers two tracks of study: History and Theory of Architecture, and Ecosystems in Architectural Sciences. Both tracks aim to educate teachers capable of effectively instructing future architects in 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 architecture, deepening awareness of the field's current state and the critical issues it faces.

The History and Theory track provides sound training in historical study and historiography, and cultivates understanding of intellectual trends that inform the reception and role of architecture in the world at large. It prepares candidates for careers in university teaching, cultural advocacy and administration, museum curatorship, and publishing, among others. Students draw on a wide range of disciplines including, but not limited to, the history of science and technology, social and political history, media theory, as well as the fine arts, literature, and popular culture.

The Ecosystems in Architectural Sciences track provides preparation in interdisciplinary scientific inquiry, qualifying students to incorporate scientific methods into experimental design frameworks in order to research and develop novel material and informational ecosystems. Students in this track engage in research related to the behaviors of living ecosystems, emphasizing their interconnection with the built environment.

ADMISSION REQUIREMENTS

Applicants must have a master's degree or equivalent in Architecture, Engineering, Environmental Design, or, exceptionally, a related field. They should specify to

which track of the program – History and Theory of Architecture, or Ecosystems in Architectural Sciences – they seek admission. Two years of professional work in an architecture office are recommended. 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), which 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 another institution.

In addition to meeting the 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 their chosen 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 to be submitted digitally as a single pdf document optimized not to exceed 20mb and will need to be uploaded as part of 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 all incoming Ph.D. students.

- Summer Digital Media Orientation Course. This half-day orientation covers how to access 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 both parts of 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 three academic years. (See Degree Requirements under Policies and Regulations.) Students in both tracks of the program take twelve graduate and Ph.D. seminars for credit. In the History and Theory track, these include 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 specific topic. Others offer a survey of historiographic approaches or focus on the reading of a body of texts. The four required seminars (ARCH 551, ARCH 552, ARCH 553, ARCH 554) form the methodological foundation of the program. In the Ecosystems in Architectural Sciences track, the requirements in the initial two years include four Ecosystems in Architectural Sciences seminars, ARCH 558, ARCH 559, ARCH 568, and ARCH 569.

All 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 culture. Likewise, a student working on biodiversity in urban contexts might take courses in the School of the Environment. 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 related to 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 literature in the chosen language. Competency may be demonstrated by a grade of B or better in a full-year, intermediate-level language course, or through examination.

The student's field of interest within either the History and Theory of Architecture track or the Ecosystems in Architectural Sciences track is defined by the end of the second year, by which point all course and language requirements are normally completed. At this time the director of doctoral studies (DDS) assigns the student a thesis adviser, who may or may not be from the School of Architecture. During the fall term of the third year, students undergo three oral examinations on topics relevant to their doctoral research, in the presence of the thesis adviser. Following successful completion of the examinations, the DDS, 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 typically comes from outside the School of Architecture, with selection based on the student's area of interest.

By the end of the third year, students are required to present and defend their preliminary proposal of a dissertation topic. This prospectus should consist of a topic statement, an outline of a detailed program of research, and an annotated bibliography. Students are admitted to candidacy for the Ph.D. upon completion of all predissertation requirements, including the prospectus and oral examinations. At this point, they begin dissertation research and writing, submitting drafts of the dissertation chapters as they are completed. The dissertation committee guides and monitors the student's progress in writing the dissertation and evaluates the dissertation upon completion.

The Ph.D. program is designed to be completed in five years. However, if the dissertation has not been completed by the end of the fifth year and if, 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 to take a teaching position in the

School of Architecture or elsewhere in the University and extend 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 are expected to teach or serve as research assistants for four terms, normally in their third and fourth years. During these four terms, it is anticipated that a student in the History and Theory track will teach in two 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. Students in the Ecosystems in Architectural Sciences track are expected to serve as both teaching fellows in the School of Architecture and research assistants in the School’s Center for Ecosystems in Architecture. All assignments are carried out 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 requirement for this degree is completion of all requirements for the Ph.D., with the exception of the teaching or research assignments and the dissertation.

COURSES

For a current listing of Architecture courses, consult the School of Architecture bulletin, available online at <https://bulletin.yale.edu>, and Yale Course Search at <https://courses.yale.edu>.

Required Courses in the History and Theory of Architecture Track

ARCH 551	Ph.D. Seminar I
ARCH 552	Ph.D. Seminar II
ARCH 553	Ph.D. Seminar III
ARCH 554	Ph.D. Dissertation Preparation

Required Courses in the Ecosystems in Architectural Sciences Track

ARCH 558	Ph.D. Seminar: Ecosystems in Architecture I
ARCH 559	Ph.D. Seminar: Ecosystems in Architecture II
ARCH 568	Ph.D. Seminar: Ecosystems in Architecture III
ARCH 569	Ph.D. Seminar: Ecosystems in Architecture IV

Astronomy

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

Chair

Sarbani Basu

Director of Graduate Studies

Robert Zinn [F] (203.432.3017, robert.zinn@yale.edu)
 Héctor Arce [Sp] (203.432.3018, hector.arce@yale.edu) (hector.arce@yale.edu)

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

Associate Professors Reina Maruyama (*Physics*), Daisuke Nagai (*Physics*), Nikhil Padmanabhan (*Physics*)

Assistant Professor Laura Newburgh (*Physics*)

FIELDS OF STUDY

Fields include observational and theoretical astronomy, solar and stellar astrophysics, exoplanets, the interstellar medium and star formation, galactic astronomy, extragalactic astronomy, radio astronomy, high-energy astrophysics, and cosmology.

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 research 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 and ASTR 711) every term, unless registered in absentia. 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, ASTR 711, 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 partly 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. Students who require additional support from the Graduate School must teach additional terms, if needed, after they have fulfilled the academic teaching requirement.

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 or better.

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 examination, which is based on the student's chosen field of research, 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 and ASTR 711), 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 500b, The Physics of Astrophysics Gregory Laughlin

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.

ASTR 520a / EPS 538, 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 550a, 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 560b, Interstellar Matter and Star Formation Hector 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, The Evolving Universe Pieter van Dokkum

Overview of cosmic history from the formation of the first star to the present day, focusing on direct observations of the high-redshift universe.

ASTR 580a or b, Research Robert Zinn

By arrangement with faculty.

ASTR 610a, The Theory of Galaxy Formation Frank van den Bosch

This astronomy course focuses on the physical processes associated with galaxy formation. Topics include Newtonian perturbation theory, the spherical collapse model, formation and structure of dark matter haloes (including Press-Schechter theory), the virial theorem, gravitational interactions, cooling processes, theory of star formation, feedback processes, and numerical simulations. The course also includes a detailed treatment of statistical tools used to describe the large-scale distribution of galaxies and introduces the student to the concepts of galaxy bias and halo occupation

modeling. During the final lectures we discuss a number of outstanding issues in galaxy formation.

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.

ASTR 666a / AMTH 666a / EPS 666a / MATH 666a, Classical Statistical

Thermodynamics John Wettlaufer

Classical thermodynamics is derived from statistical thermodynamics. Using the multi-particle 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 ASTR 711b, Professional Seminar Gregory Laughlin

A weekly seminar covering science and professional issues in astronomy.

Biomedical Engineering

17 Hillhouse Avenue, 203.432.4220
M.S., M.Phil., Ph.D.

Chair

Jay Humphrey

Director of Graduate Studies

Richard Carson (richard.carson@yale.edu)

Professors Helene Benveniste,* Joerg Bewersdorf,* Richard Carson,† Nicholas Christakis,* Todd Constable,* Robin de Graaf,* James Duncan,† Jay Humphrey, Fahmeed Hyder,† Francis Lee,* Andre Levchenko, Graeme Mason,* Evan Morris,* Laura Niklason,* Xenophon Papademetris,* Douglas Rothman,† W. Mark Saltzman, Martin Schwartz,* Fred Sigworth,* Albert Sinusas,* Brian Smith,* Lawrence Staib,† Hemant Tagare,* Paul Van Tassel,* Steven Zucker†

Associate Professors Stuart Campbell, Tarek Fahmy, Rong Fan, Gigi Galiana,* Anjelica Gonzalez, Michelle Hampson,* Henry Hsia,* Farren Issacs,* Themis Kyriakides,† Chi Liu,* Kathryn Miller-Jensen, Michael Murrell, Dana Peters,* Jiangbing Zhou*

Assistant Professors Nicha Dvornek,* Ansel Hillmer,* Michael Mak, Dustin Scheinost,* Gregory Tietjen*

* A secondary appointment with primary affiliation in another department or school.

† A joint appointment with another department.

FIELDS OF STUDY

Biological and medical devices, biological signals and sensors, biomaterials, biophotonics, cellular biomechanics, computational biomechanics, computational medicine, computer vision, digital image analysis and processing, drug delivery, energy metabolism, experimental biomechanics, gene delivery, gene therapy, image analysis, Magnetic Resonance Imaging (MRI), Magnetic Resonance Spectroscopy (MRS), modeling in mechanobiology, molecular biomechanics, nanomedicine, network analysis, neuroreceptors, physics of image formation (MRI, optics, ultrasound, nuclear medicine, and X-ray), physiology and human factors engineering, Positron Emission Tomography (PET), regenerative medicine, signaling pathways, Single Photon Emission Computed Tomography (SPECT), systems biology, systems medicine, tissue engineering, tracer kinetic modeling, and vascular biology.

For degree requirements and courses, see Engineering & Applied Science.

Cell Biology

Sterling Hall of Medicine C207, 203.737.5603

<http://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 Joerg Bewersdorf, Christopher Burd, Michael Caplan (*Cellular & Molecular Physiology*), Lynn Cooley (*Genetics*), Peter Cresswell (*Immunobiology*), Pietro De Camilli, Jorge Galán (*Microbial Pathogenesis*), Fred Gorelick, Valentina Greco (*Genetics*), Carl Hashimoto (*Emeritus*), 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*), Karin Reinisch, James Rothman, Martin Schwartz (*Internal Medicine/Cardiology*), Derek Toomre, Felix Weiland (*Adjunct*), Sandra Wolin (*Emerita*)

Associate Professors Julien Berro (*Molecular Biophysics & Biochemistry*), Jonathan Bogan (*Internal Medicine/Endocrinology*), David Calderwood (*Pharmacology*), Daniel Colón-Ramos, Shawn Ferguson, Megan King, Chenxiang Lin, Jun Liu (*Microbial Pathogenesis*), Patrick Lusk, Malaiyalam Mariappan, Thomas Melia, Christian Schlieker (*Molecular Biophysics & Biochemistry*), Julia von Blume, Min Wu, Yongli Zhang

Assistant Professors David Baddeley (*Adjunct*), Shangqin Guo, Kallol Gupta, Xiaolei Su, Peter Takizawa, Siyuan Wang (*Genetics*), Shaul Yogeve (*Neuroscience*)

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, crystallography, and single-particle electron microscopy; bacterial, yeast, *Drosophila*, *C. elegans*, and mouse genetics; immunocytochemistry and electron microscopy and tomography; live cell and super-resolution imaging.

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, Quantitative Biology, Biophysics, and Structural Biology (BQBS) track, within the interdepartmental graduate program in Biological and Biomedical Sciences (BBS), <https://medicine.yale.edu/bbs>.

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 602 (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 603 (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, submission for publication of at least one first-author paper to a peer-reviewed journal describing the dissertation research, 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.

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 900 and CBIO 901 (Research Skills and Ethics I and II) prior to the end of their first year of study. In their fourth year of study, all students must successfully complete B&BS 503 (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 the CBIO 501/CBIO 502 sequence (Molecules to Systems), CBIO 602 (Molecular Cell Biology), 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 602 (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 900 (Research Skills and Ethics I), CBIO 901 (Research Skills and Ethics II), CBIO 911 (First Laboratory Rotation), CBIO 912 (Second Laboratory Rotation), and CBIO 913 (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 website (<http://bbs.yale.edu>), MCGD and BQBS 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 501a and CBIO 502b, Molecules to Systems Peter Takizawa

This full-year course (CBIO 501/CBIO 502) 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.

CBIO 600a and CBIO 601b, Science at the Frontiers of Medicine Fred Gorelick,

Karin Finberg, Reiko Fitzsimonds, Jonathan Bogan, and George Lister

This full-year graduate seminar (CBIO 600/CBIO 601) for first-year M.D./Ph.D. students – an elective course for M.D. students – matches the progression of topics in the eighteen-month preclinical medical school curriculum and emphasizes the connections between basic and clinical science, human physiology, and disease. It is directed by M.D./Ph.D. program faculty, and many class discussions are led by expert Yale School of Medicine faculty members who select the papers to be read. Students explore scientific topics in depth, learn about cutting-edge research, and improve their presentation skills. The curriculum provides a framework for critically reading and analyzing papers drawn broadly from the biomedical sciences; this breadth of knowledge is also leveraged in team-based exercises that promote peer-to-peer teaching and learning. Enrollment limited to students who have taken or are currently taking CBIO 501/CBIO 502.

CBIO 602a / MB&B 602a / MCDB 602a, Molecular Cell Biology Thomas Melia,

Michael Caplan, Thomas Pollard, Peter Takizawa, James Rothman, Valerie Horsley, Megan King, Patrick Lusk, Martin Schwartz, Christopher Burd, Josien van Wolfswinkel, and David Breslow

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. Prerequisites: none, but some knowledge of basic cell biology and biochemistry is assumed. Students who have not taken courses in these areas can prepare by reading relevant sections in basic molecular cell biology texts. We recommend Pollard et al., *Cell Biology* (3rd ed., 2016), Alberts et al., *Molecular Biology of the Cell* (6th ed., 2014), or Lodish et al., *Molecular Cell Biology* (8th edition, 2016).

CBIO 603a / MCDB 603a, Seminar in Molecular Cell Biology Megan King, Michael Caplan, Thomas Pollard, Peter Takizawa, James Rothman, Valerie Horsley, Thomas Melia, Patrick Lusk, Martin Schwartz, Christopher Burd, and David Breslow

A graduate-level seminar 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 602 lecture schedule. Thus, concurrent enrollment in CBIO 602 is required.

CBIO 604b, Systems Cell Biology Agnes Vignery, Fred Gorelick, John Wysolmerski, Michael Nathanson, Stefan Somlo, Peter Takizawa, Jonathan Bogan, Ann Haberman, Martina Brueckner, Shangqin Guo, Joanna Gibson, Anne Eichmann, Pallavi Gopal, and Shaul Yogev

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.

CBIO 606b, Advanced Topics in Cell Biology Shawn Ferguson, Xiaolei Su, Christopher Burd, and Julia von Blume

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.

CBIO 701b, Illuminating Cellular Function Derek Toomre and Joerg Bewersdorf
The focus of the course is on the technical treatment of light microscopy and its applications. The course provides biology and bioengineering students with the knowledge and skills necessary to design and undertake advanced light microscopy experiments. It covers conceptual elements of fluorescence microscopy imaging and analysis (without going too heavily into the theory and math); new advances in super-resolution modalities; biological applications; and hands-on practical work. Enrollment limited to fifteen.

CBIO 900a / GENE 900a / MCDB 900a, Research Skills and Ethics I
Shirin Bahmanyar

This course consists of a weekly seminar that covers ethics, writing, and research methods in cellular and molecular biology as well as student presentations ("rotation talks") of work completed in the first and second laboratory rotations.

CBIO 912a / GENE 912a / MCDB 912a, Second Laboratory Rotation
Shirin Bahmanyar

Second laboratory rotation for Molecular Cell Biology, Genetics, and Development track students.

Cellular and Molecular Physiology

Sterling Hall of Medicine B147, 203.785.4041

<http://medicine.yale.edu/physiology>

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 Nadia Ameen (*Pediatrics*), Peter Aronson (*Internal Medicine/Nephrology*), Angelique Bordey (*Neurosurgery*), Cecilia Canessa, Lloyd Cantley (*Internal Medicine/Nephrology*), Michael Caplan, Lawrence Cohen, Alan Dardik (*Surgery*), Sabrina Diano, 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 (*Internal Medicine/Digestive Diseases; 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, Susumu Tomita, Alda Tufro (*Pediatrics*), Fred Wright (*Internal Medicine/Nephrology*), Lawrence Young (*Internal Medicine/Cardiology*), David Zenisek, Z. Jimmy Zhou (*Ophthalmology & Visual Science*)

Associate Professors Nii Addy (*Psychiatry*), Sviatoslav Bagriantsev, Nigel Bamford (*Neurology*), Stuart Campbell (*Biomedical Engineering*), Jonathan Demb (*Ophthalmology & Visual Science*), Tore Eid (*Laboratory Medicine*), Elena Gracheva, Shuta Ishibe (*Internal Medicine/Nephrology*), Erdem Karatekin, Richard Kibbey (*Internal Medicine/Endocrinology*), Jesse Rinehart, Matthew Rodeheffer (*Comparative Medicine*), Carson Thoreen, Xiaoyong Yang (*Comparative Medicine*)

Assistant Professors Rui Chang, Jean-Ju Chung, Kristopher Kahle (*Neurosurgery*), Rachel Perry, Hongying Shen

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.

To enter the Ph.D. program, students apply to the Molecular Medicine, Pharmacology, and Physiology (MMPP) track within the interdepartmental graduate program in Biological and Biomedical Sciences (BBS), <https://medicine.yale.edu/bbs>.

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 550, C&MP 560, and C&MP 630. 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 503, 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 560.

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 / ENAS 550a / MCDB 550a / PHAR 550a, Physiological Systems

Stuart Campbell and W. Mark Saltzman

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.

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

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.

C&MP 629a and C&MP 630b / PATH 679a and PATH 680b / PHAR 501a and PHAR 502b, Seminar in Molecular Medicine, Pharmacology, and Physiology

Susumu Tomita and Staff

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). Required of and open only to Ph.D. and M.D./Ph.D. students in the Molecular Medicine, Pharmacology, and Physiology track.

C&MP 650b / PATH 660b / PHAR 580b, The Responsible Conduct of Research

Barbara Ehrlich

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.

Chemical & Environmental Engineering

17 Hillhouse Avenue, 203.432.4220

M.S., M.Phil., Ph.D.

Chair

Jaehong Kim

Director of Graduate Studies

Paul Van Tassel (paul.vantassel@yale.edu)

Professors Eric Altman, Paul Anastas,[†] Michelle Bell,^{*} Ruth Blake,^{*} Menachem Elimelech, Gary Haller (*Emeritus*), Edward Kaplan,^{*} Jaehong Kim, Michael Loewenberg, Andrew Miranker,^{*} Jordan Peccia, Lisa Pfefferle, Daniel Rosner (*Emeritus*), W. Mark Saltzman,^{*} Udo Schwarz,^{*} T. Kyle Vanderlick, Paul Van Tassel, Julie Zimmerman[†]

Associate Professors John Fortner, Drew Gentner

Assistant Professors Peijun Guo, Amir Haji-Akbari, Shu Hu, Mingjiang Zhong

Lecturer Aniko Bezur

^{*} A secondary appointment with primary affiliation in another department or school.

[†] A joint appointment with another school.

FIELDS OF STUDY

Fields include nanomaterials, soft matter, interfacial phenomena, energy, water and air quality, and sustainability.

For degree requirements and courses, see Engineering & Applied Science.

Chemistry

Sterling Chemistry Laboratory, 203.432.3913
<http://chem.yale.edu>
 M.S., Ph.D.

Chair

Kurt Zilm (chemistry.chair@yale.edu)

Director of Graduate Studies

Jonathan Ellman (jonathan.ellman@yale.edu)

Professors Victor Batista, Gary Brudvig, Robert Crabtree, Craig Crews,* R. James Cross, Jr. (*Emeritus*), Jonathan Ellman, John Faller (*Emeritus*), Sharon Hammes-Schiffer, Nilay Hazari, Seth Herzon, Patrick Holland, Mark Johnson, William Jorgensen, J. Patrick Loria, James Mayer, J. Michael McBride (*Emeritus*), Scott Miller, Peter Moore (*Emeritus*), Anna Pyle,* James Rothman,* Martin Saunders, Charles Schmuttenmaer, Dieter Söll,* David Spiegel, Scott Strobel,* John Tully (*Emeritus*), Patrick Vaccaro, Elsa Yan, Frederick Ziegler (*Emeritus*), Kurt Zilm

Associate Professors Jason Crawford, Timothy Newhouse

Assistant Professors Caitlin Davis, Ziad Ganim, Stavroula Hatzios,* Sarah Slavoff, Hailiang Wang

Lecturers Paul Anastas, Paul Cooper, Christine DiMeglio, Narasimhan Ganapathi, Jonathan Parr

* A secondary appointment with primary affiliation in another department.

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 REQUIREMENTS FOR THE PH.D. DEGREE

A foreign language is not required. Five term courses are required within the first two years 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—or, for biophysical chemistry students, two oral examinations—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 independent proposal by the end of the fourth year, 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-20 level. Students who require additional support from the Graduate School must teach additional terms, if needed, after they have fulfilled the academic teaching requirement but will not be required to teach more than five terms over their first five years. All students are required to take

CHEM 590, 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 online at <https://chem.yale.edu/useful-links>.

COURSES

CHEM 502a, Fundamentals of Transition Metal Chemistry Patrick Holland

This half-term course covers the structures and properties of coordination compounds, and strategies for the design and analysis of new compounds. Elements of chelating ligands, spectroscopic methods, and magnetism are addressed. Prerequisites: two terms of organic chemistry and one term of inorganic chemistry (CHEM 252 or equivalent).
½ Course cr

CHEM 503a, Fundamentals of Organometallic Chemistry Robert Crabtree

A half-term survey of the main principles of organometallic chemistry that enable students to understand basic concepts in the field. It prepares students for CHEM 504, the second half of this course. Prerequisites: two terms of organic chemistry and one term of inorganic chemistry (CHEM 252) or equivalent experience. ½ Course cr

CHEM 504b, Applications of Organometallic Chemistry Nilay Hazari

A half-term survey of the applications of organometallic chemistry demonstrating the range of areas where organometallic reactions are important. It builds on the knowledge learned in CHEM 503. Prerequisite: CHEM 503 or equivalent experience. ½ Course cr

CHEM 505a, Inorganic Reaction Mechanisms Patrick Holland

This half-term course covers the fundamentals of kinetics and mechanisms used by coordination compounds and transition-metal catalysts, and features analysis of papers from the recent literature. Prerequisites: two terms of organic chemistry, one term of inorganic chemistry, and CHEM 502 or equivalent. ½ Course cr

CHEM 513b, Electronic Structure in Inorganic Chemistry Patrick Holland

This course covers a number of methods for analyzing the electronic structure of coordination complexes of the transition metals. It features the use of density-functional theory (DFT) to gain quantitative insight into properties, and critical analysis of the results. Prerequisite: CHEM 502 or equivalent. ½ Course cr

CHEM 518a, Advanced Organic Chemistry Scott Miller

Concise overview of structure, properties, thermodynamics, kinetics, reactions, and intermolecular interactions for organic molecular systems.

CHEM 521a, Chemical Biology Jason Crawford and 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.

CHEM 522b, Chemical Biology II Sarah Slavoff

A comprehensive introduction to the origins and emerging frontiers of chemical biology.

CHEM 523a, Synthetic Methods in Organic Chemistry Jon Ellman

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.

CHEM 525b, Spectroscopic Methods of Structure Determination Martin Saunders

The background and use of spectroscopic methods emphasizing NMR in organic chemistry. The course includes the use of programs for simulating spin-spin coupling and rapid rearrangement reactions in NMR. All methods commonly used by organic chemists for determining molecular structures of species in solution, in the gas phase, and in solids are included.

CHEM 530a, 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.

CHEM 531b, Special Topics in Organic Chemistry Jon Ellman and

Timothy Newhouse

Current topics in organic chemistry.

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.

CHEM 542b, Molecules and Radiation II Charles Schmittenmaer

An extension of the material covered in CHEM 540 to atomic and molecular spectroscopy, including rotational, vibrational, and electronic spectroscopy, as well as an introduction to laser spectroscopy.

CHEM 553b, Small Molecule X-ray Crystallography Brandon Mercado

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.

CHEM 554b, Bio-Inorganic Chemistry Gary Brudvig

An advanced introduction to biological inorganic chemistry. Important topics in metalloprotein chemistry are illustrated. Objective is to define and understand function in terms of structure. Topics include catalysis with and without electron transfer, and carbon, oxygen, and nitrogen metabolism.

CHEM 556a, 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.

CHEM 562La or b / PHYS 762, Laboratory in Instrument Design and the Mechanical

Arts David Johnson and Kurt Zilm

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 564La or b, Advanced Mechanical Instrumentation David Johnson and

Kurt Zilm

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 565Lb, Introduction to Glass Blowing Daryl Smith and Patrick Vaccaro

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 570a, Quantum Chemistry Sharon Hammes-Schiffer

The elements of quantum mechanics developed and illustrated with applications in chemistry and chemical physics.

CHEM 576a, Fundamentals for Physical Chemistry Mark Johnson

This course reinforces the principles of physics that are most relevant to experimental and theoretical physical chemistry. These include classical electricity and magnetism (with emphasis on the nature of light and the interaction of light with matter, optics, lasers, angular momentum, and atomic structure, including the spin-orbit interaction). The basic theme of the course is to provide students with physical intuition that can bridge the observations of everyday experience to the abstract concepts required for the correct, quantum-mechanical description of atomic-scale phenomena. Prerequisites: two terms of undergraduate physical chemistry (CHEM 328 or CHEM 332, and CHEM 333; or equivalents; and physics course work covering classical mechanics and electrostatics. ½ Course cr

CHEM 577a, Optics and Optical Components in Physical Chemistry Research

Charles Schmittenmaer

This course provides an intuitive understanding of optics and optical components that are used in modern physical chemistry laboratories. Topics include the polarization state of light, methods to calculate transmission and reflection coefficients beyond Snell's law, nonlinear optics, ultrafast lasers, regenerative amplifiers, plasmonics, and Fourier transforms. Prerequisites: undergraduate physics (including mechanics and E&M and undergraduate physical chemistry; CHEM 576 is highly recommended but not necessarily required. ½ Course cr

CHEM 584b, Machine Learning and Quantum Computing in Chemistry and

Materials Science Victor Batista

Machine learning and quantum computing have emerged as leading technologies of the twenty-first century and are expected to be increasingly applied to a wide variety of chemical and materials science challenges. This course introduces fundamental concepts of machine learning and quantum computing to chemists and materials

science students through an overview of algorithms, computational methods, and applications. It is intended to empower students to engage with this emerging field and foster the growing field of artificial intelligence for accelerated scientific discoveries in the molecular and physical sciences. Prerequisites: introductory quantum mechanics and Python, or permission of the instructor. ½ Course cr

CHEM 585b, Protein NMR Spectroscopy J. Patrick Loria

A theoretical treatment of solution NMR spectroscopy with emphasis on applications to proteins and biological macromolecules. This includes classical and quantum mechanical descriptions of NMR, product operator formalism, multidimensional NMR, phase cycling, gradient selection, relaxation phenomena, and protein resonance assignments. Prerequisite: physical chemistry that includes quantum mechanics; calculus and linear algebra are recommended but not required. ½ Course cr

CHEM 586b, Quantitative Biochemical Imaging Caitlin Davis

Theory of optical microscopy, imaging, and image analysis with emphasis on quantitative characterization of the structure, dynamics, and chemical reactions of proteins, nucleic acids, and other biopolymers. Topics include optics of microscope and image formation, interaction of light and matter, fluorescent probes and biosensors, digital image processing, modern approaches in light microscopy (including confocal and multiphoton, and a brief introduction to electron microscopy and scanning probe techniques. Prerequisite: physical chemistry that includes quantum mechanics; calculus and linear algebra are recommended but not required. ½ Course cr

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. 0 Course cr

Classics

402 Phelps Hall, 203.432.0977

www.yale.edu/classics

M.A., M.Phil., Ph.D.

Acting Chair

Christina Kraus

Director of Graduate Studies

Emily Greenwood (dgs.classics@yale.edu)

Professors Egbert Bakker, Kirk Freudenburg, Milette Gaifman (*Classics; History of Art*), Emily Greenwood (*Classics; African American Studies*), Verity Harte (*Classics; Philosophy*), Brad Inwood (*Classics; Philosophy*), Diana Kleiner (*Classics; History of Art*), Christina Kraus, Noel Lenski (*Classics; History*), J.G. Manning (*Classics; History*), Irene Peirano Garrison

Associate Professors Pauline LeVen, Andrew Johnston

Assistant Professor Jessica Lamont

Lecturers Timothy Robinson, Joseph Solodow

Affiliated Faculty and Secondary Appointments Harold Attridge (*Divinity School; Emeritus*), Adela Yarbro Collins (*Divinity School; Emerita*), John J. Collins (*Divinity School*), John Hare (*Divinity School*), Susan Matheson (*Curator of Ancient Art, Yale University Art Gallery*), David Quint (*English*), 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.

GRADING AND GOOD STANDING

In addition to the Graduate School's requirement of Honors grades in at least one yearlong 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 the student writes the formal dissertation prospectus.
9. A dissertation prospectus by the end of the sixth term in residence.
10. A dissertation. Once dissertation writing has begun, students will present work in progress from the dissertation at least once per academic year. Research presentations will normally take the form of pre-circulation of a selection of work from the dissertation and a discussion of it with interested faculty, or some other research presentation experience approved by the DGS. This is a requirement for remaining in good standing; exemptions from the requirement require support of the dissertation adviser and the approval of the graduate committee.

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. Once dissertation writing has begun, students will present work in progress from the dissertation at least once per academic year. Research presentations will normally take the form of pre-circulation of a selection of work from the dissertation and a discussion of it with interested faculty, or some other research presentation experience approved by the DGS. This is a requirement for remaining in good standing; exemptions from the requirement require support of the dissertation adviser and the approval of the graduate committee.

COMBINED PROGRAMS

Classics and Comparative Literature

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 minimum of fourteen term courses: (i) at least seven in Classics, which includes two yearlong surveys (four courses) in the history of Greek and Latin literature, two 800-level seminars, and the proseminar in Classics; (ii) at least six courses in Comparative Literature; of these at least four courses should be on postclassical

- European literature; (iii) 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; (iv) 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.
3. Literary proficiency in German and in one other modern language, to be demonstrated by the end of the second year in residence.
 4. 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).
 5. Translation examinations in Greek and Latin, based on the Classical Philology Ph.D. reading list, by the beginning of the fifth term in residence.
 6. 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.
 7. 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.
 8. A dissertation. Once dissertation writing has begun, students will present work in progress from the dissertation at least once per academic year. Research presentations will normally take the form of pre-circulation of a selection of work from the dissertation and a discussion of it with interested faculty, or some other research presentation experience approved by the DGS. This is a requirement for remaining in good standing; exemptions from the requirement require support of the dissertation adviser and the approval of the graduate committee.

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.

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 Program for the Study of Ancient and Premodern Cultures and Societies (Archaia) 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.

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) Archaia 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, and simulation; 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. Diagnostic sight translations in Greek and/or Latin, depending on which languages are required for the student's program; 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.

3. 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).
4. 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.
5. 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, one of which will be verse, one a documentary text (epigraphy/papyrology), and two will be prose texts from literary sources. 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.
6. 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.
7. A dissertation prospectus by the end of the sixth term in residence.
8. A dissertation. 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. 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. For students on the Classics track: once dissertation writing has begun, students will present work in progress from the dissertation at least once per academic year. Research presentations will normally take the form of pre-circulation of a selection of work from the dissertation and a discussion of it with interested faculty, or some other research presentation experience approved by the DGS. This is a requirement for remaining in good standing; exemptions from the requirement require support of the dissertation adviser and the approval of the graduate committee.

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 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 the student writes the formal dissertation prospectus.
8. A dissertation prospectus, by the end of the sixth term in residence.
9. A dissertation. Once dissertation writing has begun, students will present work in progress from the dissertation at least once per academic year. Research presentations will normally take the form of pre-circulation of a selection of work from the dissertation and a discussion of it with interested faculty, or some other research presentation experience approved by the DGS. This is a requirement for

remaining in good standing; exemptions from the requirement require support of the dissertation adviser and the approval of the graduate committee.

THE CLASSICAL NEAR EAST

For information about the Ph.D. specialization in the Classical Near East, please contact Professor Kevin van Bladel in the Department of Near Eastern Languages and Civilizations.

ARCHAIA GRADUATE QUALIFICATION

The Yale Program for the Study of Ancient and Premodern Cultures and Societies (Archaia) offers a graduate qualification. For further information, see Archaia, 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, the student 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

CLSS 802b / PHIL 756b, Plato's *Protagoras* Verity Harte and Brad Inwood

The class reads and discusses the Greek text of Plato's *Protagoras*, a central work of Plato's ethics and moral psychology and of his engagement with the fifth-century intellectual Protagoras. Over the course of the term, we read the entire dialogue, with detailed in-class discussion each week of focused passages chosen from larger sections of the work. This core course for the combined Ph.D. program in Classics and Philosophy is open to all graduate students in Philosophy or Classics who have suitable preparation in Attic Greek (L5 equivalent) and some prior knowledge of ancient philosophy. Others interested in taking or attending the class must have prior permission of the instructors. Undergraduates are not normally admitted.

CLSS 813b / HIST 510b, The Long Fourth Century: 404/3–272 BCE Joseph Manning and Jessica Lamont

This advanced seminar provides a broad overview of the major themes and problems in Greek history from the end of the Peloponnesian War in 404/3 BCE through the first quarter of the third century BCE, with an emphasis on the scholarship of the past twenty years. Ideally, readings function as foundations on which to build further research (e.g., toward a dissertation, article, or some less far-reaching enterprise) or as starting points from which to begin devising and organizing your own courses of instruction (syllabi). Using a variety of methods and sources, including papyri, literary texts, inscriptions, material remains, and secondary scholarship, this course surveys the development of Greek economic, political, social, and cultural history during the “long” fourth century BCE. Geographically the course ranges across much of the eastern

and central Mediterranean, from Egypt to the Levant to mainland Greece to Sicily to Carthage.

CLSS 829b / HIST 507b / LING 668b / NELC 668b, Historical Sociolinguistics of the Ancient World Kevin van Bladel

Social history and linguistic history can illuminate each other. This seminar confers the methods and models needed to write new and meaningful social history on the basis of linguistic phenomena known through traditional philology. Students learn to diagnose general historical social conditions on the basis of linguistic phenomena occurring in ancient texts. Prerequisite: working knowledge of at least one ancient language.

CLSS 856a / HIST 506a / MDVL 506a, Human Migration in Antiquity Noel Lenski

This course examines the processes of human migration in premodern societies with an emphasis on ancient Rome. It explores voluntary and forced migrations, their motivations, processes, and outcomes. Particular attention is paid to sources and problems in the period of late antiquity, when human migration helped drive the collapse of the Roman Empire.

CLSS 860a, Horace's Odes: Poetics and Meaning Christina Kraus

We read Horace's *Odes* in their entirety, attending to the generic, stylistic, metrical, structural, and textual challenges presented by these variously styled "songs." Close attention to the relationship between poetics and interpretation. Readings from secondary literature focus on the poet's voice, lyric technique, and literary-cultural contexts.

CLSS 872b / HIST 513b / MDVL 513b / NELC 683b / RLST 619b, Law and History, Law in History: Premodern Civilizations through the Lens of Legal Historiography Maria Doerfler and Travis Zadeh

This seminar invites students into a comparative exploration of the intersection of law, history, and historiography in the ancient and premodern world. Sessions explore these links across a variety of linguistic and geographic settings, including those of ancient and medieval India, China, Persia, Greece, and Rome, as well as in different political, religious, literary, and archaeological contexts. The seminar constructs the category of law expansively to encompass civic, religious, and hybrid forms of legislation. In the process, we seek to explore, inter alia, questions of the relevance of history for the study of law, history's deployment in the context of legal writings, and law's concomitant relevance for historiography; the use of theoretical models, including those forged in modern and postmodern contexts, for the study of law and legal historiography; and the implications of discourses about law and history in premodernity for contemporary, post-secular societies.

CLSS 881a, Proseminar: Classical Studies Milette Gaifman

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.

CLSS 896a, History of Greek Literature I Egbert Bakker

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.

CLSS 897b, History of Greek Literature II Emily Greenwood Milne

A continuation of CLSS 896a.

CLSS 900a, Directed Reading Staff

By arrangement with faculty.

GREK 720a, Sophocles Egbert Bakker

GREK 754a, Greek Myth, Fiction, and Science Fiction Pauline LeVen

Relationships among ancient Greek myths, fiction, and speculative/science fiction, with attention to interpretive approaches and methodologies. Narrative modes of representing reality; distinguishing fiction from myth and science fiction; cultural uses of myth and fiction. Readings include works by Homer, Longus, Lucian, and Philostratus.

LATN 721b, Vergil's *Aeneid* Kirk Freudenburg

An in-depth study of Vergil's *Aeneid* within its political context.

LATN 728a, Verse Letters Irene Peirano Garrison

This course provides in-depth introduction to the forms and themes of literary letters written in verse. We read poetic letters from the Roman world, with selections from Horace, Propertius, and Ovid, among others. Readings are supplemented by a study of real letters and a comparison with literary letters in prose (especially those of Pliny the Younger). Attention is paid to both form and content. Main topics include the nature of an ancient letter; epistolary communication in antiquity; stylized form of literary letters; the difference between prose and verse letters; self-presentation and figuration in epistles; the influence of Horace and Ovid on later epistolary collections.

LATN 729b, The Roman World of the Plinys Andrew Johnston

The Roman world of the Flavian Age and the principate of Trajan (ca. 70–110 C.E.) as seen through the writings of two of its public intellectuals, Pliny the Elder and his nephew Pliny the Younger. The former's encyclopedic *Natural History* and the latter's *Letters* and *Panegyric*. Politics, physical science, history, literature, zoology, magic, patronage, art history, and slavery during the period.

LATN 732a / PHIL 729a, Seneca: Letters on Ethics Brad Inwood

Lucius Annaeus Seneca was one of the most distinguished writers of Latin prose and also an important Stoic philosopher. This course focuses on readings in his most important and best known works, the *Epistulae Morales*. Most of the letters we read deal with themes of broad general interest, but some include the more challenging philosophical topics in Stoic ethics that form the culmination of the work. We aim to read the letters included in *Seneca: Selected Letters*, ed. Catharine Edwards (2019), which has an excellent literary and philological commentary; a few additional letters are read with the more philosophical commentary found in the instructor's *Seneca: Selected Philosophical Letters* (2007).

LATN 737a, Roman Comedy Joseph Solodow

A close reading of the *Pseudolus* of Plautus and the *Adelphoe* of Terence, with attention to the literary, social, and historical contexts of both plays.

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

Rüdiger Campe [F]
 Jing Tsu [Sp]

Professors Dudley Andrew, Rüdiger Campe, Katerina Clark, Roberto González Echevarría, Martin Hägglund, Hannan Hever, Pericles Lewis, David Quint, Katie Trumpener, Jing Tsu, Jane Tylus

Associate Professors Robyn Creswell, Marta Figlerowicz, Moira Fradinger, Ayesha Ramachandran

Assistant Professor Samuel Hodgkin

Lecturer Peter Cole

Emeritus Peter Brooks, Peter Demetz, Carol Jacobs, Rainer Nägele

Affiliated Faculty Rolena Adorno (*Spanish & Portuguese*), R. Howard Bloch (*French*), Francesco Casetti (*Film & Media Studies*), Kang-I Sun Chang (*East Asian Languages & Literatures*), Michael Denning (*American Studies*), Wai Chee Dimock (*English*), Alice Kaplan (*French*), Tina Lu (*East Asian Languages & Literatures*), John MacKay (*Slavic Languages & Literatures*), Giuseppe Mazzotta (*Italian Studies*), Maurice Samuels (*French*), 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 candidates to teach comparative literature as well as the national literature(s) of their specialization.

SPECIAL REQUIREMENTS FOR THE PH.D. DEGREE

Students must successfully complete fourteen term courses, including the departmental proseminar (CPLT 515) 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 a faculty committee, 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 (including the proseminars in Classics and in Comparative Literature). In Classics, at least seven courses, including the Classics proseminar, four courses (two yearlong 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. 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 twelve of the fourteen 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, as necessary.

Languages To assess each student's proficiency and progress in both key languages, two diagnostic sight translation examinations each in Greek and Latin are to be taken before the beginning of the first and third terms. Literary proficiency in German and one other

modern language must be passed by the end of the second year. Literary proficiency in English, Greek, and Latin must be demonstrated by course work.

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, usually in mid-January. 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, and must be submitted by the end of the fourth term. 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 By October 1 of the third year, students must have fulfilled an assignment related to foundational texts and films. During this third year 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 Executive Committee. The dissertation must pass a presubmission defense of method (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.

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 512b / ENGL 879b, Essays: Moral, Political, and Literary David Bromwich
The course surveys the essay as a genre of writing and thinking, from Montaigne to Virginia Woolf. Among the authors are Bacon, Hume, Johnson, Hazlitt, Emerson, Shaw, Gandhi, Sartre. This is a cross-listed graduate seminar in English and Comparative Literature in the Ivy Consortium, taught in alternate weeks at Columbia University and Yale. We test Adorno's thesis that the essay is the distinctively modern and emancipatory form of writing.

CPLT 515b, Proseminar in Comparative Literature Rudiger Campe
Introductory proseminar for all first- and second-year students in Comparative Literature (and other interested graduate students). An introduction to key problems in the discipline of Comparative Literature, its disciplinary history, and its major theoretical and methodological debates (including philology; Marxist, structuralist, and poststructuralist approaches; world literature; translation). Emphasis on wide reading and intense discussion, in lieu of term paper. Graded Satisfactory/Unsatisfactory; offered every other year.

CPLT 564b / GMAN 734b, Rethinking Representation Katrin Truedstedt
How can we speak for others? What does it mean to be spoken for? And what type of agency is evoked by this constellation? The course explores the implications, both productive and problematic, of representation – for agency and subjectivity, for recognition and acknowledgment, for political action, and for the conception of literature and art. Close readings of major literary works, from Greek tragedy and Shakespeare to Kleist and Kafka, is accompanied by theoretical texts, from Arendt's notion of the Greek polis to the critique of representation by Foucault, Spivak, and others, and debates about the legal representation of nature in the climate crisis.

CPLT 574a / JDST 677, Marxist Theory of Literature Hannan Hever
Marxist thought has played a major role in the understanding of literary institutions, as well as literary texts. Within Marxist thought, literature always had a unique function in the processes of ideology, class struggles, and the constitution of the subject; material Marxism, cultural Marxism, European Marxism, and neo-Marxism all studied the work of literature as an institution and as both reflection and construction of reality, and of its perception. The aim of this seminar is to acquaint ourselves with Marxist theories of literature in the twentieth century. We start with the very basics of Marxism, focusing especially on the theory of ideology. We then study Lukács's theory of literature as the basis of the development of Marxist literary theory, followed by the literary theories developed by the Frankfurt School, the materialistic school of Louis Althusser, Antonio Gramsci, E.P. Thompson, Raymond Williams, Stuart Hall, Terry Eagleton, Catherine Belsey, Fredric Jameson, and others. Open to undergraduates. All texts are in English, and no previous knowledge is required.

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

A continuing yearlong collective research project, a cultural studies "laboratory." The group, drawing on several disciplines, meets regularly to discuss common readings, develop collective and individual research projects, and 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.

CPLT 632a / FILM 861a, Literature and Film of World War II: Homefront Narratives

Katie Trumpener

Taking a pan-European perspective, the course examines quotidian, civilian experiences of war during a conflict of unusual scope and duration. Considering key works of wartime and postwar fiction and film alongside diaries and memoirs, we explore the kinds of literary reflection war occasioned, how civilians experienced the relationship between history and everyday life (both during and after the war), children's experience of war, and the ways that homefront, occupation, and concentration camp memories shaped postwar avant-garde aesthetics. Novels and autobiographical fiction by Elio Vittorini, Anna Seghers, Irène Némirovsky, Elizabeth Taylor, Georges Simenon, Jiri Weil, Jorge Semprún, Miron Bialoszewski, Christa Wolf. Films by Humphrey Jennings, Andrzej Munk, Theo Angelopoulos, Péter Forgács, István Szabó, Bill Douglas, Kevin Brownlow. Diaries and memoirs by Victor Klemperer, Anne Frank, Sarah Kofman. We also consider poetry, photography, and art.

CPLT 646b / ENGL 723b, Rise of the European Novel Katie Trumpener

In the eighteenth century, the novel became a popular literary form in many parts of Europe. Yet now-standard narratives of its "rise" often offer a temporally and linguistically foreshortened view. This seminar examines key early modern novels in a range of European languages, centered on the dialogue between highly influential eighteenth-century British and French novels (Montesquieu, Defoe, Sterne, Diderot, Laclos, Edgeworth). We begin by considering a sixteenth-century Spanish picaresque life history (*Lazarillo de Tormes*) and Madame de Lafayette's seventeenth-century secret history of French court intrigue; contemplate a key sentimental Goethe novella; and end with Romantic fiction (an Austen novel, a Kleist novella, Pushkin's historical novel fragment). These works raise important issues about cultural identity and historical experience, the status of women (including as readers and writers), the nature of society, the vicissitudes of knowledge – and novelistic form. We also examine several major literary-historical accounts of the novel's generic evolution, audiences, timing, and social function, and historiographical debates about the novel's rise (contrasting English-language accounts stressing the novel's putatively British genesis, and alternative accounts sketching a larger European perspective). The course gives special emphasis to the improvisatory, experimental character of early modern novels, as they work to reground fiction in the details and reality of contemporary life. Many epistolary, philosophical, sentimental, and Gothic novels present themselves as collections of "documents" – letters, diaries, travelogues, confessions – carefully assembled, impartially edited, and only incidentally conveying stories as well as information. The seminar explores these novels' documentary ambitions; their attempt to touch, challenge, and change their readers; and their paradoxical influence on

“realist” conventions (from the emergence of omniscient, impersonal narrators to techniques for describing time and place).

CPLT 657a / PORT 652a, Clarice Lispector: The Short Stories K. David Jackson

This course is a seminar on the complete short stories of Clarice Lispector (1920–1977), a master of the genre and one of the major authors of twentieth-century Brazil known for existentialism, mysticism, and feminism.

CPLT 658a / ENGL 699a / ITAL 946a / MDVL 946a, Early Modern Ecologies:

Representing Peasants, Animals, Labor, Land Jane Tylus

To what extent does writing about the land and depicting landscapes in early modern Europe reflect a new interest in engaging the boundaries between the human and nonhuman? What does it show about the commitment of artists and intellectuals to representing cultures and environments not necessarily their own? And how did writers and artists seek to legitimize their intellectual labors by invoking images of agricultural work? Since antiquity, artists have often chosen to make the countryside and its human and nonhuman denizens symbols of other things: leisure, song, exile, patriotism, erotic sensibilities, anti-urbanism. Early Christianity in turn embraced the desert—and the countryside—as a space for spirituality. We explore these origins and turn to the early modern period, when such interests exploded into poems, novels, plays, and paintings—a period that coincided with new world discoveries and new possibilities for “golden ages” abroad. We read works by Virgil, St. Jerome, Petrarch, Shakespeare, Spenser, Milton, Tasso, Seamus Heaney, and others, and take at least one trip to a local gallery (in New Haven or New York). Finally, we explore recent work in ecocriticism and environmental studies in order to grapple with ancient and early modern understandings of the natural world.

CPLT 672a / ENGL 672a, Milton David Quint

This course studies Milton's poetry and some of his controversial prose. We investigate the relation of the poetry to its historical contexts, focusing on the literary, religious, social, and political forces that shaped Milton's verse. We survey and assess some of the dominant issues in contemporary Milton studies, examining the types of readings that psychoanalytic, feminist, Marxist, and historicist critics have produced. A brief oral report and a term paper (as well as a prospectus and preliminary bibliography for the term paper required).

CPLT 677b / RUSS 699b, The Performing Arts in Twentieth-Century Russia

Katerina Clark

The course covers ballet, opera, theater, mass spectacle, and film, as well as theory of the performing arts, including selections from the writings of some of the most famous Russian directors and choreographers, such as Constantine Stanislavsky, Vsevolod Meyerhold, and Michel Fokine. It also includes their major productions and some of the most important Russian plays of the twentieth century (e.g., by Anton Chekhov, Vladimir Mayakovsky, Mikhail Bulgakov) and works by contemporary dramatists. All readings are available in both English and Russian. No knowledge of Russian required. Students taking the course for credit in Comparative Literature can write their papers on texts in other languages.

CPLT 688a / JDST 842a / RLST 775a, What is Political Theology? Hannan Hever

This course investigates the theological aspects of modern political ideologies. It takes its title from the controversial work of the German political thinker Carl Schmitt,

who argued that theological assumptions stood behind the veneer of secular politics. Concepts such as sovereignty, citizenship, universalism, law, and the state of exception have been said to have their provenance in Jewish and Christian concepts of God, election, Messiah, the commandment, and antinomianism. In recent years the study of the theological origins of political concepts has become important for both those seeking to critique the neutrality of certain western-democratic institutions as well as those hoping to better understand the relationship between religion and politics. Subjects covered in the course include sovereignty, universalism, law, election, commandment, messianism, and nationalism. Readings focus on the work of modern political thinkers such as Benedict Spinoza, Thomas Hobbes, and Bruno Bauer, whose normative works assumed a direct relationship between the political and the theological, as well as those who have theorized the very idea of political-theology, such as Martin Buber, Alain Badiou, Slavoj Žižek, Daniel Boyarin, and Giorgio Agamben.

CPLT 735b / AFST 885b / FREN 885b, Modern French Poetry in the Maghreb

Thomas Connolly

A survey of twentieth- and twenty-first-century poetry written in French by authors from North Africa, including works by Amrouche, Sénac, Khaïr-Eddine, Laâbi, Nissaboury, Djaout, Jabès, Farès, Ben Jelloun, Meddeb, Acherchour, Negrouche, Dib, and Bekri. Readings in French, discussion in English. Prerequisite: reading knowledge of French.

CPLT 788a / GMAN 571a, Robert Musil's *Man without Qualities*: The End of the Novel Rudiger Campe

Musil's gigantic *Man without Qualities* (published 1930–33, 1943) is one of the quintessential modernist (interwar) European novels. After looking into Musil's earlier narrative experiments, the course begins with the close reading of part I of the novel and then focuses on the main strands of its narrative network: modernization and mysticism; the end of old Europe and the rise of fascism; the Vienna Circle's epistemology and the legal doctrine of accountability; love and violence. The intertwining of essay and narration in the novel, the theory of the novel in the novel, and the question of prose as form are at the core of the course. Readings in English or German. Discussions in English.

CPLT 807b / FREN 888b / ITAL 888b, The Novel of Historical Event: The Nineteenth Century and Beyond Jane Tylus

The seminar moves from the traditional idea of the historical novel to other, often more experimental versions of fictions that engage historical events: war, revolution, plague, genocide. We consider how individual lives intersect with and are changed by historical events, and the extent to which individuals are able to understand how history impacts their lives. Is the course of history controllable or even understandable to its participants and bystanders? Does historical knowledge always arrive too late? Primary texts include Manzoni, *I Promessi Sposi*; Balzac, *Le Colonel Chabert*; Flaubert, *L'Education sentimentale*; Verga, *Novelle*; Tomasi di Lampedusa, *Il Gattopardo*; Faulkner, *Absalom, Absalom!*; Modiano, *Dora Bruder*. There are also readings in the history and theory of the novel, as well as works contextualizing issues of nationalism in the nineteenth century. They include essays/chapters by Georg Lukács, Nelson Moe, Roberto Dainotto, Edward Said, Franco Moretti, Peter Brooks, and others. Prerequisite: reading knowledge of French and/or Italian.

CPLT 822b / AMST 623b, Working Group on Globalization and Culture

Michael Denning

A continuing yearlong collective research project, a cultural studies “laboratory.” The group, drawing on several disciplines, meets regularly to discuss common readings, develop collective and individual research projects, and 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.

CPLT 898b / FREN 898b, Fin-de-siècle France Maurice Samuels

The course examines major French literary and artistic movements of the last decades of the nineteenth century (Naturalism, Decadence, Symbolism) in their cultural context. Weekly reading assignments pair literary texts with contemporary theoretical/medical/political discourse on such topics as disease, crime, sex, poverty, colonialism, nationalism, and technology. Literary authors include Barbey, Mallarmé, Maupassant, Rachilde, Villiers, and Zola. Theorists include Bergson, Freud, Krafft-Ebing, Le Bon, Nordau, Renan, and Simmel. Some attention also paid to the visual arts. Prerequisite: reading knowledge of French.

CPLT 904a / FILM 617a / FREN 875a / SPAN 901a, Key Concepts in Psychoanalysis:**Tools for the Critical Humanities** Moira Fradinger

Working with primary sources mainly from the Freudian and Lacanian corpuses, this seminar is an introduction to key concepts of psychoanalytic theory, ending with an exploration of the afterlife of these concepts in other disciplines, focusing on one or two concrete examples. Students gain proficiency in what has been called “the language of psychoanalysis,” as well as the tools to assess how these concepts have been translated into the language of disciplines such as aesthetic criticism, political theory, film studies, gender studies, theory of ideology, sociology, etc. Concepts to be studied include the unconscious, the ego, identification, the drive, the death drive, repetition, the imaginary, the symbolic, the real, and *jouissance*. Depending on the interests of the group, others can be added (such as neurosis, perversion, fetishism, psychosis, anti-psychiatry, etc.). Commentators, readers, and critics of Freud and Lacan are also consulted (Michel Arrivé, Guy Le Gaufey, Jean Laplanche, André Green, Markos Zafiroopoulos, and others).

CPLT 940a / SPAN 913a, Realismo mágico – Magical Realism

Roberto González Echevarría

Latin American novels and short stories from the 1920s to the 1990s in which the fantastic appears, derived from avant-garde tendencies, anthropology, and popular Afro-Hispanic religions (*santería*) and a Catholic tradition of miracles. Theoretical texts by Franz Roh, Sigmund Freud, Marcel Mauss, Jorge Luis Borges, Alejo Carpentier, Arturo Usler Pietri, Gabriel García Márquez, and Roberto González Echevarría. Prose

fiction by Miguel Ángel Asturias, Borges, Lydia Cabrera, Carpentier, García Márquez, João Guimarães Rosa, and Juan Rulfo, among others. Novels such as *El reino de este mundo*, *Cien años de soledad*, and *Aura*, and short story collections such as *Cuentos negros de Cuba*, *Leyendas de Guatemala*, and *Guerra del tiempo*. Conducted in Spanish; course work for students in departments other than Spanish and Portuguese in English. Open to undergraduates.

CPLT 958a, Dissertation Writing Seminar Robyn Creswell and Martin Hagglund
This is a writing seminar for graduate students of Comparative Literature in their fifth, sixth, or seventh year, aiming to familiarize them with three key genres of academic writing: the conference paper, journal article, and dissertation chapter. We read and analyze models of each genre, including the work of recent department graduates as well as new and exemplary work in the field. Students share their own writing in a workshop setting, receiving feedback from peers and instructors. Each student is expected to produce a conference paper, article, or chapter as their final project.

CPLT 969b / FREN 658b / MDVL 658b / NELC 684 / SPAN 658b, Law and the

Science of the Soul: Iberian and Mediterranean Connections Jesus Velasco
This seminar suggests a research project to investigate the affinity between the legal discipline and the science of the soul, or, if you wish, between the science of the soul and the body of law. The point of departure for our framing argument—the existence of this affinity—is that at different moments in history, the legal science (in the form of legal scholarship, religious law, or even legislation) has toiled to appropriate cognitive processes (the external senses, for instance) and post-sensorial operations (imagination, fantasy, memory, etc.). However, this appropriation has become, at different moments in history, so naturalized, so dissolved, so automatized, that it has become invisible for us, and that, because of this invisibility, the affinity can continue doing a political work that is not always evident to us readers, citizens, and clients of the law. In this seminar we read Iberian and Mediterranean primary sources from different confessions, in different languages, and within different legal and political backgrounds—from pre-Socratic thinkers to al-Ghazali, from Averroes and Maimonides to Alfonso X, from Parisian theologians to Spinoza, etc. Likewise, we read theoretical work that allow us to conceptualize the kind of research we are doing.

Computational Biology and Bioinformatics

300 George Street, Suite 501, 203.737.6029
<http://cbb.yale.edu>
 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 Marcus Bosenberg (*Dermatology; Pathology*), Cynthia Brandt (*Emergency Medicine; Anesthesiology*), Kei-Hoi Cheung (*Emergency Medicine*), Ronald Coifman (*Mathematics; Computer Science*), Stephen Dellaporta (*Molecular, Cellular, & Developmental Biology*), Richard Flavell (*Immunobiology*), Joel Gelernter (*Genetics; Neuroscience*), Mark Gerstein (*Biomedical Informatics; Molecular Biophysics & Biochemistry; Computer Science*), Antonio Giraldez (*Genetics*), Jeffrey Gruen (*Genetics; Investigative Medicine; Pediatrics*), Murat Gunel (*Neurosurgery; Genetics*), Amy Justice (*Internal Medicine; Public Health*), Naftali Kaminski (*Internal Medicine*), Steven Kleinstein (*Pathology*), Yuval Kluger (*Pathology*), Harlan Krumholz (*Internal Medicine; Investigative Medicine; Public Health*), Haifan Lin (*Cell Biology; Genetics*), Shuangge (Steven) Ma (*Public Health*), Andrew Miranker (*Molecular Biophysics & Biochemistry; Chemical & Environmental Engineering*), Corey O'Hern (*Mechanical Engineering & Materials Science; Applied Physics; Physics*), Lajos Pusztai (*Internal Medicine*), Anna Pyle (*Molecular Biophysics & Biochemistry*), David Stern (*Pathology*), Hemant Tagare (*Radiology & Biomedical Imaging; Biomedical Engineering*), Jeffrey Townsend (*Public Health; Ecology & Evolutionary Biology*), Günter Wagner (*Ecology & Evolutionary Biology*), Hongyu Zhao (*Public Health; Genetics*), Steven Zucker (*Computer Science; Electrical Engineering; Biomedical Engineering*)

Associate Professors Julien Berro (*Molecular Biophysics & Biochemistry*), Chris Cotsapas (*Neurology*), Forrest Crawford (*Public Health*), Jun Lu (*Genetics*), Kathryn Miller-Jensen (*Engineering & Applied Science*), James Noonan (*Genetics*), Zuoheng (Anita) Wang (*Public Health*)

Assistant Professors Leying Guan (*Biostatistics*), Samah Jarad (*Emergency Medicine*), Smita Krishnaswamy (*Genetics*), Monkol Lek (*Genetics*), Bluma Lesch (*Genetics*), Morgan Levine (*Pathology*), Zachary Levine (*Pathology*), Benjamin Machta (*Physics*), Robert McDougal (*Biostatistics*), John Murray (*Psychiatry; Neuroscience; Physics*), Andrew Taylor (*Emergency Medicine*), David vanDijk (*Cardiology*), Jack Zhang (*Molecular Biophysics & Biochemistry*)

FIELDS OF STUDY

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

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

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

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 562 or CB&B 750, CB&B 740 or CB&B 561, and CB&B 752. 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 711, CB&B 712, CB&B 713) 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 601, 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 503, 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 with the following exceptions: there are no requirements for fulfilling laboratory research rotations or completing a Ph.D. dissertation, and only one term as a teaching assistant is required. 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

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

CB&B 523b / ENAS 541b / MB&B 523b / PHYS 523b, Biological Physics

Benjamin Machta

The course has two aims: (1) to introduce students to the physics of biological systems and (2) to introduce students to the basics of scientific computing. The course focuses on studies of a broad range of biophysical phenomena including diffusion, polymer statistics, protein folding, macromolecular crowding, cell motion, and tissue development using computational tools and methods. Intensive tutorials are provided for MATLAB including basic syntax, arrays, for-loops, conditional statements, functions, plotting, and importing and exporting data.

CB&B 550a, Introduction to Neuroinformatics Staff

An introduction to the new field of neuroinformatics. Students will learn principles of informatics, how informatics tools and approaches can make the complex data of neuroscience robustly accessible and searchable over the Web, and how the data are integrated into working computational models of neurons and neural networks in order to gain deeper insight into brain function. Weekly class sessions will consist of one hour of overview by the instructor and one hour of student presentations in a journal-club format.

CB&B 555a / AMTH 553a / CPSC 553a / GENE 555a, Unsupervised Learning for Big

Data Smita Krishnaswamy

This course focuses on machine-learning methods well-suited to tackling problems associated with analyzing high-dimensional, high-throughput noisy data including: manifold learning, graph signal processing, nonlinear dimensionality reduction, clustering, and information theory. Though the class goes over some biomedical applications, such methods can be applied in any field. Prerequisites: knowledge of linear algebra and Python programming.

CB&B 561a, Modeling Biological Systems I Staff

Study of the analytic and computational skills needed to model genetic networks and protein signaling pathways. Review of basic biochemical concepts including chemical

reactions, ligand binding to receptors, cooperativity, and Michaelis-Menten enzyme kinetics. Deep exploration of biological systems including: kinetics of RNA and protein synthesis and degradation; transcription activators and repressors; lysogeny/lysis switch of lambda phage and the roles of cooperativity and feedback; network motifs such as feed-forward networks and how they shape response dynamics; cell signaling, MAP kinase networks, and cell fate decisions; bacterial chemotaxis; and noise in gene expression and phenotypic variability. Students learn to model using MATLAB in a series of in-class hackathons that illustrate biological examples discussed in lectures. Prerequisite: course admission for CB&B students is with permission of the instructor only.

CB&B 601b, Fundamentals of Research: Responsible Conduct of Research

Carla Rothlin

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.

CB&B 634a, Computational Methods for Informatics Robert McDougal

This course introduces the key computational methods and concepts necessary for taking an informatics project from start to finish: using APIs to query online resources, reading and writing common biomedical data formats, choosing appropriate data structures for storing and manipulating data, implementing computationally efficient and parallelizable algorithms for analyzing data, and developing appropriate visualizations for communicating health information. The FAIR data-sharing guidelines are discussed. Current issues in big health data are discussed, including successful applications as well as privacy and bias concerns. This course has a significant programming component, and familiarity with programming is assumed. Prerequisite: CPSC 223 or equivalent, or permission of the instructor.

CB&B 638a, Clinical Database Management Systems and Ontologies

Kei-Hoi Cheung

This course introduces database and ontology in the clinical/public health domain. It reviews how data and information are generated in clinical/public health settings. It introduces different approaches to representing, modeling, managing, querying, and integrating clinical/public health data. In terms of database technologies, the course describes two main approaches – SQL database and non-SQL (NoSQL) database – and shows how these technologies can be used to build electronic health records (EHR), data repositories, and data warehouses. In terms of ontologies, it discusses how ontologies are used in connecting and integrating data with machine-readable knowledge. The course reviews the major theories, methods, and tools for the design and development of databases and ontologies. It also includes clinical/public health use cases demonstrating how databases and ontologies are used to support clinical/public health research.

CB&B 711a and CB&B 712b and CB&B 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, Introduction to Health Informatics Andrew Taylor

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, and (8) topics in translational bioinformatics. Permission of the instructor required.

CB&B 750b, Core Topics in Biomedical Informatics Samah Jarad

The course focuses on providing an introduction to common unifying themes that serve as the foundation for different areas of biomedical informatics. It is designed for students with programming experience 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, predictive analytics, information extraction, deep learning, and other related topics.

CB&B 752b / CPSC 752b / MB&B 752b and MB&B 753b and MB&B 754b / MB&B 753b and MB&B 754b / MB&B 754b / MCDB 752b, Biomedical Data Science: Mining and Modeling Mark Gerstein and Matthew Simon

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. 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.

Computer Science

A. K. Watson Hall, 203.432.1246

<http://cpsc.yale.edu>

M.S., M.Phil., Ph.D.

Chair

Zhong Shao

Director of Graduate Studies

Vladimir Rokhlin (AKW 108, 203.432.1278, vladimir.rokhlin@yale.edu)

Professors Dana Angluin, James Aspnes, Dirk Bergemann,* Ronald Coifman,* Aaron Dollar,* Julie Dorsey, Stanley Eisenstat, Joan Feigenbaum, Michael Fischer, David Gelernter, Mark Gerstein,* John Lafferty,* Rajit Manohar,* Drew McDermott (*Emeritus*), Dragomir Radev, Vladimir Rokhlin,† Holly Rushmeier, Brian Scassellati, Martin Schultz (*Emeritus*), Zhong Shao, Avi Silberschatz, Daniel Spielman, Leandros Tassioulas,* Nisheeth Vishnoi, Y. Richard Yang, Lin Zhong, Steven Zucker†

Associate Professors Abhishek Bhattacharjee, Theodore Kim, Sahand Negahban,* Ruzica Piskac, Jakub Szefer*

Assistant Professors Yang Cai, Wenjun Hu,* Julian Jara-Ettinger,* Amin Karbasi,* Smita Krishnaswamy,* Robert Soulé, David van Dijk,* Marynel Vázquez

Senior Lecturers James Glenn, Kyle Jensen,* Stephen Slade

Lecturers Andrew Bridy,† Benedict Brown, Cody Murphey, Scott Petersen, Brad Rosen, Andrew Sherman, Cecillia Xie

* 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, and 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 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, CPSC 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 521b, Compilers and Interpreters Robert Soule

Compiler organization and implementation: lexical analysis, formal syntax specification, parsing techniques, execution environment, storage management, code generation and optimization, procedure linkage, and address binding. The effect of language-design decisions on compiler construction.

CPSC 522a, 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.

CPSC 524b, 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.

CPSC 531a, 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.

CPSC 532b, 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.

CPSC 533b, Computer Networks Anurag Khandelwal

An introduction to the design, implementation, analysis, and evaluation of computer networks and their protocols. Topics include layered network architectures, applications, transport, congestion, routing, data link protocols, local area networks, performance analysis, multimedia networking, network security, and network management. Emphasis on protocols used in the Internet.

CPSC 534b, Topics in Networked Systems Y. Richard Yang

Study of networked systems such as the Internet and mobile networks which provide the major infrastructure components of an information-based society. Topics include the design principles, implementation, and practical evaluation of such systems in new settings, including cloud computing, software-defined networking, 5G, Internet of things, and vehicular networking.

CPSC 537a, Introduction to Database Systems 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.

CPSC 546a, Data and Information Visualization Holly Rushmeier and Benedict Brown

Visualization is a powerful tool for understanding data and concepts. This course provides an introduction to the concepts needed to build new visualization systems, rather than to use existing visualization software. Major topics are abstracting visualization tasks, using visual channels, spatial arrangements of data, navigation in visualization systems, using multiple views, and filtering and aggregating data. Case studies to be considered include a wide range of visualization types and applications in humanities, engineering, science, and social science. Prerequisite: CPSC 223.

CPSC 553a / AMTH 553a / CB&B 555a / GENE 555a, Unsupervised Learning for Big**Data** Smita Krishnaswamy

This course focuses on machine-learning methods well-suited to tackling problems associated with analyzing high-dimensional, high-throughput noisy data including: manifold learning, graph signal processing, nonlinear dimensionality reduction, clustering, and information theory. Though the class goes over some biomedical applications, such methods can be applied in any field. Prerequisites: knowledge of linear algebra and Python programming.

CPSC 554a, Software Analysis and Verification Ruzica Piskac

Introduction to concepts, tools, and techniques used in the formal verification of software. State-of-the-art tools used for program verification; detailed insights into algorithms and paradigms on which those tools are based, including model checking, abstract interpretation, decision procedures, and SMT solvers.

CPSC 555a, Economics and Computation Yang Cai

A mathematically rigorous investigation of the interplay of economic theory and computer science, with an emphasis on the relationship of incentive-compatibility and algorithmic efficiency. Particular attention to the formulation and solution of mechanism-design problems that are relevant to data networking and Internet-based commerce.

CPSC 556b / ENAS 951b, Wireless Technologies and the Internet of Things

Wenjun Hu

Fundamental theory of wireless communications and its application explored against the backdrop of everyday wireless technologies such as WiFi and cellular networks. Channel fading, MIMO communication, space-time coding, opportunistic communication, OFDM and CDMA, and the evolution and improvement of technologies over time. Emphasis on the interplay between concepts and their implementation in real systems. The labs and homework assignments require Linux and MATLAB skills and simple statistical and matrix analysis (using built-in MATLAB functions).

CPSC 557b, Sensitive Information in a Wired World Michael Fischer

Issues of ownership, control, privacy, and accuracy of the huge amount of sensitive information about people and organizations that is collected, stored, and used by today's ubiquitous information systems. Readings consist of research papers that explore both the power and the limitations of existing privacy-enhancing technologies such as encryption and 'trusted platforms.'

CPSC 559a, Building Interactive Machines Marynel Vazquez

This advanced course brings together methods from machine learning, computer vision, robotics, and human-computer interaction to enable interactive machines to perceive and act in a variety of environments. Part of the course examines approaches for perception with different sensing devices and algorithms; the other part focuses on methods for decision-making and applied machine learning for control. The course is a combination of lectures, state-of-the-art reading, presentations and discussions, programming assignments, and a final team project. Prerequisites: CPSC 570 and understanding of probability, differential calculus, linear algebra, and planning (in Artificial Intelligence). Programming assignments require proficiency in Python and

high-level familiarity with C++. Students who do not fit this profile may be allowed to enroll with the permission of the instructor.

CPSC 560a, Automata Theory and Formal Languages Andrew Bridy

Introduction to the theory of automata and formal languages, one of the building blocks of theoretical computer science. Major topics covered are finite automata, pushdown automata, and Turing machines, and their associated languages.

CPSC 564b, Topics in Foundations of Machine Learning Nisheeth Vishnoi

This course focuses on current and important topics in machine learning where a foundational understanding is lacking or under development. This includes modern algorithmic methods, novel learning and generative models, and the societal impact of machine learning. Representative topics include optimization and sampling methods for nonconvex functions in Euclidean spaces or manifolds, algorithms beyond worst case, fairness, and robustness. The course is for students who would like to address the limitations of current machine learning systems deployed in the real world through a combination of foundational work such as coming up with the right definitions, modeling, methods, along with empirical evaluation. The grade will be based on class participation and project. Project grade will be determined by a midterm and endterm report/presentation. The course has four primary modules, each roughly three to four weeks: (1) Introduction. Methods: overview of continuous optimization methods; overview of sampling methods; advanced methods such as minimax optimization, optimization, and sampling on manifolds; (2) Models: traditional models in supervised and unsupervised learning; maximum entropy-based generative models; neural networks, convolutional neural networks, and generative adversarial networks; (3) Robustness in ML: adversarial examples and misclassification; notions of robustness; methods for robust training; (4) Fairness in ML: sociotechnical contexts and the underlying algorithmic/ML problems; definitions of fairness; methods/models/interventions for fair ML; implicit bias and downstream effects of interventions. Prerequisites: solid background in calculus, linear algebra, stochastic processes, and advanced algorithms along with a good background in programming. CPSC 365 or CPSC 366 is required, and S&DS 251 is recommended.

CPSC 565a, Theory of Distributed Systems James Aspnes

Models of asynchronous distributed computing systems. Fundamental concepts of concurrency and synchronization, communication, reliability, topological and geometric constraints, time and space complexity, and distributed algorithms.

CPSC 567a, Cryptography and Computer Security Michael Fischer

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.

CPSC 569b, 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.

CPSC 570b, Artificial Intelligence Brian Scassellati

Introduction to artificial intelligence research, focusing on reasoning and perception. Topics include knowledge representation, predicate calculus, temporal reasoning, vision, robotics, planning, and learning.

CPSC 574a, Computational Intelligence for Games James Glenn**CPSC 575a / ENAS 575, 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.

CPSC 576b / AMTH 667 / ENAS 576, Advanced Computational Vision Steven Zucker

Advanced view of vision from a mathematical, computational, and neurophysiological perspective. Emphasis on differential geometry, machine learning, visual psychophysics, and advanced neurophysiology. Topics include perceptual organization, shading, color, and texture.

CPSC 577b, Natural Language Processing Dragomir Radev

Linguistic, mathematical, and computational fundamentals of natural language processing (NLP). Topics include part of speech tagging, Hidden Markov models, syntax and parsing, lexical semantics, compositional semantics, machine translation, text classification, discourse, and dialogue processing. Additional topics such as sentiment analysis, text generation, and deep learning for NLP.

CPSC 578b, Computer Graphics Theodore Kim

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.

CPSC 579a, Advanced Topics in Computer Graphics Julie Dorsey

An in-depth study of advanced algorithms and systems for rendering, modeling, and animation in computer graphics. Topics vary and may include reflectance modeling, global illumination, subdivision surfaces, NURBS, physically based fluids systems, and character animation.

CPSC 610b, Topics in Computer Science and Law Joan Feigenbaum

This course focuses on socio-technical problems in computing, i.e., problems that cannot be solved through technological progress alone but rather require legal, political, or cultural progress as well. Examples include but are not limited to computer security, intellectual property protection, cyber crime, cyber war, surveillance, and online privacy. The course is addressed to graduate students in Computer Science who are interested in socio-technical issues but whose undergraduate work may not have addressed them; it is designed to bring these students rapidly to the point at which they can do research on socio-technical problems. Students do term projects (either papers or software artifacts) and present them at the end of the term. In order to ensure that there is enough time for both midterm feedback on project proposals and in-class presentation of the finished projects, enrollment is limited to fifteen. If fewer than fifteen Computer Science graduate students enroll, Yale College undergraduates will be allowed to enroll with permission of the instructor. Prerequisites: the basics of

cryptography and computer security (as covered in CPSC 467), networks (as covered in CPSC 433), and databases (as covered in CPSC 437), or permission of the instructor.

CPSC 626a, Human Factors in Computer Systems: Design, Evaluation, and Presentation

Humans are stupid; computers are limited. Yet a collaboration of humans and computers has led to ever more powerful and complex computer systems. This course examines the mental limitations of human users and developers of computers and how they shape the design, implementation, evaluation, and presentation of computer systems. The lectures, reading assignments, and classroom discussions travel through psychology and philosophy and revisit important results from theoretical computer science, with a goal of elucidating the rationales behind the best practices in computer systems research and development. Prerequisite: CPSC 522, CPSC 523, or equivalent.

CPSC 634a, Building an Internet Router Robert Soule

This course combines seminar-style readings and discussions with practical, hands-on development of a term-long project. Students read a selection of papers to get both a historical perspective and exposure to current research in networking. Students write reviews of the papers to make sure everyone keeps up with the readings and to develop their (technical) communication skills. Throughout the term, students work in teams to develop a fully functional IP router. Students design the control plane in Python on a Linux host and design the data plane in the new P4 language. Teams must demonstrate that their routers can interoperate with the those of the other teams by building a small topology utilizing everyone's router. At the end of the course, teams participate in an open-ended design challenge. Prerequisite: undergraduate networking.

CPSC 637a, Big Data Anurag Khandelwal

Today's Internet-scale applications and cloud services generate massive amounts of data. At the same time, the availability of inexpensive storage has made it possible for these services and applications to collect and store every piece of data they generate, in the hopes of improving their services by analyzing the collected data. This introduces interesting new opportunities and challenges designing systems for collecting, analyzing, and serving the so-called big data. This course looks at technology trends that have paved the way for big data applications, surveys state-of-the-art systems for storage and processing of big data, and considers future research directions driven by open research problems. It includes a mix of lectures, seminar-style discussions, student presentations, and a course-long research project. Readings are selected from top-tier conferences such as SOSP, OSDI, NSDI, SIGCOMM, SIGMOD, and EuroSys, spanning topics such as cluster architecture, big data analytics stacks, scheduling and resource management, machine learning, batch and stream analytics, graph processing, serverless platforms, and disaggregated architectures.

CPSC 640b / AMTH 640b, Topics in Numerical Computation Vladimir Rokhlin

This course discusses several areas of numerical computing that often cause difficulties to non-numericists, from the ever-present issue of condition numbers and ill-posedness to the algorithms of numerical linear algebra to the reliability of numerical software. The course also provides a brief introduction to “fast” algorithms and their interactions with modern hardware environments. The course is addressed to Computer Science graduate students who do not necessarily specialize in numerical computation; it assumes the understanding of calculus and linear algebra and familiarity with (or

willingness to learn) either C or FORTRAN. Its purpose is to prepare students for using elementary numerical techniques when and if the need arises.

CPSC 677a, Advanced Natural Language Processing Dragomir Radev

Advanced topics in natural language processing (NLP), including related topics such as deep learning and information retrieval. Included are: (1) fundamental material not covered in the introductory NLP class such as text summarization, question answering, document indexing and retrieval, query expansion, graph-based techniques for NLP and IR, as well as (2) state-of-the-art material published in the past few years such as transfer learning, generative adversarial networks, reinforcement learning for NLP, sentence representations, capsule networks, multitask learning, and zero-shot learning. Prerequisite: CPSC 570, CPSC 577, or equivalent, or permission of the instructor.

CPSC 678b, Creative Artificial Intelligence for Visual Computing Julie Dorsey

How can artificial intelligence help us create visual content? In this readings-and-projects-based course, we explore how to use tools such as probabilistic models, probabilistic programs, and neural networks to generate content, explore design spaces, and support creativity for 2D and 3D graphics and vision applications. Each week, we read recent papers from the visual computing and AI literatures and discuss their contributions, connections, and limitations. Students also complete a collaborative, open-ended final project. Throughout, the course emphasizes key academic skills such as critical paper-reading and how to give clear and compelling presentations. Topics include arranging objects, controlling procedural models, generating 3D geometry, writing and drawing, assigning materials and colors, generative adversarial models, learning representations of shape, learning from RGB-D panoramas, deep reinforcement learning, and exploring manifolds. Prerequisites: equivalent of CPSC 323 and some background in computer graphics, artificial intelligence, machine learning, or probabilistic modeling are helpful. Students are not expected to be familiar with all of these areas; this is a multidisciplinary area, and we welcome students of diverse backgrounds to share their expertise and interests. Students who lack this background may be allowed to enroll with permission of the instructor.

CPSC 690a or b, Independent Project I Staff

By arrangement with faculty.

CPSC 691a or b, Independent Project II Staff

By arrangement with faculty.

CPSC 752b / CB&B 752b / MB&B 752b and MB&B 753b and MB&B 754b / MB&B 753b and MB&B 754b / MCD B 752b, Biomedical Data Science: Mining and Modeling Mark Gerstein and Matthew Simon

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. 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.

CPSC 990a, Ethical Conduct of Research for Master's Students Staff

This course meets on four consecutive Fridays.

CPSC 991a / MATH 991, Ethical Conduct of Research Staff

o Course cr

Earth and Planetary Sciences

Kline Geology Laboratory, 203.432.3124
<http://earth.yale.edu>
 M.S., M.Phil., Ph.D.

Chair

David Bercovici

Director of Graduate Studies

Maureen Long

Professors Jay Ague, David Bercovici, Ruth Blake, Mark Brandon, Derek Briggs, David Evans, Alexey Fedorov, Debra Fischer, Jacques Gauthier, Shun-ichiro Karato, Jun Korenaga, Maureen Long, Jeffrey Park, Peter Raymond, Danny Rye, James Saiers, Ronald Smith, Mary-Louise Timmermans, John Wettlaufer

Associate Professor Noah Planavsky

Assistant Professors Bhart-Anjan Bhullar, Pincelli Hull, Juan Lora, Alan Rooney, Lidya Tarhan

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.

Students admitted in 2020 or earlier have the option of receiving a degree in either Geology and Geophysics or Earth and Planetary Sciences. Students admitted in 2021 and subsequent years will receive a degree in Earth and Planetary Sciences.

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 the student 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.

Teaching experience is regarded as an integral part of the graduate training program in Earth and Planetary Sciences. For this reason, all students are required to serve as teaching fellows for two terms during the course of their predoctoral training. Students who require additional support from the Graduate School must teach additional terms, if needed, after they have fulfilled the academic teaching requirement.

In addition to all other requirements, students must successfully complete EPS 710, 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 Earth and Planetary Sciences, Yale University, PO Box 208109, New Haven CT 06520-8109; e-mail, dgs@eps.yale.edu.

COURSES

EPS 520b, Physics and Chemistry of Earth Materials II Shun-ichiro Karato

Basic principles that control the transport properties of Earth materials. Chemical reactions, anelasticity, diffusion, kinetics of reaction, and mass/energy transport.

EPS 521b, Geophysical Fluid Dynamics Mary-Louise Timmermans

A survey of fluid dynamics, with applications to oceans and atmospheres. Mathematical models illustrate the fundamental dynamical principles of geophysical fluid phenomena such as large-scale flows, waves, boundary layers, and flow stability. Concepts are investigated through laboratory experiments in a rotating water tank. Prerequisite: differential equations and introductory fluid mechanics.

EPS 528a, 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.

EPS 535a, 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.

EPS 556a, 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.

EPS 625a, Oceanography Pincelli Hull and Noah Planavsky

This course provides an introduction to the basics of oceanography. It is structured as an interdisciplinary overview, designed to ensure that graduate students working in the oceans (i.e., those from paleontology, geochemistry, and/or AOCD) have the ability to form interdisciplinary collaborations through shared vocabulary and concepts, and to answer such basic questions as: why are there currents? what makes sea water salty? where is most life in the ocean? Topics are treated in interactive lectures, flipped classroom discussions/activities, and labs and are rigorously tested in one-on-one oral exams.

EPS 636b / ANTH 636b / ARCG 636b, Geoarchaeology: Earth and Environmental Sciences in Archaeological Investigations Ellery Frahm

A survey of the numerous ways in which theories, approaches, techniques, and data from the earth and environmental sciences are used to address archaeological research questions. A range of interfaces between archaeology and the geological sciences are considered. Topics include stratigraphy, geomorphology, site formation processes, climate reconstruction, site location, and dating techniques.

EPS 650a, Deformation of Earth Materials Shun-ichiro Karato

Microscopic physics of deformation of minerals and rocks and its applications to global geophysics.

EPS 655a, Extraordinary Glimpses of Past Life Derek Briggs

Study of exceptionally well preserved fossil deposits (*lagerstaetten*) that contain nonmineralized animal skeletons and casts of the soft parts of organisms. Examples such as the Burgess Shale and Solnhofen limestones; what they can reveal about the history and evolution of life, ancient lifestyles and environments, and preservational processes.

EPS 658a, Seismic Data Analysis Jeffrey Park

This course covers several techniques of seismic data analysis, revisiting some classical results from global seismology that helped to define our knowledge of Earth's interior. Wave-propagation behavior in the context of simple theories of ray tracing, tomography, shear-wave birefringence, free-oscillation frequency shifts, attenuation, receiver functions, surface-wave dispersion, and other observables.

EPS 666a / AMTH 666a / ASTR 666a / MATH 666a, Classical Statistical Thermodynamics John Wettlaufer

Classical thermodynamics is derived from statistical thermodynamics. Using the multi-particle 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.

EPS 710a, Responsible and Ethical Conduct of Research Staff

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. EPS 710 is in addition to the existing online ethics module, The Yale Guide to Professional Ethics, that must be completed by all GSAS students within the first term of study, regardless of source of financial support. o Course cr

EPS 721a, Topics in Geobiology Lidya Tarhan and Alan Rooney

In this seminar, students explore recent papers and emerging ideas concerning life-environment interactions through Earth's history.

EPS 744a or b, Seminar in Mantle and Core Processes Staff

The seminar covers advanced topics concerning physical and chemical processes in the mantle and core of the Earth and planets. Specific topic and hour are arranged in consultation with enrolled graduate students.

EPS 757b, Studies in Global Geoscience David Evans

Reading seminar devoted to a specific geographic region of the Earth, selected as the destination of the departmental field trip for the current year. Topics of discussion include a broad range of geoscience disciplines, to be determined in part by the interests of participating students.

EPS 857a / ANTH 857a, Topics and Issues in Evolutionary Theory Eric Sargis and Jacques Gauthier

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.

East Asian Languages and Literatures

320 York Street, Rm. 110, 203.432.2860
<http://eall.yale.edu>
M.A., M.Phil., Ph.D.

Chair

Aaron Gerow

Director of Graduate Studies

Michael Hunter

Professors Kang-i Sun Chang, Aaron Gerow, Edward Kamens, Tina Lu, Jing Tsu

Associate Professor Michael Hunter

Assistant Professor Lucas Bender

Senior Lecturer Pauline Lin

Senior Lectors II Seungja Choi, Angela Lee-Smith

Senior Lectors Hsiu-hsien Chan, Min Chen, Rongzhen Li, Ninghui Liang, Fan Liu, Kumiko Nakamura, Hiroyo Nishimura, Jianhua Shen, Mari Stever, Wei Su, Chuanmei Sun, Haiwen Wang, Yu-lin Wang Saussy, Peisong Xu, Mika Yamaguchi, Yongtao Zhang, William Zhou

Lector Hyun Sung Lim

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 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. If approved by the director of graduate studies (DGS), graduate courses taken for a grade of Satisfactory/Unsatisfactory in other departments or programs in which these courses are counted toward that department/program's doctoral course or certificate requirements will be counted toward the fourteen-course requirement. 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 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 the student's 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 DGS 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 September 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 and the dissertation prospectus, 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 on the department website, <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*. See also <https://courses.yale.edu>.

CHNS 570a, Introduction to Literary Chinese I Mick 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 151 or CHNS 153 or equivalent.

CHNS 571a or b, Introduction to Literary Chinese II Staff

Continuation of CHNS 570. Reading and interpretation of texts in various styles of literary Chinese (*wenyan*), with attention to basic problems of syntax and literary style. Prerequisite: CHNS 570 or equivalent.

EALL 503a, *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. No knowledge of Japanese required. A previous college-level course in the study of literary texts is recommended but not required.

EALL 510a / EAST 540a, Man and Nature in Chinese Literature Kang-I 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.

EALL 511b / EAST 541b, Women and Literature in Traditional China Kang-I 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.

EALL 512b, Ancient Chinese Thought Mick Hunter

An introduction to the foundational works of ancient Chinese thought from the ruling ideologies of the earliest historical dynasties, through the Warring States masters, to the Qin and Han empires. Topics include Confucianism and Daoism, the role of the intellectual in ancient Chinese society, and the nature and performance of wisdom. This is primarily an undergraduate course; graduate students are provided readings in the original language and meet in an additional session to review translations.

EALL 513b, Philosophy, Religion, and Literature in Medieval China Lucas Bender

This course explores the rich intellectual landscape of the Chinese middle ages, introducing students to seminal works of Chinese civilization and to the history of their debate and interpretation in the first millennium. No previous knowledge of China is assumed. This is primarily an undergraduate course; graduate students are provided readings in the original language and meet in an additional session to review translations.

EALL 530a, Poetry and Ethics Amidst Imperial Collapse Lucas Bender

Du Fu has for the last millennium been considered China's greatest poet. Close study of nearly one-sixth of his complete works, contextualized by selections from the tradition that defined the art in his age. Exploration of the roles literature plays in interpreting human lives and the ways different traditional forms shape different ethical orientation. Poetry as a vehicle for moral reflection. All readings are in English.

EALL 602b, Readings in Classical Chinese Prose Kang-I Chang

Close reading of classical Chinese texts (*wenyan*) primarily from late Imperial China. A selection of formal and informal prose, including memoirs, *sanwen* essays, classical tales, biographies, and autobiographies. Focus on cultural and historical contexts, with attention to reception in China and in some cases in Korea and Japan. Questions concerning readership and governmental censorship, function of literature, history and fictionality, memory and writing, and the aesthetics of *qing* (emotion). Readings in Chinese; discussion in English. Prerequisite: CHNS 171 or equivalent, or permission of instructor.

EALL 625a, Chinese Poetic Form, 1490–1990 Kang-I Chang

What is the appeal and the aesthetic concept of the Classical Chinese poetic form, which began in classical antiquity and continued to serve as a primary medium for poetic expression in modern times? How did modern writers express their “new” voices by using this “old” form? The seminar traces the “modern” development of Chinese classical poetry from the Revivalist (*fugu*) movement of the Ming to contemporary China in Shanghai. Emphasis on critical close reading, with attention to cultural and political contexts. *Baihua* translations and notes are provided for most of the poems. Primary readings in Chinese; discussion in English.

EALL 823a / CPLT 953, Topics in Sinophone and Chinese Studies Jing Tsu

This seminar examines the current state of the field of Chinese and Sinophone studies from different geographical and theoretical perspectives. It is a research seminar and colloquium, and we use texts in the original as well as translated languages. Topics vary.

EALL 872b / FILM 880b, Theories Popular Cult In Japan: TV Aaron Gerow

Exploration of postwar theories of popular culture and subculture in Japan, particularly focusing on the intellectual debates over television and new media.

EALL 900a or b, Directed Readings Mick Hunter

Offered by permission of instructor and DGS to meet special needs not met by regular courses.

EALL 990a or b, Directed Research Mick Hunter

Offered as needed with permission of instructor and DGS for student preparation of dissertation prospectus.

JAPN 570a, 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.

JAPN 872b, Theories of Subculture and Popular Culture in Japan Aaron Gerow

Exploration of postwar theories of popular culture and subculture in Japan, particularly focusing on the intellectual debates over television and new media.

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

Hwansoo Kim (451 College St., Rm. 310, hwansoo.kim@yale.edu)

Professors Daniel Botsman (*History*), Kang-i Sun Chang (*East Asian Languages & Literatures*), Fabian Drixler (*History*), Aaron Gerow (*East Asian Languages & Literatures; Film & Media Studies*), Valerie Hansen (*History*), Edward Kamens (*East Asian Languages & Literatures*), Tina Lu (*East Asian Languages & Literatures*), Peter Perdue (*History*), Frances Rosenbluth (*Political Science*), Helen Siu (*Anthropology*), Chlöe Starr (*Divinity School*), Jing Tsu (*East Asian Languages & Literatures; Comparative Literature*), Anne Underhill (*Anthropology*), Arne Westad (*History; Global Affairs*), Mimi Hall Yiengpruksawan (*History of Art*)

Associate Professors William Honeychurch (*Anthropology*), Michael Hunter (*East Asian Languages & Literatures*), Hwansoo Kim (*Religious Studies*), Yukiko Koga (*Anthropology*)

Assistant Professors Lucas Bender (*East Asian Languages & Literatures*), Jinyi Chu (*Slavic Languages & Literatures*), Eric Greene (*Religious Studies*), Denise Ho (*History*), Daniel Mattingly (*Political Science*), Quincy Ngan (*History of Art*), Hannah Shepherd (*History*), Emma Zang (*Sociology*)

Senior Lecturer Pauline Lin (*East Asian Languages & Literatures*)

Lecturers Allison Bernard, Garrett Bredell, Russell Burge, Paula Curtis, Philip Gant, Jooyeon Hahm, Alex Finn Macartney, David Porter, Kyle Shernuk, Tomonori Sugimoto

Senior Lectors II Seungja Choi, Angela Lee-Smith

Senior Lectors Hsiu-hsien Chan, Min Chen, Rongzhen Li, Ninghui Liang, Fan Liu, Kumiko Nakamura, Hiroyo Nishimura, Aoi Saito, Jianhua Shen, Mari Stever, Wei Su, Chuanmei Sun, Haiwen Wang, Yu-lin Wang Saussy, Peisong Xu, Mika Yamaguchi, Yongtao Zhang, William Zhou

Lector Hyun Sung Lim

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 the student's second year on a mid-December date (if completed in the fall term) or an early-May date (if completed in the spring term) as specified by CEAS.

JOINT-DEGREE PROGRAMS

The Council on East Asian Studies (CEAS) collaborates with three of Yale's professional schools—Environment, 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; website, <http://ceas.yale.edu>. Applications are available online at <http://gsas.yale.edu/admission>; e-mail, graduate.admissions@yale.edu.

COURSES

Please consult the course information available online at <http://ceas.yale.edu/academics/courses> and <https://courses.yale.edu> for a complete list of East Asian-related courses offered at Yale University.

EAST 501a / HIST 867a, Modern Korean History Studies: Issues and Methods Staff

This course examines major works in Korean history of the twentieth century, encompassing the colonial period and the Korean War, the First Republic, economic development, and democratization of South Korea, as well as the building of the North Korean state under Kim Il Sung. Within each of the six topics, a seminal work is paired with an enthusiastically received recent study investigating the same question or time period. By critically analyzing and comparing the issues illuminated and methods employed by these studies, the course seeks to discuss the transformations and continuity of perspectives and methodology in the study of modern Korean history.

EAST 502b / HIST 890b, History of North Korea: Politics, Society, and Culture Staff

This course explores the political, social, and cultural history of North Korea from the origins of the state during the Japanese colonial period to the regime transition in the early twenty-first century. The particular focus is on the factors driving the transformations of North Korea. Nicknamed “the hermit kingdom,” the regime is often commonly perceived as isolated from the outside world. This course seeks to evaluate the importance of external influence and international context at the turning points in North Korean history, which include the establishment of DPRK, its militarization and beginning of nuclear development, Kim Il Sung’s purge of factions and the succession to Kim Jong Il and Kim Jong Un, and other topics. Discussions also analyze the accompanying changes in North Korean society and art. In addition to academic sources, the course utilizes artworks, films, music, historical newspapers, and memoirs. Through the critical examination of the evolution of North Korea, this course situates the country in the region as well as among other authoritarian and communist states.

EAST 540a / EALL 510a, Man and Nature in Chinese Literature Kang-I 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.

EAST 541b / EALL 511b, Women and Literature in Traditional China Kang-I 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.

EAST 542a, Poetry and Ethics Amidst Imperial Collapse Lucas Bender

Du Fu has for the last millennium been considered China's greatest poet. Close study of nearly one-sixth of his complete works, contextualized by selections from the tradition that defined the art in his age. Exploration of the roles literature plays in interpreting human lives and the ways different traditional forms shape different ethical orientation. Poetry as a vehicle for moral reflection. All readings are in English.

EAST 641b, Readings in Classical Chinese Prose Kang-I Chang

Close reading of classical Chinese texts (wenyan) primarily from late Imperial China. A selection of formal and informal prose, including memoirs, sanwen essays, classical tales, biographies, and autobiographies. Focus on cultural and historical contexts, with attention to reception in China and in some cases in Korea and Japan. Questions concerning readership and governmental censorship, function of literature, history and fictionality, memory and writing, and the aesthetics of qing (emotion). Readings in Chinese; discussion in English. Prerequisite: CHNS 171 or equivalent, or permission of instructor.

EAST 889a / HIST 889a, Research in Japanese History Daniel Botsman

After a general introduction to the broad array of sources and reference materials available for conducting research related to the history of Japan since ca. 1600, students prepare original research papers on topics of their own choosing in a collaborative workshop environment. Prerequisite: reading knowledge of Japanese.

EAST 900a or b, Master's Thesis Hwansoo Kim

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 or b, Independent Study Hwansoo Kim

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

Thomas Near

Director of Graduate Studies

Erika Edwards

Professors Richard Bribiescas (*Anthropology*), Nicholas Christakis (*Sociology*), Michael Donoghue, Casey Dunn, Erika Edwards, Vivian Irish (*Molecular, Cellular, & Developmental Biology*), Walter Jetz, Thomas Near, David Post, Jeffrey Powell, Richard Prum, Eric Sargis (*Anthropology*), Oswald Schmitz (*School of the Environment*), David Skelly (*School of the Environment*), Stephen Stearns, Jeffrey Townsend (*Public Health*), Paul Turner, J. Rimas Vaisnys (*Electrical Engineering*), Günter Wagner

Associate Professors Craig Brodersen (*School of the Environment*), Liza Comita (*School of the Environment*), Forrest Crawford (*Public Health*), James Noonan (*Genetics*), Carla Staver, Alison Sweeney, David Vasseur

Assistant Professors Martha Munoz, Alvaro Sanchez

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, phylogenetics, molecular population genetics, developmental evolution, and evolutionary theory.

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 and E&EB 501, Advanced Topics in Ecology and Evolutionary Biology; (2) E&EB 545, 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 Honors (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 the TF-20 level, typically during their first two years of study. Students who require additional support from the Graduate School must teach additional terms, if needed, after they have fulfilled the academic teaching requirement.

By the middle of the fourth term of study, each student organizes a formal pre-prospectus consultative meeting with the student's 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 Marx Science and Social Science Library.

In cases where the dissertation committee decides that preliminary field work during the summer after the fourth term is necessary prior to the prospectus, the prospectus meeting can be delayed by one term. A request for a delay 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 eight graduate-level courses. Required courses are: E&EB 500 and E&EB 501, 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. These courses are taken Sat/Unsat. A minimum of three additional graduate-level, elective courses are required and must be taken for a grade. Students must earn Honors in at least two courses and maintain an overall average of High Pass.

Additional information on the department, faculty, courses, and facilities is available from Deanna Brunson, 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, deanna.brunson@yale.edu; tel., 203.432.3837; fax, 203.432.2374; website, <http://eeb.yale.edu>.

COURSES

E&EB 500a and E&EB 501b, Advanced Topics in Ecology and Evolutionary Biology

Erika Edwards

Topics to be announced. Graded Satisfactory/Unsatisfactory.

E&EB 510a / S&DS 501a, Introduction to Statistics: Life Sciences Walter Jetz and Jonathan Reuning-Scherer

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.

E&EB 515a, Conservation Biology 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.

E&EB 520a, General Ecology David Post and 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.

E&EB 523Lb, Laboratory for Principles of Ecology, Evolutionary Biology, and the Tree of Life Marta Wells

Experimental approaches to organismal and population biology, including study of the diversity of life.

E&EB 525b, Evolutionary Biology Paul Turner

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; and application of evolutionary thinking in disciplines such as developmental biology, ecology, microbiology, molecular biology, and human medicine.

E&EB 530a, 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.

E&EB 545b, Responsible Conduct of Research Jeffrey Powell

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. o Course cr

E&EB 550a, Biology of Terrestrial Arthropods Marta Wells

Evolutionary history and diversity of terrestrial arthropods (body plan, phylogenetic relations, fossil record); physiology and functional morphology (water relations, thermo-regulation, energetics of flying and singing); reproduction (biology of reproduction, life cycles, metamorphosis, parental care); behavior (migration, communication, mating systems, evolution of sociality); ecology (parasitism, mutualism, predator-prey interactions, competition, plant-insect interactions).

E&EB 551La, Laboratory for Biology of Terrestrial Arthropods Marta Wells

Comparative anatomy, dissections, identification, and classifications of terrestrial arthropods; specimen collection; field trips.

E&EB 635a, 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. Prerequisites: BIOL 101–BIOL 104.

E&EB 636b / SOCY 636b, Biosocial Science Nicholas Christakis

This seminar (with limited enrollment, but open to anyone) covers topics at the intersection of the natural and social sciences, including behavior genetics, gene-environment interactions, social epigenetics, and diverse other topics.

E&EB 654a, Phylogenetic Biology Casey Dunn

Phylogenetic biology is the study of the evolutionary relationships between organisms, and the use of evolutionary relationships to understand other aspects of organism biology. This course surveys phylogenetic methods, providing a detailed picture of the statistical, mathematical, and computational tools for building phylogenies and using them to study evolution. We also examine the application of these tools to particular problems in the literature and emerging areas of study.

E&EB 672b, 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.

E&EB 673Lb, Laboratory for Ornithology Richard Prum

Laboratory and field studies of avian morphology, diversity, phylogeny, classification, identification, and behavior. Must be taken concurrently with E&EB 672. ½ Course cr

E&EB 678a, Mathematical Models and Quantitative Methods in Evolution and Ecology Alvaro Sanchez

In this course, we focus on how quantitative approaches are used to allow scientific inference. We discuss general principles for generating hypotheses that are testable (i.e., quantifiable). The course also examines a variety of approaches used to model population-level processes in evolution and ecology, including an overview of population genetics, quantitative genetics, optimality models, game theory, and population dynamic equations. We also discuss experimental design, statistical analyses, inference, and other quantitative methods. The course assumes a basic background in algebra, calculus, probability theory, and statistics. Please address any questions regarding the course to alvaro.sanchez@yale.edu. Prerequisite: although mathematical refreshers are provided, a college-level calculus course (or equivalent) is necessary in order to follow the materials.

E&EB 680b, 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.

E&EB 821a, Advanced Topics in Philosophy of Biology Casey Dunn and Gunter Wagner

This course focuses on epistemology—how we know what we know. We investigate the various scientific methods that biologists employ, and how these reconcile with

approaches in other fields. We also address causality, measurement theory, and the challenges that arise when integrating heterogeneous categories of information that do not have shared ontologies. Prerequisite: E&EB 621 or permission of the instructor.

E&EB 901a, Research Rotation I Erika Edwards

E&EB 902b, Research Rotation II Erika Edwards

Economics

28 Hillhouse Avenue, 203.432.3575
<http://economics.yale.edu>
 M.A., M.Phil., Ph.D.

Chair

Tony Smith

Director of Graduate Studies

Yuichi Kitamura (30 Hillhouse, Rm. 15, 203.432.3699, yuichi.kitamura@yale.edu)

Professors Joseph Altonji, Donald Andrews, Konstantinos Arkolakis, Orazio Attanasio, Dirk Bergemann, Steven Berry, Xiaohong Chen, Ray Fair, Howard Forman (*Public Health*), John Geanakoplos, Pinelopi Goldberg, Timothy Guinnane, Philip Haile, Marina Halac, Johannes Hörner, Gerald Jaynes, Yuichi Kitamura, Alvin Klevorick, Samuel Kortum, Naomi Lamoreaux, Giovanni Maggi, Costas Meghir, Robert Mendelsohn (*School of the Environment*), Giuseppe Moscarini, Kaivan Munshi, William Nordhaus, Gerard Padró i Miquel, Rohini Pande, Benjamin Polak, Mark Rosenzweig, Larry Samuelson, Katja Seim (*Management*), Robert Shiller, Tony Smith, Philipp Strack, Aleh Tsyvinski, Edward Vytlačil, Ebonya Washington, Fabrizio Zilibotti

Associate Professors Timothy Armstrong, Mitsuru Igami, Michael Peters

Assistant Professors Eduardo Davila, José-Antonio Espín-Sánchez, Mira Frick, Charles Hodgson, John Eric Humphries, Zhen Huo, Ryota Iijima, Ilse Lindenlaub, Yusuke Narita, Cormac O'Dea, Nicholas Ryan, Anna Sanktjohanser

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 REQUIREMENTS FOR THE PH.D. DEGREE

Exceptions to the requirements described below may be obtained only by vote of the Economics faculty and will be granted only in recognition of extenuating circumstances.

Prior to Registration for the Second Year

(1.1) Students must have taken for credit and passed at least six economics graduate courses. (Courses in the International and Development Economics master's program do not satisfy this requirement.) (1.2) Students must pass written comprehensive examinations in microeconomics and macroeconomics. These are given in May and late August each year. One or both may be taken in the August just prior to the first year of study with permission of the director of graduate studies (DGS). Examinations not passed prior to the first year of study must be taken in the spring term of the first year. In the event of failure, the failed exam must be retaken the next time it is offered. Students may take each comprehensive exam no more than two times. Students who have not passed both examinations prior to the second year of study may register as

master's candidates for the following fall term for the purpose of completing enough courses to be eligible for the M.A. degree. The microeconomics and macroeconomics comprehensive exams will be given on two different days for at least three hours. The examinations scheduled in the spring term will occur approximately a week after the end of course exams. The questions on the comprehensive exams will be on topics taught in the first-year microeconomic and macroeconomic courses of the immediately preceding year. Each exam will be graded separately. In the event of failure, students will retake only the exam they did not pass. Comprehensive exams taken by students prior to their first year will be graded as a pass only if they are a "solid" pass rather than a "minimal" pass.

Students considering a combined degree with Economics and another department or program should consult the Economics department website: <https://economics.yale.edu/graduate/combined-doctoral-degrees>. The proposal for a combined degree should be submitted during the summer after the first year of study. See also Combined Ph.D. Degrees below.

Prior to Registration for the Third Year

(2.1) Students must have met the Graduate School's requirement of Honors in two courses. (2.2) Students must have taken at least fourteen term courses in economics and have received a grade of at least a P- in each of them. With the permission of the DGS, courses in related fields and independent reading courses can be used to fulfill this requirement. Workshops may not be used to satisfy it. (2.3) Students must have received an average of at least HP in the courses they have taken. The admissibility of courses for this requirement is the same as for the fourteen-course requirement, (2.2). Grades within the Economics department include pluses and minuses. The grade average is computed as follows. A failure counts as a zero, a P- as a 1, a P as a 2, a P+ as a 3, an HP- as a 4, and so on up to a 9 for an H+. The arithmetic average of these numbers must be at least 4.5. (2.4) All students must have submitted a draft of their applied econometrics paper, discussed under (3.3) below. (2.5) All students must make their first attempt at each of two oral qualifying examinations by June 30 of their second year in the program. The examinations test a student's general analytic ability in economics and knowledge of two fields chosen by the student. At least one of the fields must have substantial empirical and institutional content. Such applied fields are drawn from a departmental list that includes labor economics, market organization, macroeconomics, financial economics, behavioral economics, economics of the public sector and of the environment, international trade and finance, economic development, economic history, and comparative economic systems. Students may also choose as one of their fields mathematical economics, advanced micro- or macroeconomic theory, or econometric theory. Students may request examination in a special field designed in consultation with Economics department faculty. The choice of fields must be approved by the DGS. Students may take the oral examination in one field no more than twice. An oral examination that was failed on the first attempt must be retaken in the fall of the third year, and the retake must be in the same field. Students may list two preferred examiners in each field. The DGS's office strives to satisfy these preferences subject to faculty availability and the number of students making similar requests. Students are required to provide field sheets for each exam which list the literature and topics or subfields on which they wish to be examined. Students should consult faculty members

as they prepare this list. Students are expected both to have command of the general field of the exam and to know in depth the material in the areas they specify. The examinations are normally question-and-answer on this material, but examiners are not required to restrict questioning to it. The broader the topics listed, the more likely examiners are to confine questioning to them.

Admission to Candidacy

The Economics department adheres strictly to the Graduate School requirement that students be admitted to candidacy prior to registration for the fourth year of study. Students are recommended to the Graduate School for admission to candidacy by vote of the Department of Economics faculty after having completed requirements (2.1), (2.2), and (2.3) above, the Graduate School's prospectus requirement, and the following additional requirements. (3.1) Students must have completed two one-term prospectus workshops, one in each term of the third year. All prospectus workshops have the word "prospectus" in their title. If students can find no prospectus workshop corresponding to their interests, they may substitute other workshops to meet this requirement. In order for two workshops to count toward the prospectus requirement, students must make a presentation in each workshop and present original work in one of them. This stipulation applies even if a workshop is not labeled as a prospectus workshop. If students can find no workshop whatsoever in their area of interest, they may substitute an independent study course guided by a faculty member, provided the independent study leads to a dissertation prospectus that is accepted. (3.2) Students must receive a grade of HP- or better in ECON 551 (Econometrics II) or ECON 552 (Econometrics III). More advanced courses may be substituted for these with permission of the DGS. (3.3) Students must receive a grade of Satisfactory on an applied econometrics paper, which is evaluated by a faculty adviser of the paper and another faculty member. In the paper, the student should (a) specify an economic model useful for the investigation of an interesting economic problem, (b) select data and econometric methods appropriate to the question, (c) conduct proper statistical analysis, and (d) interpret the results in an intelligent way. The department's posted description of the Applied Econometrics Paper Requirement should answer any questions about it. The paper may be written in the course ECON 556 or independently with the help of a faculty adviser, the standards for a satisfactory paper being the same in both cases. The paper is not expected to be of publishable or nearly publishable quality, but should demonstrate facility in the application of econometric methods to an economic question. *Note:* Jointly authored papers will not be accepted. (3.4) Students must complete with a grade of at least HP- a term of economic history, drawn from a list of courses approved by the DGS and the economic history instructors. (3.5) Students must pass two oral qualifying examinations given by committees of faculty members. These exams are discussed under (2.5) above.

Additional Requirements

(1) All students must give a dissertation prospectus to their advisory committee by the second Friday in May of their third year. (2) Students must provide the names of their advisory committee to the DGS's office by February 1 of the third year. (3) In each academic year after the second, all students must regularly attend at least two workshops. At least one of them must be an "informal" prospectus workshop lunch or reading group, and at least one must be a "formal" research workshop. Each student

must present at least once a year in one or other of the workshops that they regularly attend. (4) Third-year students who have not yet satisfied the econometrics paper requirement must submit an econometrics paper by February 1.

The Dissertation

The dissertation should make an original contribution to economics that demonstrates the student's mastery of relevant resources and methods. Although the dissertation may cover several related topics, it should have a unifying theme. The dissertation may consist of one or more than one essay. The dissertation is guided by a committee of two advisers, at least one of whom must be a member of the Economics department. The second adviser need not be from the Economics department or even from Yale University. Second advisers from outside the Yale Economics department must be approved by the DGS. The two advisers serve as readers. After the student has completed a first draft of the dissertation, the DGS appoints a third reader. The student and the committee may recommend third readers, but the choice remains with the DGS, since the third reader serves as an independent referee.

Collaborative Work on the Dissertation

The Economic department's objective regarding collaboration is to achieve a reasonable compromise between two goals. While the department wishes to encourage collaborative research among students and between students and faculty, a dissertation should demonstrate the student's ability to do independent research. A substantial part of a dissertation must present work done and written solely by the student. The dissertation committee and the DGS must approve the inclusion of collaborative work in the dissertation, and students must acknowledge and describe any collaboration in the preface to the dissertation.

Expiration of Admission to Candidacy

Advancement to candidacy expires ten years after the date it is granted, if no dissertation has been submitted and approved in the intervening period.

Normal Sequence of Courses

The following are recommendations, *not* requirements.

During the fall term of the first year, students usually take ECON 500 (General Economic Theory: Microeconomics), ECON 510 (General Economic Theory: Macroeconomics), ECON 550 (Econometrics I), and an economic history class that would satisfy the economic history requirement, (3.4) above, if a grade of at least HP- were obtained. In the following spring, they usually take ECON 501 (General Economic Theory: Microeconomics), ECON 511 (General Economic Theory: Macroeconomics), ECON 551 (Econometrics II), and a fourth course in economics or related subjects, such as probability theory, mathematics, finance, or political science. Students who are well prepared in econometrics may take an advanced econometrics course instead of ECON 550 in the fall of the first year after consulting the DGS and an appropriate econometrics faculty member.

During the second year, students normally take economics courses in specialized fields, such as industrial organization, mathematical economics, international trade, or

public finance. These courses serve as preparation for the oral qualifying examinations. Students may also take courses related to economics from other departments. It is a good idea to satisfy the econometrics paper requirement in the second year and to locate a faculty adviser to advise them about their studies.

The third year is normally devoted to finding a dissertation topic and to beginning research on it. In this year, students are expected to make the transition from being a taker of classes to a participant in research. Important elements in achieving this transition are thinking critically about material learned, reading widely, choosing research topics that are feasible and of interest to the student, and gaining contact with faculty. Students can expect to take the initiative in making such contact.

COMBINED PH.D. DEGREES

A combined degree results in the award of one Ph.D. with two departments named. Combined degrees are intended to provide a sufficiently broad training program for a student wishing to complete an interdisciplinary dissertation. Combined degree programs are designed on an ad hoc basis by the student, the directors of graduate studies of the two departments, and the appropriate associate dean of the Graduate School. Most combined degrees are proposed by students during the summer after the first year of study. Students must advance to candidacy by the end of their third year of study.

A combined program should synthesize the knowledge and methods of the two departments into a single study. Students interested in pursuing an ad hoc combined degree program should write a pre-prospectus, which must be approved by a faculty dissertation adviser from each department. Two additional faculty, one from each department, must serve on the dissertation committee. The DGS from each department, as well as the cognizant associate dean from the Graduate School, should review and approve a comprehensive plan of study. Qualifying examinations should include the two comprehensive examinations in micro- and macroeconomic theory given at the end of the first year by the Department of Economics. Normally the two departments administer qualifying examinations jointly. Both departments must accept the dissertation prospectus.

Ideally students should obtain teaching experience from both departments. For further details, see <https://economics.yale.edu/graduate/combined-doctoral-degrees>.

MASTER'S DEGREES

M.Phil. The M.Phil. degree is awarded to students in the Ph.D. program upon completion of all the requirements for advancement to candidacy for a doctorate in economics except the prospectus and prospectus workshop requirements.

M.A. (en route to the Ph.D.) The M.A. degree is awarded upon completion of at least eight term graduate courses listed or cross-listed by the Department of Economics. At least six of these courses must be Ph.D. courses in the Department of Economics (not courses from the International and Development Economics master's program). The average grade of all the graduate courses taken that are listed or cross-listed by the Department of Economics must be at least a High Pass, and at least two of these grades must be an Honors. Students must complete at least two of the three first-year two-course sequences in microeconomics, macroeconomics, or econometrics. In computing

the grade average, the relevant grades are those reported to the registrar and so do not include pluses or minuses. A Fail counts as a zero, a Pass counts as a 1, a High Pass counts as a 2, and an Honors counts as a 3. To say that the average grade must be High Pass means that the arithmetic average of these numbers must be at least 2.

Students in doctoral programs other than Economics may earn an M.A. in Economics under the conditions listed in the previous paragraph. Such students automatically earn an M.A. in their own department when awarded a Ph.D., and Yale allows students to earn only one M.A. degree. Consequently, students must apply to have the M.A. in their own department replaced by the Economics M.A. This application must be made to the DGS of Economics and to the DGS of the student's own department. Prior to this application, the student must have taken the first one-term course in at least one of the three first-year two-course sequences in microeconomics, macroeconomics, or econometrics and obtained a grade of at least High Pass. As part of the application, the student must submit a proposed list of economics courses, and this list must be approved by the two DGSs and by the appropriate dean of the Graduate School. The DGS of Economics must approve any deviation from this list, and this approval should be obtained before taking courses not on the list.

Terminal Master's Degree Program Students working toward a J.D. in the Law School may earn an M.A. degree in Economics. The degree requirements that apply to these students are the same as those described above for the M.A. degree en route to Ph.D. for students in doctoral programs other than Economics. Students wishing to join this J.D./M.A. joint-degree program must apply for separate admission to the Economics graduate program; applicants should submit scores from the GRE General Test. Students admitted to this program pay three years of tuition to the Law School and one year of tuition to the Graduate School. The Graduate School does not offer fellowship support to J.D./M.A. candidates.

The M.A. in International and Development Economics is described under International and Development Economics.

COURSES

ECON 500a and ECON 501b, General Economic Theory: Microeconomics

Larry Samuelson and Johannes Horner

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 510a and ECON 511b, General Economic Theory: Macroeconomics

Zhen Huo and Fabrizio Zilibotti

Analysis of short-run determination of aggregate employment, income, prices, and interest rates in closed and open economies. Stabilization policies.

ECON 520a, Advanced Microeconomic Theory I

Johannes Horner and Mira Frick

A formal introduction to game theory and information economics. Alternative non-cooperative solution concepts are studied and applied to problems in oligopoly, bargaining, auctions, strategic social choice, and repeated games.

ECON 521b, Advanced Microeconomic Theory II Marina Halac and 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 ECON 523b, Microeconomic Theory Lunch Staff

A forum for advanced students to critically examine recent papers in the literature and present their own work.

ECON 525a, Advanced Macroeconomics I Zhen Huo

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 Giuseppe Moscarini and Ilse Lindenlaub

Macroeconomic equilibrium in the presence of uninsurable labor income risk. Implications for savings, asset prices, unemployment.

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 (GEL. Part III focuses on the special case of the capital asset pricing model (CAPM, including extensions to multi-commodity 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.

ECON 531b, Mathematical Economics II Staff

This course examines the foundations of money and finance from the perspective of general equilibrium with incomplete markets. The relevant mathematical tools from elementary stochastic processes to differential topology are developed in the course. Topics include asset pricing, variations of the capital asset pricing model, the “Hahn paradox” on the value of fiat money, default and bankruptcy, collateral equilibrium, market crashes, adverse selection and moral hazard with perfect competition, credit card equilibrium, and general equilibrium with asymmetric information.

ECON 537a and ECON 538b, Microeconomic Theory Workshop Staff

Presentations by research scholars and participating students.

ECON 540a and ECON 541b, Student Workshop in Macroeconomics Staff

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 ECON 543b, Macroeconomics Workshop Staff

A forum for presentation and discussion of state-of-the-art research in macroeconomics. Presentations by research scholars and participating students of papers in closed economy and open economy macroeconomics and monetary economics.

ECON 545a, Microeconomics Michael Boozer

A survey of the main features of current economic analysis and of the application of the theory to a number of important economic questions, covering microeconomics and demand theory, the theory of the firm, and market structures. For IDE students.

ECON 546a, Growth and Macroeconomics Staff

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 Donald Andrews

The treatment of the subject is rigorous, attentive to modern developments, and proceeds to research level in several areas. Linear models from core curriculum. Topics include linear estimation theory, multiple and multivariate regressions, Kruskal's theorem and its applications, classical statistical testing by likelihood ratio, Lagrange multiplier and Wald procedures, bootstrap methods, specification tests, Stein-like estimation, instrumental variables, and an introduction to inferential methods in simultaneous stochastic equations.

ECON 554b, Econometrics V Xiaohong Chen

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 556a, Topics in Empirical Economics and Public Policy Philip Haile and Joseph Altonji

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 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 564a or b, Research Sem in Econometrics Staff

ECON 567a and ECON 568b, Econometrics Workshop Staff

A forum for state-of-the-art research in econometrics. Its primary purpose is to disseminate the results and the technical machinery of ongoing research in theoretical and applied fields.

ECON 570a and ECON 571b, Prospectus Workshop in Econometrics Staff

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 500 and ECON 510; permission of the instructor.

ECON 581b, American Economic History Jose-Antonio Espin-Sanchez

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 501 and ECON 510.

ECON 588a and ECON 589b, Economic History Workshop Staff

A forum for discussion and criticism of research in progress. Presenters include graduate students, Yale faculty, and visitors. Topics concerned with long-run trends in economic organization are suitable for the seminar. Special emphasis given to the use of statistics and of economic theory in historical research.

ECON 600a, Industrial Organization I Philip Haile and 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 Katja Seim

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 ECON 607b, Prospectus Workshop in Industrial Organization Staff

For third-year students in microeconomics, intended to guide students in the early stages of theoretical and empirical dissertation research. Emphasis on regular writing assignments and oral presentations.

ECON 608a and ECON 609b, Industrial Organization Seminar Staff

For advanced graduate students in applied microeconomics, serving as a forum for presentation and discussion of work in progress of students, Yale faculty members, and invited speakers.

ECON 630a and ECON 631b, 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 638a and ECON 639b, Labor and Population Workshop Staff

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 or b, Prospectus Workshop in Labor Economics and Public Finance
Staff

Workshop for students doing research in labor economics and public finance.

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, Financial Crises Gary Gorton and 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 740 and 741 (doctoral students in Economics may substitute the core microeconomics sequence), and permission of the instructor.

ECON 679a or b, Financial Economics Student Lunch Staff

This workshop is for third-year and other advanced students in financial economics. It is intended to guide students in the early stages of dissertation research. The emphasis is on presentation and discussion of materials presented by students that will eventually lead to dissertation topics. Open to third-year and advanced Ph.D. students only.

ECON 680a, Public Finance I Orazio Attanasio

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 Orazio Attanasio

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 706a and ECON 707b, Prospectus Workshop in International Economics Staff

This workshop is for third-year and other advanced students in international economic fields. It is intended to guide students in the early stages of dissertation research. The emphasis is on students' presentation and discussion of material that will eventually lead to the prospectus.

ECON 720a, International Trade I Costas Arkolakis and Giovanni Maggi

The first part of this course covers the basic theory of international trade, from neoclassical theory where trade is the result of comparative advantage (Ricardo, Heckscher-Ohlin) to the "New Trade Theory" where trade is generated by imperfect competition and increasing returns to scale. Particular emphasis is placed on the implications of the different theories concerning the aggregate gains or losses from trade and the distributional implications of trade liberalization. The second part of the course explores new advances in the field. It covers the Eaton-Kortum (2002) and Melitz (2003) models; extensions of these models with many countries, multiproduct firms, and sectors; methods of quantitative trade analysis to revisit classic questions (gains from trade, distributional effects of trade, trade policy); and new advances in dynamic trade theory.

ECON 724a, International Finance Ana Fielor

A study of how consumers and firms are affected by the globalization of the world economy. Topics include trade costs, the current account, exchange rate pass-through, international macroeconomic co-movement, multinational production, and gains from globalization. Prerequisite: intermediate macroeconomics or equivalent.

ECON 728a and ECON 729b, Workshop: International Trade Staff

ECON 730a, Economic Development I Mark Rosenzweig and Nicholas Ryan
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 Rohini Pande and Kaivan Munshi
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 Michael Boozer
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 737a, 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 750a or b, Trade and Development Workshop Staff

A forum for graduate students and faculty with an interest in the economic problems of developing countries. Faculty, students, and a limited number of outside speakers discuss research in progress.

ECON 756a or b, Prospectus Workshop in Development Staff

Workshop for students doing research in development to present and discuss work.

ECON 790b / PLSC 725b, Empirical Political Economy 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, International Trade Policy 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 500 and 501.

ECON 899a or b, Individual Reading and Research Staff

By arrangement with faculty.

Electrical Engineering

17 Hillhouse Avenue, 203.432.4220
M.S., M.Phil., Ph.D.

Chair

Leandros Tassiulas

Director of Graduate Studies

Hong Tang (hong.tang@yale.edu)

Professors Hui Cao,* James Duncan,† Jung Han, Roman Kuc, Tso-Ping Ma, Rajit Manohar, A. Stephen Morse, Kumpati Narendra, Daniel Prober,† Mark Reed, Peter Schultheiss (Emeritus), Lawrence Staib,† Hemant Tagare,* Hong Tang, Leandros Tassiulas, J. Rimantas Vaisnys, Y. Richard Yang†

Associate Professors Fengnian Xia, Jakub Szefer, Sekhar Tatikonda

Assistant Professors Wenjun Hu, Amin Karbasi, Priyadarshini Panda

Senior Lecturer Richard Lethin

* A secondary appointment with primary affiliation in another department or school.

† A joint appointment with another department.

FIELDS OF STUDY

Fields include biomedical sensory systems, communications and signal processing, neural networks, control systems, wireless networks, sensor networks, microelectro-mechanical and nanomechanical systems (MEMS and NEMS), nanoelectronic science and technology, optoelectronic materials and devices, semiconductor materials and devices, quantum and nonlinear photonics, quantum materials and engineering, computer engineering, computer architecture, hardware security, and VLSI design and testing.

For degree requirements and courses, see Engineering & Applied Science.

Engineering & Applied Science

17 Hillhouse Avenue, 203.432.4220

<http://seas.yale.edu>

M.S., M.Phil., Ph.D.

Dean

Jeffrey Brock

Deputy Dean

Vincent Wilczynski

Assistant Dean

Sarah M. Miller

BIOMEDICAL ENGINEERING

Chair

Jay Humphrey

Director of Graduate Studies

Richard Carson (richard.carson@yale.edu)

Professors Helene Benveniste,* Joerg Bewersdorf,* Richard Carson,† Nicholas Christakis,* Todd Constable,* Robin de Graaf,* James Duncan,† Jay Humphrey, Fahmeed Hyder,† Francis Lee,* Andre Levchenko, Graeme Mason,* Evan Morris,* Laura Niklason,* Xenophon Papademetris,* Douglas Rothman,† W. Mark Saltzman, Martin Schwartz,* Fred Sigworth,* Albert Sinusas,* Brian Smith,* Lawrence Staib,† Hemant Tagare,* Paul Van Tassel,* Steven Zucker†

Associate Professors Stuart Campbell, Tarek Fahmy, Rong Fan, Gigi Galiana,* Anjelica Gonzalez, Michelle Hampson,* Henry Hsia,* Farren Issacs,* Themis Kyriakides,† Chi Liu,* Kathryn Miller-Jensen, Michael Murrell, Dana Peters,* Jiangbing Zhou*

Assistant Professors Nicha Dvornek,* Ansel Hillmer,* Michael Mak, Dustin Scheinost,* Gregory Tietjen*

* A secondary appointment with primary affiliation in another department or school.

† A joint appointment with another department.

CHEMICAL & ENVIRONMENTAL ENGINEERING

Chair

Jaehong Kim

Director of Graduate Studies

Paul Van Tassel (paul.vantassel@yale.edu) (paulvantassel@yale.edu)

Professors Eric Altman, Paul Anastas,† Michelle Bell,* Ruth Blake,* Menachem Elimelech, Gary Haller (*Emeritus*), Edward Kaplan,* Jaehong Kim, Michael Loewenberg, Andrew Miranker,* Jordan Peccia, Lisa Pfefferle, Daniel Rosner (*Emeritus*), W. Mark Saltzman,* Udo Schwarz,* T. Kyle Vanderlick, Paul Van Tassel, Julie Zimmerman†

Associate Professors John Fortner, Drew Gentner

Assistant Professors Peijun Guo, Amir Haji-Akbari, Shu Hu, Mingjiang Zhong

Lecturer Aniko Bezur

* A secondary appointment with primary affiliation in another department or school.

† A joint appointment with another school.

COMPUTER SCIENCE

Chair

Zhong Shao

Director of Graduate Studies

Vladimir Rokhlin (108 AKW, 203.432.1283, vladimir.rokhlin@yale.edu)

Professors Dana Angluin, James Aspnes, Dirk Bergemann,* Ronald Coifman,* Aaron Dollar,* Julie Dorsey, Stanley Eisenstat, Joan Feigenbaum, Michael Fischer, David Gelernter, Mark Gerstein,* John Lafferty,* Rajit Manohar,* Drew McDermott (*Emeritus*), Dragomir Radev, Vladimir Rokhlin,† Holly Rushmeier, Brian Scassellati, Martin Schultz (*Emeritus*), Zhong Shao, Avi Silberschatz, Daniel Spielman, Leandros Tassioulas,* Nisheeth Vishnoi, Y. Richard Yang, Lin Zhong, Steven Zucker†

Associate Professors Abhishek Bhattacharjee, Theodore Kim, Sahand Negahban,* Ruzica Piskac, Jakub Szefer*

Assistant Professors Yang Cai, Wenjun Hu,* Julian Jara-Ettinger,* Amin Karbasi,* Smita Krishnaswamy,* Robert Soule, David van Dijk,* Marynel Vázquez

Senior Lecturers James Glenn, Stephen Slade

Lecturers Andrew Bridy,† Benedict Brown, Kyle Jensen,* Scott Petersen, Brad Rosen, Andrew Sherman, Cecillia Xie

* A secondary appointment with primary affiliation in another department or school.

† A joint appointment with another department.

ELECTRICAL ENGINEERING

Chair

Leandros Tassioulas

Director of Graduate Studies

Hong Tang (hong.tang@yale.edu)

Professors Hui Cao,* James Duncan,† Jung Han, Roman Kuc, Tso-Ping Ma, Rajit Manohar, A. Stephen Morse, Kumpati Narendra, Daniel Prober,† Mark Reed, Peter Schultheiss (*Emeritus*), Lawrence Staib,† Hemant Tagare,* Hong Tang, Leandros Tassioulas, J. Rimas Vaisnys, Y. Richard Yang†

Associate Professors Fengnian Xia, Jakub Szefer, Sekhar Tatikonda

Assistant Professors Wenjun Hu, Amin Karbasi, Priyadarshini Panda

Senior Lecturer Richard Lethin

* A secondary appointment with primary affiliation in another department or school.

† A joint appointment with another department.

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, Aaron Dollar, Alessandro Gomez, Sohrab Ismail-Beigi,^{*} Shun-Ichiro Karato,^{*} Marshall Long, Corey O'Hern, Vidvuds Ozolins,^{*} Brian Scassellati,^{*} Jan Schroers, Udo Schwarz, Mitchell Smooke

Associate Professor Judy Cha

Assistant Professors Rebecca Kramer-Bottiglio, Diana Qiu, Madhusudhan Venkadesan

Lecturers Beth Anne Bennett, Joran Booth, Joseph Zinter

^{*} A secondary appointment with primary affiliation in another department or school.

[†] A joint appointment with another department.

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

Fields of Study

Biological and medical devices, biological signals and sensors, biomaterials, biophotonics, cellular biomechanics, computational biomechanics, computational medicine, computer vision, digital image analysis and processing, drug delivery, energy metabolism, experimental biomechanics, gene delivery, gene therapy, image analysis, Magnetic Resonance Imaging (MRI), Magnetic Resonance Spectroscopy (MRS), modeling in mechanobiology, molecular biomechanics, nanomedicine, network analysis, neuroreceptors, physics of image formation (MRI, optics, ultrasound, nuclear medicine, and X-ray), physiology and human factors engineering, Positron Emission Tomography (PET), regenerative medicine, signaling pathways, Single Photon Emission Computed Tomography (SPECT), systems biology, systems medicine, tissue engineering, tracer kinetic modeling, and vascular biology.

CHEMICAL & ENVIRONMENTAL ENGINEERING

Fields of Study

Fields include nanomaterials, soft matter, interfacial phenomena, energy, water and air quality, and sustainability.

COMPUTER SCIENCE

Fields of Study

Algorithms and computational complexity, artificial intelligence, data networking, databases, graphics, machine learning, programming languages, robotics, scientific computing, security and privacy, and systems.

ELECTRICAL ENGINEERING

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, quantum and nonlinear photonics, quantum materials and engineering, computer engineering, computer architecture, hardware security, and VLSI design and testing.

MECHANICAL ENGINEERING & MATERIALS SCIENCE

Fields of Study

Fluids and thermal sciences Electrospray theory and characterization; electrical propulsion applications; combustion and flames; computational methods for fluid dynamics and reacting flows; and laser diagnostics of reacting and nonreacting flows.

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 proteins and other 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, optical, and emergent 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; nanostructured energy applications; nanoparticle synthesis for energy applications; combinatorial materials science; in situ transmission electron and scanning probe microscopy; theoretical spectroscopy and computational materials science; and halide perovskites.

Robotics/mechatronics Machine and mechanism design; dynamics and control; robotic grasping and manipulation; human-machine interface; rehabilitation robotics; haptics; soft robotics; flexible and stretchable electronics; soft material manufacturing; responsive material actuators; soft-bodied control; electromechanical energy conversion; biomechanics of human movement; mechanics of biological muscle; 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.

Students plan their 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 up to two terms, 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 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.

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) Biological Processes in Environmental Engineering (ENAS 641), Environmental Physicochemical Processes (ENAS 642), and either Environmental Organic Chemistry (ENAS 638) or Aquatic Chemistry (ENAS 640). 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 (ENV 781), Multivariate Data Analysis in the Environmental Sciences (ENV 758), Data Exploration and Analysis (S&DS 530), or Multivariate Statistical Methods for the Social Sciences (S&DS 563).

Computer Science See the departmental entry for Computer Science in this bulletin.

Electrical Engineering (Computer Engineering track) Competence must be demonstrated in at least two of the three research areas. At least two courses that cover two different areas are required. In the area of computer organization and architecture, the course options are Computer Architectures and Artificial Intelligence (ENAS 907) and Computer Organization and Architecture (ENAS 967). In the area of VLSI, the course options are Introduction to VLSI System Design (ENAS 875) and Silicon Compilation (ENAS 876). In the area of computer systems, the course options are Principles of Operating Systems (CPSC 523), Building Distributed Systems (CPSC 526), Computer Networks (CPSC 533), Topics on the Hardware/Software Interface (CPSC 635), and Cloud FPGA (ENAS 968).

Electrical Engineering (Microelectronics track) Two of the following four courses: Phototonics and Optical Electronics (ENAS 511), Advanced Electron 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 572), Intelligent Robotics Laboratory (CPSC 573), Classical

and Statistical Thermodynamics (ENAS 521), Biological Physics (ENAS 541), Neuromuscular Biomechanics (ENAS 559), Polymer Chemistry and Physics (ENAS 606), Synthesis of Nanomaterials (ENAS 615), Statistical Physics II (PHYS 628), Introduction to Nanomaterials and Nanotechnology (ENAS 703), Theoretical Fluid Dynamics (ENAS 704), Fundamentals of Combustion (ENAS 708), Solidification and Phase Transformations (ENAS 752), Introduction to Robot Analysis (ENAS 777), Advanced Robotic Mechanisms (ENAS 778), 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), Systems and Control (ENAS 936), and Mechatronics Laboratory (ENAS 994). 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. An average grade of at least High Pass must be maintained through all courses that count toward the Ph.D.

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 in Engineering & Applied Science. 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.

Joint Master's Degree Program (School of Engineering & Applied Science and School of the Environment) The joint master's degree program offered by the School of the Environment (YSE) and the School of Engineering & Applied Science (SEAS) provides environmental engineers and environmental managers with the opportunity to develop knowledge and tools to address the complex relationship between technology and the environment. This joint-degree program will train graduate students to design and manage engineered and natural systems that address critical societal challenges, while considering the complex technical, economic, and sociopolitical systems relationships. Each joint program leads to the simultaneous award of two graduate professional degrees: either the Master of Environmental Management (M.E.M.) or the Master of Environmental Science (M.E.Sc.) from YSE, and a Master of Science (M.S.) from SEAS. Students can earn the two degrees concurrently in 2.5 years, less time than if they were pursued sequentially. Candidates spend the first year at YSE, the second year at SEAS, and their final term at YSE. Joint-degree students are guided in this process by advisers in both YSE and SEAS. Candidates must submit formal applications to both YSE and SEAS 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. Prospective students to the joint-degree program apply to the YSE master's degree through YSE (<https://apply.environment.yale.edu/apply>) and to the SEAS master's degree in Chemical & Environmental Engineering through the Graduate School of Arts and Sciences (<https://gsas.yale.edu/admissions/degree-program-application-process>).

The following six courses are required of all joint-degree YSE/SEAS master's students completing their M.S. in Environmental Engineering: ENAS 641, ENAS 642, ENAS 660, ENV 773, ENV 838, and either ENV 712 or ENV 724. Two additional Yale-wide technical electives approved by the DGS (or faculty in an equivalent role in Environmental Engineering) are required. These courses may be cross-listed with or administered by YSE with prior approval from the DGS. For the joint-degree requirements for completion of the M.E.M. or M.E.Sc. in YSE, see the bulletin of the Yale School of the Environment at <https://bulletin.yale.edu>.

Program materials are available upon request to the Office of Graduate Studies, School of Engineering & Applied Science, Yale University, PO Box 208292, New Haven CT 06520-8292; e-mail, engineering@yale.edu; website, <http://seas.yale.edu>.

COURSES

The list of courses may be slightly modified by the time term begins. Please visit <https://courses.yale.edu> for the most updated course listing.

ENAS 500b, Mathematical Methods I Paul Van Tassel

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.

ENAS 502b / S&DS 551b, Stochastic Processes Joseph Chang

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.

ENAS 508b, Responsible Conduct of Research Staff

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. o Course cr

ENAS 509b, Electronic Materials Jung Han

Survey and review of fundamental material issues pertinent to modern microelectronic and optoelectronic technology. Topics include band theory, electronic transport, surface kinetics, diffusion, defects in crystals, thin film elasticity, crystal growth, and heteroepitaxy.

ENAS 510a, Physical and Chemical Basis of Bioimaging and Biosensing

Douglas Rothman, Fahmeed Hyder, and 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.

ENAS 513a, Introduction to Analysis Peter Jones

Foundations of real analysis, including metric spaces and point set topology, infinite series, and function spaces.

ENAS 514b, Real Analysis Yair Minsky

The Lebesgue integral, Fourier series, applications to differential equations.

ENAS 519b, Responsible Conduct of Research Staff

Required of first-year students in Chemical & Environmental Engineering, Electrical Engineering, and Mechanical Engineering & Materials Science. 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. o Course cr

ENAS 521b, Classical and Statistical Thermodynamics

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 522a, Engineering and Biophysical Approaches to Cancer Michael Mak

This course examines the current understanding of cancer as a complex disease and the advanced engineering and biophysical methods developed to study and treat this disease. All treatment methods are covered. Basic quantitative and computational backgrounds are required. Prerequisites: BENG 249 or equivalent and MATH 120 or equivalent.

ENAS 535b / PATH 630b, Biomaterial-Tissue Interactions Themis Kyriakides

Study of 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. Attention to specific areas such as biomaterials for tissue engineering and the importance of stem/progenitor cells, as well as biomaterial-mediated gene and drug delivery.

ENAS 541b / CB&B 523b / MB&B 523b / PHYS 523b, Biological Physics

Benjamin Machta

The course has two aims: (1) to introduce students to the physics of biological systems and (2) to introduce students to the basics of scientific computing. The course focuses on studies of a broad range of biophysical phenomena including diffusion, polymer statistics, protein folding, macromolecular crowding, cell motion, and tissue development using computational tools and methods. Intensive tutorials are provided for MATLAB including basic syntax, arrays, for-loops, conditional statements, functions, plotting, and importing and exporting data.

ENAS 544a, Fundamentals of Medical Imaging Chi Liu

Review of basic engineering and physical principles of common medical imaging modalities including X-ray, CT, PET, SPECT, MRI, and echo modalities (ultrasound and optical coherence tomography). Additional focus on clinical applications and cutting-edge technology development.

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 / C&MP 550a / MCDB 550a / PHAR 550a, Physiological Systems

Stuart Campbell and W. Mark Saltzman

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.

ENAS 551b, 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.

ENAS 553a, Immunoengineering 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.

ENAS 555b, 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.

ENAS 556b, Molecular and Cellular Biomechanics Michael Murrell

The basic mechanical principles at the molecular and cellular level that underlie the major physical behaviors of the cell, from cell division to cell migration. Basic cellular physiology, methodology for studying cell mechanical behaviors, models for understanding the cellular response under mechanical stimulation, and the mechanical impact on cell differentiation and proliferation.

ENAS 558a, Introduction to Biomechanics Michael Murrell

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.

ENAS 567b, 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.

ENAS 568b, Topics in Immunoengineering Tarek Fahmy

This course addresses the intersection of immunobiology with engineering and biophysics. It invokes engineering tools, such as biomaterials, solid-state devices, nanotechnology, biophysical chemistry, and chemical engineering, toward developing newer and effective solutions to cancer immunotherapy, autoimmune therapy, vaccine

design, transplantation, allergy, asthma, and infections. The central theme is that dysfunctional immunity is responsible for a wide range of disease states and that engineering tools and methods can forge a link between the basic science and clinically translatable solutions that will potentially be “modern cures” to disease. This course is a follow-up to ENAS 553 and focuses more on the clinical translation aspect as well as new understandings in immunology and how they can be translated to the clinic and eventually to the market. Prerequisites: ENAS 553, differential equations, and advanced calculus.

ENAS 569b, Single-Cell Biology, Technologies, and Analysis Rong Fan

This course teaches the principles of single-cell heterogeneity in human health and disease as well as the cutting-edge wet-lab and computational techniques for single-cell analysis, with a particular focus on omics-level profiling and data analysis. Topics covered include single-cell-level morphometric analysis, genomic alteration analysis, epigenomic analysis, mRNA transcriptome sequencing, small RNA profiling, surface epitope, intracellular signaling protein and secreted protein analysis, metabolomics, multi-omics, and spatially resolved single-cell omics mapping. We also teach computational methods for quantification of cell types, states, and differentiation trajectories using single-cell high-dimensional data. Finally, case studies are provided to show the power of single-cell analysis in therapeutic target discovery, biomarker research, clinical diagnostics, and personalized medicine. Prerequisite: physiological systems, molecular biology, or biochemistry.

ENAS 570b / C&MP 560b / MCDB 560b / PHAR 560b, Cellular and Molecular

Physiology: Molecular Machines in Human Disease Emile Boulpaep

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.

ENAS 585b, Fundamentals of Neuroimaging Douglas Rothman and Fahmeed Hyder

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.

ENAS 600b, Computer-Aided Engineering Staff

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 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.

ENAS 603a, Energy, Mass, and Momentum Processes Amir Haji-Akbari

Application of continuum mechanics approach to the understanding and prediction of fluid flow systems that may be chemically reactive, turbulent, or multiphase.

ENAS 606b, Polymer Chemistry and Physics Mingjiang Zhong

A graduate-level introduction to the physics and physical chemistry of macromolecules. This course covers the static and dynamic properties of polymers in solution, melt and surface adsorbed states and their relevance in industrial polymer processing, nanotechnology, materials science, and biophysics. Starting from basic considerations of polymerization mechanisms, control of chain architecture, and a survey of polymer morphology, the course also extensively addresses experimental methods for the study of structure and dynamics via various scattering (light, x-ray, neutron) and spectroscopic methods (rheology, photon correlation spectroscopy) as integral components of polymer physics.

ENAS 609a, Principles and Design of Energy Devices Shu Hu

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 615a, Synthesis of Nanomaterials Lisa Pfefferle

This course focuses on the synthesis and engineering of nanomaterials. We also introduce different types of nanomaterials, unique properties at the nanoscale, measurement, and important applications of nanomaterials (including biomedical, electronic, and energy applications). Synthesis methods covered include gas phase and high vacuum techniques (CVD, MOCVD) as well as wet chemistry techniques such as reduction of metal salts, sonochemistry, and sol gel methods. Taking sample applications, we discuss the properties necessary for each, and how to control these properties through synthesis control, such as by using templating methods.

ENAS 626a, Chemical Engineering Process Control Michael Loewenberg

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 638a, Environmental Organic Chemistry John Fortner

This course examines the major physical and chemical attributes and processes affecting the behavior of organic compounds in environmental systems, including volatilization, sorption/attachment, diffusion, and reactions. Emphasis is on anthropogenic hydrophobic organic compounds (e.g., TCE, PCBs, DDT) and less hydrophobic emerging contaminants of concern (e.g., pharmaceuticals, explosives, etc.). The course

reviews basic concepts from physical chemistry and examines the relationships between chemical structure, properties, and environmental behavior of organic compounds. Physical and chemical processes important to the fate, treatment, and transformation of specific organic compounds are addressed, including solubility, volatilization, partitioning, sorption/attachment, bioaccumulation, and bulk environmental transformation pathways. Equilibrium and kinetic models based on these principles are used to predict the fate and transport of organic contaminants in the environment.

ENAS 641a, 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.

ENAS 648a, Environmental Transport Processes Menachem Elimelech
Analysis of transport phenomena governing the fate of chemical and biological contaminants in environmental systems. Emphasis on quantifying contaminant transport rates and distributions in natural and engineered environments. Topics include distribution of chemicals between phases; diffusive and convective transport; interfacial mass transfer; contaminant transport in groundwater, lakes, and rivers; analysis of transport phenomena involving particulate and microbial contaminants.

ENAS 660b, 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.

ENAS 673b, Air Quality and Energy Drew Gentner
The production and use of energy are among the most important sources of air pollution worldwide. It is impossible to effectively address the impacts and regulation of air quality without understanding the impacts and behavior of emissions from energy sources. Through an assessment of emissions and physical/chemical processes,

the course explores advanced topics (at the graduate level) on the behavior of pollutants from energy systems in the atmosphere. Topics include traditional and emerging energy technology, climate change, atmospheric aerosols, tropospheric ozone, as well as transport/modeling/mitigation.

ENAS 703a, Introduction to Nanomaterials and Nanotechnology Judy Cha
Survey of nanomaterial synthesis methods and current nanotechnologies. Approaches to synthesizing nanomaterials; characterization techniques; device applications that involve nanoscale effects.

ENAS 718b, Advanced Electron Devices Mark Reed
The science and technology of semiconductor electron devices. Topics include compound semiconductor material properties and growth techniques; heterojunction, quantum well, and superlattice devices; quantum transport; graphene and other 2-D material systems.

ENAS 747a, Applied Numerical Methods for Algebraic Systems, Eigensystems, and Function Approximation 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 studied in several contexts throughout the course.

ENAS 758b, Multiscale Models of Biomechanical Systems Stuart Campbell
Current methods for simulating biomechanical function across biological scales, from molecules to organ systems of the human body. Theory and numerical methods; case studies exploring recent advances in multiscale biomechanical modeling. Includes computer laboratory sessions that introduce relevant software packages.

ENAS 770b, Soft Robot Modeling and Control Rebecca Kramer-Bottiglio
This course covers topics including robot kinematics, elastic materials models, conductive composites, responsive material actuators, simple controllers, and physics-based soft robot simulation. The course also includes a project. Projects must involve theoretical modeling, design implementation, and/or experimental testing of a scientific hypothesis, and must have a mechanics and/or materials component. Prerequisites: prior course work in solid mechanics and familiarity with MATLAB.

ENAS 787b, Forces on the Nanoscale Udo Schwarz
Modern materials science often exploits the fact that atoms located at surfaces or in thin layers behave differently from bulk atoms to achieve new or greatly altered material properties. The course provides an in-depth discussion of intermolecular and surface forces, which determine the mechanical and chemical properties of surfaces. In the first part, we discuss the fundamental principles and concepts of forces between atoms and molecules. Part two generalizes these concepts to surface forces. Part three then gives a variety of examples. The course is of interest to students studying thin-film growth, surface coatings, mechanical and chemical properties of surfaces, soft matter including biomembranes, and colloidal suspensions.

ENAS 805b, 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.

ENAS 850a, Solid State Physics I Staff

A two-term sequence (with ENAS 851) 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.

ENAS 851b, Solid State Physics II Vidvuds Ozolins

A two-term sequence (with ENAS 850) 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.

ENAS 866a, CMOS Devices and Beyond Tso-Ping Ma

The science and technology of modern CMOS devices and circuits, as well as emerging technologies. Topics may include basic CMOS device physics; interface properties of MOS structures; hot-carrier effects; experimental techniques to probe MOS parameters; and scaling of CMOS devices. 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.

ENAS 875a, Introduction to VLSI System Design Richard Lethin

Chip design. Provides background in integrated devices, circuits, and digital subsystems needed for design and implementation of silicon logic chips. Historical context, scaling, technology projections, physical limits. CMOS fabrication overview, complementary logical circuits, design methodology, computer-aided design techniques, timing, and area estimation. Case studies of recent research and commercial chips. Objectives of the course are (1) to give students the ability to complete the course project (design of a digital CMOS subsystem chip through layout), and (2) to understand the directions that future chip technologies may take. Selected projects are fabricated and packaged for testing by students. Prerequisite: circuits at the level of introductory physics and computer programming.

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, non-homogeneous 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, 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.

ENAS 905a, Applied Digital Signal Process J. Rimas Vaisnys

ENAS 912a, Biomedical Image Processing and Analysis James Duncan and Lawrence Staib

A study of the basic computational principles related to processing and analysis of biomedical images (e.g., magnetic resonance, computed X-ray tomography, fluorescence microscopy). Basic concepts and techniques related to discrete image representation, multidimensional frequency transforms, image enhancement/restoration, image segmentation, and image registration.

ENAS 938b, 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.

ENAS 940a, Neural Networks and Learning Systems Priya Panda

Neural networks (NNs) have become all-pervasive, giving us self-driving cars, Siri voice assistant, Alexa, and many more. While deep NNs deliver state-of-the-art accuracy on many artificial intelligence tasks, it comes at the cost of high computational complexity. Accordingly, designing efficient hardware architectures for deep neural networks is an important step toward enabling the wide deployment of NNs, particularly in low-power computing platforms, such as mobiles, embedded Internet of Things (IoT), and drones. This course aims to provide a thorough overview of deep learning techniques, while highlighting the key trends and advances toward efficient processing of deep learning in hardware systems, considering algorithm-hardware co-design techniques. Prerequisite: prior exposure to probability/linear algebra/matrix operations at basic undergraduate level is expected. Prior knowledge of programming language like Python NumPy is useful. Familiarity with digital system design with basic understanding of logic, memory, and related design components is expected.

ENAS 951b / CPSC 556b, Wireless Technologies and the Internet of Things Wenjun Hu

Fundamental theory of wireless communications and its application explored against the backdrop of everyday wireless technologies such as WiFi and cellular networks. Channel fading, MIMO communication, space-time coding, opportunistic communication, OFDM and CDMA, and the evolution and improvement of technologies over time. Emphasis on the interplay between concepts and their implementation in real systems. The labs and homework assignments require Linux

and MATLAB skills and simple statistical and matrix analysis (using built-in MATLAB functions).

ENAS 952a, Internet Engineering Leandros Tassiulas

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.

ENAS 986b, 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.

ENAS 990a or b, Special Investigations Staff

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 991a / MB&B 591a / MCDB 591a / PHYS 991a, Integrated Workshop

Corey O'Hern

This required course for students in the PEB graduate program involves a series of modules, co-taught by faculty, in which students from different academic backgrounds and research skills collaborate on projects at the interface of physics, engineering, and biology. The modules cover a broad range of PEB research areas and skills. The course starts with an introduction to MATLAB, which is used throughout the course for analysis, simulations, and modeling.

English Language and Literature

Linsly-Chittenden Hall, 203.432.2233

<http://english.yale.edu>

M.A., M.Phil., Ph.D.

Chair

Jessica Brantley

Director of Graduate Studies

Catherine Nicholson (106a LC, 203.432.2226)

Professors Jessica Brantley, Leslie Brisman, David Bromwich, Ardis Butterfield, Jill Campbell, Joe Cleary, Michael Denning, Wai Chee Dimock, Paul Fry (*Emeritus*), Jacqueline Goldsby, Langdon Hammer, Margaret Homans, David Scott Kastan, Jonathan Kramnick, Lawrence Manley, Stefanie Markovits, Stephanie Newell, John Durham Peters, David Quint, Marc Robinson, Caleb Smith, Peter Stallybrass (*Visiting*), Robert Stepto (*Emeritus*), Katie Trumpener, Michael Warner, Ruth Bernard Yeazell

Associate Professors Marta Figlerowicz, Catherine Nicholson, Emily Thornbury, R. John Williams

Assistant Professors Anastasia Eccles, Marcel Elias, Ben Glaser, Alanna Hickey, Cajetan Ihaka, Naomi Levine, Priyasha Mukhopadhyay, Joseph North, Jill Richards, Sunny Xiang

FIELDS OF STUDY

Fields include English language and literature from Old English to the present, American literature, and Anglophone world literature.

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 director of graduate studies [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, since the English department considers teaching an integral part of graduate education. In practice, most students teach between four and six 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 History of Art

The Department of English Language and Literature also offers, in conjunction with the Department of the History of Art, a combined Ph.D. degree in English Language and Literature and History of Art. The requirements are designed to emphasize the interdisciplinarity of the combined degree program.

Course work In years one and two, a student in the combined program will complete sixteen courses: ten seminars in English, including *The Teaching of English* (ENGL 990) and one course in each of four historical periods (Medieval, Renaissance, eighteenth–nineteenth century, twentieth–twenty-first century), and six in History of Art, including HSAR 500 and one course outside the student's core area. Up to two cross-listed seminars may count toward the number in both units, reducing the total number of courses to fourteen.

Languages Two languages pertinent to the student's field of study, to be determined and by agreement with the advisers and directors of graduate studies. Normally the language requirement will be satisfied by passing a translation exam administered by one of Yale's language departments. One examination must be passed during the first year of study, the other by the end of the third year.

Qualifying paper History of Art requires a qualifying paper in the spring term of the second year. The paper must demonstrate original research, a logical conceptual structure, stylistic lucidity, and the ability to successfully complete a Ph.D. dissertation. The qualifying paper will be evaluated by two professors from History of Art and one professor from English.

Qualifying examination *Written exam:* addressing a question or questions having to do with a broad state-of-the-field or historiographic topic. Three hours, closed book, written by hand or on a non-networked computer. *Oral exam:* given one week after the written exam, covering six fields, including three in English (question periods of twenty minutes each, covering thirty texts each, representing three distinct fields of literary history) and three in History of Art (twenty-five minutes each, fields to be agreed on in advance with advisers and DGS). Exam lists will be developed by the student in consultation with faculty examiners.

Teaching Two years of teaching—one course per term in years three and four—are required: two in English and two in History of Art.

Prospectus The dissertation prospectus must be approved by both English and History of Art. The colloquium will take place in the spring term of the third year of study. The committee will include at least one faculty member from each department. As is implied by its title, the colloquium is not an examination, but a meeting during which the student can present ideas to a faculty committee and receive advice from its members. The colloquium should be jointly chaired by the directors of graduate studies of both departments.

First chapter reading Students will participate in a first chapter reading (also known as a first chapter conference) normally within a year of advancing to candidacy (spring term of year four). The dissertation committee, including faculty members from both departments, will discuss the progress of the student's work in a seminar-style format.

Dissertation defense The hour-long defense is a serious intellectual conversation between the student and the committee. Present at the defense will be the student's advisers, committee, and the directors of graduate studies in both English and History of Art; others may be invited to comment after the committee's questioning is completed.

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.

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 Special Requirements for the Ph.D. Degree, above).

COURSES

ENGL 500a / LING 500a / MDVL 665a, Old English I Emily Thornbury

The essentials of the language, some prose readings, and close study of several celebrated Old English poems.

ENGL 501b / LING 501b / MDVL 510b, *Beowulf* and the Beowulf Complex

Emily Thornbury

A close reading of *Beowulf* in Old English, within the modern and medieval critical landscapes. Prerequisite: a strong working knowledge of Old English (typically ENGL 500, or the equivalent).

ENGL 594b, Reading, Writing, and Printing God: The English Bible in Britain and America, 1390–1900 Peter Stallybrass

This course examines reading, writing, printing, and interpreting the Bible in Britain and America from 1390 to 1900, beginning with Wycliffite manuscripts and ending with canvassing books for marketing the Bible in a range of formats throughout the United States. The reading practices that we explore include typological interpretation, commonplacing, note-taking at sermons, and the catechizing of children; we also analyze illustrations as both interpretations and counter-narratives. The seminar meets in Beinecke Library, drawing upon its outstanding primary sources from medieval Bibles, books of hours, and children's primers to sixteenth- and seventeenth-century translations of the Bible to texts by Julian of Norwich, John Donne, George Herbert, John Milton, and Mary Rowlandson, to the spectacular range of early modern English manuscripts in the Osborn collection.

ENGL 630b, Death to Tyrants!

"There can be slain no sacrifice to God," Seneca's Hercules declares, "more acceptable than an unjust and wicked king." For Cicero, tyrants show the exact opposite of the spirit of fraternity that should govern human interactions, and so, as he puts it in *De officiis*, "that pestilent and abominable race should be exterminated from human society." The Reformation's white-hot religious controversies, and humanist reengagement of classical authors, lead the question of tyrannicide frequently to bubble to the surface of early modernity. We examine several examples of Protestant thought on tyrannicide, including that of François Hotman, John Knox, and George Buchanan, a tradition energetically taken up by John Milton. We must also recognize, however, that immediately after killing the tyrant Lycus, Seneca's Hercules is visited by a madness that leads him to kill his wife and children. Noble and necessary as it might be, tyrannicide is also symptom and expression of a deep wrench in right order. So it is especially in early modern tragedy, that genre obsessed with ills spanning human and cosmic realms, that we see tyrannicide explored in all of its complexity. That tendency is visible in tragedies by Buchanan, Marlowe, Shakespeare, and Milton. At bottom, early modern engagements of tyrannicide are also engagements of the foundations of political society, and meditations on the proper relationship between subject and sovereign. Here we find leitmotifs of early modern political thought that continue to be revolutionary in late modernity: sovereignty is delegated from the people, not transferred to the sovereign, and so can be revoked when the people so choose; citizenship must include the right of resistance—otherwise political life is a form of slavery. This course follows such ideas across English and Continental, Protestant, and Catholic thinkers, in literary and nonliterary texts. Major requirements

are a conference-style seminar presentation giving rise to a brief paper of 8–10 pages; these may be used as the foundation of the final paper.

ENGL 672a / CPLT 672a, Milton David Quint

This course studies Milton's poetry and some of his controversial prose. We investigate the relation of the poetry to its historical contexts, focusing on the literary, religious, social, and political forces that shaped Milton's verse. We survey and assess some of the dominant issues in contemporary Milton studies, examining the types of readings that psychoanalytic, feminist, Marxist, and historicist critics have produced. A brief oral report and a term paper (as well as a prospectus and preliminary bibliography for the term paper) required.

ENGL 699a / CPLT 658a / ITAL 946a / MDVL 946a, Early Modern Ecologies:

Representing Peasants, Animals, Labor, Land Jane Tylus

To what extent does writing about the land and depicting landscapes in early modern Europe reflect a new interest in engaging the boundaries between the human and nonhuman? What does it show about the commitment of artists and intellectuals to representing cultures and environments not necessarily their own? And how did writers and artists seek to legitimize their intellectual labors by invoking images of agricultural work? Since antiquity, artists have often chosen to make the countryside and its human and nonhuman denizens symbols of other things: leisure, song, exile, patriotism, erotic sensibilities, anti-urbanism. Early Christianity in turn embraced the desert – and the countryside – as a space for spirituality. We explore these origins and turn to the early modern period, when such interests exploded into poems, novels, plays, and paintings – a period that coincided with new world discoveries and new possibilities for “golden ages” abroad. We read works by Virgil, St. Jerome, Petrarch, Shakespeare, Spenser, Milton, Tasso, Seamus Heaney, and others, and take at least one trip to a local gallery (in New Haven or New York). Finally, we explore recent work in ecocriticism and environmental studies in order to grapple with ancient and early modern understandings of the natural world.

ENGL 719b, Ecopoetics, Enlightenment to Romanticism Jonathan Kramnick

This is a course on poetry and ecology during the long eighteenth century and on the tools and theories of the environmental humanities. We look closely at how genres like pastoral, georgic, locodescriptive, and the greater Romantic lyric considered the countryside, the city, and imperial periphery as particular kinds of spaces and environments. We also look at how ideas of landscape, wilderness, and the garden, of stranger sociability and urban publicity, and of the exotic or oceanic or savage took shape against the backdrop of enclosure and industrialism at home and of empire and colonialism abroad. We pay particular attention to the relation between form and phenomenology in the depiction of ecological surround. Writers include Denham, Gay, Swift, Pope, Thomson, Dyer, Cowper, Smith, Wordsworth, Keats, and Shelley, read alongside theory and history from Raymond Williams to reflections on the Anthropocene.

ENGL 723b / CPLT 646b, Rise of the European Novel Katie Trumpener

In the eighteenth century, the novel became a popular literary form in many parts of Europe. Yet now-standard narratives of its “rise” often offer a temporally and linguistically foreshortened view. This seminar examines key early modern novels in a range of European languages, centered on the dialogue between highly influential eighteenth-century British and French novels (Montesquieu, Defoe, Sterne, Diderot,

Laclos, Edgeworth). We begin by considering a sixteenth-century Spanish picaresque life history (Lazarillo de Tormes) and Madame de Lafayette's seventeenth-century secret history of French court intrigue; contemplate a key sentimental Goethe novella; and end with Romantic fiction (an Austen novel, a Kleist novella, Pushkin's historical novel fragment). These works raise important issues about cultural identity and historical experience, the status of women (including as readers and writers), the nature of society, the vicissitudes of knowledge – and novelistic form. We also examine several major literary-historical accounts of the novel's generic evolution, audiences, timing, and social function, and historiographical debates about the novel's rise (contrasting English-language accounts stressing the novel's putatively British genesis, and alternative accounts sketching a larger European perspective). The course gives special emphasis to the improvisatory, experimental character of early modern novels, as they work to reground fiction in the details and reality of contemporary life. Many epistolary, philosophical, sentimental, and Gothic novels present themselves as collections of "documents" – letters, diaries, travelogues, confessions – carefully assembled, impartially edited, and only incidentally conveying stories as well as information. The seminar explores these novels' documentary ambitions; their attempt to touch, challenge, and change their readers; and their paradoxical influence on "realist" conventions (from the emergence of omniscient, impersonal narrators to techniques for describing time and place).

ENGL 742a / WGSS 769a, 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, Elizabeth Inchbald, Maria Edgeworth, Jane Austen, Anna Barbauld, and Mary Shelley.

ENGL 774a, Romantic Poetry Leslie Brisman

An introduction to the work of Blake, Coleridge, Wordsworth, Shelley, and Keats, with some attention to Byron and the minor poets of this rich period of poetic innovation and revolutionary spirit.

ENGL 830a / HSAR 678a, Portraiture and Character from Hogarth to Woolf

Ruth Yeazell

Case studies in the visual and verbal representation of persons in Anglo-American painting and fiction, with particular attention to novels that themselves include portraits or address relations between the two media. Novelists tentatively include Henry Fielding, Jane Austen, Henry James, Edith Wharton, Oscar Wilde, and Virginia Woolf. Painters include William Hogarth, Joshua Reynolds, Thomas Lawrence, James McNeill Whistler, John Singer Sargent, and Vanessa Bell. Selected readings in recent theories of fictional character and in the history and theory of portraiture. Whenever possible, we draw on paintings in Yale's collections.

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). 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.

ENGL 879b / CPLT 512b, *Essays: Moral, Political, and Literary* David Bromwich

The course surveys the essay as a genre of writing and thinking, from Montaigne to Virginia Woolf. Among the authors are Bacon, Hume, Johnson, Hazlitt, Emerson, Shaw, Gandhi, Sartre. This is a cross-listed graduate seminar in English and Comparative Literature in the Ivy Consortium, taught in alternate weeks at Columbia University and Yale. We test Adorno's thesis that the essay is the distinctively modern and emancipatory form of writing.

ENGL 902b, *Elizabeth Bishop* Langdon Hammer

An experiment in intensive author-centered reading, this course studies the life, writing, and visual art of Elizabeth Bishop using tools from biography, gender studies, queer theory, object relations psychoanalysis, and phenomenology. We read against chronology and the focus on single poems in conventional close reading. Topics for discussion include the pressures on and possibilities for a woman poet's career in the mid-twentieth-century United States; the relations between poetry and painting, verse and prose, and private and public writing; the idea of minor literature, and the figure of the minor; Bishop in Brazil and as a hemispheric poet; houses; epistolarity; secularity and religion; the role of objects and the senses in subject formation; the ordinary, perverse, and fantastic; tourism, cosmopolitanism, and the local; the poetics of description. We use archives in the Yale Collection of American Literature at Beinecke Library and in Special Collections, Vassar College Library. In addition to Bishop, readings include, among others, Christopher Bollas, Judith Butler, Lee Edelman, Melanie Klein, Maurice Merleau-Ponty, Marion Milner, and D.W. Winnicott.

ENGL 923a / FILM 652a, Media Theory John Peters

This course provides an intensive introduction to foundational texts in media theory from the early to the later twentieth century. The course makes no effort to cover the current array of media theories. Rather, it brings current concerns to spectacularly rich historical sources. We study intellectual traditions from the United States, Canada, UK, France, and Germany in particular, though students with interests in other traditions – such as Latin America, Japan, Eastern Europe – are welcome. Authors may include Adorno, Arendt, Benjamin, Dewey, Du Bois, Heidegger, Horkheimer, Innis, Kittler, Leroi-Gourhan, Lippmann, McLuhan, Mumford, Simondon, Wiener, Raymond Williams, and others. Ongoing questions include community, democracy, power, race, gender, ideology, culture, industry, technics, cybernetics, embodiment, modernity, and space and time.

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.

ENGL 956b, Modern European Drama Marc Robinson

The major European playwrights active from 1879 (the premiere of Ibsen's *Doll's House*) to 1989 (the death of Beckett) were responsible for theatrical advances of continuing influence and importance. This seminar traces the advent of dramatic naturalism and realism (early Ibsen and Strindberg, the major plays of Chekhov); the contrary movement toward symbolist subtlety and expressionist urgency (late Strindberg and Ibsen, early Brecht); the effort to shoulder the burden of history and engage contemporary politics (Shaw, middle- and late-period Brecht); and the opening of drama to the ambiguities of religion and philosophy (Beckett). The seminar is grounded in close readings of representative plays but also considers how dramas change under the pressures of performance. Readings in theater theory, manifestos, and criticism supplement the primary texts.

ENGL 973a / FILM 973a, Modernity and the Time of Literature 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”?

ENGL 990b, The Teaching of English Benjamin Glaser and Rasheed Tazudeen

An introduction to the teaching of literature and of writing with attention to the history of the profession and to current issues in higher education such as the corporatization of the university, the role of the state in higher education, and the precarity of the humanities at the present time. Weekly seminars address a series of issues about teaching: guiding classroom discussion; introducing students to various literary genres; addressing race, class, and gender in the teaching of literature; formulating aims and assignments; grading and commenting on written work; lecturing and serving as a teaching assistant; preparing syllabuses and lesson plans.

ENGL 992a, Advanced Pedagogy Heather Klemann

Training for graduate students teaching introductory expository writing. Students plan a course of their own design on a topic of their own choosing, and they then put theories of writing instruction into practice by teaching a writing seminar. Prerequisite: open only to graduate students teaching ENGL 114.

ENGL 993a and ENGL 994b, Prospectus Workshop Catherine Nicholson

A two-term workshop in which students develop, draft, revise, and present their dissertation prospectuses, open to all third-year Ph.D. students in English.

ENGL 995a or b, Directed Reading Staff

Designed to help fill gaps in students' programs when there are corresponding gaps in the department's offerings. By arrangement with faculty and with the approval of the DGS.

Environment

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 M.S., M.Phil., Ph.D.

Dean

Ingrid Burke (Kroon, 203.432.5109)

Director of Doctoral Studies

Oswald Schmitz (137 Kroon, 203.436.5276, oswald.schmitz@yale.edu)

Professors Mark Ashton, Michelle Bell, Gaboury Benoit, Graeme Berlyn, Mark Bradford, Benjamin Cashore, Michael Dove, Daniel Esty, Eli Fenichel, Timothy Gregoire, Matthew Kotchen, Xuhui Lee, Robert Mendelsohn, Chadwick Oliver, Peter Raymond, James Saiers, Oswald Schmitz, Karen Seto, David Skelly, Gerald Torres, John Wargo, Julie Zimmerman

Associate Professors Craig Brodersen, Marian Chertow, Liza Comita, Justin Farrell, Kenneth Gillingham

Assistant Professor Narasimha Rao

FIELDS OF STUDY

Fields include agroforestry; biodiversity conservation; biostatistics and biometry; community ecology; ecosystems ecology; ecosystems management; energy and the environment; environmental and resource policy; environmental anthropology; environmental biophysics and meteorology; environmental chemistry; environmental ethics; environmental governance; environmental health risk assessment; environmental history; environmental law and politics; environmental management and social ecology in developing countries; forest ecology; green chemistry and engineering; hydrology; industrial ecology; industrial environmental management; plant physiology and anatomy; pollution management; population ecology; resource economics; silviculture; social ecology; stand development, tropical ecology, and conservation; sustainable development; urban ecology; urban geography; urban land cover change; urban planning; and water resource management.

Students admitted in 2020 or earlier have the option of receiving a degree in either Forestry & Environmental Studies or Environment. Students admitted in 2021 and subsequent years will receive a degree in Environment.

SPECIAL REQUIREMENTS FOR THE PH.D. DEGREE

Students are required to take ENV 900, Doctoral Student Seminar and Responsible Conduct of Research, 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 doctoral training program in Environment. 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.

COMBINED PH.D. PROGRAM

The Graduate School offers a combined doctoral degree between the Yale School of the Environment (YSE) and the Department of Anthropology. The purpose of the degree is threefold: it combines (1) the disciplinary identity and strengths of the Anthropology department with the interdisciplinary character and possibilities of YSE, especially in bridging the social and natural sciences; (2) the strengths in ecological and environmental studies of YSE with the social science strengths of the Anthropology department; and (3) the Anthropology department's strengths in theory with the emphasis within YSE on linking theory with policy and practice. The combined degree offers its graduates great flexibility when entering the marketplace. They can represent themselves as anthropologists and/or environmental scientists, as theoreticians and/or practitioners. Combined-degree recipients have the credentials to apply for policy-oriented positions with international institutions, as well as academic positions. The academic program of each student in the combined-degree program is tailored specifically to that student's particular history, interests, and needs, but all combined-degree students are expected to follow the program's general guidelines.

Prospective combined-degree students must initially apply either to Anthropology or to the doctoral program in Environment but not to both at the same time. However, applicants should indicate their interest in the combined degree by marking the application form appropriately. Once the student is accepted in the initial doctoral program, the application file will be considered in the second program, and a decision on the combined-degree application will be communicated by the Graduate School by the usual deadline for acceptance of admission offers. Such students will be allocated to their initial program as their primary administrative home, but will enter Yale as members of the combined-degree program. Being turned down for entry into the

combined-degree program initially does not preclude reapplication after arriving at Yale the following fall term. More detailed guidelines for the combined-degree program can be found on the YSE website at <http://environment.yale.edu/doctoral/degrees/combined-anthropology>.

MASTER'S DEGREES

M.Phil. 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 the Environment (the Master of Forestry, Master of Forest Science, Master of Environmental Management, and Master of Environmental Science degrees), visit the School's website, <http://environment.yale.edu>, or contact Admissions Director, Yale School of the Environment, 195 Prospect Street, New Haven CT 06511.

REQUIRED COURSE

All Ph.D. students are required to take the following course in the fall term of their first year. For a complete list of ENV courses, see the School of the Environment bulletin, available online at <https://bulletin.yale.edu>; and Yale Course Search at <https://courses.yale.edu>.

ENV 900a, Doctoral Student Seminar and Responsible Conduct of Research

Oswald Schmitz

This course provides the foundation for doctoral study at the School of the Environment. Students learn what it means to do scholarly research as well as become adept with philosophy of science and research methodology and proposal writing, as a basis for exploring diverse approaches to formulating and addressing research questions. Students work with their advisers to put these concepts and principles into practice to develop the basis for their dissertation research (including building bibliography, identifying and crafting research questions, formulating research hypotheses, and drafting a research proposal). Students further learn about funding opportunities and procedures for submitting grants. The course also covers professional ethics and responsible conduct of research, including ethical approaches to inquiry and measurement, data acquisition and management, authorship and publication, peer review, conflicts of interest, mentoring, collaborative research, and animal and human subjects research. Finally, the course explores ethical ways to advocate for the application of scholarly knowledge in the interest of environmental problem solving. Weekly assigned readings support concepts and issues addressed in class. Students present their embryonic research ideas in class and use feedback from the group to further develop their ideas.

European and Russian Studies

The MacMillan Center

242 Luce Hall, 203.432.3107

<http://europeanstudies.macmillan.yale.edu>

M.A.

Chair

Edyta Bojanowska (*Slavic Languages & Literatures*; on leave)

Acting Chair

Julia Adams (*Sociology*)

Director of Graduate Studies

Marci Shore (marci.shore@yale.edu, 203.432.6792)

Professors Bruce Ackerman (*Law*), Julia Adams (*Sociology*), Rolena Adorno (*Spanish & Portuguese*), Dudley Andrew (*Comparative Literature; Film & Media Studies*), Seyla Benhabib (*Political Science; Philosophy*), Dirk Bergemann (*Economics; Computer Science*), R. Howard Bloch (*French*), Edyta Bojanowska (*Slavic Languages & Literatures*), Paul Bracken (*Management; Political Science*), David Bromwich (*English*), Paul Bushkovitch (*History*), David Cameron (*Political Science*), Francesco Casetti (*Humanities; Film & Media Studies*), Katerina Clark (*Comparative Literature; Slavic Languages & Literatures*), Carolyn Dean (*History; French*), Carlos Eire (*History; Religious Studies*), Paul Franks (*Philosophy; Judaic Studies; Religious Studies*), Paul Freedman (*History*), Bryan Garsten (*Political Science; Humanities*), John Geanakoplos (*Economics*), Harvey Goldblatt (*Slavic Languages & Literatures*), Bruce Gordon (*Divinity; History*), Philip Gorski (*Sociology; Religious Studies*), Timothy Guinnane (*Economics*), Alice Kaplan (*French*), David Kastan (*English*), Paul Kennedy (*History*), John MacKay (*Slavic Languages & Literatures; Film & Media Studies*), Lawrence Manley (*English*), Ivan Marcus (*History; Religious Studies*), Millicent Marcus (*Italian Studies*), Isabela Mares (*Political Science*), Stefanie Markovits (*English*), Alan Mikhail (*History*), Samuel Moyn (*Law; History*), Robert Nelson (*History of Art*), William Nordhaus (*Economics; School of the Environment*), Paul North (*German*), Mark Peterson (*History*), David Quint (*English; Comparative Literature*), Douglas Rogers (*Anthropology*), Pierre Saint-Amand (*French*), Maurice Samuels (*French*), Timothy Snyder (*History*), Peter Swenson (*Political Science*), Katie Trumpener (*Comparative Literature; English*), Miroslav Volf (*Divinity*), Kirk Wetters (*German*), James Whitman (*Law*), Keith Wrightson (*History*), Fabrizio Zilibotti (*Economics*)

Associate Professors Paola Bertucci (*History*), Molly Brunson (*Slavic Languages & Literatures; History of Art*), Marcela Echeverri (*History*), Emily Erikson (*Sociology*), Isaac Nakhimovsky (*History; Humanities*), Ayesha Ramachandran (*Comparative Literature*), Marci Shore (*History*)

Assistant Professors Jennifer Allen (*History*), Sergei Antonov (*History*), Marijeta Bozovic (*Slavic Languages & Literatures; Film & Media Studies; Women's, Gender, & Sexuality Studies*), Jinyi Chu (*Slavic Languages & Literatures*), José-Antonio Espín-Sánchez (*Economics*), Cormac O'Dea (*Economics*), Giulia Oskian (*Political Science*)

Lecturers Paris Aslanidis (*Hellenic Studies; Political Science*), George Syrimis (*Hellenic Studies; Religious Studies*)

Senior Lectors Irina Dolgova (*Slavic Languages & Literatures*), Marion Gehlker (*German*), Krystyna Illakowicz (*Slavic Languages & Literatures*), Maria Kaliambou (*Hellenic Studies*), Ruth Koizim (*French*), Constantine Muravnik (*Slavic Languages & Literatures*), 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 East Europe, for example, will concentrate their efforts in that area, but will also take courses that address Europe-wide problems or the countries of West and Central 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 East Europe, or (2) West and Central Europe. All students must complete sixteen graduate-level term courses (or their equivalent) in the various fields related to European and Russian studies.

Students in their first year must enroll in one course focusing on methodology in a field of study, e.g., History, Comparative Literature, Sociology, or Political Science. Students are required to take at least one course in at least three of the four fields of study relevant to the program, i.e., 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. Only one of the sixteen graduate-level term courses may be taken for audit. Courses graded Satisfactory/Unsatisfactory cannot be counted toward the sixteen-course requirement of the program. For students focusing on Russia and East Europe,

two of the sixteen required courses (excluding language courses) must concern the nations of West and Central Europe. Conversely, for those focusing on West and Central Europe, two courses must concern Russia and East Europe.

For the purposes of this program, language courses in modern 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 cannot 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 East Europe will need to demonstrate knowledge of Russian or an East European language; those focusing on West and Central Europe will need to demonstrate knowledge of one of the appropriate regional 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 (DGS). Students who wish to take Yale department examinations in French, German, Italian, Spanish, or other West European languages should register for a placement examination or a complete proficiency 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. Students who have met the language proficiency degree requirement may study a non-European language related to the student's academic and professional goals if the courses are approved by the DGS.

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 the Environment, 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 <http://macmillan.yale.edu/academic-programs/joint-degree-programs> and contact the European 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 940a or b, Independent Study Staff

By arrangement with faculty.

E&RS 950b, Master's Thesis Staff

By arrangement with faculty.

Experimental Pathology

140 Brady Memorial Laboratory, 203.785.3624

<https://medicine.yale.edu/pathology/training/graduateprogram>

M.S., M.Phil., Ph.D.

Chair

Chen Liu

Director of Graduate Studies

Themis Kyriakides (10 Amistad St., Rm. 301C, 203.737.2214)

Professors Nita Ahuja (*Surgery*), Marcus Bosenberg (*Dermatology*), Richard Bucala (*Internal Medicine*), Sandy Chang (*Laboratory Medicine*), Keith Choate (*Dermatology*), Gary Friedlaender (*Orthopaedics & Rehabilitation*), Patrick Gallagher (*Pediatrics*), Robert Homer, S. David Hudnall, Steven Kleinstein, Yuval Kluger, Christine Ko (*Dermatology*), Diane Krause (*Laboratory Medicine*), Francis Lee (*Orthopaedics & Rehabilitation*), Chen Liu, Vincent Marchesi, Wang Min, Gilbert Moeckel, Jon Morrow, Jordan Pober (*Immunobiology*), David Rimm, Jeffrey Sklar, David Stern

Associate Professors Ranjit Bindra (*Therapeutic Radiology*), Demetrios Braddock, Hyung Chun (*Internal Medicine*), Ayman El-Guindy (*Pediatrics*), Carlos Fernandez-Hernando (*Comparative Medicine*), Karin Finberg, Joanna Gibson, Erica Herzog (*Internal Medicine*), Anita Huttner, Ryan Jensen (*Therapeutic Radiology*), Samuel Katz, Themis Kyriakides, Ruth Montgomery (*Rheumatology*), Don Nguyen, Manoj Pillai (*Internal Medicine*), Katerina Politi, Yibing Qyang (*Internal Medicine*), Yajaira Suarez (*Comparative Medicine*), Qin Yan

Assistant Professors Pallavi Gopal, Peter Gruber (*Surgery*), Brian Hafler (*Neurology*), Jeffrey Ishizuka (*Medical Oncology*), Morgan Levine, Zachary Levine, Peggy Myung (*Dermatology*), Kurt Schalper, Il Song Hahn, Silvia Vilarinho (*Internal Medicine*)

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.

To enter the Ph.D. program, students apply to an interest-based track, usually the Molecular Medicine, Pharmacology, and Physiology track (MMPP), within the interdepartmental graduate program in Biological and Biomedical Sciences (BBS), <https://medicine.yale.edu/bbs>.

SPECIAL REQUIREMENTS FOR THE PH.D. DEGREE

Course requirements Experimental Pathology students must pass PATH 640, Developing and Writing a Scientific Research Proposal; PATH 650, Cellular and Molecular Biology of Cancer; and PATH 690, Molecular Mechanisms of Disease. All MMPP students are required to take and pass PATH 680, Seminar in Molecular

Medicine, Pharmacology and Physiology. 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 503, 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 (PATH 640) 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. Five courses are required for the Ph.D., including PATH 640, Developing and Writing a Scientific Research Proposal; PATH 650, Cellular and Molecular Biology of Cancer; and PATH 690, 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 640, PATH 650, PATH 660, PATH 690, 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; website, <https://medicine.yale.edu/pathology/training/graduateprogram>.

COURSES

PATH 622b, Laboratory Rotations in Experimental Pathology Themis Kyriakides
Laboratory rotations for first-year graduate students.

PATH 625a, Pathobiology of Neurodegeneration Vincent Marchesi
Aging individuals throughout the world suffer from neurodegenerative diseases that resist treatment and prevention and are among the costliest chronic diseases in the United States. This course is about their causes, complications, and the rationale behind the treatments that are now available. We begin by reviewing normal brain functions and how they are impaired and then evaluate the evidence linking toxic protein deposits of amyloid and tau to Alzheimer's dementia. Our inability to design effective anti-amyloid treatments has turned our attention to many other pathogenic factors. These include toxic mutations, blood vessel damage, myelin dysfunction, inflammation, autophagy, and neuronal cell death. We also explore immune therapy, brain training, protective lifestyles, false alarms and uncertain claims, and the economics of dementia. Prerequisite: students interested in this course should e-mail a brief description of their background and future goals to vincent.marchesi@yale.edu. Enrollment limited.

PATH 630b / ENAS 535b, Biomaterial-Tissue Interactions Themis Kyriakides
Study of 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. Attention to specific areas such as biomaterials for tissue engineering and the importance of stem/progenitor cells, as well as biomaterial-mediated gene and drug delivery.

PATH 640a / B&BS 640a, Developing and Writing a Scientific Research Proposal
Katerina Politi and Jean-Ju Chung

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 twelve. Required of second-year graduate students in Experimental Pathology. Registration allowed by prior authorization from course directors only.

PATH 650b, Cellular and Molecular Biology of Cancer David Stern and 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.

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

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.

PATH 679a and PATH 680b / C&MP 629a and C&MP 630b / PHAR 501a and PHAR 502b, Seminar in Molecular Medicine, Pharmacology, and Physiology

Susumu Tomita and Staff

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). Required of and open only to Ph.D. and M.D./Ph.D. students in the Molecular Medicine, Pharmacology, and Physiology track.

PATH 681a / B&BS 681a, Advanced Topics in Cancer Biology Kurt Schalper

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 650 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.

PATH 690a, Molecular Mechanisms of Disease Demetrios Braddock and

Carlos Fernandez-Hernando

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.

Film and Media Studies

53 Wall Street, Rm. 216, 203.436.4668
<http://filmstudies.yale.edu>
M.Phil., Ph.D.

Chair

John Durham Peters

Director of Graduate Studies

Francesco Casetti

Professors Dudley Andrew, Francesco Casetti, Katerina Clark, Aaron Gerow, Brian Kane, John MacKay, Millicent Marcus, Charles Musser, Fatima Naqvi, John Durham Peters, Brigitte Peucker, Katie Trumpener, Jing Tsu, Laura Wexler

Associate Professors Marta Figlerowicz, R. John Williams

Assistant Professor Marijeta Bozovic

Senior Lecturer Marc Lapadula

Lecturers Oksana Chefranova, Thomas Allen Harris, Brian Meacham, Camille Thomasson

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 Studies, 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.

This is a combined degree program. To be considered for admission to this program, applicants must indicate both Film and Media Studies and one of the participating departments/programs listed above.

In addition to the combined Ph.D. program, Film and Media Studies offers students in the Graduate School's other doctoral programs the chance to obtain a Graduate Certificate in Film and Media Studies. See Film and Media Studies, under Non-Degree Granting Programs, Councils, and Research Institutes, in this bulletin.

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 (DGS) of Film and Media Studies and the DGS 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 submitted to the prospectus committee of Film and Media Studies for approval.
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 very likely be Introduction to Film Studies (FILM 150) or Introduction to Media (FILM 160).

MASTER'S DEGREE

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

COURSES

The required core seminars, FILM 601 and FILM 603, are offered in alternating years.

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.

FILM 617a / CPLT 904a / FREN 875a / SPAN 901a, Key Concepts in Psychoanalysis:**Tools for the Critical Humanities** Moira Fradinger

Working with primary sources mainly from the Freudian and Lacanian corpuses, this seminar is an introduction to key concepts of psychoanalytic theory, ending with an exploration of the afterlife of these concepts in other disciplines, focusing on one or two concrete examples. Students gain proficiency in what has been called “the language of psychoanalysis,” as well as the tools to assess how these concepts have been translated into the language of disciplines such as aesthetic criticism, political theory, film studies, gender studies, theory of ideology, sociology, etc. Concepts to be studied include the unconscious, the ego, identification, the drive, the death drive, repetition, the imaginary, the symbolic, the real, and *jouissance*. Depending on the interests of the group, others can be added (such as neurosis, perversion, fetishism, psychosis, anti-psychiatry, etc.). Commentators, readers, and critics of Freud and Lacan are also consulted (Michel Arrivé, Guy Le Gaufey, Jean Laplanche, André Green, Markos Zafiroopoulos, and others).

FILM 644a / AMST 626a / WGSS 678a, Visuality, Embodiment, Performance: Seeing with Companions Laura Wexler

This co-taught interuniversity seminar offers in-depth engagements with recent works by leading feminist theorists and artists committed to anti-racist, anti-imperialist, activist ways of seeing, knowing, thinking, and doing. Forging a participatory, collaborative, critical practice of “seeing with companions,” it responds to provocations posed by the course materials to go beyond critique, to reconceive feminist and queer epistemologies and pedagogies, and to imagine different ways of being in the world. Readings include recent works by Ariella Azoulay, Judith Butler, Saidiya Hartman, and Diana Taylor, as well as visual artworks, performances, and films by Regina José Galindo, Arthur Jafa, Simone Leigh, Doris Salcedo, and Kara Walker, among others. Permission of instructors required.

FILM 652a / ENGL 923a, Media Theory John Peters

This course provides an intensive introduction to foundational texts in media theory from the early to the later twentieth century. The course makes no effort to cover the current array of media theories. Rather, it brings current concerns to spectacularly rich historical sources. We study intellectual traditions from the United States, Canada, UK, France, and Germany in particular, though students with interests in other traditions — such as Latin America, Japan, Eastern Europe — are welcome. Authors may include Adorno, Arendt, Benjamin, Dewey, Du Bois, Heidegger, Horkheimer, Innis, Kittler, Leroi-Gourhan, Lippmann, McLuhan, Mumford, Simondon, Wiener, Raymond Williams, and others. Ongoing questions include community, democracy, power, race, gender, ideology, culture, industry, technics, cybernetics, embodiment, modernity, and space and time.

FILM 653b / AMST 653b, Studies in Documentary Film Charles Musser

This course examines key works, crucial texts, and fundamental concepts in the critical study of nonfiction cinema, exploring the participant-observer dialectic, the performative, and changing ideas of truth in documentary forms.

FILM 735a and FILM 736b / AMST 832a, 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.

FILM 755b / CPLT 935 / FREN 752, French Cinema through the New Wave

Dudley Andrew

This seminar uses a sample of twenty films (with clips from many others) to survey four decades of the tradition of French cinema crowned by the privileged moment of the New Wave. Graduate students are asked to challenge the idea of “national cinema” by reporting on some non-canonical or marginal film before midterm. Keeping the culture industry in view, we question the extent to which such a consistently robust cinema has been bound to—or remained partly independent of—a nation that from 1930 to 1970 underwent a depression, a socialist experiment, an occupation, a liberation, and the humiliations of decolonization abroad and social unrest (May ’68) at home. In addition to the midterm contribution, graduate students write a substantial term paper.

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.

FILM 779a / ITAL 783a, Italian Film Ecologies: Yesterday, Today, and Tomorrow

Millicent Marcus

Landscape and the natural environment have never occupied “background” status in Italian film. Given the spectacular visual presence of its terrain—thanks to the relative proximity of mountain chains and the long seacoast—and given the pivotal importance of farming and pasturage in this traditionally agrarian economy, the synergy between the human and natural worlds has played a prominent role in Italian filmmaking since the very inception of the industry. Most recently, two developments have pushed this issue to the forefront of scholarly attention: the advent of ecocriticism, which found one of its earliest and most influential champions in Serenella Iovino, and the establishment of regional film commissions, grassroots production centers that sponsored cinematic works attuned to the specificity of “the local.” The course includes study of films that predate our current environmental consciousness, as well as recent films that foreground it in narrative terms. In the case of the older films, which have already attracted a great deal of critical commentary over time, we work to shift our interpretive frame in an “eco-friendly” direction (even when the films’ characters are hardly friends of the environment). Among the films considered are *Le quattro volte*, *Il vento fa il suo giro*, *L’uomo che verrà*, *Gomorra*, *L’albero degli zoccoli*, *Riso amaro*, *Red Desert*, *Christ Stopped at Eboli*, and *Il ladro di bambini*. We screen one film a week and devote our seminars to close analysis of the works in question.

FILM 826b, Technics and Technology: Dispositives, Machines, Bodies

Francesco Casetti

The seminar explores the *operations* that sustain visual media—operations that become fully apparent once we conceive of these media as social dispositives, as technical objects, and as complements or alternatives to bodily gestures and postures. Reexamining contributions by scholars as different as Deleuze, Agamben, Simondon, Latour, Flusser, and Mauss, this seminar engages an extensive exploration of both cultural practices (*techniques*) and material processes (*technologies*) that allow us to make an image “visible,” and consequently exchangeable, interpretable, reworkable, exhibitable, and so on. What is at stake is the mutual dependence of cultural choices and concrete arrangements of media, and ultimately the mutual determination of machines and bodies. The final section of the seminar is devoted to the work of the German filmmaker Harun Farocki, who anticipated the idea of “operational images.” The seminar matches a philosophical approach with an archaeological account of the mode of working of actual visual media, from the Phantasmagoria to the Panorama and film. Enrollment is capped; the seminar requires active participation on the part of admitted students.

FILM 831b, Media, Semiotics, Hermeneutics Dudley Andrew

Media texts are openly characterized by their capability of displaying their own linguistic operations (reflexivity), by their aptitude in reworking previous texts for a new use (forms of rewriting), and by their capability of creating a direct—even if “mediatized”—access to the real (transparency, authenticity). These three topics on one hand may underline some of the most important—and controversial—trends in media culture, and on the other hand may highlight the way in which semiotics and hermeneutics confront each other in the field of media studies. The seminar explores these three topics with the help of some examples (films, photos, television programs, comics), as well as with references to some theoretical debates, especially discussions about enunciation (Christian Metz), adaptation (Umberto Eco, Gérard Genette), and experience (Maurice Merleau-Ponty, Stanley Cavell).

FILM 833a, Semiotics Francesco Casetti

The seminar discusses the most relevant concepts and categories elaborated by semiotics in order to provide analytical tools for “close readings” of verbal or visual texts, cultural objects, artifacts, events, and social situations. Semiotics’s foundational goal consisted in retracing how meaning emerges and circulates in connection with a variety of objects, from literary works to social rituals, from natural phenomena to artificial languages. To revamp semiotics’s main tasks, the seminar discusses three issues: the structure of semiotic objects, in particular their internal organization and their ideological connotations; the narrative strategies that semiotic objects display, with their capacity to establish a subtle parallel with a theory of human action; and the process of semiosis, and the ways in which a semiotic object becomes “meaningful” in the framework of a culture. Analytical tools are tested in class through close readings of a great variety of objects and situations, spanning from celebrities’ depictions to Genesis, from social encounters to urban design. Further examples are proposed by students. These close readings will imply the collective work of the whole class.

FILM 855a or b, Aesthetics and Hermeneutics in Film and Literature Dudley Andrew

In 1976 the paired concepts “Ideology and Utopia” appeared in the bibliographies of both Paul Ricoeur and Fredric Jameson, two towering intellectuals with exceptionally

long careers. This seminar examines the indispensable place of aesthetics and interpretation (mainly of fiction) in their approach to human history and present ethics/politics. Ricoeur had just published *The Rule of Metaphor*, arguing that philosophy needs novels and films as metaphors that open up the future of history and of thought. Jameson preferred allegory to open up Balzac, science fiction, detective novels, and—starting in 1976—Hollywood and art films. Last year he published *Allegory and Ideology*. This seminar examines Ricoeur on metaphor and Jameson on allegory at the place where both of them labored—narrative—and in view of their mutual belief in history as the (battle)ground of “ideology and utopia.” Ricoeur’s roots in phenomenology and hermeneutics stress temporality (*Temps et Récit*), while Jameson’s Marxist structuralism leads him to spatialize narrative as an ideological or cognitive map. Both men gather vast philosophical traditions; both tangle openly with competing views (Deleuze, Lacan, et al.), and both write with an urgency about immediate social consequence, one from a generally Christian aspiration, the other a generally Marxist one. Sampling key moments of their vast output, we also interpret fiction and images as they would have us do, i.e., as extended metaphors or allegories. We certainly discuss Godard’s *Histoire(s) du Cinéma* as a contemporaneous intervention via images in ideology and utopia. Lanzmann’s *Shoah* must also be confronted. Reading knowledge of French is desirable but not essential. We may elect to hold a weekly screening, as a kind of cine-club running to the side of the seminar.

FILM 861a / CPLT 632a, Literature and Film of World War II: Homefront Narratives

Katie Trumpener

Taking a pan-European perspective, the course examines quotidian, civilian experiences of war during a conflict of unusual scope and duration. Considering key works of wartime and postwar fiction and film alongside diaries and memoirs, we explore the kinds of literary reflection war occasioned, how civilians experienced the relationship between history and everyday life (both during and after the war), children’s experience of war, and the ways that homefront, occupation, and concentration camp memories shaped postwar avant-garde aesthetics. Novels and autobiographical fiction by Elio Vittorini, Anna Seghers, Irène Némirovsky, Elizabeth Taylor, Georges Simenon, Jirí Weil, Jorge Semprún, Miron Bialoszewski, Christa Wolf. Films by Humphrey Jennings, Andrzej Munk, Theo Angelopoulos, Péter Forgács, István Szabó, Bill Douglas, Kevin Brownlow. Diaries and memoirs by Victor Klemperer, Anne Frank, Sarah Kofman. We also consider poetry, photography, and art.

FILM 880b / EALL 872b, Theories Popular Cult In Japan: TV Aaron Gerow

Exploration of postwar theories of popular culture and subculture in Japan, particularly focusing on the intellectual debates over television and new media.

FILM 973a / ENGL 973a, Modernity and the Time of Literature 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”?

French

320 York Street, 3rd floor, 203.432.4900

<http://french.yale.edu>

M.A., M.Phil., Ph.D.

Chair

Alice Kaplan

Director of Graduate Studies

Pierre Saint-Amand

Professors R. Howard Bloch, Dominique Brancher (*Visiting*), Ardis Butterfield (*English*), Carolyn Dean (*History*), Marie-Hélène Girard (*Visiting*), Alice Kaplan, Pierre Saint-Amand, Maurice Samuels

Associate Professors Morgane Cadieu, Thomas Connolly

Assistant Professors Jill Jarvis, Christophe Schuwey

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 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 (FREN 610) 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. At the end of the first year of study, a grade of Honors must be obtained in at least two graduate term courses taught by core faculty within the French department. By the end of the second year, a grade of Honors must be obtained in at least four graduate term courses taught by core faculty within the French department. The total required number of Honors in French department courses taught by core faculty is thus four. (Core faculty are faculty appointed in French, as opposed to affiliated faculty.) (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 505), 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 (DGS) 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.

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 website at <http://french.yale.edu/academics/graduate-program>.

COURSES

FREN 658b / CPLT 969b / MDVL 658b / NELC 684 / SPAN 658b, Law and the

Science of the Soul: Iberian and Mediterranean Connections Jesus Velasco

This seminar suggests a research project to investigate the affinity between the legal discipline and the science of the soul, or, if you wish, between the science of the soul and the body of law. The point of departure for our framing argument – the existence of this affinity – is that at different moments in history, the legal science (in the form of legal scholarship, religious law, or even legislation) has toiled to appropriate cognitive processes (the external senses, for instance) and post-sensorial operations (imagination, fantasy, memory, etc.). However, this appropriation has become, at different moments in history, so naturalized, so dissolved, so automatized, that it has become invisible for us, and that, because of this invisibility, the affinity can continue doing a political work that is not always evident to us readers, citizens, and clients of the law. In this seminar we read Iberian and Mediterranean primary sources from different confessions, in different languages, and within different legal and political backgrounds – from pre-Socratic thinkers to al-Ghazali, from Averroes and Maimonides to Alfonso X, from Parisian theologians to Spinoza, etc. Likewise, we read theoretical work that allow us to conceptualize the kind of research we are doing.

FREN 700a / HIST 654a, Readings in Modern European Cultural History

Carolyn Dean

This course covers readings in European cultural history from 1789 to the present, with a focus on Western Europe.

FREN 841b, Plant, Animal, Man: The Necessary “Art of Conference”

Dominique Brancher

This seminar examines the relationships between three terms: man, animal, and plant. Cultural history has long privileged the man-animal dyad. We try to understand how in early modern Europe discursive representations, sensitive to the dynamic interactions between these three communities, have built a shared history. We are brought back to the etymology of the term “ecology”: these three areas of life interact in the same medium, *oikos*, that can be physical as well as textual. Our investigation thus attempts to sketch an archaeology of Western thought on life, the challenge being to reconstitute a forgotten model of reflection on the community between humanity and other forms of life. Readings in a multidisciplinary corpus that includes medical, legal, and theological productions; agronomic and hunting literature; herbaria; natural

history books (Belon, Rondelet, Aldrovandi); travel accounts (Jean de Léry, Thevet); poetry (Ronsard, Baïf, Madeleine and Catherine des Roches); fiction (Alberti, Rostand, Sorel); autobiographical texts (Montaigne, Agrippa d'Aubigné); treatises (Du Bellay, Henri Estienne). Conducted in French.

FREN 861a, 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.

FREN 875a / CPLT 904a / FILM 617a / SPAN 901a, Key Concepts in Psychoanalysis: Tools for the Critical Humanities Moira Fradinger

Working with primary sources mainly from the Freudian and Lacanian corpuses, this seminar is an introduction to key concepts of psychoanalytic theory, ending with an exploration of the afterlife of these concepts in other disciplines, focusing on one or two concrete examples. Students gain proficiency in what has been called "the language of psychoanalysis," as well as the tools to assess how these concepts have been translated into the language of disciplines such as aesthetic criticism, political theory, film studies, gender studies, theory of ideology, sociology, etc. Concepts to be studied include the unconscious, the ego, identification, the drive, the death drive, repetition, the imaginary, the symbolic, the real, and *jouissance*. Depending on the interests of the group, others can be added (such as neurosis, perversion, fetishism, psychosis, anti-psychiatry, etc.). Commentators, readers, and critics of Freud and Lacan are also consulted (Michel Arrivé, Guy Le Gaufey, Jean Laplanche, André Green, Markos Zafiroopoulos, and others).

FREN 885b / AFST 885b / CPLT 735b, Modern French Poetry in the Maghreb

Thomas Connolly

A survey of twentieth- and twenty-first-century poetry written in French by authors from North Africa, including works by Amrouche, Sénac, Khaïr-Eddine, Laâbi, Nissaboury, Djaout, Jabès, Farès, Ben Jelloun, Meddeb, Acherchour, Negrouche, Dib, and Bekri. Readings in French, discussion in English. Prerequisite: reading knowledge of French.

FREN 888b / CPLT 807b / ITAL 888b, The Novel of Historical Event: The Nineteenth Century and Beyond Jane Tylus

The seminar moves from the traditional idea of the historical novel to other, often more experimental versions of fictions that engage historical events: war, revolution, plague, genocide. We consider how individual lives intersect with and are changed by historical events, and the extent to which individuals are able to understand how history impacts their lives. Is the course of history controllable or even understandable to its participants and bystanders? Does historical knowledge always arrive too late? Primary texts include Manzoni, *I Promessi Sposi*; Balzac, *Le Colonel Chabert*; Flaubert, *L'Education sentimentale*; Verga, *Novelle*; Tomasi di Lampedusa, *Il Gattopardo*; Faulkner, *Absalom, Absalom!*; Modiano, *Dora Bruder*. There are also readings in the history and theory of the novel, as well as works contextualizing issues of nationalism in the nineteenth century. They include essays/chapters by Georg Lukács, Nelson Moe,

Roberto Dainotto, Edward Said, Franco Moretti, Peter Brooks, and others. Prerequisite: reading knowledge of French and/or Italian.

FREN 898b / CPLT 898b, Fin-de-siècle France Maurice Samuels

The course examines major French literary and artistic movements of the last decades of the nineteenth century (Naturalism, Decadence, Symbolism) in their cultural context. Weekly reading assignments pair literary texts with contemporary theoretical/medical/political discourse on such topics as disease, crime, sex, poverty, colonialism, nationalism, and technology. Literary authors include Barbey, Mallarmé, Maupassant, Rachilde, Villiers, and Zola. Theorists include Bergson, Freud, Krafft-Ebing, Le Bon, Nordau, Renan, and Simmel. Some attention also paid to the visual arts. Prerequisite: reading knowledge of French.

FREN 930a / CPLT 734, War and Memory from WWII to the Algerian War: Archive, Fiction, Theory Alice Kaplan

The seminar moves from WWII to the Algerian War, comparing classic works of fiction and film (both fiction and documentary) that take on the problem of war and memory through characters and narrative structure. Fictions include: Modiano, *Dora Bruder*; Camus, *The First Man*; Sebald, *Austerlitz*; Toumi, *L'effacement*; Zeniter, *L'Art de perdre*; and Djaout, *Les chercheurs d'os*. Films include: Audiard, *Un héros très discret*; Ophuls, *The Sorrow and the Pity*; Resnais, *Muriel*; and Bensmaïl, *La Bataille d'Alger, un film dans l'histoire*. Theoretical works on war and memory include: Roussio, *The Vichy Syndrome*; Benjamin Stora, *Le gangrène et l'oubli*; and YFS, "Noeuds de mémoire" and debates on multidirectional memory. Conducted in English.

Genetics

Sterling Hall of Medicine I313, 203.785.5846

<http://medicine.yale.edu/genetics>

M.S., M.Phil., Ph.D.

Chair

Antonio Giraldez

Directors of Graduate Studies

Marc Hammarlund

Zhaoxia Sun

Professors Allen Bale, Susan Baserga (*Molecular Biophysics & Biochemistry*), W. Roy Breg, Jr. (*Emeritus*), Martina Brueckner (*Pediatrics/Cardiology*), Keith Choate (*Dermatology*), Lynn Cooley, Daniel DiMaio, Casey Dunn (*Ecology & Evolutionary Biology*), Patrick Gallagher (*Pediatrics*), Joel Gelernter (*Psychiatry; Neuroscience*), Antonio Giraldez, Peter Glazer (*Therapeutic Radiology*), Valentina Greco, Jeffrey Gruen (*Pediatrics*), Murat Gunel (*Neurosurgery*), Ira Hall, Arthur Horwich, Yong-Hui Jiang, Kenneth Kidd (*Emeritus*), Haifan Lin (*Cell Biology*), Maurice Mahoney (*Emeritus*), Shrikant Mane, Arya Mani (*Internal Medicine*), Michael Murray, Michael Nitabach (*Cellular & Molecular Physiology*), Charles Radding (*Emeritus*), Valerie Reinke, Margretta Seashore (*Emerita*), Nenad Sestan (*Neuroscience*), Stefan Somlo (*Internal Medicine/Nephrology*), Berna Sozen, Peter Tattersall (*Laboratory Medicine*), Sherman Weissman, Hongyu Zhao (*Public Health; Biostatistics*)

Associate Professors Chris Cotsapas (*Neurology*), Daniel Greif (*Internal Medicine/Cardiology*), Marc Hammarlund, Mustafa Khokha (*Pediatrics*), Peining Li, Janghoo Lim, Jun Lu, Stefania Nicoli (*Internal Medicine/Cardiology*), James Noonan, In-Hyun Park, Curt Scharfe, Zhaoxia Sun, Andrew Xiao

Assistant Professors Kaya Bilguvar, Sidi Chen, Rama Kastury, Smita Krishnaswamy, Monkol Lek, Bluma Lesch, Mandar Muzumdar, Michele Spencer-Manzon, Siyuan Wang, Frederick Wilson (*Internal Medicine/Oncology*), 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.

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), <https://medicine.yale.edu/bbs>.

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 900 and GENE 901, Research Skills and Ethics I and II, prior to the end of their first year of study. In their fourth year of study, all students must successfully complete B&BS 503, 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 are 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 director of graduate studies (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: Graduate Student Seminar: Critical Analysis and Presentation of Scientific Literature (2 terms; GENE 675 and GENE 676, graded Satisfactory/Unsatisfactory); Responsible Conduct of Research (B&BS 501, graded Satisfactory/Unsatisfactory); and, in their fifth year of study, RCR Refresher for Senior BBS Students (B&BS 503).

Recommended courses: Advanced Eukaryotic Molecular Biology (GENE 743); Biochemical and Biophysical Approaches in Molecular and Cellular Biology (MCDB 630); Molecules to Systems (CBIO 502); Science at the Frontiers of Medicine (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 website (<https://medicine.yale.edu/bbs/>), MCGD Track.

COURSES

GENE 555a / AMTH 553a / CB&B 555a / CPSC 553a, Unsupervised Learning for Big Data Smita Krishnaswamy

This course focuses on machine-learning methods well-suited to tackling problems associated with analyzing high-dimensional, high-throughput noisy data including: manifold learning, graph signal processing, nonlinear dimensionality reduction, clustering, and information theory. Though the class goes over some biomedical applications, such methods can be applied in any field. Prerequisites: knowledge of linear algebra and Python programming.

GENE 675a, Graduate Student Seminar: Critical Analysis and Presentation of Scientific Literature Siyuan Wang

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.

GENE 734b / MB&B 734b / MBIO 734b, Molecular Biology of Animal Viruses Daniel DiMaio and Brett Lindenbach

Lecture course with emphasis on mechanisms of viral replication, oncogenic transformation, and virus-host cell interactions.

GENE 749a / MB&B 749a, Medical Impact of Basic Science Joan Steitz, I. George Miller, Daniel DiMaio, Franziska Bleichert, Sandy Chang, Karla Neugebauer, and Seyedtaghi Takyar

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. May not be taken by MB&B B.S./MS. students for graduate course credit. Prerequisite: biochemistry or permission of the instructor.

GENE 900a / CBIO 900a / MCDB 900a, Research Skills and Ethics I Shirin Bahmanyar

This course consists of a weekly seminar that covers ethics, writing, and research methods in cellular and molecular biology as well as student presentations ("rotation talks") of work completed in the first and second laboratory rotations.

GENE 912a / CBIO 912a / MCDB 912a, Second Laboratory Rotation

Shirin Bahmanyar

Second laboratory rotation for Molecular Cell Biology, Genetics, and Development track students.

Germanic Languages and Literatures

W.L. Harkness Hall, 203.432.0788

<http://german.yale.edu>

M.A., M.Phil., Ph.D.

Chair

Kirk Wetters

Directors of Graduate Studies

Fatima Naqvi [F]

Rüdiger Campe [Sp]

Professors Rüdiger Campe, Fatima Naqvi, Paul North, Brigitte Peucker, Kirk Wetters

Assistant Professor Katrin Truedstedt

Affiliated Faculty Jeffrey Alexander (*Sociology*), Jennifer Allen (*History*), Seyla Benhabib (*Political Science; Philosophy*), Thomas Connolly (*French*), Paul Franks (*Philosophy*), Gundula Kreuzer (*Music*), Patrick McCreless (*Music*), Steven Smith (*Political Science*), David Sorkin (*History*), Nicola Suthor (*History of Art*), Katie Trumpener (*Comparative Literature; English*)

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; visibility and German cinema.

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. 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. Of these sixteen courses, one must be GMAN 501, Methods of Teaching German as a World Language; and at least one must be taken in pre-nineteenth-century topics. Three of the sixteen courses in the first four terms may be audited.

A written examination in two parts must be taken during the reading period of the fifth term of study, followed by an oral discussion approximately a week later. 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. Candidates who wish to write

the dissertation in a language other than English, in this case in German, should notify the DGS at the moment of the prospectus defense.

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. After the dissertation is submitted, the DGS convenes a defense colloquium with the candidate, the committee, and invited guests.

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 of another foreign language chosen in consultation with the DGS.

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 501b, Methods of Teaching German as a World Language Theresa Schenker

This course introduces a variety of language teaching principles and methods and discusses best practices in language teaching. Students get to know the most important second-language acquisition theories as background to our discussions on effective language teaching. We combine the principles of language teaching with observed classroom techniques as we discuss and prepare lesson plans for language-learning classrooms.

GMAN 571a / CPLT 788a, Robert Musil's *Man without Qualities*: The End of the Novel Rudiger Campe

Musil's gigantic *Man without Qualities* (published 1930–33, 1943) is one of the quintessential modernist (interwar) European novels. After looking into Musil's earlier narrative experiments, the course begins with the close reading of part I of the novel and then focuses on the main strands of its narrative network: modernization and mysticism; the end of old Europe and the rise of fascism; the Vienna Circle's epistemology and the legal doctrine of accountability; love and violence. The intertwining of essay and narration in the novel, the theory of the novel in the novel, and the question of prose as form are at the core of the course. Readings in English or German. Discussions in English.

GMAN 656b, Performance and Theater Katrin Truedstedt

The course combines an introduction to major plays with a historical overview of theatrical forms and a theoretical exploration of performance studies. The course thus studies "literature in context." One crucial goal is to teach critical reading skills that especially attend to essential characteristics of theatrical settings and performances: How do characters enter the stage? How do they come to inhabit a specific role? How is a scene created? What are the architectural, cultural, and social conditions of a particular type of theater in its larger contexts? And how are paradigmatic types of theater connected to social and cultural categories like person, race, class, and gender? The course addresses such crucial categories in the practice of close readings of major plays. Readings of dramatic texts and analyses of performance videos are accompanied by discussions of theoretical texts on performativity, theatricality, and subjectivation. Topics include the history of theater, drama, and play from Greek tragedy to Shakespeare, Brecht, and contemporary performances; conceptions of performance, performativity, theatricality, and antitheatricality; speech act theory; subjectivity and authority; performance in the context of race, class, and gender; and the reentry of the body within the theatrical play.

GMAN 734b / CPLT 564b, Rethinking Representation Katrin Truedstedt

How can we speak for others? What does it mean to be spoken for? And what type of agency is evoked by this constellation? The course explores the implications, both productive and problematic, of representation—for agency and subjectivity, for recognition and acknowledgment, for political action, and for the conception of literature and art. Close readings of major literary works, from Greek tragedy and Shakespeare to Kleist and Kafka, is accompanied by theoretical texts, from Arendt's

notion of the Greek polis to the critique of representation by Foucault, Spivak, and others, and debates about the legal representation of nature in the climate crisis.

GMAN 743a, Karl Marx's Critiques of Capitalism Paul North

A careful analysis of volume 1 of *Capital*, with reference to earlier and later works, including volumes 2 and 3, and the *Grundrisse*.

GMAN 900a or b, Directed Reading Staff

By arrangement with the faculty.

Global Affairs

Jackson Institute for Global Affairs

Horchow Hall, 203.432.3418

<http://jackson.yale.edu/study>

M.A.S., M.A.

Director

James Levinsohn (*Global Affairs; School of Management*)

Directors of Graduate Studies

Marnix Amand

James Levinsohn

Director of Student Affairs

Lily Sutton (lily.sutton@yale.edu)

Professors David Engerman (*History*), John Gaddis (*History*), Pinelopi Goldberg (*Economics*), Jacob Hacker (*Political Science*), Oona Hathaway (*Law*), Robert Hecht (*School of Medicine*), Amy Kapczynski (*Law; Global Health*), Paul Kennedy (*History*), James Levinsohn (*School of Management*), A. Mushfiq Mobarak (*School of Management*), Samuel Moyn (*Law*), Catherine Panter-Brick (*Anthropology*), Frances Rosenbluth (*Political Science*), Peter Schott (*Economics; School of Management*), Ian Shapiro (*Political Science*), Timothy Snyder (*History*), Jing Tsu (*East Asian Languages & Literatures*), Aleh Tsyvinski (*Economics*), Arne Westad (*History*), Steven Wilkinson (*Political Science*), Ernesto Zedillo (*International Economics & Politics*)

Associate Professors Alexandre Debs (*Political Science*), Nuno Monteiro (*Political Science*), Marci Shore (*History*), Jonathan Wrytzen (*Sociology; International Affairs*)

Assistant Professors Lorenzo Caliendo (*Economics; School of Management*), Gregg Gonsalves (*Public Health*), Alice Miller (*Public Health; Law*), Kristina Talbert-Slagle (*Internal Medicine; Global Health*)

Senior Lecturers Marnix Amand, Sigga Benediktsdottir, Charles Hill (*International Security Studies*), Asha Rangappa, Justin Thomas

Lecturers William (Casey) King, Nicholas Lotito (*Political Science*), Nathaniel Raymond, Edward Wittenstein

Senior Fellows Susan Biniaz, Eric Braverman, David Brooks, Ryan Crocker, Howard Dean, Janine di Giovanni, Robert Ford, Clare Lockhart, Stanley McChrystal, Rakesh Mohan, Stephen Roach, Emma Sky

The Jackson Institute for Global Affairs offers degree programs and nurtures scholarship with a strong interdisciplinary and policy-oriented international focus. The programmatic interests of the institute focus on development; ethics, leadership, and political life; empirical and research methods; global economics; global security; human rights; democracy; transparency and governance; and IGOs and international cooperation and diplomacy.

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 curriculum 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 the Environment, the Law School, the School of Management, and the School of Public Health. The M.A.S. program is aimed at mid-career professionals with extensive experience in a field of global affairs such as, but not limited to, international security, diplomacy, and development.

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, including the core 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, GLBL 802, and GLBL 803 during the first year of enrollment. Any exceptions are to be made at the discretion of the director of graduate studies (DGS).

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. Any exceptions are to be made at the discretion of the DGS.

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, with special permission, also be fulfilled by completing independent research or language study.

Each first-year student must file a form with the director of the career development office before June 1 stating the nature of the student's summer internship or alternative for committee approval and submit a self-evaluation form by September 14.

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 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 JOINT-DEGREE MASTER'S 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, GLBL 802, and GLBL 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.

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/study>, e-mail jackson.institute@yale.edu, or call 203.432.3418.

COURSES

GLBL 529a / WGSS 529a, Sexuality, Gender, Health, and Human Rights Ali 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 are required.

GLBL 552a or b, Asia Now: Human Rights, Globalization, Cultural Conflicts Jing Tsu

This course examines contemporary and global issues in Asia (east, southeast, northeast, south), in a historical and interdisciplinary context that includes international law, policy debates, cultural issues, security, military history, media, science and technology, and cyber warfare.

GLBL 570a, Negotiating International Agreements: The Case of Climate Change

Susan Biniaz

This seminar is a practical introduction to the negotiation of international agreements, with a focus on climate change. Through the climate lens, students explore the crosscutting features of international agreements, the process of international negotiations, the development of national positions, advocacy of national positions internationally, and the many ways in which differences among negotiating countries are resolved. The seminar also examines the history and substance of the climate change regime, including the 1992 UN Framework Convention on Climate Change, the 1997 Kyoto Protocol, the 2009 Copenhagen Accord, and the 2015 Paris Agreement. The seminar ends with a mock climate-related negotiation.

GLBL 579a / PLSC 656, 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.

GLBL 580a, Russian Intelligence, Information Warfare, and Social Media Asha

Asha Rangappa

This course explores the evolution of information warfare as a national security threat to the United States. Beginning with the KGB's use of "active measures" during the Cold War, the course looks at how propaganda and disinformation campaigns became central to the Putin regime and how social media has facilitated their expansion and impact. Using Russia's efforts in the 2016 election as an example, students examine the legal limitations on the FBI and intelligence community's ability to counter such operations in the United States and explore potential policy solutions in the realm of intelligence tools, privacy laws, Internet regulation, and human "social capital." Guest speakers include information warfare expert Molly McKew, Russian CIA officer John Sipher, producers of the recent documentary *Active Measures*, and others.

GLBL 588a, Public Order of the World Community: A Contemporary International

Law W. Michael Reisman

This introduction to contemporary international law studies the role of authority in the decision-making processes of the world community, at the constitutive level where international law is made and applied and where the indispensable institutions for making decisions are established and maintained, as well as in the various sectors of the public order that is established. Consideration is given to formal as well as operational prescriptions and practice with regard to the participants in this system (states, intergovernmental and nongovernmental organizations, political parties, pressure groups, multinational enterprises, other private associations, private armies and gangs, and individuals); the formal and informal arenas of interaction; the allocation of control over and regulation of the resources of the planet; the protection of people and the regulation of nationality; and the allocation among states of jurisdiction to make and apply law. In contrast to more traditional approaches, which try to ignore the role of power in this system, that role will be candidly acknowledged, and the problems and opportunities it presents will be explored. Special attention is given to (1) theory; (2) the establishment, transformation, and termination of actors; (3) control of access to and regulation of resources, including environmental prescriptions; (4) nationality

and human rights; and (5) the regulation of armed conflict. Scheduled examination or paper option. *Also LAW 20040.*

GLBL 592a, Intelligence, Espionage, and American Foreign Policy Edward

Edward Wittenstein

The discipline, theory, and practice of intelligence; the relationship of intelligence to American foreign policy and national security decision-making. Study of the tools available to analyze international affairs and to communicate that analysis to senior policy makers. Case studies of intelligence successes and failures from World War II to the present.

GLBL 603a, Terrorism and Global Development Nicholas Lotito

This course explores the interaction of two central global challenges: terrorism and development. It interrogates the causal cycle of development and terrorism. Are political and economic underdevelopment a “root cause” of terrorism? And under what conditions does terrorism cause or further underdevelopment? The course considers whether international development policy can improve security outcomes, and vice versa. Topics include foreign aid, democracy promotion, failed states, and civil war. Paper required.

GLBL 604a, Four Conflicts: Iraq, Syria, Yemen, and Afghanistan Staff

This course focuses on four recent conflicts—Afghanistan, Iraq, Syria, and Yemen—using human rights as a sustaining theme. The instructor uses her on-the-ground knowledge to dig deep into the roots of the conflicts; the specific battles; turning points; the case studies of human rights abuse; and finally, possible political solutions and post-conflict resolution. We use a mix of video footage from reputable journalists as well as testimonies, texts, and articles from the time. An important dimension is lessons learned from previous wars, and the diplomatic and international response. There will be two or three guest speakers who were directly involved in the individual conflicts. Students have assigned readings and three blogs to write, as well as a final presentation, which can take the form of a long essay, an academic paper, or an audiovisual presentation, with approval from the instructor. Class participation constitutes a large portion of the grade; students must be willing to engage and debate throughout.

GLBL 616a, China's Rise and the Future of Foreign Policy David Rank

China's return to its traditional role as a regional—and, increasingly, global—power has implications for the political, security, and economic structures that have been the foundation of the international system since the end of the Second World War. This course looks at the impact China's ascent has had, the challenges a rising China will pose for policy makers in the years ahead, and the internal issues China will need to address in the years ahead. It does so from the perspective of a practitioner who spent nearly three decades working on U.S. foreign policy and U.S.-China relations.

GLBL 618a, The Next China Staff

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.

GLBL 631a, The Politics of Economic Policy Making Frances McCall Rosenbluth
Economics can tell us with increasing precision what policies maximize growth, welfare, and productivity. But how are policies actually made? Why are so many poor policies adopted and good ones foregone? In this seminar students investigate how government organization and the structure of political competition shape the conditions for better and worse economic policy making across a range of economic policies including macroeconomic policy, corporate and financial regulation, industrial policy, and trade. Students consider these policy areas in democratic and nondemocratic regimes, and in developed and developing countries.

GLBL 637a, U.S. Economic Policy toward Africa: On Target or Misguided?

Harry Thomas

This course explores the United States' focus on security and counterterrorism at the expense of development assistance and questions if trade opportunities are being lost to the EU, Russia, and China. We examine the policy to counter extremist groups such as Boko Haram, ISIS, and the insurgent group al-Shabab, and the United States' military assistance to governments including but not limited to Chad, Djibouti, Nigeria, Somalia, and South Africa, and examine its effectiveness. We analyze the role of America's 4,000-troop multinational Djibouti-based Joint Task Force-Horn of Africa. Will it protect America and prevent terrorists' attacks, or is it doomed to failure?

GLBL 692a, The Politics of American Foreign Policy Howard Dean

This seminar addresses the domestic political considerations that have affected American foreign policy in the post-World War II world. The goals are to give historical context to the formation of major existing global governance structures, give students an opportunity to research how major foreign policy decisions in the past were influenced by contemporary political pressure, and assess what effect those pressures have had on today's global issues. Case studies include but are not limited to Truman and the Marshall Plan; Johnson and the Vietnam War; Nixon and the opening of China; Reagan and the collapse of the Soviet Union; George H.W. Bush and Iraq; Clinton and the Balkans; and Obama and the development of a multipolar foreign policy for a multipolar world. Students assume the role of decision-makers under political pressure and are asked to generate a point of view regarding past, present, and future foreign policy decisions.

GLBL 713a, Middle East Politics Emma Sky

Exploration of the international politics of the Middle East through a framework of analysis that is partly historical and partly thematic. How the international system, as well as social structures and political economy, shape state behavior. Consideration of Arab nationalism; Islamism; the impact of oil; Cold War politics; conflicts; liberalization; the Arab-spring, and the rise of the Islamic State.

GLBL 730a, Managing the Clean Energy Transition: Contemporary Energy and Climate Change Policy Making Staff

This course explores the principal challenges facing both advanced and developing economies in managing their respective transitions to a clean energy future and the goals of the Paris agreement, while simultaneously meeting their energy security needs and keeping their economies competitive. By the end of the course, students should be familiar with key features of the global energy and climate change architecture, principal challenges facing policy makers in balancing energy and climate goals, and prospects for the development of key fuels and technologies in the coming energy

transition. Specific topics include energy and climate change fundamentals, scenarios and outlooks, the role of specific fuels (oil, gas, coal, renewable energy) in the energy transition, the role of clean energy technologies including hydrogen and storage, and green recovery plans for post COVID-19. The final session of the course brings all the previous themes together through a group exercise that examines the future of the energy and climate change nexus, with students role-playing a 2021 G20 ministerial meeting on energy and climate change, presenting and debating country and regional plans to accelerate the energy transition.

GLBL 740a, The Western Hemisphere: Designing a Transnational Policy Agenda

Francisco Palmieri

This course explores four transnational challenges confronting the Western Hemisphere region: inequality; corruption; migration; and race, gender, and sexuality. Governments must rethink their priorities. Citizens are seeking greater accountability from political leaders and rejecting externally imposed austerity reforms. What does a proactive *transnational* agenda for the region look like? How can national leaders restore stability to the streets and create new economic opportunities? What could be the role of the United States and of intergovernmental institutions, if any? Students develop concrete policy recommendations to address these pressing issues. They will be challenged to base their policies on dynamics within the region, rather than solely on traditional U.S. foreign policy objectives.

GLBL 745a, Climate Change Policy and Perspectives Daniel Esty

This course examines the scientific, economic, legal, political, institutional, and historic underpinnings of climate change and the related policy challenge of developing the energy system needed to support a prosperous and sustainable modern society. Particular attention is given to analyzing the existing framework of treaties, law, regulations, and policy – and the incentives they have created – which have done little over the past several decades to change the world's trajectory with regard to the build-up of greenhouse gas emissions in the atmosphere. What would a twenty-first-century policy framework that is designed to deliver a sustainable energy future and a successful response to climate change look like? How would such a framework address issues of equity? How might incentives be structured to engage the business community and deliver the innovation needed in many domains? While designed as a lecture course, class sessions are highly interactive. Self-scheduled examination or paper option.

GLBL 765a, Contemporary Issues in American Diplomacy and National Security

John Negroponte

This seminar addresses current issues in American diplomacy and national security from the perspective of a practitioner. Class discussion focuses on functional and country/regional issues that are the subject of current attention by the U.S. administration, Congress, and the media. Cross-cutting functional issues include such topics as global health, current intelligence challenges, polar issues, economic diplomacy, and environmental negotiations. The course also addresses country/regional issues related to Russia, China, South Asia, the Middle East, Latin America, Africa, and the United Nations. The goal of this course is to impart the centrality of the presidency in the day-to-day conduct of our national security policy, the political and budgetary constraints on its conduct, and the almost incessant intervention of unexpected events shaping policies.

GLBL 781a, Banking Crises and Financial Stability Sigridur Benediktsdottir

This course focuses on systemic risk, banking crises, financial stability and macroprudential policies. An emphasis will be on systemic risk and prudential policies in peripheral economies. Peripheral economies is defined here as peripheral European economies and emerging economies. Prerequisites: ECON 115 and 116, or equivalent.

GLBL 792a, Ethical Choices in Public Leadership Eric Braverman

All public leaders must make choices that challenge their code of ethics. Sometimes, a chance of life or death is literally at stake: how and when should a leader decide to let some people die, or explicitly ask people to die to give others a chance to live? At other times, while life or death may not be at stake, a leader must still decide difficult issues: when to partner with unsavory characters, when to admit failure, when to release information or make choices transparent. This interdisciplinary seminar draws on perspectives from law, management, and public policy in exploring how leaders develop their principles, respond when their principles fail or conflict, and make real-world choices when, in fact, there are no good choices. Permission of the instructor required; application at <http://jackson.yale.edu/apply/glbl-792>. Attendance at first session is mandatory.

GLBL 793a / HIST 790a, Relations of the Great Powers since 1890 Paul Kennedy
Reading seminar. Among the topics covered are the “New Imperialism,” the military and naval arms race prior to 1914, the relationship between domestic politics and foreign affairs, the First World War and the alteration of the Great Power order, the “new diplomacy,” appeasement, the rise of the dictator-states, the origins of the Second World War, military and strategic results of the war, the Cold War, reconfigurations of the 1970s and ’80s, the end of the Cold War, post-Cold War relations. There is a heavy emphasis on historiography and an encouragement to relate economic and strategical trends to diplomatic. Open to undergraduate seniors with permission of the instructors.

GLBL 799a, Independent Project Staff

By arrangement with Jackson Institute Senior Fellows.

GLBL 801a, Economics: Principles and Applications Staff

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 Justin Thomas

This course is an introduction to statistics and their application in public policy and global affairs research. It consists of two weekly class sessions in addition to a discussion section. The discussion section is used to cover problems encountered in the lectures and written assignments, as well as to develop statistical computing skills. Throughout the term we cover issues related to data collection (including surveys, sampling, and weighted data), data description (graphical and numerical techniques for summarizing data), probability and probability distributions, confidence intervals, hypothesis testing, measures of association, and regression analysis. The course

assumes no prior knowledge of statistics and no mathematical knowledge beyond calculus.

GLBL 820a / HIST 972a, Freedom and History Timothy Snyder

The idea of human freedom is a central theme of history, but it is also a central problem of historical method. This course surveys attempts in philosophy, literature, and historiography to address three questions. Where does historical reconstruction end and the imponderable begin? In what measure does the endeavor of history itself depend upon a protective notion of individual freedom? How should the historian navigate between writing as an expression of individuality and writing as self-restraint?

GLBL 827a / HIST 966a, Totalitarianism: An Intellectual History Marci Shore

2017 marked the 100th anniversary of the Bolshevik Revolution, which ushered in the largest and most all-encompassing social engineering experiment in human history; 2019 marked the thirtieth anniversary of the fall of the Berlin Wall. For most of this past hundred years, historians, novelists, socialist scientists, and philosophers (many victims, survivors, or disillusioned believers themselves) have struggled to understand the twentieth-century experiences of Nazism, fascism, and Stalinism. Politics alone fails to explain what the Russian philosopher Nikolai Berdyaev described as a “deep deformation of the structure of consciousness” prompting “individual conscience to flee from the world.” We discuss what we can learn both about the totalitarian experiences of the twentieth century and about our present “post-factual” world where, as Peter Pomerantsev describes, “nothing is true and everything is possible,” by revisiting classic works like Hannah Arendt’s *Origins of Totalitarianism*. The readings include a mixture of the empirical and the philosophical, of narrative and theory.

GLBL 833a, Anti-Money Laundering and Counterterrorist Financing William King

For more than a decade, the international community has attempted to disrupt, debilitate, and destroy illegal financial networks of those who would finance terror. This course provides an introduction to anti-money laundering (AML) and counterterrorist financing (CTF). The approach is interdisciplinary, as understanding the financial tools to combat terrorism necessitates a consideration of law, policy, and intelligence. Additionally, AML and CTF focus on the overlapping realms of crime, corruption, and terrorism. Guest speakers join the class for select discussions. Students gain a better understanding of the fundamentals of AML/CTF, the approaches and limitations of combating current terrorist threats, particularly ISIL, and the challenges and opportunities of using financial tools in the war against terror.

GLBL 842a, Special Operations: History, Current Context, and Future Utilization of Specialized Military Units Staff

Special Operations Forces have a long and rich history in military affairs. These forces have gone by many names and had different areas of specialization over the millennia, but they have consistently been small, well-funded, and focused on niche operations. For nearly twenty years, the world has seen the role, funding, and employment of these forces increase in ways that might seem unrecognizable to previous generations of military leaders. This course looks at the reasons for this expansion, and the associated risks and benefits, and explores what their future utilization might look like. It is divided into three main sections. Students first look at the history of these forces, starting in the earliest periods of recorded conflict and moving quickly to the twentieth century. Then, students look deeply into the transformation of these forces over the past two decades, focusing heavily on changes in authorities, funding, and the manner

in which these units have been employed. Finally, the course looks forward and works together on a single question applicable to the future of these forces. This is a capstone course. Enrollment limited to twelve. The class will produce a paper for presentation to a component of the U.S. Department of Defense that is specifically interested in future utilization of these forces.

GLBL 849a, Big Data and Global Policies William King

Cell phones, twitter accounts, human genetic sequencing, trade figures, Web content, video surveillance, drone-collected bits and bytes, national security, and investigative sifting have generated a massive and ever-growing torrent of information. The term “big data” has recently been coined to capture this shift in the way we live and think. This course defines big data, investigates big data analytical and visualization methods, and explores implications of big data analyses on a variety of sectors including global policy, human trafficking, national security, global capitalism, and global health and finance.

GLBL 889a, World Fellows Seminar Staff

Enrollment limited to those graduate and professional school students selected as Associate World Fellows. Associates join 16 leaders from across the globe to learn, share, connect, and challenge through their participation in the weekly “Good Society” seminar, the Distinguished Speaker weekly dinner series, and other events throughout the fall term. See <http://worldfellows.yale.edu/associate> for details. 0.5 GSAS credit. Graded Satisfactory/Unsatisfactory. ½ Course cr

GLBL 929a, GSE India: Global Social Entrepreneurship Tony Sheldon

Launched in 2008 at the Yale School of Management, the Global Social Entrepreneurship (GSE) course links teams of Yale students with social enterprises based in India. GSE is committed to channeling the skills of Yale students to help Indian organizations expand their reach and impact on “bottom of the pyramid” communities. Yale students partner with mission-driven social entrepreneurs (SEs) to focus on a specific management challenge that the student/SE teams work together to address during the term. GSE has worked with thirty leading and emerging Indian social enterprises engaged in economic development, sustainable energy, women’s empowerment, education, environmental conservation, and affordable housing. The course covers both theoretical and practical issues, including case studies and discussions on social enterprise, developing a theory of change and related social metrics, financing social businesses, the role of civil society in India, framing a consulting engagement, managing team dynamics, etc. Enrollment is by application only. *Also* MGT 529. ½ Course cr

GLBL 944a, Macroprudential Policy I Sigridur Benediktsdottir

This two-term course (with GLBL 945) focuses on current macroprudential theory and the application and experience of macroprudential policy. The course focuses on the motivation for monitoring systemic risk and what indicators may be best to evaluate systemic risk. Macroprudential policy tools, theory behind them, and research on their efficiency, supported with data analysis, models, and examples of use of the tools and evaluation of their efficiency.

GLBL 999a, Directed Reading Staff

By arrangement with faculty.

History

McClellan Hall, 203.432.1366

<http://history.yale.edu>

M.A., M.Phil., Ph.D.

Chair

Alan Mikhail

Director of Graduate Studies

Noel Lenski (203.432.1361)

Professors Abbas Amanat, Sunil Amrith, Lauren Benton, Ned Blackhawk, David Blight, Daniel Botsman, Edyta Bowjanowska, Paul Bushkovitch, Deborah Coen, Stephen Davis, Carolyn Dean, Fabian Drixler, Carlos Eire, David Engerman, Paul Freedman, Joanne Freeman, John Gaddis, Beverly Gage, Bruce Gordon, Greg Grandin, Valerie Hansen, Robert Harms, Matthew Jacobson, Gilbert Joseph, Paul Kennedy, Benedict Kiernan, Jennifer Klein, Regina Kunzel, Naomi Lamoaux, Noel Lenski, Kathryn Lofton, Mary Lui, Daniel Magaziner, J.G. Manning, Ivan Marcus, John Merriman, Joanne Meyerowitz, Alan Mikhail, Samuel Moyn, Nicholas Parrillo, Peter Perdue, Mark Peterson, Stephen Pitti, Naomi Rogers, Paul Sabin, Stuart Schwartz, Timothy Snyder, David Sorkin, Harry Stout, John Harley Warner, Arne Westad, John Witt, Keith Wrightson, Taisu Zhang

Associate Professors Paola Bertucci, Rohit De, Marcela Echeverri, Anne Eller, Crystal Feimster, Elizabeth Hinton, Andrew Johnston, Isaac Nakhimovsky, Joanna Radin, William Rankin, Edward Rugemer, Marci Shore, Eliyahu Stern, Jonathan Wrytzen

Assistant Professors Jennifer Allen, Sergei Antonov, Denise Ho, Benedito Machava, Nana Quarshie, Carolyn Roberts

Senior Lecturers Jay Gitlin, Stuart Semmel, Rebecca Tannenbaum

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 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 and either 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 one additional language, as approved by the student's adviser and the DGS.

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 (HIST 994, HIST 995, HIST 998) 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, students are strongly recommended 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 not less than two weeks prior to the oral portion of the examination. 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, students are strongly recommended 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.

Both the comprehensive examinations and the prospectus colloquium must be held by the end of the sixth term.

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 Poorvu Center for Teaching and Learning 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 for extended registration. The petition, submitted to 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 the DGS's request. The DGS will use discretion in ensuring that feedback is provided in a clear and effective manner to any students about whom there are concerns. 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.

A student informed of a vote of dismissal from the program 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 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 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 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.

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 Ph.D. program in American Studies who wishes to obtain an M.A. degree 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.

Students enrolled in the Ph.D. program in Political Science may qualify for the M.A. degree in History, rather than an M.A. in Political Science, upon completion of a minimum of six graduate term courses in History at Yale, of which two must have earned Honors grades and the other four courses must average High Pass overall. A student must include in the six 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. An undergraduate language course, statistics course, or other applicable course in a technological "language" may count for one course 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 website, <http://history.yale.edu>.

COURSES

HIST 500a, Approaching History: Problems, Methods, and Theory Jennifer Klein and Sunil Amrith

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 and restricted to first-term History Ph.D. students.

HIST 506a / CLSS 856a / MDVL 506a, Human Migration in Antiquity Noel Lenski

This course examines the processes of human migration in premodern societies with an emphasis on ancient Rome. It explores voluntary and forced migrations, their motivations, processes, and outcomes. Particular attention is paid to sources and

problems in the period of late antiquity, when human migration helped drive the collapse of the Roman Empire.

HIST 507b / CLSS 829b / LING 668b / NELC 668b, Historical Sociolinguistics of the Ancient World Kevin van Bladel

Social history and linguistic history can illuminate each other. This seminar confers the methods and models needed to write new and meaningful social history on the basis of linguistic phenomena known through traditional philology. Students learn to diagnose general historical social conditions on the basis of linguistic phenomena occurring in ancient texts. Prerequisite: working knowledge of at least one ancient language.

HIST 510b / CLSS 813b, The Long Fourth Century: 404/3–272 BCE Joseph Manning and Jessica Lamont

This advanced seminar provides a broad overview of the major themes and problems in Greek history from the end of the Peloponnesian War in 404/3 BCE through the first quarter of the third century BCE, with an emphasis on the scholarship of the past twenty years. Ideally, readings function as foundations on which to build further research (e.g., toward a dissertation, article, or some less far-reaching enterprise) or as starting points from which to begin devising and organizing your own courses of instruction (syllabi). Using a variety of methods and sources, including papyri, literary texts, inscriptions, material remains, and secondary scholarship, this course surveys the development of Greek economic, political, social, and cultural history during the “long” fourth century BCE. Geographically the course ranges across much of the eastern and central Mediterranean, from Egypt to the Levant to mainland Greece to Sicily to Carthage.

HIST 513b / CLSS 872b / MDVL 513b / NELC 683b / RLST 619b, Law and History, Law in History: Premodern Civilizations through the Lens of Legal Historiography Maria Doerfler and Travis Zadeh

This seminar invites students into a comparative exploration of the intersection of law, history, and historiography in the ancient and premodern world. Sessions explore these links across a variety of linguistic and geographic settings, including those of ancient and medieval India, China, Persia, Greece, and Rome, as well as in different political, religious, literary, and archaeological contexts. The seminar constructs the category of law expansively to encompass civic, religious, and hybrid forms of legislation. In the process, we seek to explore, *inter alia*, questions of the relevance of history for the study of law, history’s deployment in the context of legal writings, and law’s concomitant relevance for historiography; the use of theoretical models, including those forged in modern and postmodern contexts, for the study of law and legal historiography; and the implications of discourses about law and history in premodernity for contemporary, post-secular societies.

HIST 535a / MDVL 585a, Problems in Church History, 800–1500 Paul Freedman

The course runs chronologically from the Carolingian Empire and its form of imperial church governance through the ecclesiastical reform of the eleventh century, monastic orders and their proliferation in the twelfth century, the emergence of the papal monarchy, and challenges to church authority from secular rulers and popular, sometimes heretical, movements. It ends with the upheavals of the late Middle Ages, specifically the Great Schism of 1378–1417 and the failed conciliar movement of the fifteenth century. Among the sources to be considered are cathedral and monastic cartularies, archival documents, saints’ lives and other biographies of church figures,

and records indicating the position of the church in the secular world, including education, commerce, city planning, and jurisdictional conflicts.

HIST 570b / AMST 836b, American Religion in the Archives Tisa Wenger

An advanced seminar on archival research methods for historians of American religion. The class begins with readings that theorize the archive, particularly for the study of American religion. What counts as an archive? How are archives constituted and by whom? What are the limits and pitfalls of archives—and the construct of “the archive”—for research in this field? Over the course of the term, students are guided through the process of writing an archivally grounded research paper using Yale Divinity School Library Special Collections and the Beinecke Rare Book and Manuscript Library. Enrollment capped at fifteen; meets at YDS Library L104.

HIST 575b / RLST 739b, Jonathan Edwards and American Puritanism Harry Stout and Kenneth Minkema

This course offers students an opportunity for intensive reading in and reflections upon the significance of early America's premier philosophical theologian through an examination of the writings of the Puritans, through engagement with Edwards's own writings, and through selected recent studies of Euro-Indian contact. Through primary and secondary literature, the course familiarizes students with the life and times of Edwards and encourages reading and discussion about his background, historical and intellectual contexts, and legacy.

HIST 579a / RLST 679a, Popular Religion in Europe, 1300–1700 Carlos Eire

Readings and discussion in recent scholarship on the history of religion in the Christian West in the late medieval and early modern periods.

HIST 582a / AMST 705a / RLST 705a, Readings in Religion in American Society, 1600–2018 Harry Stout and Kenneth Minkema

This seminar explores intersections of religion and society in American history from the colonial period to the present as well as methodological problems important to their study. It is designed to give graduate students a working knowledge of the field, ranging from major recent studies to bibliographical tools. In short, the seminar is a broad readings course surveying religion in American history from colonization to the present. It is not a specialized research seminar, but it does require a basic understanding of historiography.

HIST 590b / JDST 764b / MDVL 590b / RLST 777b, 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.

HIST 596a / JDST 761a / MDVL 596a / RLST 773a, 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.

HIST 597b / JDST 861b / RLST 797b, Twentieth-Century Jewish Politics

David Sorkin

This seminar explores major aspects of twentieth-century Jewish politics with an emphasis on new forms of political practice.

HIST 603a / JDST 806a / MDVL 603a / RLST 616a, Jews and Christians in the Formation of Europe, 500–1500

Ivan Marcus

This seminar explores how medieval Jews and Christians interacted as religious societies between 500 and 1500.

HIST 622b, Cultural Contacts: Ourselves and Others in the Early Modern Era

Stuart Schwartz

An examination of the encounters between Europeans and other peoples, 1480–1800, with attention to the role of perception, conceptions, and events on both sides of such meetings. Both the history of such encounters as well as the theories of alterity and cultural perceptions are discussed.

HIST 652a, British Identity since 1800

Stuart Semmel

This course explores recent historical writings in British national identity. A significant number of readings consider the imperial dimension of modern British history, but other topics include race, postcolonial immigration and multiculturalism, the “four nations” (England, Scotland, Wales, Ireland), and European integration.

HIST 654a / FREN 700a, Readings in Modern European Cultural History

Carolyn Dean

This course covers readings in European cultural history from 1789 to the present, with a focus on Western Europe.

HIST 664a, Historiography of Modern Germany

Jennifer Allen

This reading seminar surveys major themes in German history since unification. Through readings of both classic and recent research, students familiarize themselves with key debates that have shaped historical understanding of modern Germany.

HIST 669a, European Empires and Law

Lauren Benton

Empires used law to structure conquest, establish the legitimacy of rule, justify violence, and absorb new populations and territories. Imperial interactions with conquered populations developed in important ways through the medium of law. The conflicts in and among empires helped to shape the global legal order and to mold the contents of international law. This course considers these and other topics and problems. Readings include selections from the works of key European jurists but focus mainly on providing students with a firm grasp of trends in the secondary literature on empire and law. The emphasis is on the legal history of European empires between 1500 and 1900, but students are encouraged to explore topics and interests in other imperial historiographies.

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.

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.

HIST 688b, New Approaches to Russian and Eurasian History: The Archival Revolution Sergei Antonov

A reading seminar addressing recent work on Russian and Soviet history grounded in the ongoing “archival revolution” that began in the late 1980s. After reviewing the major earlier paradigms, we examine how they were overturned or significantly modified by archival-based evidence. Topics include the development of government and the law; historical actors and places marginalized by the earlier historiography, such as non-capital regions, the middle classes, conservatism, religion, and (more generally) non-state structures; and Russia’s position in the imperial, Soviet, and post-Soviet periods as a vast and complex multiethnic political entity. Class discussions in English. Readings in English with Russian options available.

HIST 699b, Readings in Early American History Mark Peterson

This readings seminar introduces students to the historical literature on European colonization of North America and the Caribbean, from the sixteenth century to the age of the American Revolution. It covers major themes in the scholarship, including European-Indigenous American contact and conflict, the rise of African chattel slavery, the institutional and political development of colonial America’s societies and economies, the formation and dissolution of Britain’s American empire, and the emergence of new American cultures. The assigned readings connect classics in this very rich scholarly field to recent works. As such, the course serves as excellent preparation for comprehensive exam fields, but also offers students interested in doing advanced research in this period the opportunity to explore promising topics.

HIST 700a / AMST 801a, U.S. Colonial Present Lisa Lowe

Settler colonialism, slavery, racialized immigration, and military empire have been integral to the emergence of the U.S. nation, state, and economy, and their historical consequences continue today. In this interdisciplinary seminar, we study the relevance of these historical and ongoing formations to the founding and development of the United States, giving attention to the independence of each, as well as to their differences, convergences, and contestations. We consider the strengths and limits of given analytic frames for understanding our current historical crises of public health, economic austerity, and racial state violence. Despite the differentiated histories of settler colonialism, slavery, and empire, contemporary struggles and solidarities can identify links and convergences that colonial logics may disallow. The seminar includes readings in history, anthropology, political theory, and literature, as well as films and other media. Enrollment limited. Permission of the instructor required.

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.

HIST 721b / AFAM 626b / RLST 626b, African American Religious History

Nicole Turner

African American religions have been central to the African American experience since Africans arrived in North America. An amalgam of traditional African religions, Christianity, Islam, Judaism, and African American ingenuity, African American religions are dynamic and multifaceted. Although they are often depicted as sources of black resilience and emblems of black resistance, they have also been critiqued

for marginalizing and racializing black people, as well as encoding archaic gender paradigms and reinforcing class divisions. This course explores the ways histories of African American religions have produced these various interpretive frames. Questions that animate the course include: What role have African American religions played in African American life? How have scholars studied the history of African American religions and ultimately shaped the discourse about African American religious life, and by extension African American history? The course engages foundational works, such as Albert Raboteau's *Slave Religion* and Evelyn Brooks Higginbotham's *Righteous Discontent*, as well as newer works like Judith Weisenfeld's *New World A-Coming* and Matthew Harper's *The End of Days*.

HIST 729b / AFAM 771b / AMST 830b, The American Carceral State

Elizabeth Hinton

This readings course examines the historical development of the U.S. carceral state, focusing on policing practices, crime control policies, prison conditions, and the production of scientific knowledge. Key works are considered to understand the connections between race and the development of legal and penal systems over time, as well as how scholars have explained the causes and consequences of mass incarceration in America.

HIST 731a / AMST 835a, Research in Recent U.S. History Joanne Meyerowitz

Students conduct research in primary sources and write original essays on post-1945 U.S. history. Readings include scholarly articles that might serve as models for students' research projects.

HIST 732b, Research and Writing the History of the Yale History Department

Jay Gitlin

In this seminar, we spend eight weeks in a readings-and-discussion format. Topics include Leopold von Ranke and the rise of source-based "Scientific History," the establishment of history as part of the core curriculum at Yale in 1917 and as a department in 1919, and the career of Charles M. Andrews and his role in encouraging women graduate students. We examine Allen Johnson and the *Chronicles of America* Series (fifty volumes and fifteen films). After looking at the modernization of the department in the era of Edmund Morgan, John Morton Blum, Howard Lamar, and C. Vann Woodward, we spend four weeks in research workshops discussing periodization, curricular change, and faculty diversity over time with the intent of producing a publishable history of the department.

HIST 733a / AMST 800a, The United States in the Twentieth Century Beverly Gage

An introduction to the historiography of the United States in the twentieth century. Emphasis on methodology and major interpretive problems. Readings include "classics" as well as exemplary recent works.

HIST 734b / AMST 780b, Class and Capitalism in the 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).

HIST 746b / AMST 903b / PHUM 903b, Introduction to Public Humanities

Karin Roffman

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 website, a documents collection for use in public schools.

HIST 747b / AFAM 763b / AMST 731b, Methods and Practices in U.S. Cultural**History** Matthew Jacobson

This sampling of U.S. cultural history from the early national period to the present is designed to unfold on two distinct planes. The first is a rendering of U.S. culture itself—a survey, however imperfect, of the major currents, themes, and textures of U.S. culture over time, including its contested ideologies of race and gender, its organization of productivity and pleasure, its media and culture industries, its modes of creating and disseminating “information” and “knowledge,” its resilient subcultures, and its reigning nationalist iconographies and narratives. The second is a sampling of scholarly methods and approaches, a meta-history of “the culture concept” as it has informed historical scholarship in the past few decades. The cultural turn in historiography since the 1980s has resulted in a dramatic reordering of “legitimate” scholarly topics, and hence a markedly different scholarly landscape, including some works that seek to narrate the history of the culture in its own right (Kasson’s history of the amusement park, for instance), and others that resort to cultural forms and artifacts to answer questions regarding politics, nationalism, and power relations (Melani McAlister’s *Epic Encounters*). In addition to providing a background in U.S. culture, then, this seminar seeks to trace these developments within the discipline, to understand their basis, to sample the means and methods of “the cultural turn,” and to assess the strengths and shortcomings of culture-based historiography as it is now constituted.

HIST 749a / AMST 838a / HSHM 753a, Research in Environmental History

Paul Sabin

Students conduct advanced research in primary sources and write original essays over the course of the term. Readings and library activities inform students’ research projects. Interested graduate students should contact the instructor with proposed research topics.

HIST 764a / AFAM 716a / AMST 910a, Working Group on Latina/o Studies I

Stephen Pitti and 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.

HIST 768b / AMST 768b, 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.

HIST 775b / AMST 866b / WGSS 712b, Readings in the History of Sexuality

Joanne Meyerowitz and Regina Kunzel

Selected topics in the history of sexuality. Emphasis on key theoretical works and recent historical literature.

HIST 790a / GLBL 793a, Relations of the Great Powers since 1890 Paul Kennedy

Reading seminar. Among the topics covered are the “New Imperialism,” the military and naval arms race prior to 1914, the relationship between domestic politics and foreign affairs, the First World War and the alteration of the Great Power order, the “new diplomacy,” appeasement, the rise of the dictator-states, the origins of the Second World War, military and strategic results of the war, the Cold War, reconfigurations of the 1970s and ’80s, the end of the Cold War, post-Cold War relations. There is a heavy emphasis on historiography and an encouragement to relate economic and strategic trends to diplomatic. Open to undergraduate seniors with permission of the instructors.

HIST 792b, Research Seminar in International and Transnational History

David Engerman

This seminar provides a venue for writing a substantial research paper that crosses national borders in terms of perspective, analysis, and/or sources. While there are a handful of general readings, the bulk of the course focuses on individual research projects that are workshopped in various ways through the term. The seminar focuses especially on digital sources for international/transnational history. While the United States figures prominently in the course, students may conduct research on transnational topics from any geography in the nineteenth and twentieth centuries.

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 815b, Slavery in the Atlantic World Stuart Schwartz and Marcela Echeverri Munoz

This seminar provides an introduction to the legal, economic, social, and political dimensions of the history of slavery in the Atlantic world. With a comparative perspective, it examines the rise and fall of the institution of slavery in the European Atlantic empires between the sixteenth and nineteenth centuries. Topics include the

transatlantic slave trade, the plantation economy and the master class, alternative slave economies, slave life and politics, free blacks, and abolitionism during the Age of Revolutions.

HIST 825b, New Nations Anne Eller

This seminar examines classic and new works on state building after independence in Latin America and the Caribbean.

HIST 836a / AFST 836a, Histories of Postcolonial Africa: Themes, Genres, and the Phantoms of the Archive Benedito Machava

This course is both historiographic and methodological. It is meant as an introduction to the major themes that have dominated the study of postcolonial Africa in recent years, and the material circumstances in which they were produced. We pay close attention to the kinds of sources and archives that scholars have employed in their works, and how they addressed the challenges of writing contemporary histories in Africa. We center our weekly meetings around one key text and one or two supplementary readings. We engage with works on politics, violence, environment and technology, women and gender, affect, fashion, leisure, and popular culture.

HIST 837a / AFST 837a, 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.

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 on periodization, and other interpretive problems. All students should read Caroline Finkel's *Osman's Dream* for the first meeting. Open to advanced undergraduates with permission of the instructor.

HIST 862a, Persian Art of Governance: Text and Context Abbas Amanat

This course examines classical and modern writings on the Persian tradition of governance. They include the genre of "mirrors," critiques of power, literature of dissent, and Islamic theories of state.

HIST 867a / EAST 501a, Modern Korean History Studies: Issues and Methods Staff

This course examines major works in Korean history of the twentieth century, encompassing the colonial period and the Korean War, the First Republic, economic development, and democratization of South Korea, as well as the building of the North Korean state under Kim Il Sung. Within each of the six topics, a seminal work is paired with an enthusiastically received recent study investigating the same question or time period. By critically analyzing and comparing the issues illuminated and methods employed by these studies, the course seeks to discuss the transformations and continuity of perspectives and methodology in the study of modern Korean history.

HIST 871a / EAST 571, The History of the People's Republic of China Denise Ho

This is a reading seminar that examines recent English-language scholarship on the People's Republic of China, focusing on the Mao period (1949–76). Considering the question of the PRC as history, the seminar compares present-day scholarship to earlier social science research and discusses the questions being asked and

answered by historians today. Reading knowledge of Chinese is not required; open to undergraduates with permission of the instructor.

HIST 878a, Readings in Japanese History to 1850 Fabian Drixler

A critical introduction to debates in the history of Japan up to about 1850, with particular emphasis on the Tokugawa period but some coverage of earlier times as well. Readings are in English but, depending on student interest, supplemental materials may also be assigned in Japanese.

HIST 881b, China's Age of Discovery Valerie Hansen

Study of China's maritime history focusing on the period 1000–1500, culminating with the Zheng He voyages and their cancellation. English-language readings in secondary sources and primary sources in translation; examination of relevant maps in Beinecke's collection. Separate section for those with a reading knowledge of classical Chinese.

HIST 889a / EAST 889a, Research in Japanese History Daniel Botsman

After a general introduction to the broad array of sources and reference materials available for conducting research related to the history of Japan since ca. 1600, students prepare original research papers on topics of their own choosing in a collaborative workshop environment. Prerequisite: reading knowledge of Japanese.

HIST 890b / EAST 502b, History of North Korea: Politics, Society, and Culture Staff

This course explores the political, social, and cultural history of North Korea from the origins of the state during the Japanese colonial period to the regime transition in the early twenty-first century. The particular focus is on the factors driving the transformations of North Korea. Nicknamed “the hermit kingdom,” the regime is often commonly perceived as isolated from the outside world. This course seeks to evaluate the importance of external influence and international context at the turning points in North Korean history, which include the establishment of DPRK, its militarization and beginning of nuclear development, Kim Il Sung's purge of factions and the succession to Kim Jong Il and Kim Jong Un, and other topics. Discussions also analyze the accompanying changes in North Korean society and art. In addition to academic sources, the course utilizes artworks, films, music, historical newspapers, and memoirs. Through the critical examination of the evolution of North Korea, this course situates the country in the region as well as among other authoritarian and communist states.

HIST 896a / SAST 820, Readings in South Asia: Across the Disciplines Rohit De and Sunil Amrith

Since the emergence of subaltern studies in the 1980s, South Asian historiography has been dominated by debates over the methods and theory that have come to influence the broader discipline of history. The seminar introduces participants to the major debates in South Asian studies through reading the original texts alongside newer scholarship addressing the themes of bureaucracy, secularism, visual media, political economy, and the environment.

HIST 913a / HSHM 713a, Geography and History Bill 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.

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.

HIST 924a / HSHM 768a, Epidemics and the Early Modern Body Paola Bertucci

Epidemics in the history of the early modern world. Focusing on individual epidemics that contributed to shaping the early modern world, students discuss conceptions of the body and racist stereotyping, spaces and strategies of containment, visual and material culture of disease and treatment, and the relationship between public health and the early modern state.

HIST 925b / HSHM 749b, Visual and Material Cultures of Science Paola Bertucci

The seminar discusses recent works that address the visual and material cultures of science. Visits to Yale collections, with a particular emphasis on the History of Science and Technology Division of the Peabody Museum. Students may take the course as a reading or research seminar.

HIST 926a / AMST 877a / HSHM 703a, Problems in the History of Medicine and Public Health John Warner

An examination of the variety of approaches to the social, cultural, 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 vernacular and professional understandings of the body; the role of the marketplace in shaping professional identities and patient expectations; health activism and social justice; citizenship, nationalism, and imperialism; and the visual cultures of medicine.

HIST 931a / HSHM 702a, Problems in the History of Science Deborah Coen

Close study of recent secondary literature in the history of the physical and life sciences. An inclusive overview of the emergence and diversity of scientific ways of knowing, major scientific theories and methods, and the role of science in politics, capitalism, war, and everyday life. Discussions focus on historians' different analytic and interpretive approaches.

HIST 940a / HSHM 770a / WGSS 782a, Disability Histories: Research Seminar
Naomi Rogers

This course introduces students to the major issues in current disability history as well as theoretical debates in disability studies. We discuss cultural, social, and political meanings of citizenship; efforts to define and classify disabled bodies; contested notions of bodily difference; and the ways disability has and continues to be used as a metaphor for socially defined inferiority like gender, race, or sexuality. By the fourth week students have identified the topic for their research papers and discussed them in class. The next month is devoted to research and writing. We then start meeting again to read and discuss a draft of each paper.

HIST 963a and HIST 964b / ANTH 963a and ANTH 964b / HSAR 841a and HSAR 842b / HSHM 691a and HSHM 692b, Topics in the Environmental Humanities Paul Sabin and Tomo Sugimoto

This is the required workshop for the Graduate Certificate in Environmental Humanities. The workshop meets six times per term to explore concepts, methods, and pedagogy in the environmental humanities, and to share student and faculty research. Each student pursuing the Graduate Certificate in Environmental Humanities must complete both a fall term and a spring term of the workshop, but the two terms of student participation need not be consecutive. The fall term each year emphasizes key concepts and major intellectual currents. The spring term each year emphasizes pedagogy, methods, and public practice. Specific topics vary each year. Students who have previously enrolled in the course may audit the course in a subsequent year. Open only to students pursuing the Graduate Certificate in Environmental Humanities.

½ Course cr per term

HIST 965a / ANTH 541a / ENV 836a / PLSC 779a, Agrarian Societies: Culture, Society, History, and Development Kalyanakrishnan Sivaramakrishnan, Elisabeth Wood, and Marcela Echeverri Munoz

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.

HIST 966a / GLBL 827a, Totalitarianism: An Intellectual History Marci Shore
2017 marked the 100th anniversary of the Bolshevik Revolution, which ushered in the largest and most all-encompassing social engineering experiment in human history; 2019 marked the thirtieth anniversary of the fall of the Berlin Wall. For most of this past hundred years, historians, novelists, socialist scientists, and philosophers (many victims, survivors, or disillusioned believers themselves) have struggled to understand the twentieth-century experiences of Nazism, fascism, and Stalinism. Politics alone fails to explain what the Russian philosopher Nikolai Berdyaev described as a “deep deformation of the structure of consciousness” prompting “individual conscience to flee from the world.” We discuss what we can learn both about the totalitarian experiences of the twentieth century and about our present “post-factual” world where, as Peter Pomerantsev describes, “nothing is true and everything is possible,” by revisiting classic works like Hannah Arendt’s *Origins of Totalitarianism*. The readings include a mixture of the empirical and the philosophical, of narrative and theory.

HIST 972a / GLBL 820a, Freedom and History Timothy Snyder

The idea of human freedom is a central theme of history, but it is also a central problem of historical method. This course surveys attempts in philosophy, literature, and historiography to address three questions. Where does historical reconstruction end and the imponderable begin? In what measure does the endeavor of history itself depend upon a protective notion of individual freedom? How should the historian navigate between writing as an expression of individuality and writing as self-restraint?

HIST 980a, Genocide in History and Theory Ben 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.

History of Art

Loria Center, Rm. 251, 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

Carol Armstrong (Loria 658, 203.432.2680, carol.armstrong@yale.edu)

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Associate Professors Marisa Bass, Craig Buckley, Cécile Fromont, Jacqueline Jung, Jennifer Raab

Assistant Professors Joanna Fiduccia, Subhashini Kaligotla, Quincy Ngan

Lecturer Nenagh Hathaway

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; Material Culture and Decorative Arts; British; Pre-Columbian; Islamic; East Asian.

SPECIAL REQUIREMENTS FOR THE PH.D. DEGREE

All students must pass examinations in at least two languages pertinent to their field of study, to be determined and by agreement with the adviser and director of graduate studies (DGS). One examination must be passed during the first year of study, the other not later than the beginning of the third term. During the first two years of study, students typically take twelve term courses. 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 English

The Department of the History of Art also offers, in conjunction with the Department of English Language and Literature, a combined Ph.D. degree in History of Art and English Language and Literature. The requirements are designed to emphasize the interdisciplinarity of the combined degree program.

Course work In years one and two, a student in the combined program will complete sixteen courses: ten seminars in English, including The Teaching of English (ENGL 990) and one course in each of four historical periods (Medieval, Renaissance, eighteenth–nineteenth century, twentieth–twenty-first century), and six in History of Art, including HSAR 500 and one course outside the student's core area. Up to two cross-listed seminars may count toward the number in both units, reducing the total number of courses to fourteen.

Languages Two languages pertinent to the student's field of study, to be determined and by agreement with the advisers and directors of graduate studies. Normally the language requirement will be satisfied by passing a translation exam administered by one of Yale's language departments. One examination must be passed during the first year of study, the other by the end of the third year.

Qualifying paper History of Art requires a qualifying paper in the spring term of the second year. The paper must demonstrate original research, a logical conceptual structure, stylistic lucidity, and the ability to successfully complete a Ph.D. dissertation. The qualifying paper will be evaluated by two professors from History of Art and one professor from English.

Qualifying examination *Written exam:* addressing a question or questions having to do with a broad state-of-the-field or historiographic topic. Three hours, closed book, written by hand or on a non-networked computer. *Oral exam:* given one week after the written exam, covering six fields, including three in English (question periods of twenty minutes each, covering thirty texts each, representing three distinct fields of literary history) and three in History of Art (twenty-five minutes each, fields to be agreed on in advance with advisers and DGS). Exam lists will be developed by the student in consultation with faculty examiners.

Teaching Two years of teaching—one course per term in years three and four—are required: two in English (up to two sections per course) and two in History of Art.

Prospectus The dissertation prospectus must be approved by both English and History of Art. The colloquium will take place in the spring term of the third year of study. The committee will include at least one faculty member from each department. As is implied by its title, the colloquium is not an examination, but a meeting during which the student can present ideas to a faculty committee and receive advice from its members. The colloquium should be jointly chaired by the directors of graduate studies of both departments.

First chapter reading Students will participate in a first chapter reading (also known as a first chapter conference) normally within a year of advancing to candidacy (spring term of year four). The dissertation committee, including faculty members from both programs, will discuss the progress of the student's work in a seminar-style format.

Dissertation defense The hour-long defense is a serious intellectual conversation between the student and the committee. Present at the defense will be the student's advisers, committee, and the directors of graduate studies in both English and History of Art; others may be invited to comment after the committee's questioning is completed.

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 Earth and Planetary Sciences—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.

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 online at <http://arthistory.yale.edu>.

COURSES

HSAR 500a, First-Year Colloquium Kishwar Rizvi

The focus of the first-year colloquium is to analyze and critique the history of art history and its methodology from a variety of disciplinary perspectives. The seminar discusses foundational texts as well as new methods relevant to the study of the history of art and architecture today, notably those concerned with issues of race, gender, and representation. It also engages with debates about museums and the ethics of collecting and display. The seminar is structured around selected readings and includes workshops with guest speakers.

HSAR 540b, The Decorative Threat Joanna Fiduccia

"Decoration is the specter that haunts modern painting," Clement Greenberg once claimed; it is modernism's "symptomatic shadow," wrote Peter Wollen. This course seeks to understand these statements by exploring the role of decoration in modernist aesthetics and modern ideology, in which the decorative was entangled with motifs of excess and desire, truth and deception, and gendered labor and space, along with Orientalist fantasies, bourgeois reveries, socialist aspirations, and metaphors for the interiority of the modern subject. Beginning with readings on the significance of ornamentation and decoration at the origins of modern art history, we examine the relationship between theories of modernism and the development of the decorative arts in the nineteenth and twentieth centuries. The course concludes by considering the cultural and political legacies of the decorative threat in art and art history today. Readings include Alois Riegl, John Ruskin, Gottfried Semper, Theodor Adorno, Joris-Karl Huysmans, Gertrude Stein, Clement Greenberg, Caroline Arscott, Gülru Necipoğlu, Oleg Grabar, Peter Wollen, Rae Beth Gordon, Partha Mitter, Whitney Davis, Nancy Troy, Tag Gronberg, Anne Cheng.

HSAR 542a, Global Materiality of Color Quincy Ngan

This seminar explores a global phenomenon wherein color makes meaning beyond sheer coloration and complements the function and meaning of artworks, inseparable from their conceptual properties. The seminar has two fundamentally different but reciprocal inquiries. The first is to study how pigments and dyes entangle with the wider world, reconstructing the history of their production and circulation along with the worldview of minerals and dyes in a given civilization. This inquiry leads to a better understanding of the history of trade, economy, science, medicine, chemistry, technology, and culture. The second inquiry, which fundamentally concerns art historians, studies how the production and circulation of pigments and dyes, as well as views on the material, permeate the conceptual property of artworks, such as paintings and murals, and colored objects, such as textiles and sculptures. Together, we explore the multivalent significance of colors—cochineal, indigo, Maya blue, malachite, azurite,

lapis lazuli, and gold—across cultures. For the final paper, students write about the materiality of color in their own field. Major texts include *Pigments and Power in the Andes* (2011), *Colors Between Two Worlds* (2011), *The Materiality of Color* (2012), *Colour, Art, and Empire* (2013), *A Red Like No Other* (2015), *Color in Ancient and Medieval East Asia* (2015), *Color in the Age of Impressionism* (2017), and *Colour and Light in Ancient and Medieval Art* (2018).

HSAR 545b, Research Methods in the Arts of the Americas Jennifer Raab

Discussion of scholarly methods, research practices, and critical texts to facilitate the conceptualization and development of dissertation projects. Workshops and presentations to mark various stages (key questions, core objects, relevant literature, argument, outline, drafts). Intended primarily for students undertaking the dissertation prospectus on topics related to the arts of the Americas. Prior permission of the instructor required.

HSAR 546a, Critical Readings in American Art Jennifer Raab

Readings in American art in preparation for Ph.D. examinations. Discussions of texts, methods, and works of art. Prior permission of the instructor required.

HSAR 547a or b, Futures in Art History Jennifer Raab

Addresses professional development in the field of art history through workshops, discussions, and events. Open to all graduate students in the History of Art at any stage of the Ph.D. program.

HSAR 549b, Thinking Small Marisa Bass

How do we think differently with images and objects that are small in scale? Do small-scale works have a particular ability to rouse the imagination, to engage the senses, or to operate in the political sphere? What are the implications of working small for artists in terms of their approach to technique, materiality, and composition? What kinds of knowledge and engagement do small works demand on the part of the viewer or user? And how might we extend the concept of thinking small even to large-scale works, for instance, by considering painting in terms of the unit of the brushstroke or the level of detail? When does smallness result in greater abstraction or obscurity rather than greater realism or clarity? This seminar explores the concept of thinking small across media, including but also looking beyond the usual categories of the miniature and the microscopic. Our particular focus is on the art of the early modern Netherlands, but readings and discussion range more widely. A major component of the course is planning a prospective exhibition on Dutch art at the Yale Art Gallery and attendant discussion of curatorial issues and practice.

HSAR 550a, Early Indian Afterlives Subhashini Kaligotla

This seminar combines close looking and reading with writing imaginatively. With the help of an array of texts and visual material we explore how early South Asians thought about death, dying, and the afterlife. Students are encouraged to react to these primary sources in order to develop their writing muscles and incorporate a range of ekphrastic stances into their writing. Students write weekly creative texts that culminate in a final longer work, which can take the form of a literary essay, a poem sequence, short story, film, or a mixed media project. Topics of discussion include the moment of death and the kinds of death valorized by social groups; rituals of mourning, grief, and remembrance; the iconography of death; conceptions of afterworlds and their inhabitants; and such Indic concepts as rebirth, karma, and nirvana. We read literary,

political, religious, and art historical texts, and consider Buddhist, Hindu, and Jain perspectives as well as contemporary prose and poetry such as Joan Didion's *The Year of Magical Thinking*, Mary Jo Bang's *Elegy*, and Marie Howe's *What the Living Do*. Visual examples run the gamut: memorial buildings, relics and reliquaries, prints capturing the rewards and punishments of the afterlife, mandalas and cosmological maps, and the striking portrayals of the god of death and ghosts and ghouls on temple walls, paintings, and textiles.

HSAR 551a, Art. Race. Violence. Cecile Fromont

This seminar investigates the many entanglements between art, race, and violence in the early modern Atlantic world and the long shadow these entanglements have cast on the contemporary era. Readings, class discussions, assignments, and invited speakers address topics such as racial construction in colonial Latin America; the visual culture of slavery; race and the advent of photography; the memorialization of slavery and colonialism; and race, piety, and aesthetics.

HSAR 600b, Painting and Poetry in Islamic Art Kishwar Rizvi

An exploration of the intersection between objects and texts in Islamic art with a focus on the arts of Iran, Turkey, and India. The seminar studies holdings in Yale's libraries and art galleries, which include ninth-century Qurans, thirteenth-century ceramics, and nineteenth-century lithographs, in order to gain an understanding of the manner in which poetic texts were deployed as an inspiration for visual art while serving as a critique of its very materiality.

HSAR 678a / ENGL 830a, Portraiture and Character from Hogarth to Woolf

Ruth Yeazell

Case studies in the visual and verbal representation of persons in Anglo-American painting and fiction, with particular attention to novels that themselves include portraits or address relations between the two media. Novelists tentatively include Henry Fielding, Jane Austen, Henry James, Edith Wharton, Oscar Wilde, and Virginia Woolf. Painters include William Hogarth, Joshua Reynolds, Thomas Lawrence, James McNeill Whistler, John Singer Sargent, and Vanessa Bell. Selected readings in recent theories of fictional character and in the history and theory of portraiture. Whenever possible, we draw on paintings in Yale's collections.

HSAR 682b, The Matter of Still Life Carol Armstrong

This seminar concerns the history of still-life painting and photography from the seventeenth through the twentieth century, with an emphasis on the nineteenth century in France. We consider the genre of painting that was the lowest on the old hierarchy of genres as a site of contemplation of the following themes of modernity and modernism: materiality and commodification, medium-specificity, the gendering of the private sphere, fetishism, fantasy and displacement, subject/object relations, relations between the optical and the tactile, and the transformation of the artist's studio. We also consider the theory of the genres to which this particular genre belonged.

HSAR 694a, Edwardian Modernities Timothy Barringer

This seminar explores the complex and heterogeneous culture of Edwardian Britain and its empire, 1901–1910, and in the following years leading to the First World War. Recent scholarship has emphasized the transitional nature of Edwardian culture. Radical shifts in social, political, and economic structures, and demands for the representation of women, for Indian and Irish independence, coincided with displays

of opulence and imperial bravado. New technologies such as the motor car proliferated, and popular culture took on distinctively modern forms through the music halls, illustrated press, gramophone, and cinema. This was the moment of the emergence of distinctively British forms of modern art, literature, and music. Particular emphasis is placed on relationships between the arts: paintings by Sargent, Orpen, Conder, and Vanessa Bell; the literary work of Hardy, H.G. Wells, and Rudyard Kipling; and music by Elgar, Delius, and Vaughan Williams. Architecture and urbanism in Britain, its colonies, and dominions are also considered.

HSAR 709a, Precarity Pamela Lee

An intensive reading seminar on precarity and neoliberalism, and the aesthetic and art-critical responses to the diverse phenomena these terms encompass and name. Topics include bio- and necropolitics; the Anthropocene and environmental justice; human capital and its complements in immaterial, reproductive, and contingent labor; black, brown, and red bodies under perpetual siege and surveillance; education, credit, and debt. Readings in autonomist/workerist and post-Marxist literature; debates on the status of critique within the arts; strategies of protest and/or refusal/withdrawal within the art world and its institutions; and how artists, students, and arts professionals confront the material realities of precarious life. Enrollment limited and by approval of the instructor.

HSAR 714b, Globalization of Modern Craft Edward Cooke

This seminar explores the development of self-conscious craft in the condition of modernity. Emerging from the work of the English designer-writer William Morris, modern craft has been intertwined with issues of identity (national and personal), class, and politics. Its intellectual foundation in the writings of Morris has also permitted modern craft to spread throughout the globe, taking root in different ways and at different times. The seminar investigates this geographic and temporal spread in a comparative fashion.

HSAR 727a, The American Interior Edward Cooke

The course historicizes and theorizes the furnishing and cultural function of American domestic space from the colonial period to the present. It charts developments over time with an eye toward themes such as gendered consumption, accumulated possessions, en suite decoration, separation of public and private space, identity formation, interest in domesticating cultural tourism, professionalization of the interior designer or architect, desire to reshape domesticity, rise of interior decorators, and impact of technology. The course also makes use of collections at Yale.

HSAR 752a, Art and the American Civil War: Violence, Race, and Memory

Jennifer Raab

The military battles of the American Civil War may have been fought between 1861 and 1865, the Emancipation Proclamation issued in 1863, but the pain, injustice, structural inequalities, and state-sponsored violence that are the legacies of chattel slavery remain. One might say that the Civil War has never really ended. This course looks not only at the visual and material culture produced during the conflict but also its far-reaching future effects. We explore the emergence of photojournalism and the illustrated newspaper; African American activism and the use of photographic portraiture; radical shifts in religious and cultural rituals surrounding death and mourning; the material culture of disability; the absence of traditional history paintings and the surge of white supremacist sculptures after Reconstruction; and how the violence and trauma of

war and enslavement pose distinct ethical and representational challenges for visual media. The course ends by considering the recent movement to take down Confederate statues and monuments and the broader questions raised about art in public spaces, the suppression of histories of racial violence and imperialism, and the possibilities and limitations of memorialization. Permission of instructor required; priority is given to graduate students.

HSAR 785b / AFAM 839, Cross-Cultural Issues: From Modern to Contemporary

Kobena Mercer

Examines the changing vocabulary in which cross-cultural aesthetics have been discussed in the twentieth-century shift from “modern” to “contemporary” art. Concepts of creolization, hybridity, syncretism, and transculturation are examined in their disciplinary sources and as taken up in art criticism, against the background of modernist paradigms of primitivism, internationalism, and universalism. More so than artists or artworks, the basic unit of analysis is the art exhibition, from the national pavilions of the first Venice Biennale in 1895 to such curatorial initiatives as Jean Hubert Martin’s *Magiciens de la terre* and Okwui Enwezor’s *The Short Century: Independence and Liberation Movements in Africa, 1945–1994*.

HSAR 841a and HSAR 842b / ANTH 963a and ANTH 964b / HIST 963a and HIST 964b / HSHM 691a and HSHM 692b, Topics in the Environmental Humanities Paul Sabin and Tomo Sugimoto

This is the required workshop for the Graduate Certificate in Environmental Humanities. The workshop meets six times per term to explore concepts, methods, and pedagogy in the environmental humanities, and to share student and faculty research. Each student pursuing the Graduate Certificate in Environmental Humanities must complete both a fall term and a spring term of the workshop, but the two terms of student participation need not be consecutive. The fall term each year emphasizes key concepts and major intellectual currents. The spring term each year emphasizes pedagogy, methods, and public practice. Specific topics vary each year. Students who have previously enrolled in the course may audit the course in a subsequent year. Open only to students pursuing the Graduate Certificate in Environmental Humanities.

½ Course cr per term

History of Science and Medicine

McClellan Hall, 203.432.1365

<http://hshm.yale.edu>

M.A., M.Phil., Ph.D.

Chair

Deborah Coen

Director of Graduate Studies

Paola Bertucci

Faculty Sakena Abedin (*History of Science & Medicine*), Paola Bertucci (*History*), Deborah Coen (*History*), Ivano Dal Prete (*History*), Nana Quarshie (*History*), Joanna Radin (*History of Medicine*), Chitra Ramalingam (*History of Science & Medicine*), William Rankin (*History*), Miriam Rich (*History of Medicine*), Carolyn Roberts (*African American Studies; History; History of Medicine*), Naomi Rogers (*History; History of Medicine; Women's, Gender, & Sexuality Studies*), John Harley Warner (*History of Medicine; History*)

Affiliated Faculty Rene Almeling (*Sociology*), Toby Appel (*Librarian for Medical History*), Alexi Baker (*Collections Manager, HSI*), Marisa Bass (*History of Art*), Randi Epstein (*English*), Melissa Grafe (*Librarian for Medical History*), Dimitri Gutas (*Emeritus, Near Eastern Languages & Civilizations*), Ann Hanson (*Classics*), Jessica Helfand (*Yale College*), Marcia Inhorn (*Anthropology*), Kathryn James (*Curator, Early Modern Books & Manuscripts, Beinecke Library*), Amy Kapczynski (*Law*), Jennifer Klein (*History*), Stephen Latham (*Director, Interdisciplinary Center for Bioethics*), Lisa Messeri (*Anthropology*), Joanne Meyerowitz (*History*), Alan Mikhail (*History*), Jennifer Raab (*History of Art*), Ayesha Ramachandran (*Comparative Literature*), Kevin Repp (*Curator, Modern European Books & Manuscripts, Beinecke Library*), Paul Sabin (*History*), Jason Schwartz (*Public Health*), Gordon Shepherd (*Neuroscience*), Rebecca Tannenbaum (*History*), R. John Williams (*English; Film & Media Studies*)

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.

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; science and national security; science and law, science and religion, life sciences, human genetics, eugenics, biotechnology, gender, race, and science/medicine; bioethics and medical research; environmental sciences; human and social sciences; physical and earth sciences.

SPECIAL REQUIREMENTS FOR THE PH.D. DEGREE

Courses

Students will ordinarily take twelve courses during the first two years. All students will normally take the three core Problems seminars: Problems in the History of

Medicine and Public Health (HSHM 701 or HSHM 703), Problems in the History of Science (HSHM 702), and Problems in Science Studies (HSHM 710). These courses are committed to exploring histories of medicine and science alongside the cultural, political, and social forces that shape them. Issues of race, gender, sexuality, disability, class, and religion are integrated into discussions of medical and scientific knowledge production and praxis in Western and non-Western contexts.

In addition to the three core Problems seminars, students are required to take four graduate seminars in the history of science or medicine. Two of the four must be graduate research seminars. The remaining five courses can be taken in history of science or medicine, history, science, or any other field of demonstrated special relevance to the student's scholarly objectives.

Graduate school grading at Yale follows a qualitative rubric of Honors, High Pass, or Pass. 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 director of graduate studies (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 the DGS's request. The DGS will use discretion in ensuring that feedback is provided in a clear and effective manner to any students about whom there are concerns.

Students who enter having previously completed graduate work may obtain up to three course credits toward the completion of the total course requirement, the number being contingent on the extent and nature of the previous work and its fit with intended course of study at Yale.

Languages

All students must show proficiency in two languages in addition to English relevant to the student's research interests and approved by the DGS. Over the years, our graduate students have demonstrated proficiency in a wide range of languages, including American Sign Language, Bulgarian, French, German, Hebrew, Hindi, Italian, Japanese, Korean, Latin, Mandarin Chinese, Norwegian, Russian, Spanish, and Swedish. Students may fulfill the requirement in a variety of ways, including demonstrated command of a native language other than English, graduation from an approved foreign university where teaching is conducted in a language other than English, passing an approved language course for credit, or passing a language test administered by the faculty or by one of Yale's language departments. Language tests are administered by their respective departments (such as German, Italian, French, East Asian Languages and Literatures). Students should consult the DGS for additional details and options for uncommon languages.

Yale offers classes in a variety of languages, from introductory to advanced levels, as well as special summer courses for targeted reading proficiency. There are also opportunities to study languages outside of Yale's curriculum, including funding for summer language study, and Directed Independent Language Study (DILS) for individuals who wish to study a language not offered by Yale. For more information

on these programs and foreign language tutoring at Yale, please visit the Center for Language Study's website at <http://cls.yale.edu>.

Second-Year Review

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-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 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.

Qualifying Examination

Prior to beginning work on the dissertation, all students are expected to develop a broad general knowledge of the discipline. This knowledge will be acquired through a combination of course work, regular participation in HSHM colloquia and workshops, and dedicated preparation for the qualifying oral examination.

The qualifying examination has two main goals. First, it is a preparatory step toward the dissertation. Students will master the analytical vocabulary of the discipline and engage critically with key historiographic and theoretical questions. This will prepare them to select a research topic of scholarly significance and to articulate its import effectively. Second, the qualifying examination will prepare students for teaching. Students will learn to communicate a set of historical themes and narratives confidently and fluently. Accordingly, as part of their exam preparation, students may be asked to draft a syllabus for an undergraduate course based on each exam field.

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 normally consist of four fields, each of which will be examined by a different faculty member: two fields in the history of science and/or history of medicine; one field in an area of history outside of medicine and/or science; and one field of special interest, the content and boundaries of which will be established in consultation with the student's adviser.

Possibilities for the field of special interest include a second field in history outside of history of science or medicine, a field with a scientific or medical focus (such as bioethics, health policy, public health, medical anthropology, or medical sociology), or a field at the intersection of science, medicine, and other subjects (such as law, national

security, religion, culture, biotechnology, gender, race, literature, the environment, and so on).

In preparation for the qualifying examination, the program's faculty work closely with students to facilitate the successful passage of the exam. A student who does fail the qualifying examination will be permitted to retake it. A student who fails a second time will be asked to withdraw from the program.

Advising

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 the student's 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 adviser when the time comes to do so. Students are encouraged to discuss their interests and program of study with other members of the faculty.

Dissertation Prospectus

Students are encouraged to begin thinking about their dissertation topics during the second year. This is an opportune time, since they will be expected to submit 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. The prospectus defense is typically held in the second term of the third year, with advancement to candidacy before the start of the fourth year.

For more information, please see the program's Guide to Prospectus and Prospectus Defense at https://hshm.yale.edu/sites/default/files/files/prospectus_guide.pdf.

Committee Constitution Requirement

Each Ph.D. student must have a dissertation committee and a dissertation adviser, 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 and dissertation adviser will normally be withdrawn from their program.

Teaching

Teaching is an important part of the professional preparation of graduate students in History of Science and Medicine. Students are encouraged to participate in programs to develop their teaching skills, including the Certificate for College Teaching Preparation, which is a comprehensive training program designed to enhance proficiency in classroom instruction.

Typically, during the third and fourth years of study, students will serve as teaching fellows, which usually means that they will lead small-group discussion sections for undergraduate courses and grade their students' exams and papers. On occasion, however, students may work as teaching fellows in the second term of the second year, particularly if they have received course credit for previous graduate studies, or if they choose to defer the completion of their required course work for the first term of the third year. Students usually work as teaching fellows for courses in the History of

Science and Medicine, but they may also have the opportunity to be teaching fellows in History or other departments.

At least two terms of teaching are required for doctoral students to graduate from the Program in the History of Science and Medicine; four terms are required for students on Yale-supported fellowships, although students may elect to substitute one or two of these terms with research assistantships at the Yale Center for British Art, the Yale University Art Gallery, or other sites across campus. For more information, please contact the Office of Financial Aid.

Chapter Conference and Dissertation Completion

In the fourth or fifth year, and preferably no later than the fall term of the fifth year, students are required to submit one chapter of the dissertation (not necessarily the first chapter) to the dissertation committee. The committee will then meet as a group with the student to discuss the chapter and the student's progress on the dissertation more generally. This conference is meant to be an extension of the conversation begun in the prospectus defense, with the aim of providing feedback on the student's research, argument, and style at this early stage of the dissertation writing process.

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 website of the Yale School of Medicine (<http://medicine.yale.edu/mdphd>) and from the website 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 website, <http://hshm.yale.edu>.

COURSES

HSHM 691a and HSHM 692b / ANTH 963a and ANTH 964b / HIST 963a and HIST 964b / HSAR 841a and HSAR 842b, Topics in the Environmental Humanities Paul Sabin and Tomo Sugimoto

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½ Course cr per term

HSHM 702a / HIST 931a, Problems in the History of Science Deborah Coen

Close study of recent secondary literature in the history of the physical and life sciences. An inclusive overview of the emergence and diversity of scientific ways of knowing, major scientific theories and methods, and the role of science in politics, capitalism, war, and everyday life. Discussions focus on historians' different analytic and interpretive approaches.

HSHM 703a / AMST 877a / HIST 926a, Problems in the History of Medicine and Public Health John Warner

An examination of the variety of approaches to the social, cultural, 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 vernacular and professional understandings of the body; the role of the marketplace in shaping professional identities and patient expectations; health activism and social justice; citizenship, nationalism, and imperialism; and the visual cultures of medicine.

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.

HSHM 713a / HIST 913a, Geography and History Bill 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.

HSHM 749b / HIST 925b, Visual and Material Cultures of Science Paola Bertucci

The seminar discusses recent works that address the visual and material cultures of science. Visits to Yale collections, with a particular emphasis on the History of Science and Technology Division of the Peabody Museum. Students may take the course as a reading or research seminar.

HSHM 753a / AMST 838a / HIST 749a, Research in Environmental History

Paul Sabin

Students conduct advanced research in primary sources and write original essays over the course of the term. Readings and library activities inform students' research projects. Interested graduate students should contact the instructor with proposed research topics.

HSHM 768a / HIST 924a, Epidemics and the Early Modern Body Paola Bertucci

Epidemics in the history of the early modern world. Focusing on individual epidemics that contributed to shaping the early modern world, students discuss conceptions of the body and racist stereotyping, spaces and strategies of containment, visual and material culture of disease and treatment, and the relationship between public health and the early modern state.

HSHM 770a / HIST 940a / WGSS 782a, Disability Histories: Research Seminar

Naomi Rogers

This course introduces students to the major issues in current disability history as well as theoretical debates in disability studies. We discuss cultural, social, and political meanings of citizenship; efforts to define and classify disabled bodies; contested notions of bodily difference; and the ways disability has and continues to be used as a metaphor for socially defined inferiority like gender, race, or sexuality. By the fourth week students have identified the topic for their research papers and discussed them in class. The next month is devoted to research and writing. We then start meeting again to read and discuss a draft of each paper.

HSHM 920a or b, Independent Reading Staff

By arrangement with faculty.

HSHM 930a or b, Independent Research Staff

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

Carla Rothlin (TAC 625, 203.737.4679, carla.rothlin@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*), Marcus Bosenberg (*Dermatology*), Alfred Bothwell, Lieping Chen, Joseph Craft (*Internal Medicine*), Peter Cresswell, Vishwa Dixit (*Comparative Medicine*), Richard Flavell, David Hafler (*Neurology*), Kevan Herold, Akiko Iwasaki, Paula Kavathas (*Laboratory Medicine*), Steven Kleinstein (*Pathology*), Ruslan Medzhitov, Jordan Pober, Carla Rothlin, Craig Roy (*Microbial Pathogenesis*), David Schatz

Associate Professors Stephanie Eisenbarth (*Laboratory Medicine*), Tarek Fahmy (*Biomedical Engineering*), Ann Haberman, John MacMicking (*Microbial Pathogenesis*), Eric Meffre, João Pereira, Kevin O'Connor (*Neurology*), Bing Su

Assistant Professors Grace Chen, Ellen Foxman (*Laboratory Medicine*), Nikhil Joshi, Carrie Lucas, Noah Palm, Aaron Ring, Andrew Wang, Craig Wilen (*Laboratory Medicine*)

FIELDS OF STUDY

Immunology is the study of the immune system that confers protection against infectious diseases. This complex system is also involved in the rejection of grafted tissues, in allergy, and in autoimmunity. The Department of Immunobiology is a multidisciplinary group of investigators committed to understanding the cellular, genetic, and molecular basis of these processes. The department is based on the understanding that the solution to complex biological problems requires the integration of individuals with a common goal but differing expertise. Research focuses on the molecular, cellular, and genetic underpinnings of immune system function and development, on host-pathogen interactions, and on a variety of autoimmune disorders. In addition to the growing need to apply basic science research toward human disease, we have developed a Human and Translational Immunology (HTI) section to improve our understanding and treatment of human immunological disorders. The general research interests of the Immunology track span almost all aspects of the immune system and its role in disease prevention.

RESEARCH AREAS

Fundamental mechanisms of immunity Research in the department examines the fundamentals of the immune system at multiple levels: development, activation, regulation, and evolution. Studies of lymphocyte and innate immune cell development examine the receptors and signals that control lineage commitment, cell maturation, and cell death; the establishment of the proper environments for cellular development; and the mechanisms by which antibody and T cell receptor genes are assembled and diversified. A critical first step in an effective immune response is the activation of cells of the innate immune system, including monocytes, macrophages, dendritic cells, and neutrophils. Research examines the receptors and signaling molecules that control these processes, the mechanism by which cells process and present antigen, and the recognition of this antigen by T cell receptors on T lymphocytes. Upon activation, T and B cells differentiate and acquire critical effector functions including the production of cytotoxic anti-pathogen molecules and antibodies. Studies in the department examine the tissue spatial context and cellular interactions that influence effector lineage fate decisions, cytoplasmic signal transduction molecules, nuclear transcription factors, and mechanisms controlling gene expression during differentiation. Finally, resolution of the immune response (leading to scarring or healing) and the evolution of adaptive immunity are under study.

The human immune system The immune system has evolved to deal with many different challenges, some of which can vary widely among vertebrate species, and thus while many basic mechanisms may be shared between humans and various animal models, the human immune system has evolved to differ in important ways from that of commonly used experimental rodents. Furthermore, human diseases, especially chronic disorders, are also significantly more complex than commonly used disease models, and the approaches to studying human immunity, for ethical reasons, must often be fundamentally different from those used in experimental systems. New immunotherapies, especially those based on the use of biologicals, have created an opportunity to ethically investigate human immunology and improve the value of clinical trials. The Human and Translational Immunology (HTI) section of the Immunobiology department studies both the immune systems of healthy individuals and the roles that immunology plays in a variety of human disease and analyzes the alterations that therapies may have on the immune response. HTI investigators also develop new approaches for human investigation and create new experimental models that better replicate human immunity.

Immunology of cancer The past several years have witnessed a revolution in cancer treatment based on the paradigm of activating a patient's own immune system to target their cancer. Cancer immunotherapy relies on the immune system's ability to not only recognize "non-self," but "altered self," detecting the remarkably subtle differences between cancer cells and healthy tissues. Moreover, many therapies rely on preexisting immune cells in the tumor microenvironment for efficacy, highlighting the potential of natural immunosurveillance mechanisms to destroy cancer. In close collaboration with the Yale Cancer Center, ongoing work in the Department of Immunobiology focuses on seeking to understand the basic mechanisms of how innate and adaptive immune responses are generated against tumors, how tumor clearance is achieved, and how the immune system can be manipulated to enhance immunotherapy.

Disorders of the immune system Adaptive immune responses provide powerful long-lived protection from pathogens, but when misdirected, T and B cell responses can cause significant injury and disease. The mechanisms controlling inappropriate adaptive immunity to self-targets/autoantigens (autoimmunity), allergens (allergy), or transplanted tissues (alloimmunity) are being addressed by faculty in our department. Diabetes, multiple sclerosis, lupus, and rheumatoid arthritis are just some of the autoimmune diseases under study. Why and how allergens are targeted by the immune system in diseases like food allergy and asthma are questions being actively studied. Vascular graft and red blood cell rejection are examples of alloimmune responses under investigation in our department.

Host-microbe interactions The immune system evolved to manage our constant exposure to diverse microbial stimuli, ranging from the smallest viruses to fifty-foot-long tapeworms. Researchers in the Department of Immunobiology investigate the full spectrum of possible host-microbe interactions, including antagonistic interactions with parasitic viruses, bacteria, and helminths, as well as mutualistic interactions with the trillions of microbes that live in and on us (our microbiota).

Inflammation biology Inflammation is a protective response including infection and injury as well as other causes of loss of tissue homeostasis. Although primarily orchestrated by the immune system, the inflammatory response can affect virtually any physiological process, from cardiovascular and digestive functions to growth, reproduction, and behavior. However, because inflammation operates at the expense of some normal physiological processes, it can also be a source of a variety of pathological sequela. Indeed, most human diseases are now known to be associated with inflammation. Research in our department addresses multiple aspects of inflammation biology, ranging from detailed molecular mechanisms underlying the response, to human diseases.

Computational immunology Computational immunology (or systems immunology) involves the development and application of bioinformatics methods, mathematical models, and statistical techniques for the study of immune system biology. The immune system is composed of dozens of different cell types and hundreds of intersecting molecular pathways and signals. Systems approaches can be used to predict how the immune system will respond to a particular infection or vaccination. Or it can help understand how best to design an immunotherapy: will it help ease disease, and what might the side effects be? In addition, computational approaches are increasingly vital to understanding the implications of the wealth of gene expression and epigenomics data being gathered from immune cells. Yale has a diverse research program in computational immunology that brings together expertise from a variety of scientific disciplines to bear on research projects in vaccine response, host-pathogen dynamics, cell-fate choices, immune genomics, informatics, and many other topics. Students interested in computational immunology can be co-mentored by faculty from the Immunology track and the Computational Biology and Bioinformatics tracks.

FACILITIES

More than thirty laboratories are actively involved in research in immunology. Many share adjoining or nearby laboratory space in the Anlyan Center (TAC) and include faculty who are funded by the Howard Hughes Medical Institute. The Department of Immunobiology provides one of the largest integrated training programs in

immunology in the country, led by a faculty with a reputation for excellence in research. The department maintains a wide variety of major equipment. In addition, investigators have access to a wide variety of cutting-edge equipment on campus in open-access core facilities for flow cytometry, mass cytometry, EM, and imaging including light-sheet microscopy and intravital two-photon LSM.

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 eight 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.

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 530, Biology of the Immune System (Students have the option of passing out of IBIO 530 by taking the final exam from the previous year.)

2. IBIO 531, Advanced Immunology
3. Two Immunobiology seminar courses taken from this series: IBIO 536, IBIO 537, IBIO 538, IBIO 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 600, Introduction to Research
2. IBIO 611, IBIO 612, IBIO 613, Research Rotations (short research projects are taken under the guidance of three Yale professors)
3. IBIO 601, Fundamentals of Research: Responsible Conduct of Research

Fourth-year students are required to take IBIO 503, 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 one-day seminar entitled “Teaching at Yale” is offered by the Yale Poorvu Center for Teaching and Learning at the start of each term. 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 530, Biology of the Immune System (Students have the option of passing out of IBIO 530 by taking the final exam from the previous year.)
2. IBIO 531, Advanced Immunology
3. Two Immunobiology seminar courses taken from this series: IBIO 536, IBIO 537, IBIO 538, IBIO 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 503) or through the M.D./Ph.D. program.

M.D./Ph.D. students are *not* required to take:

1. IBIO 600, Introduction to Research
2. IBIO 611, IBIO 612, IBIO 613, Research Rotations
3. IBIO 601, 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 the student's 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) 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 Staff

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, Biology of the Immune System Eric Meffre

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.

IBIO 531b, Advanced Immunology Noah Palm

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 530 or equivalent. Enrollment limited to fifteen.

IBIO 536a, Immunobiology Seminar: Translational Immunology Kevin O'Connor

This course is designed to introduce immunobiology Ph.D. students to translational research and medicine. Each weekly seminar focuses on a specific disease with a conspicuous immunological component. In-class periods consist of very interactive, didactic sections covering disease phenotype, underlying immunobiology and pathology, and mechanisms of treatment approaches, including limitations. Discussions

are led by principal investigators who focus on human translational immunology and by clinician-scientists who see patients in associated clinics. Examples of topics include: T and B cell contributions to the underlying pathophysiology of multiple sclerosis, type 1 diabetes, systemic lupus erythematosus, myasthenia gravis, and other autoimmune diseases; immune responses to acute brain injury; inherited immune disorders; paradigms governing how anti-tumor immune responses are promoted or suppressed; and current approaches in immunotherapy-based clinical trials. Assignments challenge students to think creatively about solutions to problems that obstruct the progress toward understanding disease mechanisms and developing therapeutics. A term assignment, in the form of a research proposal, focuses on independent study of a translational immunobiology problem of each student's choosing. The combination of medical knowledge and interaction with translational and clinician-scientists provides a new perspective to immunobiology Ph.D. students that will broaden their basic science training. The exposure to the practice of medicine enables immunobiology (and other) graduate students to work more confidently at the interface of research and medicine and facilitates collaborations with clinical investigators. Prerequisite: IBIO 531 or a similar course that provides a solid foundation in fundamental immunology; may be waived for highly motivated students.

IBIO 537b, Immunobiology Seminar Staff

A course in the Immunobiology seminar series. Topics change each year.

IBIO 600a, Introduction to Research: Faculty Research Presentations Carla Rothlin

Introduction to the research interests of the faculty. Required of all first-year Immunology/BBS students. Pass/Fail.

IBIO 601b / MBIO 601b, Fundamentals of Research: Responsible Conduct of Research Carla Rothlin

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.

IBIO 611a, Research Rotation 1 Carla Rothlin

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 Carla Rothlin

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 613b, Research Rotation 3 Carla Rothlin

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.

Interdepartmental Neuroscience Program

Sterling Hall of Medicine L-200, 203.785.5932

<http://medicine.yale.edu/inp>

M.S., M.Phil., Ph.D.

Director of Graduate Studies

Charles Greer (*Neurosurgery; Neuroscience*)

(FMB 412, 203.785.4034, charles.greer@yale.edu)

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*), B.J. Casey (*Psychology*), 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*), Thierry Emonet (*Molecular, Cellular, & Developmental Biology; Physics*), Paul Forscher (*Molecular, Cellular, & Developmental Biology*), Charles Greer (*Neurosurgery; Neuroscience*), Jaime Grutzendler (*Neurology; 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*), Fahmeed Hyder (*Radiology & Biomedical Imaging; Biomedical Engineering*), Elizabeth Jonas (*Internal Medicine; Neuroscience*), Leonard Kaczmarek (*Pharmacology; Cellular & Molecular Physiology*), Haig Keshishian (*Molecular, Cellular, & Developmental Biology*), Jeffery Kocsis (*Neurology; Neuroscience*), Michael Koelle (*Molecular Biophysics & Biochemistry*), 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*), Mark Mooseker (*Molecular, Cellular, & Developmental Biology; Cell Biology*), Evan Morris (*Radiology & Biomedical Imaging; Biomedical Engineering; Psychiatry*), 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*), Nicholas Turk-Browne (*Psychology*), Flora Vaccarino (*Child Study Center; Neuroscience*), Christopher van Dyck (*Psychiatry; Neuroscience; Neurology*), Stephen Waxman (*Neurology; Pharmacology; Neuroscience*), Robert Wyman (*Molecular, Cellular, & Developmental Biology*), 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 Nii Addy (*Psychiatry; Cellular & Molecular Physiology*), Meenakshi Alreja (*Psychiatry; Neuroscience*), Sviatoslav Bagriantsev (*Cellular & Molecular Physiology*), Charles Bruce (*Neuroscience*), William Cafferty (*Neurology*), Jessica Cardin (*Neuroscience*), Sreeganga Chandra (*Neurology; Neuroscience*), Steve Chang (*Psychology; Neuroscience*), Damon Clark (*Molecular, Cellular, & Developmental Biology; Physics*), Daniel Colon-Ramos (*Cell Biology; Neuroscience*), Kelly Cosgrove (*Psychiatry; Radiology & Biomedical Imaging; Neuroscience*), Jonathan Demb (*Ophthalmology & Visual Science; Cellular & Molecular Physiology*), Tore Eid (*Laboratory Medicine; Neurosurgery*), Sourav Ghosh (*Neurology*), Elena Gracheva (*Cellular & Molecular Physiology; Neuroscience*), Marc Hammarlund (*Genetics; Neuroscience*), Michael Higley (*Neuroscience*), Avram Holmes (*Psychology*), Erdem Karatekin (*Cellular & Molecular Physiology; Molecular Biophysics & Biochemistry*), In-Jung Kim (*Ophthalmology & Visual Science; Neuroscience*), Hedy Kober (*Psychiatry*), Ifat Levy (*Comparative Medicine; Neuroscience*), Chiang-shan Ray Li (*Psychiatry; Neuroscience*), Janghoo Lim (*Genetics; Neuroscience*), Angeliki Louvi (*Neurosurgery; Neuroscience*), Dhasakumar Navaratnam (*Neurology; Neuroscience*), Timothy Newhouse (*Chemistry*), Kevin O'Connor (*Neurology*), Maria Piñango (*Linguistics*), Christopher Pittenger (*Psychiatry; Child Study Center; Psychology*), Michael Schwartz (*Neuroscience*), Justus Verhagen (*Neuroscience*), Weimin Zhong (*Molecular, Cellular, & Developmental Biology*), Jiangbing Zhou (*Neurosurgery; Biomedical Engineering*)

Assistant Professors Alan Anticevic (*Psychiatry; Psychology*), Rui Chang (*Cellular & Molecular Physiology; Neuroscience*), Philip Corlett (*Psychiatry*), Marcelo de Oliveira Dietrich (*Comparative Medicine; Neuroscience*), George Dragoi (*Psychiatry; Neuroscience*), Dylan Gee (*Psychology*), Jason Gerrard (*Neurosurgery; Neuroscience*), Junjie Guo (*Neuroscience*), Ellen Hoffman (*Child Study Center*), Monika Jadi (*Psychiatry*), James Jeanne (*Neuroscience*), Kristopher Kahle (*Neurosurgery; Pediatrics; Cellular & Molecular Physiology*), Alex Kwan (*Psychiatry; Neuroscience*), John Murray (*Psychiatry*), Anirvan Nandy (*Neuroscience*), Hyojung Seo (*Psychiatry*), Shaul Yogeve (*Neuroscience*)

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.

To enter the Interdepartmental Neuroscience Ph.D. program, students apply to the Neuroscience track within the interdepartmental graduate program in Biological and Biomedical Sciences (BBS), <https://medicine.yale.edu/bbs>.

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 the student's 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: Bioethics in Neuroscience (INP 580), Principles of Neuroscience (INP 701), Foundations of Cellular and Molecular Neurobiology (INP 702), Foundations of Systems Neuroscience (INP 703), and Comparative Neuroanatomy (INP 704), all completed in the first year of enrollment. During the second year of enrollment, students are required to take an advanced course on quantitative techniques. 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 511, INP 512); both terms of Second-Year Thesis Research (INP 513, INP 514); and RCR Refresher for Senior BBS Students (B&BS 503), completed during the fourth year of enrollment. 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 at six-month intervals. 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 (INP 701; Structural and Functional Organization of the Human Nervous System [INP 510]; 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 five 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 511, INP 512) and both terms of Second-Year Thesis Research (INP 513, INP 514). 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 information is available at <http://medicine.yale.edu/inp>.

COURSES

INP 530a / PSYC 530a, Foundations of Neuroscience: Biological Bases of Human Behavior Dylan Gee

The purpose of this course is to provide students with an understanding of the biological factors underlying human cognition and behavior. Particular emphasis is placed on the mechanisms associated with individual differences in healthy functions (including emotion regulation, stress sensitivity, higher cognition, reward sensitivity, impulsivity, and social functions) and their relations with psychiatric and neurological disorders. Biological factors to be covered include genetic, neuroanatomical, neurophysiological, neurochemical, hormonal, and neuropsychological influences. Several of the initial sessions are devoted to basic topics (e.g., neurons, neuronal signaling, brain systems), before we begin our discussion of the neural basis of behavior and cognition. We also cover seminal work on animal models for mechanistic insights into the neurobiology of human behavior. Graduate students with any neuroscience research interest are encouraged to take this course. Required of Psychology Ph.D. students in the neuroscience area.

INP 558b / PSYC 558b, Computational Methods in Human Neuroscience Nick Turk-Browne

This course provides training on how to use computational science for the advanced analysis of brain imaging data, primarily from functional magnetic resonance imaging (fMRI). Topics include scientific programming, high-performance computing, machine learning, network/graph analysis, real-time neurofeedback, nonparametric statistics, and functional alignment. Prerequisite: some prior experience with programming, data preprocessing, and basic fMRI analysis.

INP 638a / PSYC 638a, Computational Models of Human Behavior Staff

Why do we do the things we do? How do we adapt to changes in the environment? And how does our happiness depend on our choices and what happens to us? How can computational models help us to gain new insights into psychological processes? The goal of this course is to use computational models to understand human behavior and its relationship to our emotions. Data is collected in a variety of tasks, including new experiments designed by students, and is analyzed using computational models.

INP 720a / MCDB 720a, Neurobiology Haig Keshishian and 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.

International and Development Economics

Economic Growth Center

27 Hillhouse Avenue, 203.432.3610

<http://ide.yale.edu>

M.A.

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.

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, five of which make up the core elements of the IDE program and are required; the remaining three are graduate electives. The required courses are ECON 545, Microeconomics; ECON 546, Growth and Macroeconomics; ECON 558, Econometrics; ECON 559, Development Econometrics; and ECON 732, Advanced Economic Development. 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 the Environment (YSE) and the School of Public Health (YSPH) are also available. Application to YSE 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 (YSE) or Master of Public Health (YSPH) degree.

Prospective applicants are encouraged to visit the IDE program website at <http://ide.yale.edu>. Send questions regarding the program to Brooke Jones, 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*), Eugene Shapiro (*Pediatrics; Epidemiology*), George Tellides (*Surgery*), Mary Tinetti (*Internal Medicine*)

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 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 630, Ethical Issues in Biomedical Research. In addition to IMED 655, 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 625, Principles of Clinical Research

IMED 630, Ethical Issues in Biomedical Research

IMED 635, Directed Reading in Investigative Medicine

IMED 645, Introduction to Biostatistics in Clinical Investigation

IMED 655, Writing Your Career Development (K-type) Grant *or* IMED 670, Writing Your First Independent Investigator-Initiated (R-type) Grant

IMED 680, Topics in Human Investigation

CBIO 601, Science at the Frontiers of Medicine

CB&B 740, Clinical and Translational Informatics

Elective (1)

Course Requirements for Clinically Based Patient-Oriented Research

IMED 630, Ethical Issues in Biomedical Research

IMED 635, Directed Reading in Investigative Medicine

IMED 655, Writing Your Career Development (K-type) Grant *or* IMED 670, Writing Your First Independent Investigator-Initiated (R-type) Grant

IMED 660, Methods in Clinical Research, Part I

IMED 661, Methods in Clinical Research, Part II

IMED 662, Methods in Clinical Research, Part III

IMED 680, 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. Two weeks, July 27–August 7, 2020. Permission of instructor required.

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.

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. Two weeks, July 13–July 24, 2020. Permission of instructor required.

Italian Studies

82-90 Wall Street, 203.432.0595

<http://italian.yale.edu>

M.A., M.Phil., Ph.D.

Chair

Jane Tylus

Director of Graduate Studies

Millicent Marcus (82-90 Wall St., Rm. 426, 203.432.0599)

Professors Millicent Marcus, Giuseppe Mazzotta, Jane Tylus

Assistant Professor Christiana Purdy Moudarres

Lecturer Serena Bassi

Senior Lectors I Michael Farina, Anna Iacovella

Lectors Simona Lorenzini, Deborah Pellegrino

Affiliated Faculty Paola Bertucci (*History of Science & Medicine*), Howard Bloch (*French*), Jessica Brantley (*English*), Francesco Casetti (*Film & Media Studies*), Virginia Jewiss (*Humanities*), Jacqueline Jung (*History of Art*), Laurence Kanter (*Yale Art Gallery*), Gundula Kreuzer (*Music*), Jessica Peritz (*Music*), David Quint (*English; Comparative Literature*), Ayesha Ramachandran (*Comparative Literature*), Ellen Rosand (*Emerita; Music*), Pierre Saint-Amand (*French*), Christophe Schuwey (*French*), Gary Tomlinson (*Music*)

Visiting faculty from other universities are regularly invited to teach courses in the department.

FIELDS OF STUDY

The Italian Studies 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 REQUIREMENTS FOR THE PH.D. DEGREE

The department recognizes that good preparation in Italian literature is unusual at the college level and so suggests that students begin as soon as possible to acquire a broad general knowledge of the field through outside reading. Candidates must demonstrate a reading knowledge of a second Romance language, Latin, and a non-Romance language. (German is recommended). Students are reminded that it is difficult to

schedule beginning language courses in addition to a normal graduate program and are therefore advised to acquire proficiency in the languages required for the doctoral program before matriculation. Reading knowledge of Latin may be acquired during the course of the first year. 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. Students who have had little or no experience in Italy are generally urged to do some work abroad during the course of their graduate program. At the end of the first and second years, students' progress is analyzed in an evaluative colloquium. 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 Studies. 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 Studies 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 Studies. All documentation within the application should include this information.

Italian and Renaissance Studies

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

MASTER'S DEGREES

Only candidates for the Ph.D. degree will be admitted to the program, but the department will, upon request, offer the M.A. and the M.Phil. degrees to students who have completed the general Graduate School requirements for those degrees (see Degree Requirements under Policies and Regulations).

Program materials are available upon request to the Director of Graduate Studies, Italian Studies, Yale University, PO Box 208311, New Haven CT 06520-8311.

COURSES

ITAL 577b / MDVL 577b, Women in the Middle Ages Christiana Purdy Moudarres
Medieval understandings of womanhood examined through analysis of writings by and/or about women, from antiquity through the Middle Ages. Introduction to the premodern Western canon and assessment of the role that women played in its construction.

ITAL 610b, USA: Travelers, Immigrants, Exiles from Italy (1920–2001)

Giuseppe Mazzotta

The course focuses on the experiences of Italian travelers to North America. Its goal is to promote a critical historical consciousness of the social, political, and cultural reality of the Italian presence in the United States from the end of the First World War to the beginning of the twenty-first century. Students engage with a variety of media: from letters and diaries to memoirs and unpublished documents, from novels and poems to music and films. Through close readings and literary analyses, the course considers the historical and cultural context of each source, eliciting reflections in at least three key areas: national identity, transcultural encounters, and the relevance of the arts for travelers, migrants, and exiles.

ITAL 653b, Baroque Epics Giuseppe Mazzotta

A study in some detail of two outstanding epics of the Italian Baroque period (Tasso's *Gerusalemme Liberata* and Marino's *Adone*). The course stresses such issues as the clash between Christians and Muslims, the continuity of the epic tradition, the retrieval of the language of the lyric, the rethinking of baroque arts and sciences, such as perspectivism, new geographical and astronomical theories, encyclopedism, and contemporary aesthetics of music and art. Guiding idea is the examination of the specific ways in which the two poets represent history, theology, and politics in their texts and, along the way, articulate a theory of modernity.

ITAL 691a or b, Directed Reading Millicent Marcus

ITAL 783a / FILM 779a, Italian Film Ecologies: Yesterday, Today, and Tomorrow

Millicent Marcus

Landscape and the natural environment have never occupied “background” status in Italian film. Given the spectacular visual presence of its terrain – thanks to the relative proximity of mountain chains and the long seacoast – and given the pivotal importance of farming and pasturage in this traditionally agrarian economy, the synergy between the human and natural worlds has played a prominent role in Italian filmmaking since the very inception of the industry. Most recently, two developments have pushed this issue to the forefront of scholarly attention: the advent of ecocriticism, which found one of its earliest and most influential champions in Serenella Iovino, and the establishment of regional film commissions, grassroots production centers that sponsored cinematic works attuned to the specificity of “the local.” The course includes study of films that predate our current environmental consciousness, as well as recent films that foreground it in narrative terms. In the case of the older films, which have already attracted a great deal of critical commentary over time, we work to shift our interpretive frame in an “eco-friendly” direction (even when the films’ characters are hardly friends of the environment). Among the films considered are *Le quattro volte*,

Il vento fa il suo giro, L'uomo che verrà, Gomorra, L'albero degli zoccoli, Riso amaro, Red Desert, Christ Stopped at Eboli, and Il ladro di bambini. We screen one film a week and devote our seminars to close analysis of the works in question.

ITAL 888b / CPLT 807b / FREN 888b, The Novel of Historical Event: The Nineteenth Century and Beyond Jane Tylus

The seminar moves from the traditional idea of the historical novel to other, often more experimental versions of fictions that engage historical events: war, revolution, plague, genocide. We consider how individual lives intersect with and are changed by historical events, and the extent to which individuals are able to understand how history impacts their lives. Is the course of history controllable or even understandable to its participants and bystanders? Does historical knowledge always arrive too late? Primary texts include Manzoni, *I Promessi Sposi*; Balzac, *Le Colonel Chabert*; Flaubert, *L'Education sentimentale*; Verga, *Novelle*; Tomasi di Lampedusa, *Il Gattopardo*; Faulkner, *Absalom, Absalom!*; Modiano, *Dora Bruder*. There are also readings in the history and theory of the novel, as well as works contextualizing issues of nationalism in the nineteenth century. They include essays/chapters by Georg Lukács, Nelson Moe, Roberto Dainotto, Edward Said, Franco Moretti, Peter Brooks, and others. Prerequisite: reading knowledge of French and/or Italian.

ITAL 946a / CPLT 658a / ENGL 699a / MDVL 946a, Early Modern Ecologies: Representing Peasants, Animals, Labor, Land Jane Tylus

To what extent does writing about the land and depicting landscapes in early modern Europe reflect a new interest in engaging the boundaries between the human and nonhuman? What does it show about the commitment of artists and intellectuals to representing cultures and environments not necessarily their own? And how did writers and artists seek to legitimize their intellectual labors by invoking images of agricultural work? Since antiquity, artists have often chosen to make the countryside and its human and nonhuman denizens symbols of other things: leisure, song, exile, patriotism, erotic sensibilities, anti-urbanism. Early Christianity in turn embraced the desert—and the countryside—as a space for spirituality. We explore these origins and turn to the early modern period, when such interests exploded into poems, novels, plays, and paintings—a period that coincided with new world discoveries and new possibilities for “golden ages” abroad. We read works by Virgil, St. Jerome, Petrarch, Shakespeare, Spenser, Milton, Tasso, Seamus Heaney, and others, and take at least one trip to a local gallery (in New Haven or New York). Finally, we explore recent work in ecocriticism and environmental studies in order to grapple with ancient and early modern understandings of the natural world.

ITAL 999a, Preparing for Doctoral Exams and Prospectus Writing Jane Tylus

The aim of this seminar is to give third-year students the opportunity to work together on the three projects that will occupy them throughout Year 3: the oral comprehensive exam (for early November), the written exam on the three topics lists (for March–April), and the writing of the prospectus, to be defended in September of Year 4. Weekly meetings are run and coordinated by a faculty member in Italian, generally the graduate adviser. Each week of the first nine weeks is devoted to a specific topic on the comprehensive lists requested by the students themselves. Students are in conversation with each other, with the presiding faculty member, and with an additional guest lecturer who is an expert in the areas under discussion. Following the ninth week, there is a dry run of the oral exam. The remaining four weeks are devoted to discussing

the composition of the topics lists and to the writing of the prospectus. Informal meetings may continue through the spring to discuss these issues as well. Prerequisite: completion of all other graduate course work (15 credits).

Law

Sterling Law Building, 203.432.1696
<http://law.yale.edu/phd>
M.A., Ph.D.

Dean

Heather Gerken

Director of Graduate Studies

Robert Post

FIELDS OF STUDY

The 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 provide a broad foundation in the canonical texts and methods of legal scholarship and to support students in producing original scholarship in the form of a dissertation. The program strongly encourages, but does not require, interdisciplinary approaches to the study of law.

SPECIAL REQUIREMENTS FOR THE PH.D. DEGREE

Each student will have a faculty advisory committee, which will help the student select appropriate courses. In their first year, students take a mandatory two-term seminar on the foundations of legal scholarship, legal theory, and methods (or its equivalent) 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 foundations seminar may not be waived and must be taken for a grade, not audited.

Each Ph.D. student must take two qualifying examinations. The first, administered before the start of the second term in the program, is a written examination based on materials studied in the first term of the foundations seminar. It will test the student's breadth of knowledge across the legal canon, including knowledge of canonical texts, methods, and principles. The second is 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 tests the student's knowledge of the scholarship, theories, and methodologies relevant to the student's area of study. Both qualifying examinations are graded on a pass/fail basis. A student who fails a qualifying examination will have one opportunity to retake the examination in 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 the 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 foundations seminar (or its equivalent); passing the first qualifying examination; and completion of a first dissertation article or chapter. Students also must submit an approved reading list for the second qualifying examination to the assistant dean and the DGS no later than the final day of the spring examination 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 the 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, the 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 typically be reviewed in person or via recorded media with the assistant dean and/or the committee chair and the 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.

TEACHING

As part of their training, Ph.D. students must complete two terms of teaching experience. There are a number of ways to fulfill this requirement, depending on the availability of teaching experiences from year to year. They include: (1) serving as a teaching assistant for a Law School course; (2) serving as a student organizer for a Law School reading group; (3) serving as a teaching fellow for a course in Yale College or another school at Yale; (4) co-teaching a Law School course with a faculty member; and (5) 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

M.A. The M.A. degree may be granted to Ph.D. in Law students who are not completing the program, but who successfully complete the two-term foundations

seminar and at least two additional courses, pass the two qualifying examinations, and submit an academic paper that is judged to be of publishable quality. Students may substitute a third course for one of the two qualifying examinations. The degree is available retroactively to students who matriculated from September 2013 onward.

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, see the Law School bulletin, online at <https://bulletin.yale.edu>. For courses in other schools at Yale University, please see their respective bulletins or <https://courses.yale.edu>. 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

Raffaella Zanuttini

Director of Graduate Studies

Jason Shaw

Professors Claire Bowern, Veneeta Dayal, Robert Frank, Laurence Horn (*Emeritus*), Frank Keil, * Zoltán Szabó, * Petronella Van Deusen-Scholl (*Adjunct; Center for Language Study*), Douglas Whalen (*Adjunct; Haskins Laboratories*), Raffaella Zanuttini

Associate Professors Maria Piñango, Kenneth Pugh (*Adjunct; Haskins Laboratories*)

Assistant Professors Jason Shaw, Natalie Weber, Jim Wood

* A joint appointment with primary affiliation in another department.

FIELDS OF STUDY

The Department of Linguistics embraces an integrative approach to the study of language, based on the premise that an understanding of the human language faculty arises only through the combination of insights from the development of explicit formal theories with careful descriptive and experimental work. Members of the department offer courses and conduct research in which theoretical inquiry proceeds in partnership with historical and comparative studies, fieldwork, experimental work, cognitive neuroscience, and computational and mathematical modeling. Faculty expertise includes all of the major domains of linguistics (phonetics, phonology, syntax, semantics, pragmatics) and spans a wide range of languages.

SPECIAL REQUIREMENTS FOR THE PH.D. DEGREE

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 includes a set of courses designed to expose students to core ideas, together with courses equipping students with a range of methodologies in linguistic research.

During their first five terms, students must complete a minimum of twelve term courses at the graduate level. During the initial two years of course work, students must receive at least three grades of H (= Honors). Two or more grades below HP (= High Pass) during the initial two-year period constitute grounds for dismissal from the Ph.D. program. As per Graduate School general regulations, grades of F cannot be counted toward degree requirements.

Foundational courses This requirement ensures that students achieve breadth in several linguistic subfields. Students take six courses in four or more subfields of

linguistics. The following courses satisfy this requirement: LING 612, Language Change; LING 636, Articulatory Phonology; LING 631, Neurolinguistics, or LING 617, Language and Mind; LING 635, Phonology II; LING 654, Syntax II; LING 664, Semantics II; LING 680, Morphology.

Students will decide on their courses, in consultation with the director of graduate studies (DGS) and other faculty, when they arrive on campus. Other sufficiently advanced courses may also satisfy the requirement.

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 619, The Evolution of Language and Culture; LING 624, Mathematics of Language; LING 627, Language and Computation I; LING 631, Neurolinguistics; LING 636, Articulatory Phonology; LING 641, Field Methods; an advanced course in statistics (e.g., S&DS 538, S&DS 563, S&DS 661, or PSYC 518).

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. Courses cannot simultaneously satisfy the foundational and methodology requirements.

Seminar courses Graduate students are active participants in department reading groups and seminars. Students should participate in three advanced seminars in which they read the original literature of the field and write a research paper. With permission of their adviser and the DGS, students may enroll in the appropriate 790s-numbered LING course and count active participation in a department reading group, including the submission of a final research paper, as satisfying this requirement.

Research

The primary focus of a Ph.D. program is independent research. In the course of our Ph.D. program, students 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.

Research adviser and first-year directed readings By the end of the first term of the program, students find a department faculty member who acts as their research adviser. This choice should be made on the basis of compatibility of research interests and discussions between the student, faculty member, and DGS. Starting from the spring term of the first year, students will, with the help of their 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 should 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 binding: students who want to change their choice of topic or adviser for whatever reason may do so. 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. Some students have two faculty co-advisers.

Portfolio At the conclusion of the first year of the program, students submit to the faculty a portfolio of two research papers, in two distinct areas (as listed above). These papers should demonstrate a student's mastery of the material in these fields to the level covered in the foundational 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 term papers from courses taken during the first year in the program. The deadline for the submission of these papers is May 10 each year.

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 September 10.

Qualifying papers Once the ABRP has been completed, the student will proceed to work on the 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, and to be eventually published in an academic journal or working papers. Students are strongly encouraged to identify a target journal early in the project.

The process of writing the first QP is broken into a number of smaller steps with specific deadlines for each (all during the second year of the program). (1) Students discuss their preliminary results in an appropriate venue (lab meeting, reading group, seminar, etc.) by no later than the end of the fall term. (2) 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 brief summary 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. (3) Students must submit a first draft of their QP to their adviser and reader no later than February 1. (4) Students present their work to the department at the yearly "QPFest," shortly before spring recess. This takes the form of a twenty-minute conference talk to members of the department. (5) Students must submit the final version of the paper to their adviser and reader by March 31. 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 September 1 of the third year. Students follow the same steps and deadlines listed above for the second QP, this time during the third year.

The second QP should be in a different area of linguistics, with a different adviser, from the first QP. It is particularly important that students make satisfactory progress toward the first QP and complete all work by the relevant deadlines. Failure to do so may result in being asked to leave the program.

Prospectus No later than the beginning of the sixth term (that is, the spring term of the third year), students choose a dissertation topic and dissertation director. By the beginning of the fourth year, 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 ladder faculty in the Linguistics department. The prospectus document should be about fifteen pages in length. After it is submitted, the prospectus is defended orally in front of the faculty. Upon successful completion of the prospectus defense, students advance to Ph.D. candidacy.

Dissertation By the end of the seventh term, students must complete a chapter of the dissertation, together with a detailed outline of the dissertation and comprehensive bibliography. When the dissertation 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. Once advanced to candidacy, the student will meet with the entire dissertation committee minimally once each term (but with frequency decided by the committee), to evaluate progress toward the dissertation. During this meeting, the committee will complete the committee meeting form, will provide a copy to the student, and will retain one for the department's records.

Students are expected to complete their dissertations by the end of the sixth 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.

Language Requirement

Students are expected to exhibit some breadth in their knowledge of the languages of the world beyond those most commonly studied 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 course, or one or more courses 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 serve as teaching fellows for a minimum of two terms, beginning in the first term of the third year. In addition, students must complete two additional terms of teaching 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 and is related to the student's dissertation research plans.
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 / MDVL 665a, Old English I Emily Thornbury

The essentials of the language, some prose readings, and close study of several celebrated Old English poems.

LING 501b / ENGL 501b / MDVL 510b, *Beowulf* and the *Beowulf* Complex

Emily Thornbury

A close reading of *Beowulf* in Old English, within the modern and medieval critical landscapes. Prerequisite: a strong working knowledge of Old English (typically ENGL 500, or the equivalent).

LING 503a, Language Contact in the Ancient World Chelsea Sanker

What languages were people using in our earliest written records? How were they written? What were people talking about in these texts? This course examines the languages of the ancient Near East and other civilizations that they interacted with, from Greece to Egypt. Language contact is reflected both in ancient people's discussion of languages and use of translations, as well as in loanwords and other influences of languages on each other. Based on the written records, we also have information about other languages that were never written down, through names and other borrowed words. From the earliest tokens tracking trade commodities to epic poetry, these written records give us insights into the lives of people in the ancient world: the complaints of scribes in training, correspondences between kings, and dedications to gods.

LING 510a, Introduction to Linguistics Claire Bowerman

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 515a, Introductory Sanskrit I Aleksandar Uskokov

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 525/SKRT 520.

LING 525b, Introductory Sanskrit II Aleksandar Uskokov

Continuation of LING 515/SKRT 510. Focus on the basics of Sanskrit grammar; readings from classical Sanskrit texts written in the Indian Devanagari script. Prerequisite: LING 515/SKRT 510.

LING 538a, Intermediate Sanskrit I Aleksandar Uskokov

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 525 or equivalent.

LING 548b / SKRT 540b, Intermediate Sanskrit II Aleksandar Uskokov

Continuation of LING 538, 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 538/SKRT 530 or equivalent.

LING 553a, 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.

LING 564a, Principles of Language Teaching and Learning Nelleke 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.

LING 617a, Language and Mind Maria Pinango

The course is an introduction to language structure and processing as a capacity of the human mind and brain. Its purpose is to bridge traditional domains in linguistics (phonetics, morphology, syntax) with cognition (developmental psychology, memory systems, inferential reasoning). The main topics covered are morphosyntax and lexical semantics, sentence composition and sentence processing, first- and second-language acquisition, acquisition under unusual circumstances, focal brain lesions, and language breakdown.

LING 634a, Quantitative Linguistics Chelsea Sanker

This course introduces quantitative methods in linguistics, which are an increasingly integral part of linguistic research. The course provides students with the skills necessary to organize, analyze, and visualize linguistic data using R, and explains the

concepts underlying these methods, which set a foundation that positions students to also identify and apply new quantitative methods, beyond the ones covered in this course, in their future projects. Course concepts are framed around existing linguistic research, to help students use these methods when designing research projects and critically evaluating quantitative methods in the academic literature. Assignments and in-class activities are a combination of hands-on practice with quantitative tools and discussion of analyses used in published academic work. Prerequisite: one entry-level linguistics course (e.g., phonetics, phonology, syntax, and psycholinguistics) or permission of the instructor.

LING 663a, Semantics I Veneeta Dayal

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 668b / CLSS 829b / HIST 507b / NELC 668b, Historical Sociolinguistics of the Ancient World Kevin van Bladel

Social history and linguistic history can illuminate each other. This seminar confers the methods and models needed to write new and meaningful social history on the basis of linguistic phenomena known through traditional philology. Students learn to diagnose general historical social conditions on the basis of linguistic phenomena occurring in ancient texts. Prerequisite: working knowledge of at least one ancient language.

LING 671a / PHIL 742, Philosophy of Language Zoltan Szabo

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.

LING 680a, 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 700a / PSYC 632a, The Cognitive Science of Sign Languages Maria Pinango and Muye Zhang

Natural sign languages like American Sign Language have all of the structure and complexity of spoken languages. They are learned and processed like spoken languages, and they activate neural structures that maximally overlap with those activated by spoken languages. These findings have not only had important implications for the sociopolitical status of deaf people as a native, American minority community, but have

also caused linguists and psychologists to reevaluate their most fundamental theories of language representation and processing in the mind and brain. The course introduces students to the analysis of sign languages at different levels of linguistic structure and related aspects of cognition in the visual modality. The primary goal is to encourage students – as linguists, psychologists, and cognitive scientists – to consider how natural sign languages can and must inform their linguistic theories (linguistics), models of language and cognition (psychology), and technological applications of language processing (computer science/artificial intelligence). We also consider the ways in which signing communities/deaf culture interact with the hearing world – often as marginalized minority groups – and reflect upon access to language and information as a basic human right. Prerequisite: some background in linguistic structure, cognitive science, any signed language, or permission of the instructor is preferred.

LING 741a, Topics in Phonology: Prosody at the Interfaces Staff

Topics in prosodic structure at the word level and above. Direct vs. indirect reference; how prosodic structure is computed from morphosyntactic structure; the extent to which prosodic constituents are isomorphic to syntactic constituents; whether prosody or other aspects of phonology can influence syntactic or morphological structures. Prerequisites: LING 632a and 635a or equivalents.

LING 749b, Topics in Phonology: The Phonetics-Phonology Interface Staff

The relationship between phonology (as the mental representation of speech) and phonetics (as the physical substance of speech). Universal and language-particular phonetics; phonetic knowledge as grammatical knowledge; phonetic detail in phonological representation and computation; unified vs. modular conceptions of the phonetics-phonology divide; how phonological systems are shaped by phonetic pressures; how phonetic patterning is shaped by phonological structure. Prerequisites: LING 620 and 635 or permission of the instructor.

LING 776b / PHIL 690, 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 778b, The Syntax of Speech Events Raffaella Zanuttini

How the notions of ‘speaker’ and ‘hearer’ of an utterance are incorporated into syntactic theory. A comparison of recent proposals to incorporate ‘speaker’ and ‘hearer’ into sentential syntax, generally in the left periphery of the clause. Topics include indexical shift, speaker-oriented discourse particles, vocatives, the category of ‘person,’ object drop, pronoun-antecedent relations, evidentials, and root clause phenomena.

LING 796a / LING 696, Semantic Investigations in an Unfamiliar Language

Veneeta Dayal

This course introduces students to semantic fieldwork. It chooses a language that is likely not known to any student in the class and has no substantive semantic literature. Students are introduced to a phenomenon in the language on which there is some syntactic literature, either in that language or in one or more related languages. This provides a starting point for students to articulate questions to investigate that are

primarily semantic in nature. Working with a native speaker consultant, students elicit data that answer these initial questions but very likely lead to further questions to investigate. To keep the elicitation focused, these investigations are restricted to topics related to the primary phenomenon discussed, while allowing some margin for individual interests. In addition to the syntactic and semantic literature on the chosen topic or topics, students also read material on fieldwork methodologies for linguistics generally as well as those specifically for semantics. Students work in small groups to fulfill part of the requirements. Prerequisites: LING 653 and LING 663 or permission of the instructor.

Management

Edward P. Evans Hall, Rm. 5125A, 203.432.6002

<https://som.yale.edu/programs/phd>

M.A., M.Phil., Ph.D.

Dean

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Professors Rick Antle, David Bach, Nicholas Barberis, James Baron, Paul Bracken, Lorenzo Caliendo, Judith Chevalier, James Choi, Ravi Dhar, Jonathan Feinstein, Shane Frederick, Stefano Giglio, William Goetzmann, Gary Gorton, Edward Kaplan, Bryan Kelly, Sang-Hyun Kim, Marissa King, Andrew Metrick, A. Mushfiq Mobarak, Tobias Moskowitz, Barry Nalebuff, Nathan Novemsky, Edieal Pinker, K. Geert Rouwenhorst, Nils Rudi, Peter Schott, Fiona Scott-Morton, Jiwoong Shin, Kelly Shue, Edward Snyder, Olav Sorenson, Matthew Spiegel, K. Sudhir, Shyam Sunder, Jacob Thomas, Heather Tookes, Amy Wrzesniewski, Gal Zauberman, X. Frank Zhang

Associate Professors Saed Alizamir, Tristan Botelho, Victoria Brescoll, Rodrigo Canales, Jason Dana, Joyee Deb, Florian Ederer, Donald Lee, Vahideh Manshadi, Justin Murfin, George Newman, Amandine Ody-Brasier, Kosuke Uetake

Participating Faculty from the School of Management Julia DeBenigno, Cydney Dupree, Soheil Ghili, Paul Goldsmith-Pinkham, Zeqiong Huang, Ivana Katic, Balázs Kovács, Michael Kraus, Song Ma, Aniko #ry, Taly Reich, Thomas Steffen, Alexander Zentefis, Jidong Zhou

FIELDS OF STUDY

Current fields include accounting, financial economics, marketing (behavioral), marketing (quantitative), operations, and organizations and management.

CORE REQUIREMENTS FOR THE PH.D. DEGREE

All students are required to take their 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 in their third term will 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 and 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 and maintain an HP average in their courses.

Research papers Students are expected to write original research papers during the summers after 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 the 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 twelve Ph.D.-level courses in their first two years of study: three behavioral marketing core courses (MGMT 753, MGMT 754, MGMT 758; two empirical methods courses that cover the topics of experimental design and statistics; two breadth courses that cover the topics of quantitative marketing and microeconomics; and five electives in behavioral sciences (example course subjects include social cognition, cognitive development, cognitive science of morality, foundations of neuroscience, cognitive science of pleasure, psychology of free will, or an independent study course). 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 after 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 the adviser 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. Students are also required to give a thirty-minute research presentation summarizing this research in the course of the academic year in which the paper was due. These research papers are considered to be a student's qualifying exam.

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 the 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 the student's 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 twelve Ph.D.-level courses in their first two years of study: two microeconomics courses (ECON 500 and ECON 501); two empirical methods courses (ECON 550 and ECON 551); three depth courses (MGMT 750, MGMT 755; MGMT 753, MGMT 754, or MGMT 758); and five electives (from ECON 520, ECON 521, ECON 527, ECON 530, ECON 531, ECON 552, ECON 553, ECON 554, ECON 555, ECON 557, ECON 600, ECON 601; MGT 611; MGMT 703; S&DS 551, S&DS 565). 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 after 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 the adviser 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 the 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 the student's 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; S&DS 541, S&DS 542, S&DS 551); two operations modeling courses (MGMT 720, MGMT 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 the 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 the student's area of interest. All students must complete twelve courses: two methods courses (PLSC 503 and PLSC 504; or ECON 550 and ECON 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); four depth courses (MGMT 731, MGMT 733, MGMT 734, MGMT 736); four social science courses in psychology or sociology (e.g., PSYC 505, PSYC 509, PSYC 557, PSYC 621; SOCY 511, SOCY 625); one breadth course outside the student's area of study, chosen in consultation with the student's adviser; and one additional elective 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.

JOINT J.D./PH.D. IN FINANCE

Students in the joint J.D./Ph.D. in Finance program must meet the following requirements:

Course requirements *Ph.D.*: Eight courses, including the following seven required courses: ECON 500; ECON 501, which covers an introduction to game theory; ECON 550 and ECON 551; MGMT 740; MGMT 742; and MGT 545. Note: Students may substitute MGMT 741 for MGT 545. If MGMT 742 is not offered in the student's second year in the program, the student may choose in its place one of the following graduate finance courses: MGMT 745, MGMT 747, or MGMT 748. *J.D.*: 71 credit units at Yale Law School, including the required first-term courses taken in one term (Contracts, Torts, Civil Procedure, and Constitutional Law); Criminal Law; a course satisfying the legal ethics requirement; and Business Organizations.

Predissertation writing requirements (1) A paper fulfilling the Ph.D. second-year research paper requirement; and (2) a paper fulfilling one of the J.D. writing requirements (substantial or supervised analytic writing). Note: an accepted Ph.D. second-year research paper will fulfill the student's remaining J.D. paper requirement by registration for independent research credit with the student's law school faculty adviser. One of these papers must qualify as the student's prospectus.

Qualifying examination in finance The section of the qualifying exam pertaining to MGMT 740 and MGMT 742 (or the doctoral finance course taken in place of MGMT 742 when it is not offered in the student's second year in the program). The qualifying exam is taken after the student has completed all required graduate finance courses.

Dissertation and oral defense

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 700a, Seminar in Accounting Research I Zeqiong Huang

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 701b, Seminar in Accounting Research II David Watts and Jake Thomas

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, and information sharing within and across firms.

MGMT 720a, Models of Operations Research and Management Vahideh

Hosseinihkhah Manshadi

MGMT 721b, Modeling Operational Processes Nils Rudi

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, Financial Crises Gary Gorton and 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 740 and 741 (doctoral students in Economics may substitute the core microeconomics sequence), and permission of the instructor.

MGMT 747a, Empirical Asset Pricing Bryan Kelly

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 751a or b, Seminar in Marketing II Vineet Kumar

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 753a / PSYC 553a, Behavioral Decision-Making I: Choice Ravi Dhar and Nathan Novemsky

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 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 758b / PSYC 602b, 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 760a, Special Topics in Judgment and Decision Research Gal Zauberman

This doctoral seminar is centered on current topics in judgment and decision research and the related fields of behavioral economics, cognitive psychology, and social psychology. The goal is to have in-depth discussion about behavioral research that addresses contemporary issues that society is facing (inequality, discrimination, etc.).

Mathematics

10 Hillhouse Avenue, 203.432.7058

<http://math.yale.edu>

M.S., M.Phil., Ph.D.

Chair

Yair Minsky

Director of Graduate Studies

Van Vu

Professors Richard Beals (*Emeritus*), Jeffrey Brock, Andrew Casson (*Emeritus*), Ronald Coifman, Igor Frenkel, Howard Garland (*Emeritus*), Alexander Goncharov, Roger Howe (*Emeritus*), Peter Jones, Richard Kenyon, Yifeng Liu, Ivan Losev, Alexander Lubotzky (*Adjunct*), Gregory Margulis (*Emeritus*), Yair Minsky, Vincent Moncrief (*Physics*), Andrew Neitzke, Hee Oh, Nicholas Read (*Physics; Applied Physics*), Vladimir Rokhlin (*Computer Science*), Wilhelm Schlag, George Seligman (*Emeritus*), Daniel Spielman (*Computer Science*), Van Vu, John Wettlaufer (*Earth & Planetary Sciences; Physics*), Gregg Zuckerman

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; probability; 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; representation theory; automorphic forms, L-functions; algebraic number theory and algebraic geometry; mathematical physics, relativity; numerical analysis; combinatorics and discrete mathematics.

SPECIAL REQUIREMENTS FOR THE PH.D. DEGREE

In order to qualify for the Mathematics Ph.D., 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;
6. Complete a dissertation that clearly advances understanding of the subject it considers.

All students must also complete any other Graduate School of Arts and Sciences degree requirements; see Degree Requirements under Policies and Regulations.

The normal time for completion of the Ph.D. program is five years. Requirement (1) normally includes basic courses in algebra, analysis, and topology. A sequence of three qualifying examinations (algebra and number theory, real and complex analysis, topology) is offered each term. All qualifying examinations must be passed by the end

of the second year. There is no limit to the number of times that students can take the exams, and so they are encouraged to take them as soon as possible.

The dissertation prospectus should be submitted during the third year.

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 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.

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, teaching is required of all graduate students, typically one term per year. (Exceptions include students with external funding and students beyond their fifth year.) Generally, first-year students work as coaches for calculus classes, meeting with small discussion sections of undergraduates; in the first few weeks of the term, they attend a seminar that prepares them for coaching. Second-year students often work as teaching assistants for a linear algebra class (MATH 222 or MATH 225) or the accelerated calculus and linear algebra sequence (MATH 230–MATH 231); duties usually include holding office hours or leading discussion sections but not homework grading.

In the spring of their second year, graduate students attend the Lang Teaching Seminar (MATH 827). In this lunch seminar, experienced faculty help students understand the challenges of teaching and prepare students to lead their own section of calculus in the following year and beyond (differential, integral, or multivariable).

MASTER'S DEGREES

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

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 terminal master's degree program in Mathematics.

COURSES

MATH 500a, Modern Algebra I Ivan Loseu

A survey of algebraic constructions and theories at a sophisticated level. Topics include categorical language, free groups and other free objects in categories, general theory of rings and modules, artinian rings, and introduction to homological algebra.

MATH 515b, Intermediate Complex Analysis Alexander Goncharov

Topics may include argument principle, Rouché's theorem, Hurwitz theorem, Runge's theorem, analytic continuation, Schwarz reflection principle, Jensen's formula, infinite

products, Weierstrass theorem; functions of finite order, Hadamard's theorem, meromorphic functions; Mittag-Leffler's theorem, subharmonic functions.

MATH 520a, Measure Theory and Integration Tom VandenBoom

Construction and limit theorems for measures and integrals on general spaces; product measures; L_p spaces; integral representation of linear functionals.

MATH 525b, Introduction to Functional Analysis Tom VandenBoom

Hilbert, normed, and Banach spaces; geometry of Hilbert space, Riesz-Fischer theorem; dual space; Hahn-Banach theorem; Riesz representation theorems; linear operators; Baire category theorem; uniform boundedness, open mapping, and closed graph theorems. After MATH 520.

MATH 533b, Introduction to Representation Theory

An introduction to basic ideas and methods of representation theory of finite groups and Lie groups. Examples include permutation groups and general linear groups. Connections with symmetric functions, geometry, and physics.

MATH 544a, Introduction to Algebraic Topology I

A one-term graduate introductory course in algebraic topology. We discuss algebraic and combinatorial tools used by topologists to encode information about topological spaces. Broadly speaking, we study the fundamental group of a space, its homology, and its cohomology. While focusing on the basic properties of these invariants, methods of computation, and many examples, we also see applications toward proving classical results. These include the Brouwer fixed-point theorem, the Jordan curve theorem, Poincaré duality, and others. The main text is Allen Hatcher's *Algebraic Topology*, which is available for free on his website.

MATH 573a, Algebraic Number Theory Alexander Goncharov

Structure of fields of algebraic numbers (solutions of polynomial equations with integer coefficients) and their rings of integers; prime decomposition of ideals and finiteness of the ideal class group; completions and ramification; adèles and ideles; zeta functions.

MATH 666a / AMTH 666a / ASTR 666a / EPS 666a, Classical Statistical

Thermodynamics John Wettlaufer

Classical thermodynamics is derived from statistical thermodynamics. Using the multi-particle 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.

MATH 678b, Functorial Constructions in Representation Theory Gregg Zuckerman

Topics include: (1) associative algebras: left modules versus linear representations; (2) algebra homomorphisms: induction and coinduction functors; (3) Goldman subcategories (named after Oscar Goldman) of the category of left modules; (4) canonical functors and canonical monads; (5) canonical injective resolutions in Goldman subcategories; (6) derived functors in Goldman theory; (7) projective objects in Goldman subcategories; (8) Frobenius reciprocity spectral sequences; (9) cohomological parabolic coinduction for semisimple Lie algebras; (10) finite

dimensional modules via cohomological parabolic induction. Prerequisite: modern algebra, including some familiarity with homological algebra.

MATH 701b, Topics in Analysis Peter Jones

MATH 710a / AMTH 710a, Harmonic Analysis on Graphs and Applications

Ronald Coifman

This class covers basic methods of classical harmonic analysis that can be carried over to graphs and data analysis. We cover the fundamentals of nonlinear Fourier analysis, including functional approximations in high dimensions. We intend to cover foundational material useful for data organization and geometries.

MATH 798a and MATH 799b, Topics in Random Matrix Theory I and II Van Vu

Random matrix theory is a fast-developing area in mathematics, with very strong links to computer science and physics. Recently, it has also become very important in data science. The most common form of data is a matrix, which is often noisy (perturbed by random noise). Random matrix theory has had a number of fundamental breakthroughs in the past twenty years, thanks to a vast amount of new mathematical tools and ideas. In this course, we (1) introduce some of the main tools (high-dimensional probability: concentration and anti-concentration; tools from linear algebra such as Stieltjes transform and perturbation theory; complex analysis); (2) discuss a few major problems and solutions (global laws, local laws, delocalization); and (3) discuss applications in computer science and data science (stochastic block model, clustering, random graphs, matrix completion and sparsification, randomized linear algebra). Prerequisites: linear algebra (completing Strang's *Linear Algebra and Its Applications*); probability (completing Feller's *Introduction to Probability Theory and Its Applications*, vol. 1); basic combinatorics (MATH 244); and basic real and complex analysis.

MATH 827b, Lang Teaching Seminar Miki Havlickova and Brett Smith

This course prepares graduate students for teaching calculus classes. It is a mix of theory and practice, with topics such as preparing classes, presenting new concepts, choosing examples, encouraging student participation, grading fairly and effectively, implementing active learning strategies, and giving and receiving feedback. Open only to mathematics graduate students in their second year.

MATH 859b, Statistical Mechanics in Two Dimensions Richard Kenyon

This course is an introduction to classical statistical mechanics from a probabilistic and combinatorial viewpoint, covering basic models such as the Ising model, dimer model, and ice models, among others. Techniques discussed include determinantal processes, Bethe Ansatz, Yang-Baxter equation, and variational methods.

MATH 861b, Dynamical Systems and Ergodic Theory Anibal Velozo

Thermodynamic formalism, as a subject of dynamical systems, is a mathematical theory inspired by statistical mechanics. An important question in dynamics is to know which measures are the most significant/meaningful, and this can (most of the time) be answered using thermodynamic formalism. Notions of entropy, pressure, and equilibrium states are central components in this theory and are important players in our discussions. The goal of the course is to set the foundations of thermodynamic formalism, focusing on symbolic dynamics and geometric examples. We first discuss the uniformly hyperbolic case, which is by far the better understood situation. We then discuss some examples of non-uniformly hyperbolic systems and move into non-

compact situations. Particular emphasis is put into the geodesic flow on non-compact negatively curved manifolds and countable Markov shifts. Prerequisite: MATH 520.

MATH 863a, Topics in Sparse Analysis

How do we compress, approximate, and estimate data (whether from physical observations, digital sources, or the results of computer simulations)? This course covers the basic mathematical and algorithmic results in the sparse approximation of data and the sparse signal recovery of information present in signals and data. A prototypical problem is how to design both a set of linear measurements or observations of a signal (or vector or function) and an algorithm so as to reconstruct important information about the signal. We then turn to more specialized topics in streaming, sketching, and sublinear algorithms (including Fourier sampling algorithms). As part of the sketching and sublinear algorithms, we discuss some developments in randomized numerical linear algebra. We end with sparse analysis topics in machine learning, including sparse coding and auto encoders. This course is suitable for (applied) mathematics, computer science, and statistics and data science graduate students.

MATH 864a and MATH 865b, Topics in Inverse Problems I, II

The goal of this course is to study inverse problems and their applications in imaging. The prototypical problem we consider is to recover the coefficients of a partial differential equation from boundary measurements of its solutions. The fundamental theoretical questions concern the uniqueness, stability, and reconstruction of the coefficients. This is a vast subject, and we will only be able to discuss a few of its important aspects. These include: the Radon transform and other ray transforms, the Calderón problem and related problems for elliptic equations, inverse transport problems and optical tomography, and the Gelfand problem and related problems for hyperbolic equations. The necessary tools from partial differential equations, differential geometry, and microlocal analysis are developed as needed.

Mechanical Engineering & Materials Science

17 Hillhouse Avenue, 203.432.4220
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, Aaron Dollar, Alessandro Gomez, Sohrab Ismail-Beigi, * Shun-Ichiro Karato, * Marshall Long, Corey O'Hern, Vidvuds Ozolins, * Brian Scassellati, * Jan Schroers, Udo Schwarz, Mitchell Smooke

Associate Professor Judy Cha

Assistant Professors Rebecca Kramer-Bottiglio, Diana Qiu, Madhusudhan Venkadesan

Lecturers Beth Anne Bennett, Joran Booth, Joseph Zinter

* A secondary appointment with primary affiliation in another department or school.

† A joint appointment with another department.

FIELDS OF STUDY

Fluids and thermal sciences Electro spray theory and characterization; electrical propulsion applications; combustion and flames; computational methods for fluid dynamics and reacting flows; and laser diagnostics of reacting and nonreacting flows.

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 proteins and other 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, optical, and emergent 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; nanostructured energy applications; nanoparticle synthesis for energy applications; combinatorial materials science; in situ transmission electron and scanning probe microscopy; theoretical spectroscopy and computational materials science; and halide perovskites.

Robotics/mechatronics Machine and mechanism design; dynamics and control; robotic grasping and manipulation; human-machine interface; rehabilitation robotics; haptics; soft robotics; flexible and stretchable electronics; soft material manufacturing; responsive material actuators; soft-bodied control; electromechanical energy conversion; biomechanics of human movement; mechanics of biological muscle; and human-powered vehicles.

For degree requirements and courses, 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

Emily Thornbury

Executive Committee R. Howard Bloch, Jessica Brantley, Ardis Butterfield, Stephen Davis, Paul Freedman, Jacqueline Jung, Vasileios Marinis, Robert Nelson, Emily Thornbury, Shawkat Toorawa, Jesús Velasco

Faculty associated with the program R. Howard Bloch, Gerhard Bowering, Jessica Brantley, Ardis Butterfield, Walter Cahn (*Emeritus*), Raymond Clemens, Marcia Colish (*Emerita*), Stephen Davis, John Dillon, Maria Doerfler, Marcel Elias, Lisa Fagin Davis, Roberta Frank (*Emerita*), Paul Freedman, Creighton Gilbert (*Emeritus*), Walter Goffart (*Emeritus*), Harvey Goldblatt, Frank Griffel, Valerie Hansen, Noel Lenski, Felicity Harley McGowan, Peter Hawkins (*Emeritus*), Samuel Hodgkin, Jacqueline Jung, Traugott Lawler (*Emeritus*), Ivan Marcus, Vasileios Marinis, Giuseppe Mazzotta, Robert Nelson, Christiana Purdy Moudarres, Barbara Shailor (*Emerita*), Emily Thornbury, Shawkat Toorawa, Jane Tylus, Kevin VanBladel, Jesús Velasco, Mimi Hall Yiengpruksawan, Anna Zayaruznaya, Travis Zadeh

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 REQUIREMENTS FOR THE PH.D. DEGREE

Students are required to demonstrate proficiency in at least one medieval language of scholarship (Arabic, Greek, Hebrew, or Latin) and in two modern languages appropriate to their field of study. Language proficiency may be demonstrated either by passing a departmental examination within the first two years of study, or by achieving at least a High Pass in an advanced language or literature course, as approved by the DGS.

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. The M.Phil. degree may be requested after all requirements but the dissertation are met.

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 Arabic, Greek, Hebrew, or Latin.

Terminal Master's Degree Program Students enrolled in the terminal master's degree program must complete either seven term courses or six term courses and a special project. One course must have a focus on the study of original manuscripts or documents. There must be at least one grade of Honors, and there may not be more than one grade of Pass. Students must maintain a minimum average of High Pass each term. Students must take two consecutive terms of a language relevant to the study of the medieval period, appropriate to the student's particular needs and interests. Students must also demonstrate knowledge of one or more of Arabic, Greek, Hebrew, or Latin. For more information, please visit the program website: <http://medieval.yale.edu>.

COURSES

MDVL 506a / CLSS 856a / HIST 506a, Human Migration in Antiquity Noel Lenski
This course examines the processes of human migration in premodern societies with an emphasis on ancient Rome. It explores voluntary and forced migrations, their motivations, processes, and outcomes. Particular attention is paid to sources and problems in the period of late antiquity, when human migration helped drive the collapse of the Roman Empire.

MDVL 510b / ENGL 501b / LING 501b, *Beowulf* and the Beowulf Complex
Emily Thornbury

A close reading of *Beowulf* in Old English, within the modern and medieval critical landscapes. Prerequisite: a strong working knowledge of Old English (typically ENGL 500, or the equivalent).

MDVL 513b / CLSS 872b / HIST 513b / NELC 683b / RLST 619b, Law and History, Law in History: Premodern Civilizations through the Lens of Legal Historiography Maria Doerfler and Travis Zadeh

This seminar invites students into a comparative exploration of the intersection of law, history, and historiography in the ancient and premodern world. Sessions explore these links across a variety of linguistic and geographic settings, including those of ancient and medieval India, China, Persia, Greece, and Rome, as well as in different political, religious, literary, and archaeological contexts. The seminar constructs the category of law expansively to encompass civic, religious, and hybrid forms of legislation. In the process, we seek to explore, inter alia, questions of the relevance of history for the study of law, history's deployment in the context of legal writings, and law's concomitant relevance for historiography; the use of theoretical models, including those forged in modern and postmodern contexts, for the study of law and legal historiography; and the implications of discourses about law and history in premodernity for contemporary, post-secular societies.

MDVL 577b / ITAL 577b, Women in the Middle Ages Christiana Purdy Moudarres
 Medieval understandings of womanhood examined through analysis of writings by and/or about women, from antiquity through the Middle Ages. Introduction to the premodern Western canon and assessment of the role that women played in its construction.

MDVL 585a / HIST 535a, Problems in Church History, 800–1500 Paul Freedman
 The course runs chronologically from the Carolingian Empire and its form of imperial church governance through the ecclesiastical reform of the eleventh century, monastic orders and their proliferation in the twelfth century, the emergence of the papal monarchy, and challenges to church authority from secular rulers and popular, sometimes heretical, movements. It ends with the upheavals of the late Middle Ages, specifically the Great Schism of 1378–1417 and the failed conciliar movement of the fifteenth century. Among the sources to be considered are cathedral and monastic cartularies, archival documents, saints' lives and other biographies of church figures, and records indicating the position of the church in the secular world, including education, commerce, city planning, and jurisdictional conflicts.

MDVL 590b / HIST 590b / JDST 764b / RLST 777b, 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.

MDVL 596a / HIST 596a / JDST 761a / RLST 773a, 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.

MDVL 603a / HIST 603a / JDST 806a / RLST 616a, Jews and Christians in the Formation of Europe, 500–1500 Ivan Marcus
 This seminar explores how medieval Jews and Christians interacted as religious societies between 500 and 1500.

MDVL 658b / CPLT 969b / FREN 658b / NELC 684 / SPAN 658b, Law and the Science of the Soul: Iberian and Mediterranean Connections Jesus Velasco
 This seminar suggests a research project to investigate the affinity between the legal discipline and the science of the soul, or, if you wish, between the science of the soul and the body of law. The point of departure for our framing argument—the existence of this affinity—is that at different moments in history, the legal science (in the form of legal scholarship, religious law, or even legislation) has toiled to appropriate cognitive processes (the external senses, for instance) and post-sensorial operations (imagination, fantasy, memory, etc.). However, this appropriation has become, at different moments in history, so naturalized, so dissolved, so automatized, that it has become invisible for us, and that, because of this invisibility, the affinity can continue doing a political work that is not always evident to us readers, citizens, and clients of the law. In this seminar we read Iberian and Mediterranean primary sources from different confessions, in different languages, and within different legal

and political backgrounds—from pre-Socratic thinkers to al-Ghazali, from Averroes and Maimonides to Alfonso X, from Parisian theologians to Spinoza, etc. Likewise, we read theoretical work that allow us to conceptualize the kind of research we are doing.

MDVL 663a, From House Churches to Medieval Cathedrals: Christian Art and Architecture to the End of Gothic Vasileios Marinis

This course examines the art associated with, or related to, Christianity from its origins to the end of Gothic. It analyzes major artistic monuments and movements in a variety of regions, paying particular attention to how art shapes and is shaped by the social and historical circumstances of the period and culture. The class considers art in diverse media, focusing on painting, sculpture, architecture, and decorative arts. Trips to the Yale Art Gallery and the Beinecke Rare Book and Manuscript Library are included. The course aims to familiarize students with key monuments of Christian architecture, sculpture, painting, and related arts, analyzing each within its particular sociocultural and theological perspective. The course stresses the importance of looking at works of art closely and in context and encourages students to develop skills of close observation and critical visual analysis. Additionally, students are encouraged to examine the ways parallel developments in Christian theology, dogma, and liturgy are influenced by art. Prerequisites: basic knowledge of Christian history and familiarity with the Bible.

MDVL 665a / ENGL 500a / LING 500a, Old English I Emily Thornbury

The essentials of the language, some prose readings, and close study of several celebrated Old English poems.

MDVL 946a / CPLT 658a / ENGL 699a / ITAL 946a, Early Modern Ecologies:

Representing Peasants, Animals, Labor, Land Jane Tylus

To what extent does writing about the land and depicting landscapes in early modern Europe reflect a new interest in engaging the boundaries between the human and nonhuman? What does it show about the commitment of artists and intellectuals to representing cultures and environments not necessarily their own? And how did writers and artists seek to legitimize their intellectual labors by invoking images of agricultural work? Since antiquity, artists have often chosen to make the countryside and its human and nonhuman denizens symbols of other things: leisure, song, exile, patriotism, erotic sensibilities, anti-urbanism. Early Christianity in turn embraced the desert—and the countryside—as a space for spirituality. We explore these origins and turn to the early modern period, when such interests exploded into poems, novels, plays, and paintings—a period that coincided with new world discoveries and new possibilities for “golden ages” abroad. We read works by Virgil, St. Jerome, Petrarch, Shakespeare, Spenser, Milton, Tasso, Seamus Heaney, and others, and take at least one trip to a local gallery (in New Haven or New York). Finally, we explore recent work in ecocriticism and environmental studies in order to grapple with ancient and early modern understandings of the natural world.

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

Professors Serap Aksoy (*Epidemiology*), Susan Baserga (*Molecular Biophysics & Biochemistry; Genetics; Therapeutic Radiology*), Choukri Ben Mamoun (*Internal Medicine; Microbial Pathogenesis*), 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; Epidemiology; Microbial Pathogenesis*), Richard Flavell (*Immunobiology*), Jorge Galán (*Microbial Pathogenesis; Cell Biology*), Andrew Goodman (*Microbial Pathogenesis*), Eduardo Groisman (*Microbial Pathogenesis*), Akiko Iwasaki (*Immunobiology; Molecular, Cellular, & Developmental Biology*), Barbara Kazmierczak (*Internal Medicine; Microbial Pathogenesis*), Albert Ko (*Epidemiology; Internal Medicine*), Ruslan Medzhitov (*Immunobiology*), I. George Miller (*Pediatrics; Epidemiology; Molecular Biophysics & Biochemistry*), Walther Mothes (*Microbial Pathogenesis*), Melinda Pettigrew (*Epidemiology*), Carla Rothlin (*Immunobiology; Pharmacology*), Craig Roy (*Microbial Pathogenesis; Immunobiology*), Dieter Söll (*Molecular Biophysics & Biochemistry; Chemistry*), Richard Sutton (*Internal Medicine; Microbial Pathogenesis*), Jeffrey Townsend (*Biostatistics; Ecology & Evolutionary Biology*), Christian Tschudi (*Epidemiology*), Paul Turner (*Ecology & Evolutionary Biology*), Yong Xiong (*Molecular Biophysics & Biochemistry*)

Associate Professors Murat Acar (*Molecular, Cellular, & Developmental Biology; Physics*), Jason Crawford (*Chemistry; Microbial Pathogenesis*), Charles Dela Cruz (*Internal Medicine; Microbial Pathogenesis*), Farren Isaacs (*Molecular, Cellular, & Developmental Biology*), Priti Kumar (*Internal Medicine/Infectious Diseases*), Brett Lindenbach (*Microbial Pathogenesis*), Jun Liu (*Microbial Pathogenesis*), John MacMicking (*Microbial Pathogenesis; Immunobiology*), Kathryn Miller-Jensen (*Biomedical Engineering; Molecular, Cellular, & Developmental Biology*), Christian Schlieker (*Molecular Biophysics & Biochemistry; Cell Biology*)

Assistant Professors Amy Bei (*Epidemiology of Microbial Diseases*), Ellen Foxman (*Laboratory Medicine; Immunobiology*), Stavroula Hatzios (*Molecular, Cellular, & Developmental Biology*), Ya-Chi Ho (*Microbial Pathogenesis; Internal Medicine/Infectious Diseases*), Noah Palm (*Immunobiology*), E. Hesper Rego (*Microbial Pathogenesis*), Craig Wilen (*Laboratory Medicine; 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, structural biology, parasitology, microbiome, and microbial ecology and evolution.

To enter the Ph.D. program, students apply to the Microbiology track within the interdepartmental graduate program in the Biological and Biomedical Sciences (BBS), <https://medicine.yale.edu/bbs>.

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, MBIO 671, and MBIO 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. A qualifying proposal, defended in an exam on the student's thesis project, 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 601, 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 503, RCR Refresher for Senior BBS Students.

MASTER'S DEGREES

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 685, MBIO 686, MBIO 530, MBIO 734, MBIO 680, and CBIO 602. 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 courses: IBIO 601, MBIO 701, MBIO 702, MBIO 670, MBIO 671, and MBIO 672. Students who are eligible for or who have already received the M.Phil. will not be awarded the M.S.

COURSES

MBIO 530a / IBIO 530a / MCDB 530a, Biology of the Immune System Eric Meffre, David Schatz, Peter Cresswell, Jordan Pober, Joao Pereira, Ruslan Medzhitov, Craig Roy, Nikhil Joshi, Aaron Ring, Noah Palm, Kevan Herold, Carla Rothlin, and Carrie Lucas

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.

MBIO 601b / IBIO 601b, Fundamentals of Research: Responsible Conduct of Research Carla Rothlin

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. o Course cr

MBIO 670a and MBIO 671b and MBIO 672b, Laboratory Rotations Walther Mothes

Rotation in three laboratories. Required of all first-year graduate students.

MBIO 685b, The Biology of Bacterial Pathogens II 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.

MBIO 686a, The Biology of Bacterial Pathogens I 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.

MBIO 701a and MBIO 702b, 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 the student's own work before a sympathetic but critical audience and to familiarize the faculty with the research.

MBIO 703a and MBIO 704b, 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.

MBIO 705b, Evasion of Host Defense by Viruses, Bacteria, and Eukaryotic Parasites
Staff

The course, in student seminar format, is required of all first- and second-year Microbiology graduate students. Subjects include strategies employed by viruses, bacteria, or eukaryotic parasites to evade either cell intrinsic defenses, such as programmed cell death or innate immune sensing, or responses operating at the level of the organism, such as the adaptive immune response.

MBIO 734b / GENE 734b / MB&B 734b, Molecular Biology of Animal Viruses
Daniel DiMaio and Brett Lindenbach

Lecture course with emphasis on mechanisms of viral replication, oncogenic transformation, and virus-host cell interactions.

Molecular Biophysics and Biochemistry

336 Bass Center, 203.432.5662

<https://mbb.yale.edu>

M.S., M.Phil., Ph.D.

Chair

Mark Hochstrasser

Director of Graduate Studies

Karla Neugebauer (SHM C123, 203.785.3322, karla.neugebauer@yale.edu)

Graduate Registrar

Nicole Evans (Bass 336, 203.432.5662, nicole.evans@yale.edu)

Professors Karen Anderson (*Pharmacology*), Susan Baserga, Ronald Breaker (*Molecular, Cellular, & Developmental Biology*), 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*), Sharon Hammes-Schiffer (*Chemistry*), Mark Hochstrasser, Jonathon Howard, Michael Koelle, Anthony Koleske, William Konigsberg, 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*), Karin Reinisch (*Cell Biology*), David Schatz (*Immunobiology*), Robert Shulman (*Emeritus*), Fred Sigworth (*Cellular & Molecular Physiology; Biomedical Engineering*), Dieter Söll, Mark Solomon, Joan Steitz, Scott Strobel, Kenneth Williams (*Adjunct; Research*), Yong Xiong, Carl Zimmer (*Adjunct*)

Associate Professors Julien Berro, Titus Boggon (*Pharmacology*), Wendy Gilbert, Erdem Karatekin (*Cellular & Molecular Physiology*), Christian Schlieker, Matthew Simon, Charles Sindelar, Seyedtaghi Takyar (*Internal Medicine/Pulmonary*), Yongli Zhang (*Cell Biology*)

Assistant Professors Franziska Bleichert, Lilian Kabeche, Nikhil Malvankar, Wei Mi (*Pharmacology*), Candice Paulsen, Sarah Slavoff (*Chemistry*), Kai (Jack) Zhang

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.

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

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 (encompassed by MB&B 650 and MB&B 651, Lab Rotation for BQBS 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 720), one course in critical thinking (MB&B 730), one course in quantitative biology (MB&B 562 and MB&B 635 are recommended but not required), 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 676, Responsible Conduct of Research. In their fourth year of study, all students must successfully complete B&BS 503, 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. Students who require additional support from the Graduate School must teach additional terms, if needed, after they have fulfilled the academic teaching requirement.

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 MB&B faculty members. 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 800 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 743.

MASTER'S DEGREES

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 MB&B 651, and one term each of MB&B 675 and MB&B 676. 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 or b / MCDB 500a or b, Biochemistry Ronald Breaker and Staff

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 520a, Boot Camp Biology Corey O'Hern

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. ½ Course cr

MB&B 523b / CB&B 523b / ENAS 541b / PHYS 523b, Biological Physics

Benjamin Machta

The course has two aims: (1) to introduce students to the physics of biological systems and (2) to introduce students to the basics of scientific computing. The course focuses on studies of a broad range of biophysical phenomena including diffusion, polymer statistics, protein folding, macromolecular crowding, cell motion, and tissue development using computational tools and methods. Intensive tutorials are provided for MATLAB including basic syntax, arrays, for-loops, conditional statements, functions, plotting, and importing and exporting data.

MB&B 529b / PHAR 529b, Structural Biology and Drug Discovery Titus Boggon and

Ya Ha

A comprehensive introduction to the concepts and practical uses of structural biology and structural biology-related techniques in drug discovery. The first half of the course focuses on techniques used to discover and optimize small and macromolecule drugs. Students are introduced to topics such as small molecule lead discovery, X-ray crystallography, cryo-electron microscopy, and biophysical techniques. The first half of the course also includes a practical component where students conduct hands-on structural biology experiments and learn about biophysical techniques in a laboratory setting. The second half of the course focuses on drug discovery, particularly for protein kinases. It includes a field trip to the Yale Center for Drug Discovery, where the students are introduced to the in-house Yale screening facilities for small molecule drug discovery. Two half-credit courses – PHAR 530 and PHAR 531 – are also offered for the two halves of PHAR 529.

MB&B 545b, Methods and Logic in Molecular Biology Wendy Gilbert,

Mark Hochstrasser, and Christian Schlieker

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.

MB&B 570a and MB&B 571b, Intensive Research for B.S./M.S. Candidates

Andrew Miranker

Required of students in the joint B.S./M.S. program with Yale College. 2 Course cr per term

MB&B 591a / ENAS 991a / MCDB 591a / PHYS 991a, Integrated Workshop

Corey O'Hern

This required course for students in the PEB graduate program involves a series of modules, co-taught by faculty, in which students from different academic backgrounds and research skills collaborate on projects at the interface of physics, engineering, and biology. The modules cover a broad range of PEB research areas and skills. The course starts with an introduction to MATLAB, which is used throughout the course for analysis, simulations, and modeling.

MB&B 600a, Principles of Biochemistry I Matthew Simon, Michael Koelle, and Candie Paulsen

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.

MB&B 601b, Principles of Biochemistry II Christian Schlieker, Joan Steitz, and Franziska Bleichert

A continuation of MB&B 600 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.

MB&B 602a / CBIO 602a / MCDB 602a, Molecular Cell Biology Thomas Melia, Michael Caplan, Thomas Pollard, Peter Takizawa, James Rothman, Valerie Horsley, Megan King, Patrick Lusk, Martin Schwartz, Christopher Burd, Josien van Wolfswinkel, and David Breslow

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. Prerequisites: none, but some knowledge of basic cell biology and biochemistry is assumed. Students who have not taken courses in these areas can prepare by reading relevant sections in basic molecular cell biology texts. We recommend Pollard et al., *Cell Biology* (3rd ed., 2016), Alberts et al., *Molecular Biology of the Cell* (6th ed., 2014), or Lodish et al., *Molecular Cell Biology* (8th edition, 2016).

MB&B 650a, Lab Rotation for BQBS First-Year Students Karla Neugebauer

Required of all first-year BQBS graduate students. Credit for full year only.

MB&B 675a, Seminar for First-Year Students Christian Schlieker, Karen Anderson, and Valerie Horsley

Required of all first-year BQBS graduate students.

MB&B 720a, Macromolecular Structure and Biophysical Analysis Yong Xiong, Joe Howard, and Jack Zhang

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.

MB&B 730a, Methods and Logic in Molecular Biology Mark Solomon, Matthew

Simon, Anthony Koleske, Scott Holley, Karla Neugebauer, and Candie Paulsen

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 BQBS.

MB&B 734b / GENE 734b / MBIO 734b, Molecular Biology of Animal Viruses

Daniel DiMaio and Brett Lindenbach

Lecture course with emphasis on mechanisms of viral replication, oncogenic transformation, and virus-host cell interactions.

MB&B 743b / GENE 743 / MCDB 743b, Advanced Eukaryotic Molecular Biology

Mark Hochstrasser, Matthew Simon, Franziska Bleichert, and Wendy Gilbert

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.

MB&B 749a / GENE 749a, Medical Impact of Basic Science Joan Steitz, I. George

Miller, Daniel DiMaio, Franziska Bleichert, Sandy Chang, Karla Neugebauer, and Seyedtaghi Takyar

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. May not be taken by MB&B B.S./MS. students for graduate course credit. Prerequisite: biochemistry or permission of the instructor.

MB&B 752b and MB&B 753b and MB&B 754b / CB&B 752b / CPSC 752b /**MCDB 752b, Biomedical Data Science: Mining and Modeling** Mark Gerstein and Matthew Simon

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. 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.

MB&B 800a, Advanced Topics in Molecular Medicine Susan Baserga and

William Konigsberg

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).

Molecular, Cellular, and Developmental Biology

Yale Science Building, 203.432.3538

<http://mcdb.yale.edu>

M.S., Ph.D.

Chair

Vivian Irish

Director of Graduate Studies

Farren Isaacs

Professors Robert Bazell (*Adjunct*), Ronald Breaker, John Carlson, Lynn Cooley,* Craig Crews, Stephen Dellaporta, Thierry Emonet, Paul Forscher, Mark Hochstrasser,* Scott Holley, Valerie Horsley, Vivian Irish, Akiko Iwasaki,* Douglas Kankel, Paula Kavathas,* Haig Keshishian, Mark Mooseker, Thomas Pollard, Anna Pyle, Joel Rosenbaum, Hugh Taylor,* Robert Wyman

Associate Professors Murat Acar, Damon Clark, Joshua Gendron, Megan King,* Farren Isaacs, Kathryn Miller-Jensen,* Weimin Zhong

Assistant Professors Shirin Bahmanyar, David Breslow, Nadya Dimitrova, Stavroula Hatzios, Yannick Jacob, Sigrid Nachtergaele, Josien van Wolfswinkel, Jing Yan

Lecturers Alexia Belperron,* Surjit Chandhoke,* Iain Dawson, Seth Guller,* Amaleah Hartman, Ronit Kaufman, Samantha Lin, Maria Moreno, Kenneth Nelson, Aruna Pawashe,* Joseph Wolenski

* A secondary appointment with primary affiliation in another department or school.

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 training and research opportunities for interdisciplinary studies.

To enter the Ph.D. program, students apply to the Molecular Cell Biology, Genetics, and Development (MCGD) track; the Biochemistry, Quantitative Biology, Biophysics, and Structural Biology (BQBS) track; or the Plant Molecular Biology (PMB) track within the interdepartmental graduate program in Biological and Biomedical Sciences (BBS), <https://medicine.yale.edu/bbs>.

INTEGRATED GRADUATE PROGRAM IN PHYSICAL AND ENGINEERING BIOLOGY (PEB)

Students applying to the MCGD or BQBS 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/MCDB 901, Research Skills and Ethics I and II. 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. At the beginning of 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 the student 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 by the end of the fall term of the second year and no later than the end of the second year of study. Following admission to candidacy, students are required to meet with their 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 Marx Science and Social Science Library. All students are required to teach in two one-term (TF-10 level) courses during their Ph.D. study, but not during the first year of graduate study. Students who require additional support from the Graduate School must teach additional terms, if needed, after they have fulfilled the academic teaching requirement. 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 900/MCDB 901, Research Skills and Ethics I and II, 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 503, 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 Degree 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/MCDB 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/MCDB 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 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 website (<https://medicine.yale.edu/bbs>), MCGD, BQBS, and PMB tracks.

COURSES

MCDB 500a or b / MB&B 500a or b, Biochemistry Staff

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 530a / IBIO 530a / MBIO 530a, Biology of the Immune System Eric Meffre,

Stephanie Eisenbarth, David Schatz, Peter Cresswell, Jordan Pober, Joao Pereira,

Craig Roy, Aaron Ring, Noah Palm, Carla Rothlin, Carrie Lucas, and Craig Wilen

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.

MCDB 550a / C&MP 550a / ENAS 550a / PHAR 550a, Physiological Systems

Stuart Campbell and W. Mark Saltzman

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.

MCDB 560b / C&MP 560b / ENAS 570b / PHAR 560b, Cellular and Molecular

Physiology: Molecular Machines in Human Disease Emile Boulpaep

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.

MCDB 570b, Biotechnology Craig Crews, Ronald Breaker, Joseph Wolenski, F. Kenneth Nelson, Farren Isaacs, and Yannick Jacob

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.

MCDB 591a / ENAS 991a / MB&B 591a / PHYS 991a, Integrated Workshop
Corey O'Hern

This required course for students in the PEB graduate program involves a series of modules, co-taught by faculty, in which students from different academic backgrounds and research skills collaborate on projects at the interface of physics, engineering, and biology. The modules cover a broad range of PEB research areas and skills. The course starts with an introduction to MATLAB, which is used throughout the course for analysis, simulations, and modeling.

MCDB 595a and MCDB 596b, Intensive Research in MCDB for B.S./M.S. Candidates
Douglas Kankel

A four-credit, yearlong course (two credits each term) that is similar to MCDB 495/496 and is taken during the senior year. During this course, students give an oral presentation describing their work. At the end of the course, students are expected to present their work to the department in the form of a poster presentation. In addition, students are 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. 2 Course cr per term

MCDB 602a / CBIO 602a / MB&B 602a, Molecular Cell Biology Thomas Melia, Michael Caplan, Thomas Pollard, Peter Takizawa, James Rothman, Valerie Horsley, Megan King, Patrick Lusk, Martin Schwartz, Christopher Burd, Josien van Wolfswinkel, and David Breslow

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. Prerequisites: none, but some knowledge of basic cell biology and biochemistry is assumed. Students who have not taken courses in these areas can prepare by reading relevant sections in basic molecular cell biology texts. We recommend Pollard et al., *Cell Biology* (3rd ed., 2016), Alberts et al., *Molecular Biology of the Cell* (6th ed., 2014), or Lodish et al., *Molecular Cell Biology* (8th edition, 2016).

MCDB 603a / CBIO 603a, Seminar in Molecular Cell Biology Megan King, Michael Caplan, Thomas Pollard, Peter Takizawa, James Rothman, Valerie Horsley, Thomas Melia, Patrick Lusk, Martin Schwartz, Christopher Burd, and David Breslow

A graduate-level seminar 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 602 lecture schedule. Thus, concurrent enrollment in CBIO 602 is required.

MCDB 625a / GENE 625 / MB&B 625, Basic Concepts of Genetic Analysis Jun Lu

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.

MCDB 650a, Epigenetics Yannick Jacob, Nadya Dimitrova, and 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.

MCDB 677b / GENE 777, Mechanisms of Development Zhaoxia Sun

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.

MCDB 720a / INP 720a, Neurobiology Haig Keshishian and 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.

MCDB 743b / GENE 743 / MB&B 743b, Advanced Eukaryotic Molecular Biology

Mark Hochstrasser, Matthew Simon, Franziska Bleichert, and Wendy Gilbert

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.

MCDB 752b / CB&B 752b / CPSC 752b / MB&B 752b and MB&B 753b and MB&B 754b / MB&B 753b and MB&B 754b / MB&B 754b, Biomedical Data Science: Mining and Modeling Mark Gerstein and Matthew Simon

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. 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.

MCDB 900a / CBIO 900a / GENE 900a, Research Skills and Ethics I

Shirin Bahmanyar

This course consists of a weekly seminar that covers ethics, writing, and research methods in cellular and molecular biology as well as student presentations (“rotation talks”) of work completed in the first and second laboratory rotations.

MCDB 902a and MCDB 903b, Advanced Graduate Seminar Staff

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 912a / CBIO 912a / GENE 912a, Second Laboratory Rotation

Shirin Bahmanyar

Second laboratory rotation for Molecular Cell Biology, Genetics, and Development track students.

MCDB 950a and MCDB 951b, Second-Year Research Staff

By arrangement with faculty.

Music

Stoeckel Hall, 203.432.2986
<http://yalemusic.yale.edu>
 M.A., M.Phil., Ph.D.

Chair

Ian Quinn

Director of Graduate Studies

Michael Veal (Stoeckel, 203.432.2986, dgs.music@yale.edu)

Professors Ardis Butterfield, Richard Cohn, Daniel Harrison, Gundula Kreuzer, Richard Lalli (*Adjunct*), Patrick McCreless, Ian Quinn, Markus Rathey (*Adjunct*), Gary Tomlinson, Michael Veal

Associate Professors Robert Holzer (*Adjunct*), Brian Kane, Anna Zayaruznaya

Assistant Professor Jessica Peritz

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 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 director of graduate studies (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. PROGRAMS

Music and African American Studies

The Department of Music offers, in conjunction with the Department of African American Studies, a combined Ph.D. degree in Music and African American Studies. For further details, see African American Studies.

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. Applicants must submit scores from the GRE General Test. 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 515b, Schenkerian Analysis Daniel Harrison

Advanced work in harmony, counterpoint, thoroughbass, structure, and form; Schenkerian analysis of selected compositions from the tonal repertory.

MUSI 697b, 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 698a, 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 812a or b, Directed Studies: Ethnomusicology Staff

MUSI 814a or b, Directed Studies: History of Music Staff

By arrangement with faculty.

MUSI 903a, The Voice Brian Kane

The seminar is intended as a general introduction to the emerging field of voice studies. Students develop an overview of the field and acquire familiarity with the central topics, problems, and thinkers about the voice, both historical and contemporary. In addition to weekly readings, writing assignments, and presentations, students are involved in the selection of topics and texts, depending on their interests. Special emphasis is placed on the interaction of voice studies with music, philosophy, and media studies.

MUSI 914a or b, Directed Studies: Theory of Music Staff

By arrangement with faculty.

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 998a, Prospectus Workshop Jessica Peritz

MUSI 999b, Dissertation Colloquium Jessica Peritz

Near Eastern Languages and Civilizations

Arnold Hall, 304 Elm Street, 203.432.2944

<http://nelc.yale.edu>

M.A., M.Phil., Ph.D.

Chair

Shawkat Toorawa

Director of Graduate Studies

Kevin van Bladel

Professors John Darnell, Benjamin Foster, Eckart Frahm, Dimitri Gutas (*Emeritus*), Bentley Layton (*Emeritus*), Nadine Moeller, Shawkat Toorawa, Kevin van Bladel, Harvey Weiss

Senior Lecturer Kathryn Slanski

Lecturers and Lectors Sarab al-Ani, Muhammad Aziz, Gaelle Chantrain, Jonas Elbousty, Ozgen Felek, Shiri Goren, Agnete Lassen, Gregory Marouard, Dina Roginsky, Farkhondeh Shayesteh, Klaus Wagensonner, Orit Yeret

FIELDS OF STUDY

Fields include Arabic Humanities, Assyriology, the Classical Near East, and Egyptology.

SPECIAL ADMISSIONS REQUIREMENTS

Applicants should state their specific field of study and intended specialization and must submit scores from the General Test of the GRE. Evidence of reading knowledge of both French and German is required of all Ph.D. students. Proficiency in one of these languages is normally a prerequisite for admission and is demonstrated by passing a departmental examination upon registration at Yale. Proficiency in the second language must be achieved before admission to the second year of study. 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 course given by the French or German department at Yale (or the equivalent elsewhere, with the approval of the director of graduate studies [DGS]). 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 DGS. For students in the M.A. program, evidence of 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 yearlong courses or eight term courses per year are considered a full load. 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 yearlong 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 exceptional 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.

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 Humanities*: Arabic and one other Near Eastern language, typically Hebrew, Persian, or Turkish. *Assyriology*: Sumerian and Akkadian. *Classical Near East*: Arabic and at least two of the following: Armenian, Aramaic (Babylonian or Syriac), Coptic, Greek, Hebrew, Middle Persian, New Persian, or Sanskrit. *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 Humanities, 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 such departments and programs as Comparative Literature, French, History, History of Science and Medicine, Italian Studies, Judaic Studies, Linguistics, Medieval Studies, Philosophy, Religious Studies, Spanish and Portuguese, or others as applicable.

Students in all four fields 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. Teaching Fellow assignments will be made by the DGS in consultation with the relevant faculty and will, whenever possible, take student preferences into account.

Examinations and the Dissertation

The qualifying 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. For students who enter with advanced standing, the qualifying examination could be taken at the end of the second year. Qualifying 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. Qualifying examinations may be based in part on reading lists of primary core texts and secondary literature compiled in advance by the student and the relevant faculty. Primary texts and secondary literature from course work may also be topics of the examination. For language examinations, unseen texts may also be included. In the case of the program in Arabic Humanities, for students electing to do a minor, the written portion will consist of two language examinations and one subject in the minor field, and the oral will consist of two subjects in Arabic studies and one in the minor field. Written examinations are set by the individual faculty members responsible for particular areas of study, but the oral portion may be conducted by the full staff of the department. The dissertation proposal is normally submitted one month after completing the qualifying examination.

In their final term of course work, students may, with the permission of the DGS and the relevant faculty, 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 selected aspects of the topic in a research paper. Students availing themselves of this option may 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.

ARCHAIA GRADUATE QUALIFICATION

Students can participate in the Yale Program for the Study of Ancient and Premodern Cultures and Societies (Archaia) and receive a graduate qualification by fulfilling the necessary requirements. For further information, see Archaia, under Non-Degree-Granting Programs, Councils, and Research Institutes.

MASTER'S DEGREES

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

Terminal Master's Degree Program The Department of Near Eastern Languages and Civilizations occasionally admits students to pursue a terminal M.A. degree. No financial aid is available. Students enrolled in the M.A. program must complete a minimum of twelve term courses, with an average of High Pass and at least two grades of Honors.

Students in the Ph.D. program who leave the program prior to completion of the doctoral degree may be eligible to receive the terminal M.A. degree upon completion of a minimum of twelve courses, with an average of High Pass and at least two grades of Honors. Automatic petition for the M.A. degree is not available to students in Near Eastern Languages and Civilizations.

COURSES

AKKD 500a, Elementary Akkadian I Eli Tadmor

Introduction to the language of ancient Babylonia and its cuneiform writing system, with exercises in reading, translation, and composition.

AKKD 501b, Elementary Akkadian II Eli Tadmor

Introduction to the language of ancient Babylonia and its cuneiform writing system, with exercises in reading, translation, and composition.

AKKD 505b, Historical and Archival Texts from First-Millennium Assyria

Eckart Frahm

Reading and discussion of inscriptions, letters, and documents pertaining to the history of the Assyrian empire. Prerequisite: knowledge of Akkadian.

ARBC 500a, Elementary Modern Standard Arabic I Staff

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.

ARBC 501b, Elementary Modern Standard Arabic II Staff

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.

ARBC 502a, Intermediate Modern Standard Arabic I Sarab Al Ani

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.

ARBC 503b, Intermediate Modern Standard Arabic II Sarab Al Ani

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.

ARBC 504a, Advanced Modern Standard Arabic I Muhammad Aziz

Focus on improving the listening, writing, and speaking skills of students who already have a substantial background in the study of modern standard Arabic. Prerequisite: ARBC 503 or permission of the instructor.

ARBC 505b, Advanced Modern Standard Arabic II Muhammad Aziz

Focus on improving the listening, writing, and speaking skills of students who already have a substantial background in the study of modern standard Arabic. Prerequisite: ARBC 503 or permission of the instructor.

ARBC 509a, Intermediate Classical Arabic I Kevin Butts

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.

ARBC 510b, Intermediate Classical Arabic II Kevin Butts

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.

ARBC 523a, Arabic Prose Narrative Muhammad Aziz

Close reading of some of Naguib Mahfouz's novels. Attention to idiomatic expressions, structural patterns, literary analysis, and discussions. Students write a brief report on their weekly reading and discuss the main ideas of the assigned reading. Short midterm paper relevant to Mahfouz (to be discussed with the instructor) and a final paper. Prerequisite: ARBC 503 or permission of the instructor.

ARBC 560a or b, Graduate Arabic Seminar: Reading Arabic Scholarship

Kevin van Bladel

Study and interpretation of classical Arabic texts for advanced students. The focus this term is on Arabic scholarly texts.

ARBC 567b, Modern Arab Writers Muhammad Aziz

Study of novels and poetry written by modern Arab writers, including Taha Hussein, Zaid Dammaj, Hoda Barakat, Nizar Qabbani, al-Maqalih, and Mostaghanimi. Prerequisite: ARBC 504 or permission of the instructor.

EGYP 500a, Introduction to Classical Hieroglyphic Egyptian I Gaelle Chantrain

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.

EGYP 501b, Introduction to Classical Hieroglyphic Egyptian II Gaelle Chantrain

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.

EGYP 512b / RLST 658b, 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.

EGYP 514a / RLST 653a, Gnostic Texts in Coptic Daniel Bohac

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 510 or equivalent.

EGYP 528a / ANTH 528a / ARCG 528a, Magic and Ritual in Ancient Egypt and the Near East John Darnell

Introduction to ancient Egyptian and Near East magic and rituals with an overview on the use of magic and discussion of the different rituals and festivals.

EGYP 568a, Intermediate Egyptian: Historical Texts 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.

EGYP 579a, Directed Readings: Egyptology John Darnell**EGYP 591a, Ancient Egyptian Love Poetry** John Darnell

Egyptian love poetry, concentrating on the major documents. Most readings in hieratic, with discussions of the grammar of literary Late Egyptian, its relationship to nonliterary Late Egyptian and late Middle Egyptian. Readings in comparative texts and investigation of iconographic parallels.

HEBR 500a, Elementary Modern Hebrew I Dina Roginsky

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.

HEBR 501b, Elementary Modern Hebrew II Orit Yeret

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.

HEBR 502a, Intermediate Modern Hebrew I Shiri Goren

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.

HEBR 503b, Intermediate Modern Hebrew II 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 502 or equivalent.

HEBR 504a, Advanced Modern Hebrew: Daily Life in Israel Orit Yeret

An examination of major controversies in Israeli society. Readings include newspaper editorials and academic articles as well as documentary and historical material.

Advanced grammatical structures are introduced and practiced.

HEBR 505b, 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.

HEBR 509b, Reading Academic Texts in Modern Hebrew Dina Roginsky

The course addresses the linguistic needs of English-speaking students who would like to be able to read with ease and accuracy contemporary Hebrew-language scholarship in the fields of Judaic studies, religious studies, history, political science, sociology, Near Eastern studies, and other related fields. Particularly, this course confronts reading comprehension problems through straightforward exposition of the grammar supported by examples from scholarly texts. Conducted in Hebrew. Prerequisite: two years of modern or biblical Hebrew, or permission of the instructor.

HEBR 513a, Intermediate Biblical Hebrew I Staff

A two-term review and continuation of instruction in grammar and vocabulary, supplemented by readings from the Bible. Prerequisite: HEBR 510 or equivalent.

HEBR 514b, Intermediate Biblical Hebrew II Staff

Continuation of HEBR 513.

HEBR 519a / JDST 835a, 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.

MESO 509a, Mesopotamian Humorous Texts Eckart Frahm

Study and interpretation of humorous cuneiform texts, including “The Poor Man of Nippur” and “The Doctor from Isin.”

MESO 530a, Beginning Sumerian I Sergio Tang

A two-term introduction to the Sumerian language.

NELC 518b, Assyria: The First Near Eastern Empire (Seminar) Eckart Frahm
Survey of the history and culture of ancient Assyria, with a focus on its imperial phase in the first millennium B.C.E. Assyria's aggressive foreign policy; the role of the military; Assyrian royal ideology, religion, literature, art, and court life; Assyria's impact on the Bible; Assyria's image in classical sources. Readings from primary sources in translation.

NELC 557b, Israeli Narratives Shiri Goren

Close reading of major Israeli novels in translation with attention to how their themes and forms relate to the Israeli condition. Focus on topics and theories of war and peace, migration, nationalism, and gender. Authors include Oz, Yehoshua, Grossman, Matalon, Castel-Bloom, Shalev, and Kashua.

NELC 588a / ANTH 773a / ARCG 773a, Climate Change, Societal Collapse, and Resilience 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.

NELC 668b / CLSS 829b / HIST 507b / LING 668b, Historical Sociolinguistics of the Ancient World Kevin van Bladel

Social history and linguistic history can illuminate each other. This seminar confers the methods and models needed to write new and meaningful social history on the basis of linguistic phenomena known through traditional philology. Students learn to diagnose general historical social conditions on the basis of linguistic phenomena occurring in ancient texts. Prerequisite: working knowledge of at least one ancient language.

NELC 683b / CLSS 827b / HIST 513b / MDVL 513b / RLST 619b, Law and History, Law in History: Premodern Civilizations through the Lens of Legal Historiography Maria Doerfler and Travis Zadeh

This seminar invites students into a comparative exploration of the intersection of law, history, and historiography in the ancient and premodern world. Sessions explore these links across a variety of linguistic and geographic settings, including those of ancient and medieval India, China, Persia, Greece, and Rome, as well as in different political, religious, literary, and archaeological contexts. The seminar constructs the category of law expansively to encompass civic, religious, and hybrid forms of legislation. In the process, we seek to explore, *inter alia*, questions of the relevance of history for the study of law, history's deployment in the context of legal writings, and law's concomitant relevance for historiography; the use of theoretical models, including those forged in modern and postmodern contexts, for the study of law and legal historiography; and the implications of discourses about law and history in premodernity for contemporary, post-secular societies.

NELC 702a / RLST 752a, Mishnah Seminar: Tractate Megillah Steven Fraade
Study of rabbinic texts treating rules for the public recitation and translation of the Scroll of Esther on the holiday of Purim and of other sacred scriptures and translations throughout the year, with special attention to the relation between law and ritual and the narrativity of both. *EMWAR area of concentration designations: STHJ, RabJud, ScrInterp*. Prerequisite: reading fluency in ancient Hebrew.

OTTM 610a, Introduction to Ottoman Turkish I Ozgen Felek

Ottoman Turkish is the Turkish language written in the Arabic alphabet during the Ottoman Empire (1299–1923), which ruled for almost seven hundred years from North Africa to the Balkans, and the early years of the Turkish Republic established in 1923. Knowledge of Ottoman Turkish thus gives students an important advantage over experts on just one geographical and cultural area of the Muslim world. Students develop skills that will enable them to read Ottoman Turkish texts and pursue independent work in Ottoman studies. We work on building vocabulary, developing competence in Ottoman Turkish, and improving reading skills. Since culture is an integral part of the language, various cultural expressions are introduced through a variety of historical and literary Ottoman texts from the fourteenth to the nineteenth century. We use Korkut Bu#day's *The Routledge Introduction to Literary Ottoman* for grammar and reading passages. In addition, we read excerpts from Ottoman texts from different genres.

OTTM 620b, Introduction to Ottoman Turkish II Ozgen Felek

Ottoman Turkish is the Turkish language written in the Arabic alphabet during the Ottoman Empire (1299–1923), which ruled for almost seven hundred years from North Africa to the Balkans, and the early years of the Turkish Republic established in 1923. Knowledge of Ottoman Turkish thus gives students an important advantage over experts on just one geographical and cultural area of the Muslim world. Students develop skills that will enable them to read Ottoman Turkish texts and pursue independent work in Ottoman studies. We work on building vocabulary, developing competence in Ottoman Turkish, and improving reading skills. Since culture is an integral part of the language, various cultural expressions are introduced through a variety of historical and literary Ottoman texts from the fourteenth to the nineteenth century. We use Korkut Bu#day's *The Routledge Introduction to Literary Ottoman* for grammar and reading passages. In addition, we read excerpts from Ottoman texts from different genres.

PERS 500a, Elementary Persian I 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.

PERS 501b, Elementary Persian II 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.

PERS 502a, Intermediate Persian I 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.

PERS 503b, Intermediate Persian II 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.

PERS 506a, Manichaean Middle Persian and Parthian Kevin van Bladel

Introduction to reading Middle Persian and Parthian, two different but closely related ancient Iranian languages, in the distinctive script employed by Manichaean scribes. Includes extensive study of the Manichaean religion through original texts and secondary readings.

PERS 561b, Persian Culture and Media Farkhondeh Shayesteh

Advanced study of Persian grammar, vocabulary, and culture through the use of authentic Persian media. Examination of daily media reports on cultural, political, historical, and sporting events in Iran, Afghanistan, Tajikistan, and other Persian-speaking regions. Designed for nonnative speakers. Prerequisite: PERS 140 or permission of instructor.

SMTC 520a / RLST 840a, Introductory Ugaritic Jimmy Daccache

The Ugaritic texts from the Bronze Age found at Ras Shamra on the Mediterranean coast of Syria provide the earliest well-attested example of the use of alphabet writing. The Ugaritic corpus comprises more than 2,000 texts of several genres (myths, rituals, incantations, "scientific" manuals, letters, administrative documents, and others), written in a "cuneiform" script. This course completes the introduction to the Ugaritic language. Students have the opportunity to improve their knowledge of Ugaritic literature by reading and analyzing texts in its major genres, with special emphasis on mythological texts.

SMTC 522b, Elementary Syriac II Christopher Mezger

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 523a / RLST 826a, Intermediate Syriac I Jimmy Daccache

This two-term course is designed to enhance students' knowledge of the Syriac language by reading a selection of texts, sampling the major genres of classical Syriac literature. By the end of the year, students are familiar with non-vocalized texts and are capable of confronting specific grammatical or lexical problems. Prerequisite: SMTC 521 or knowledge of Syriac.

Nursing

400 West Campus Drive, 203.785.2389

<https://nursing.yale.edu/academics/phd-program-nursing>

M.Phil., Ph.D.

Dean

Ann Kurth

Director of Graduate Studies

David Vlahov (203.785.2399, david.vlahov@yale.edu)

Professors Jane Dixon, Margaret Grey, Holly Kennedy, M. Tish Knobf, Ann Kurth, Carmen Portillo, Nancy Redeker, Lois Sadler, David Vlahov, Robin Whittemore

Associate Professors Joanne Iennaco, Joan Kearney, Soohyun Nam, LaRon Nelson, Monica Ordway, Dena Schulman-Green, Julie Womack, Canhua Xiao

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 REQUIREMENTS FOR THE PH.D. DEGREE

Course Work

Completion of fourteen 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 906 in the fall and NURS 907 in the spring) every term for years 1–4 is also required. The required core courses are: NURS 901, Research Methods I: Quantitative Methods for Health Research; NURS 902, Research Methods II: Qualitative Methods for Health Research; NURS 903, Research Methods III: Measurement of Health Variables; NURS 904, Research Methods IV: Mixed Methods; NURS 905, Research Methods V: Intervention Development; NURS 908, Science, Scholarship, and Communication of Knowledge I; NURS 909, Science, Scholarship, and Communication of Knowledge II; NURS 910, Science, Scholarship, and Communication of Knowledge III; NURS 911, Science, Scholarship, and Communication of Knowledge IV; NURS 912, Foundations of Scientific Inquiry I: Philosophical and Theoretical Basis for Nursing Science; NURS 913, Foundations of Scientific Inquiry II: Theories of Health, Symptom Management, and Self-Management; NURS 917, Advanced Statistics for Clinical Nursing Research; NURS 929, Ethical Conduct of Clinical Research; and NURS 941, 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 929, 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.

M.S.N./PH.D. JOINT-DEGREE PROGRAM

The joint-degree program combines the two-year M.S.N. degree from the School of Nursing and the four-year Ph.D. in Nursing. The joint program allows students to complete requirements for both degrees in five years. Applicants for admission to the joint program must be admitted to both schools. Students typically enter the joint

program at matriculation, but M.S.N. students who are completing the Research Concentration may apply to the Ph.D. program while enrolled in the fall of year two of the M.S.N. degree. Students will be assigned a Ph.D. adviser upon enrollment in the joint program; the adviser will work closely with the student to determine a plan of study, course selection (aligned with the student's research interests), and the development of research ideas. The first two years of the program are spent in the School of Nursing, completing all requirements for the M.S.N. degree. In the second year, students will complete the Research Concentration, which provides mentored research experience and the development of a research proposal. The M.S.N. Research Concentration will fulfill one half of the first-term Research Assistantship in the Ph.D. program. Students are eligible to take Graduate School courses while enrolled at the School of Nursing, with up to three courses counting toward both degrees. Students may have the opportunity to undertake additional mentored research experiences in the summers following years one and two, including research assistantship hours.

The minimum residence requirement in the program is five years. The tuition requirement is two years in the School of Nursing, and three years in the Graduate School. Financial aid is awarded by each school according to its own criteria. While enrolled at the School of Nursing, students are eligible to compete for financial aid available to master's students, but are not eligible for Graduate School aid. Once they have completed the M.S.N. degree and are enrolled in the Graduate School in year three, students in the joint-degree program receive a full doctoral financial aid package, including up to three years of tuition, stipend, and a Health Award to cover the cost of Yale Health Hospitalization/Specialty Coverage. Students are expected to complete the joint-degree program within five years.

The M.S.N. and Ph.D. degrees are awarded separately, upon completion of the M.S.N. requirements (at the end of the second year of study in the M.S.N program by the School of Nursing), and upon completion of the requirements for the Ph.D. by the Graduate School of Arts and Sciences. To qualify for the M.S.N. and Ph.D. degrees, students must satisfy all degree requirements of both schools. Any exception to this pattern of study must be approved by the DGS and the appropriate associate dean.

Applications to the M.S.N./Ph.D. joint-degree program are not being accepted for the 2021–2022 academic year.

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, four 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 website, <http://nursing.yale.edu>.

REQUIRED COURSES

All Ph.D. students are required to take the following courses. Not all required courses are offered every year; only courses offered in 2020–2021 are listed below. For a complete list of Nursing courses, see the School of Nursing bulletin, online at <https://bulletin.yale.edu>; and Yale Course Search at <https://courses.yale.edu>.

NURS 903b, 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, Research Methods IV: Mixed Methods 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 905a, Research Methods V: Intervention Development 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 instructors. Three hours per week for seven weeks.

NURS 906a, Dissertation Seminar I Jane Dixon

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 907b, Dissertation Seminar II 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 910a, Science, Scholarship, and Communication of Knowledge III

Margaret Grey

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 intermediate principles and processes of grant writing and communicating research results. The NURS 908, 909, 910, 911 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 IV

Margaret Grey

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 advanced principles and processes of grant writing and communicating research results. The NURS 908, 909, 910, 911 seminar series accompanies the research practicum and is required of all Ph.D. students in nursing. One hour every other week.

ELECTIVES**NURS 916a, Advanced Qualitative Research Methods** Holly Kennedy

This course provides the opportunity for doctoral students to engage more deeply in all aspects of qualitative research. Guided seminars examine methodological issues in qualitative research and explore emerging methodologies. Students gain knowledge in sampling strategies, data collection, analysis, and writing. Students gain skill with the ATLAS.ti software program to analyze data. This course is appropriate for Ph.D. students planning to employ qualitative methods in research. Three hours per week (two in class; one in project).

NURS 922b, Introduction to Clinical Research Informatics Julie Womack

This course provides an introduction to informatics, focusing on clinical research informatics. There are lectures and discussion on data science and big data storage, including relational databases as well as some of the newer approaches to data storage. The course explores the use of the electronic health record as a source of data and investigates issues that impact data quality and analysis. It also covers data standards, metadata, and provenance, and it briefly introduces the uses of natural language processing, machine learning, data mining, and ontologies. Hands-on sessions include an introduction to Structured Query Language (SQL) and the use of SAS for visualizing data. Optional for second-year Ph.D. students. Open to others with permission of the instructor.

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, Priscilla Dannies (*Emerita*), Barbara Ehrlich, Jonathan Ellman, Leonard Kaczmarek, Irit Lax, Mark Lemmon, Elias Lolis, Gary Rudnick, Joseph Schlessinger, William Sessa, Dianqing (Dan) Wu

Associate Professors Titus Boggon, David Calderwood, Kathryn Ferguson, Ya Ha, Benjamin Turk

Assistant Professors Claudio Alarcón, Moitrayee Bhattacharyya, Joel Butterwick, Daryl Klein, Sangwon Lee, Yansheng Liu, Wei Mi

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.

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), <https://medicine.yale.edu/bbs>. Most students interested in a Ph.D. in Pharmacology apply through the Molecular Medicine, Pharmacology, and Physiology (MMPP) track or the Biochemistry, Quantitative Biology, Biophysics, and Structural Biology (BQBS) 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 both terms of the graduate seminar course (PHAR 501 and PHAR 502) or equivalents from another department. The other courses will be selected based on each student's interest but must include at least one of the following courses: PHAR 504, PHAR 528, and PHAR 529. Students are required to do three laboratory rotations. The Graduate School requires a grade of Honors for a minimum of two courses. Honors for rotations cannot be used toward this requirement. Students must meet the Honors requirement prior to being admitted to candidacy. Students must pass a total of five courses and maintain an overall High Pass average. A grade of Honors or High Pass is required for the core Pharmacology courses. 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 580, The Responsible Conduct of Research, or the equivalent from another department. In addition, 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. One first-author manuscript is required from the thesis research. The Pharmacology faculty recognizes that some thesis-related work takes a longer time and may not yield anticipated results. As long as the student has made significant progress in parallel experiments, the faculty can exempt a student from the one first-author paper requirement.

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. 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 501a and PHAR 502b / C&MP 629a and C&MP 630b / PATH 679a and PATH 680b, Seminar in Molecular Medicine, Pharmacology, and Physiology

Susumu Tomita and Staff

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). Required of and open only to Ph.D. and M.D./Ph.D. students in the Molecular Medicine, Pharmacology, and Physiology track.

PHAR 504a, Molecular Mechanisms of Drug Actions 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.

PHAR 528b, 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.

PHAR 529b / MB&B 529b, Structural Biology and Drug Discovery Titus Boggon and

Ya Ha

A comprehensive introduction to the concepts and practical uses of structural biology and structural biology-related techniques in drug discovery. The first half of the course focuses on techniques used to discover and optimize small and macromolecule drugs. Students are introduced to topics such as small molecule lead discovery, X-ray crystallography, cryo-electron microscopy, and biophysical techniques. The first half of the course also includes a practical component where students conduct hands-on structural biology experiments and learn about biophysical techniques in a laboratory setting. The second half of the course focuses on drug discovery, particularly for protein kinases. It includes a field trip to the Yale Center for Drug Discovery, where the students are introduced to the in-house Yale screening facilities for small molecule drug discovery. Two half-credit courses – PHAR 530 and PHAR 531 – are also offered for the two halves of PHAR 529.

PHAR 530b, Targeted Use of Structural Biology in Drug Discovery Titus Boggon and

Ya Ha

This 0.5-credit course, the second half of PHAR 529, begins in February. 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. ½ Course cr

PHAR 531b, Concepts of Structural Pharmacology Titus Boggon and Ya Ha

This 0.5-credit course, the first half of PHAR 529, introduces students to the concepts of structural biology and provides the background for how these concepts are applied to areas of great importance in pharmacology and how they facilitate drug development. ½ Course cr

PHAR 537b, Systems Pharmacology and Integrated Therapeutics Kathryn Ferguson

The goal of this course is to provide an in-depth, “hands-on” experience in drug design, drug discovery, high-throughput screening, state-of-the-art proteomics, and target validation.

PHAR 550a / C&MP 550a / ENAS 550a / MCDB 550a, Physiological Systems

Stuart Campbell and W. Mark Saltzman

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.

PHAR 560b / C&MP 560b / ENAS 570b / MCDB 560b, Cellular and Molecular

Physiology: Molecular Machines in Human Disease Emile Boulpaep

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.

PHAR 580b / C&MP 650b / PATH 660b, The Responsible Conduct of Research

Barbara Ehrlich

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.

Philosophy

Connecticut Hall, 203.432.1665

<http://philosophy.yale.edu>

M.A., M.Phil., Ph.D.

Chair

Verity Harte

Director of Graduate Studies

Zoltán Szabó (C301, 203.432.1669, zoltan.szabo@yale.edu)

Professors Seyla Benhabib, David Charles, Stephen Darwall, Michael Della Rocca, Keith DeRose, Paul Franks, Tamar Gendler, John Hare, Verity Harte, Brad Inwood, Shelly Kagan, Joshua Knobe, Laurie Paul, Thomas Pogge, Scott Shapiro, Sun-Joo Shin, Steven Smith, Jason Stanley, Zoltán Szabó, Kenneth Winkler, Gideon Yaffe

Associate Professor John Pittard

Assistant Professors Robin Dembroff, Daniel Greco

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, philosophy of law, epistemology, philosophy of language, and philosophy of religion as well as other central topics.

SPECIAL REQUIREMENTS FOR THE PH.D. DEGREE

1. 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 mind, philosophy of language, philosophy of science; (2) ethics, aesthetics, philosophy of religion, political philosophy, philosophy of law, and theory of value; (3) history of philosophy. No more than six of the twelve and no fewer than two courses may be taken in each group. At least one of the twelve courses taken must be logic (unless the logic requirement is satisfied in some other way), and this course does not count toward the required minimum of two within any of the three categories.
2. Two qualifying papers must be submitted, one in the history of philosophy, the other in another distribution area. These papers must be more substantial and professional than an ordinary term paper.
3. 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.
4. Students in Philosophy typically teach in the third, fourth, and sixth years.
5. In addition to the twelve required philosophy courses, before the dissertation defense students must take at least one class that is not listed in philosophy on a subject that is relevant to their research.
6. The dissertation is expected to be submitted in the end of the fifth to sixth year.

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 <https://classics.yale.edu/research/ancient-philosophy/classics-and-philosophy-joint-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. 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 (DGS) for Classics and the DGS 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 completed 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 website for information on the program: <http://philosophy.yale.edu>.

COURSES

PHIL 567a, 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.

PHIL 610b / PSYC 610b, The Self Over Time: Psychological and Philosophical Approaches Paul Bloom and Laurie Paul

What makes someone the same person over time? Philosophers and psychologists have long been fascinated by identity and the nature of the self. Philosophers ask: Are there really such things as individuals who endure over time, from cradle to grave? Or is this an illusion—is a single life nothing but a string of related individuals? If so, is it rational to value who you are now over who you might become in the distant future? In any case, how can someone undergo profound change yet remain the same person? Psychologists explore beliefs and inclinations. What is our natural understanding of personal identity and the self, and how does this change through development? How does this understanding connect to how we think about moral responsibility, love, gratitude, and guilt? What can neuroscience and cognitive science tell us about the nature of a persisting self? In this course, we explore the nature of personal identity and see what happens when philosophy meets psychology. While the course begins with introductory material, we quickly get to contemporary debates of real interest. Prerequisite: some background in psychology, philosophy, or related disciplines. Permission of the instructor required.

PHIL 611b, Early Modern Philosophy of Language Zoltan Szabo and Kenneth Winkler

Study and discussion of early modern contributions to the philosophy of language. Reading in the *Port-Royal Logic*, Locke's *Essay*, and other works. Topics include the nature of signs; ideas as sources of meaning; the formation of propositions; truth; necessary truth; inference and logical form.

PHIL 616a, Philosophy of Spinoza Michael Della Rocca

An in-depth study of Spinoza's philosophy with attention to his major work, the *Ethics*, as well as his political writings, the *Treatise on the Emendation of the Intellect*, the letters, and other writings. Focus not only on Spinoza's metaphysics, but also on his views on philosophy of mind, teleology, action, and emotion. Some attention also to competing methods for interpreting works in the history of philosophy.

PHIL 625a, Topics in Epistemology Keith DeRose

A survey of some recent work in epistemology, with an emphasis on connections between formal approaches to epistemology and traditional epistemological questions. We explore the power and limitations of Bayesian approaches to epistemology; the

relationship between credence on the one hand, and belief and knowledge on the other; higher-order knowledge and probability; and other topics.

PHIL 627b, 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 proof theory and model theory, such as Löb's theorem, Tarski's undefinability of truth, provability logic, and nonstandard models of arithmetic.

PHIL 634a, Disagreement and Higher-Order Evidence John Pittard

An investigation of the epistemic significance of disagreement, focusing on recent work on this question and on several related issues in the theory of rationality.

PHIL 637a, Philosophy of Mathematics Sun-Joo Shin

Metaphysical and epistemological issues raised by mathematics. Questions concerning the notion of a set; whether one can quantify over absolutely everything; whether there are really infinite sets of different sizes; the significance of Gödel's incompleteness theorems; arguments designed to show that certain mathematical terms are referentially indeterminate.

PHIL 639b, Modal Logic Sun-Joo Shin

Basic philosophical concepts and logical tools underlying different modal systems, mainly focusing on necessity and possibility. Topics include propositional logic and its natural deductive system; modal operators and development of the simplest natural deductive system; extensions of the basic propositional modal system; intensional semantics; a diagrammatic method to check validity or invalidity; and quantified modal logic (QML). These topics lead to interesting philosophical issues and several nonstandard logical assumptions.

PHIL 642b, 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.

PHIL 643a, Subjectivity, Objectivity, and Intersubjectivity Paul Franks

How is thinking possible? It can seem impossible to simultaneously meet three necessary conditions for the very possibility of thinking. First, thinking is not thinking unless it is performed by subjects with their own viewpoints and interests. Second, thinking is not thinking unless it has at least the form of objectivity, the possibility of truth or falsehood. Third, thinking is not thinking unless it is accessible and communicable to more than one subject. How can thinking be by a subject, yet transcend that subject's viewpoint and interests in order to be communicable to another whose viewpoint and interests differ, let alone in order to focus on the way the world is independently of viewpoint? Emphasis on subjectivity seems to make both intersubjectivity and objectivity impossible, while emphasis on objectivity seems to leave no room for subjectivity and therefore intersubjectivity. We investigate this question by means of transcendental methods pioneered by Kant and further developed by analytic philosophers. Authors include Kant, Fichte, Hegel, Carnap, Reichenbach, Strawson, Sellars, Quine, Kuhn, Stroud, Evans, and Davidson.

PHIL 644a / WGSS 644, Social Ontology Robin Dembroff

Study of conceptual and methodological foundations of social ontology, as well as particular topics within social ontology, such as the nature of gender and race.

PHIL 655a, 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).

PHIL 657a / PLSC 611a, 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.

PHIL 660a, Hylomorphism: A Critical Assessment of Aristotle's and Neo-Aristotelian Theories David Charles

Hylomorphism is, in broad outline, the idea that substances and artifacts are made up of matter and form (or structure). A statue is, on this account, made up of its matter (for example, clay) and its shape (for example, that of Athena), if the clay statue is a statue of Athena. You and I are not simply quantities of physical materials; we are physical materials with a certain form or organization. This idea has been employed by Aristotle and by several recent writers, such as David Wiggins, Kit Fine, and Kathrin Koslicki, to answer questions about identity over time, change, and generation. It has also been used to address mind-body problems, taking the body as matter and the mind as form. Specific questions to be investigated include: (1) What is a form? Is it best understood in terms of structure, capacity, activity? (2) What is the relation between form and matter in a substance and artifact? (3) What are the causal roles of matter and form in a substance or artifact? But our general goal is to assess the strengths and weaknesses of the hylomorphic account of substances and artifacts. Priority for enrollment is given to graduates and advanced undergraduates (seniors and juniors) in philosophy or classics. Auditors are allowed subject to enrollment and with the permission of the instructor; they are expected to attend all classes, complete all reading assignments, and participate in class discussion, but not to complete writing assignments.

PHIL 664b, 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.

PHIL 671a, Moral Emotions Stephen Darwall

A close study of the role of emotions and attitudes in the moral life and in moral philosophy. The course investigates the nature of emotions such as shame, guilt, gratitude, love, and respect, as well as such related phenomena as empathy and sympathy. It considers their relation to fundamental moral concepts, as well as their epistemological role and capacity to ground moral judgments and facts.

PHIL 675b, Ethics and the Future Shelly Kagan

Decisions we make now may affect whether human life will continue on Earth or not, or what the quality of that life will be like. This means that the existence and nature of hundreds of trillions of lives (a conservative estimate) may hang in the balance. Arguably, then, our highest moral priority should be to ensure that human life continues, and at an acceptable level of well-being. The view that this should be our overriding moral concern has been dubbed “long-termism.” The seminar is devoted to examining this position and exploring the moral assumptions that lie behind it. Prerequisite: a previous course in moral philosophy.

PHIL 677b / WGSS 677b, Feminist Philosophy: Theories of Sex, Gender, and Sexual Orientation Robin Dembroff

This course surveys several feminist frameworks for thinking about sex, gender, and sexual orientation. We consider questions such as: Is there a tenable distinction between sex and gender? Between gender and sexual orientation? What does it mean to say that gender is a social construction, or that sexual orientation is innate? What is the place of politics in gender and sexual identities? How do these identities—and especially resistant or transgressive identities—impact the creation and revision of social categories?

PHIL 705a, First-Year Seminar Michael Della Rocca and Laurie Paul

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.

PHIL 706b, Work in Progress I Laurie Paul

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.

PHIL 719a, 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: 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 729a / LATN 732a, Seneca: Letters on Ethics Brad Inwood

Lucius Annaeus Seneca was one of the most distinguished writers of Latin prose and also an important Stoic philosopher. This course focuses on readings in his most important and best known works, the *Epistulae Morales*. Most of the letters we read deal with themes of broad general interest, but some include the more challenging philosophical topics in Stoic ethics that form the culmination of the work. We aim to read the letters included in *Seneca: Selected Letters*, ed. Catharine Edwards (2019), which has an excellent literary and philological commentary; a few additional letters are

read with the more philosophical commentary found in the instructor's *Seneca: Selected Philosophical Letters* (2007).

PHIL 750a or b, Tutorial Zoltan Szabo

By arrangement with faculty.

PHIL 752a, Metaphysics Laurie Paul

This course is an advanced-level exploration of the metaphysical structure of the world, focusing on the metaphysics of categories. Readings are drawn from a range of contemporary sources.

PHIL 754b, Recent Work in Analytic Philosophy of Religion Keith DeRose and John Pittard

An advanced seminar engaging state-of-the-art work in analytic philosophy of religion, with attention given to both traditional questions and areas of emerging interest. Possible topics include theodicy, alternatives to traditional theism and naturalism, fine-tuning arguments, creation ethics, skeptical worries facing various religious and nonreligious outlooks, and norms pertaining to religious hope and commitment.

PHIL 756b / CLSS 802b, Plato's *Protagoras* Verity Harte and Brad Inwood

The class reads and discusses the Greek text of Plato's *Protagoras*, a central work of Plato's ethics and moral psychology and of his engagement with the fifth-century intellectual Protagoras. Over the course of the term, we read the entire dialogue, with detailed in-class discussion each week of focused passages chosen from larger sections of the work. This core course for the combined Ph.D. program in Classics and Philosophy is open to all graduate students in Philosophy or Classics who have suitable preparation in Attic Greek (L5 equivalent and some prior knowledge of ancient philosophy). Others interested in taking or attending the class must have prior permission of the instructors. Undergraduates are not normally admitted.

PHIL 762b, Idealization and Model-Building in Science and Philosophy

Daniel Greco and Timothy Williamson

Much recent philosophy of science studies the practice of model-building, especially where it involves idealizing assumptions, such as the frictionless planes and point particles of physics, the infinitely large populations of evolutionary biology, and the logically omniscient expected utility maximizers of economics. It is increasingly common to think that philosophers also build models, and that model-building in philosophy can be fruitfully compared to model-building in science. In this class we explore a wide range of philosophical questions about the practice of building idealized models. What relations must such models bear to the real-world systems they model in order for them to give us knowledge? Is model-building always justified by concerns of tractability, or are there other reasons to build idealized models? Is idealization always eliminable in principle? What is the relationship between model-building on the one hand, and the search for laws of nature on the other?

Physics

35 Sloane Physics Laboratory, 203.432.3607

<http://physics.yale.edu>

M.S., M.Phil., Ph.D.

Chair

Karsten Heeger

Director of Graduate Studies

Bonnie Fleming (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, Hui Cao (*Applied Physics*), Richard Casten (*Emeritus*), Flavio Cavanna (*Adjunct*), Richard Chang (*Emeritus*), Paolo Coppi (*Astronomy*), David DeMille, Michel Devoret (*Applied Physics*), Thierry Emonet (*Molecular, Cellular, & Developmental Biology*), Frank Firk (*Emeritus*), Debra Fischer (*Astronomy*), Bonnie Fleming, Paul Fleury (*Emeritus*), Marla Geha (*Astronomy*), Steven Girvin, Larry Gladney, Leonid Glazman, Jack Harris, John Harris, Karsten Heeger, Victor Henrich (*Emeritus*), Jay Hirshfield (*Adjunct*), Jonathon Howard (*Molecular Biophysics & Biochemistry*), Francesco Iachello (*Emeritus*), Sohrab Ismaill-Beigi (*Applied Physics*), Steve Lamoreaux, Samuel MacDowell (*Emeritus*), Simon Mochrie, Vincent Moncrief, Priyamvada Natarajan (*Astronomy*), Corey O'Hern (*Mechanical Engineering & Materials Science*), Ornella Palamara (*Adjunct*), Peter Parker (*Emeritus*), Daniel Prober (*Applied Physics*), Nicholas Read, Jack Sandweiss (*Emeritus*), Peter Schiffer (*Applied Physics*), Robert Schoelkopf (*Applied Physics*), Jorgen Schukraft (*Adjunct*), Ramamurti Shankar, Witold Skiba, Charles Sommerfield (*Emeritus*), A. Douglas Stone (*Applied Physics*), Hong Tang (*Electrical Engineering*), Paul Tipton, Thomas Ullrich (*Adjunct*), C. Megan Urry, Frank van den Bosch (*Astronomy*), Pieter van Dokkum (*Astronomy*), John Wettlaufer (*Earth & Planetary Sciences*), Robert Wheeler (*Emeritus*), Werner Wolf (*Emeritus*), Michael Zeller (*Emeritus*)

Associate Professors Murat Acar (*Molecular, Cellular, & Developmental Biology*), Helen Caines, Damon Clark (*Molecular, Cellular, & Developmental Biology*), Sarah Demers, Walter Goldberger, Liang Jiang (*Applied Physics*), Reina Maruyama, Michael Murrell (*Biomedical Engineering*), Daisuke Nagai, Nikhil Padmanabhan, David Poland, Peter Rakich (*Applied Physics*), Alison Sweeney

Assistant Professors Eric Brown (*Mechanical Engineering & Materials Science*), Meng Cheng, Eduardo da Silva Neto, Benjamin Machta, David Moore, John Murray (*Psychiatry*), Nir Navon, Laura Newburgh

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; Astronomy; Chemistry; Earth and Planetary Sciences; Molecular Biophysics and Biochemistry; and Molecular, Cellular, and Developmental Biology.

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 six term courses: five foundational courses and one elective. The five core courses (1. PHYS 500, Advanced Classical Mechanics; 2. PHYS 508, Quantum Mechanics I; 3. PHYS 502, Electromagnetic Theory I; 4. PHYS 512, Statistical Physics I; and 5. PHYS 608, Quantum Mechanics II) serve to complete the student's undergraduate training in classical and quantum physics. For the sixth course, students select from the list of graduate elective courses offered by the Physics or Applied Physics departments, or courses offered by other departments with the approval of the DGS. In addition, all students are required to engage in a research project by taking PHYS 990, Special Investigations. In their first year of study, students must take, at a minimum, the foundational courses one through four, along with the research seminar courses: PHYS 515, Topics in Modern Physics Research, and PHYS 590, Responsible Conduct in Research for Physical Scientists. Certain equivalent course work or successful completion of a pass-out examination may allow substitution of elective courses for individual students.

Students who have completed their course requirements with satisfactory grades, passed the qualifying examination, and submitted an acceptable thesis prospectus are recommended for admission to candidacy. (A grade of Honors in PHYS 990, Special Investigations, may be counted toward the Graduate School requirement of two grades of Honors.) The qualifying examination, normally taken at the beginning of the third term (and no later than the beginning of the fifth term), consists of four separate, written exams on Classical Mechanics, Electromagnetic Theory, Statistical Mechanics, and Quantum Mechanics. 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 studies, students are expected to serve four terms as teaching fellows at the TF-10 level, usually in the first two years. Students who require additional support from the Graduate School must teach additional terms, if needed, after they have fulfilled this teaching requirement. 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 all courses numbered one through four above, plus one of the following: PHYS 608, Quantum Mechanics II; PHYS 990, Special Investigations; or an advanced elective (all with a satisfactory record) qualify for the M.S. degree. Certain equivalent course work or successful completion of a pass-out examination may allow individual students to substitute an elective course for a required one.

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; website, <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.

PHYS 502b, Electromagnetic Theory I A. Douglas Stone

Classical electromagnetic theory including boundary-value problems and applications of Maxwell equations. Macroscopic description of electric and magnetic materials. Wave propagation.

PHYS 504b, Modern Physics Measurements Steve Lamoreaux

A laboratory course with experiments and data analysis in soft and hard condensed matter, nuclear and elementary particle physics.

PHYS 506a, 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.

PHYS 508a, Quantum Mechanics I Walter Goldberger

The principles of quantum mechanics with application to simple systems. Canonical formalism, solutions of Schrödinger's equation, angular momentum, and spin.

PHYS 512b, Statistical Physics I Meng Cheng

Review of thermodynamics, the fundamental principles of classical and quantum statistical mechanics, canonical and grand canonical ensembles, identical particles, Bose and Fermi statistics, phase transitions and critical phenomena, renormalization group, irreversible processes, fluctuations.

PHYS 515a, Topics in Modern Physics Research Staff

A seminar course intended to provide an introduction to current research in physics and an overview of physics research opportunities at Yale.

PHYS 523b / CB&B 523b / ENAS 541b / MB&B 523b, Biological Physics

Benjamin Machta

The course has two aims: (1) to introduce students to the physics of biological systems and (2) to introduce students to the basics of scientific computing. The course focuses on studies of a broad range of biophysical phenomena including diffusion, polymer statistics, protein folding, macromolecular crowding, cell motion, and tissue development using computational tools and methods. Intensive tutorials are

provided for MATLAB including basic syntax, arrays, for-loops, conditional statements, functions, plotting, and importing and exporting data.

PHYS 524a, Introduction to Nuclear Physics David Moore

Introduction to a wide variety of topics in nuclear physics. A number of related nuclear models as well as experimental methods are discussed. The course also covers topics in weak interactions, neutrino physics, neutrinoless double beta decay, and relativistic heavy ion collisions. 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 530a, Scientific Teaching for Physical Sciences Rona Ramos

The course covers fundamentals of learning theory and practical strategies for teaching in the physical sciences. Students practice teaching scientific concepts, manage classroom dynamics, and implement strategies for effective and inclusive teaching. In the second half of the course, students (1) apply these principles as they develop and evaluate instructional materials for a college-level science course and (2) develop a peer-reviewed and polished teaching statement. Prerequisite: completion of one term of required teaching at Yale (n/a for postdocs).

PHYS 538b, Introduction to Relativistic Astrophysics and General Relativity

Witold Skiba

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, Solid State Physics I Staff

A two-term sequence (with PHYS 549) 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.

PHYS 549b, Solid State Physics II Vidvuds Ozolins

A two-term sequence (with PHYS 548) 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.

PHYS 570b / ASTR 570, High-Energy Astrophysics Paolo Coppi

A survey of current topics in high-energy astrophysics, including accreting black hole and neutron star systems in our galaxy, pulsars, active galactic nuclei and relativistic jets, gamma-ray bursts, and ultra-high-energy cosmic rays. The basic physical processes underlying the observed high-energy phenomena are also covered.

PHYS 590a / APHY 590a, Responsible Conduct in Research for Physical Scientists

Karsten Heeger and Rona Ramos

Required seminar for all first-year students.

PHYS 608b, Quantum Mechanics II Nicholas Read

Approximation methods, scattering theory, and the role of symmetries. Relativistic wave equations. Second quantized treatment of identical particles. Elementary introduction to quantized fields.

PHYS 609a, Relativistic Field Theory I Thomas Appelquist

The fundamental principles of quantum field theory. Interacting theories and the Feynman graph expansion. Quantum electrodynamics including lowest order processes, one-loop corrections, and the elements of renormalization theory.

PHYS 610b / 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.

PHYS 628a / APHY 628a, Statistical Physics II Benjamin Machta

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.

PHYS 630b, Relativistic Field Theory II Staff

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.

PHYS 632a, Quantum Many-Body Theory II Leonid Glazman

A second course in quantum many-body theory, covering the core physics of electron systems, with emphasis on the electron-electron interaction, on the role of dimensionality, on the coupling either to magnetic impurities leading to the well-known Kondo effect or to the electromagnetic noise. Applications to mesoscopic systems and cold atomic gases are also developed.

PHYS 669a, Relativistic Field Theory III David Poland

This course covers various advanced topics in quantum field theory. The focus is on symmetries, modern techniques for conformal field theories, and the AdS/CFT correspondence.

PHYS 816a / APHY 816a, Techniques of Microwave Measurement and RF Design

Robert Schoelkopf

An advanced course covering the concepts and techniques of radio-frequency design and their application in making microwave measurements. The course begins with a review of lumped element and transmission line circuits, network analysis, and design of passive elements, including filters and impedance transformers. We continue with a treatment of passive and active components such as couplers, circulators, amplifiers, and modulators. Finally, we employ this understanding for the design of microwave measurement systems and techniques for modulation and signal recovery, to analyze the performance of heterodyne/homodyne receivers and radiometers.

PHYS 990a, Special Investigations Staff

Directed research by arrangement with individual faculty members and approved by the DGS.

PHYS 991a / ENAS 991a / MB&B 591a / MCDB 591a, Integrated Workshop

Corey O'Hern

This required course for students in the PEB graduate program involves a series of modules, co-taught by faculty, in which students from different academic backgrounds and research skills collaborate on projects at the interface of physics, engineering, and biology. The modules cover a broad range of PEB research areas and skills. The course starts with an introduction to MATLAB, which is used throughout the course for analysis, simulations, and modeling.

Political Science

Rosenkranz Hall, 203.432.5241
<http://politicalscience.yale.edu>
 M.A., M.Phil., Ph.D.

Chair

Gregory Huber

Director of Graduate Studies

Milan Svolik [F]
 Alexandre Debs [Sp]

Professors Bruce Ackerman, Akhil Amar (*Law*), Seyla Benhabib, Paul Bracken (*Management*), David Cameron, Bryan Garsten, Alan Gerber, Jacob Hacker, Gregory Huber, Isabela Mares, Gerard Padró i Miquel, John Roemer, Frances Rosenbluth, James Scott, Jasjeet Sekhon, Ian Shapiro, Stephen Skowronek, Steven Smith, Milan Svolik, Peter Swenson, John Wargo (*School of the Environment*), Steven Wilkinson, Elisabeth Wood

Associate Professors Peter Aronow, Katharine Baldwin, Sarah Bush, Ana De La O Torres, Alexandre Debs, Hélène Landemore, Nuno Monteiro, Kelly Rader

Assistant Professors Alexander Coppock, Allison Harris, John Henderson, Joshua Kalla, Sarah Khan, Christina Kinane, Egor Lazarev, Daniel Mattingly, Elizabeth Nugent, Giulia Oskian, Tyler Pratt, Didac Queralt, Fredrik Sävje, Emily Sellars, Ian Turner

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 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 (PLSC 510), 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 (PLSC 540, PLSC 541) 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 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.

Students enrolled in the Ph.D. program in Political Science may qualify for the M.A. degree in History, rather than an M.A. in Political Science, upon completion of a minimum of six graduate term courses in History at Yale, of which two must have

earned Honors grades and the other four courses must average High Pass overall. A student must include in the six courses completed at least two research seminars in the History department.

COURSES

PLSC 500a, Quantitative Methods I: Research Design and Data Analysis

Fredrik Sävje

The first course in the Ph.D.-level sequence in quantitative methods. It provides a rigorous grounding in social-scientific research design, beginning with the specification of estimands or targets of inference. Modern computational approaches to data analysis and visualization are emphasized, with frequent practical application to political science datasets in the statistical programming language R. Topics include regression, classification, measurement, dimension reduction, hypothesis testing, confidence intervals, permutation inference, prediction, and Monte Carlo simulation.

PLSC 503b, Quantitative Methods II: Foundations of Statistical Inference

Peter Aronow

An intensive introduction to statistical theory for quantitative social inquiry. Topics include foundations of probability theory, statistical inference from random samples, estimation theory, linear regression, maximum likelihood estimation, and nonparametric identification.

PLSC 505b / SOCY 508b, Qualitative Field Research Staff

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 500, PLSC 503, PLSC 504, or the equivalent.

PLSC 508b, Causal Inference and Research Design Fredrik Sävje

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. Readings and discussions focus on selected methodological topics, such as experimental design, partial identification, design-based inference, network analysis, semiparametric efficiency theory, and qualitative/mixed-methods research. Topics vary from year to year. Statistical training at the level of PLSC 504 is expected, though training in probability theory at the level of S&DS 541 or ECON 550 is suggested.

PLSC 510a, Introduction to the Study of Politics Gregory Huber

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 512b, The Design and Analysis of Randomized Field Experiments in Political Science Alexander Coppock

Randomized field experiments are deployed across the social sciences to answer well-posed theoretical questions and to generate new information from which to build fresh theories of social interaction and behavior. Experiments are attractive because they enable the researcher to (mostly) ground statistical and causal inferences in features of the research design rather than assumptions about the world. This course covers the design and analysis of both introductory and advanced experimental designs, using the textbook by Gerber and Green (2012) as the main guide. Strong emphasis is placed on developing practical skills for real research scenarios. Given resources, how should subjects be assigned to conditions? How many treatment arms should be included? How do we plan to analyze the resulting data? The course has a relatively heavy workload: weekly problem sets in R that will prepare students for 95 percent of experimental research tasks they will encounter in the field. Prerequisite: any introductory statistics course that covers regression at any level of detail.

PLSC 518b, Introduction to Game Theory Milan Svoblik

This course offers a rigorous introduction to noncooperative game theory. The goal 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.

PLSC 520a, Game Theory and Political Science Ian Turner

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 / SOCY 503, Historical Approaches to the Study of Politics

Steven Wilkinson

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 523a, Mixed Methods Research Elizabeth Nugent

This course is intended as an overview for creating and critiquing sophisticated research designs using both quantitative and qualitative methodologies and data. The course begins with fundamental definitions and assumptions underpinning mixed methods research and then moves on to analyzing the strengths and weaknesses of specific combinations of quantitative tests, case studies, and narrative and interpretive work. Next, the course discusses the research design choices of two award-winning books using mixed methods research; it then evaluates the qualitative and quantitative data in isolation and in combination. The final assignment builds on the course material to produce a mixed method research design proposal.

PLSC 528b, Design-Based Inference for the Social Sciences Peter Aronow

Introduction to design-based statistical approaches to survey sampling and causal inference. Design and analysis of complex survey samples and randomized experiments, including model-assisted approaches. Discussion of recent advances in this paradigm, including inference in network settings. Prerequisite: knowledge of statistical theory at the level of PLSC 500 is assumed, with familiarity with probability and estimation theory. Alternative prerequisite courses include S&DS 542 or ECON 550.

PLSC 529a, Mathematics for Political Science Andrew Bridy

This course builds on the material seen in math camp. It covers foundational concepts and techniques in mathematics that are relevant to quantitative and formal research. Students learn to read and write rigorous mathematical proofs. Topics include real analysis, optimization, and probability theory.

PLSC 530a or b / S&DS 530a or b, Data Exploration and Analysis Staff

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.

PLSC 540a and PLSC 541b, Research and Writing Ian Turner and Sarah Bush

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.

PLSC 597a, Lincoln's Statecraft and Rhetoric Steven Smith

This class is based on a reading and interpretation of Lincoln's major speeches and letters. Its purpose is to understand his views on the problem of slavery, equality, and race in American society, but also to consider the relation of words to deeds in the practice of his statecraft. We also situate Lincoln within the history and theory of statesmanship.

PLSC 611a / PHIL 657a, 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.

PLSC 617b, Democracy and Deliberation Helene Landemore-Jelaca

The course examines the connection between the idea of democracy and the practice of deliberation. While deliberation is at the core of contemporary normative theories of 'deliberative democracy,' deliberation is not by itself democratic. One of the aims of the seminar is to clarify to what extent democracy needs to be deliberative and to what extent deliberation can be democratic.

PLSC 623a, Rethinking the Political Enlightenment Ian Shapiro

The calamities wrought by Fascism and Nazism, together with growing disillusionment at the excesses and direction of Soviet communism and then Mao's China, led many postwar intellectuals to rethink the Enlightenment's promise. In politics, that promise had centered on the creation of durable political institutions based on scientific principles that would foster, expand, and protect human freedom. We study the ways in which the harsh realities of twentieth-century politics led political theorists to modify, recast, and in some cases reject these Enlightenment aspirations, and we evaluate those responses from the perspective of our contemporary politics. Readings are drawn from, among others, Jonathan Israel, James Tully, Hannah Arendt, Herbert Marcuse, Nicos Poulantzas, Jürgen Habermas, Leo Strauss, Isaiah Berlin, Michel Foucault, Richard Rorty, Alasdair MacIntyre, Charles Taylor, Anthony Appiah, Nancy Fraser, Carole Pateman, Judith Shklar, Quentin Skinner, J.G.A. Pocock, Michael Walzer, and Iris Marion Young. Among the themes discussed are the connections between Enlightenment aspirations and the ideas of modernization, progress, and democracy; the advantages and limitations of periodization in the study of political theory; and teleological conceptions of history. Open to Ph.D. students in Political Science and to graduate students in other departments and programs by agreement with the instructor. Open to undergraduates as space permits, provided they have completed at least three Political Science courses, one of which is PLSC 114, PLSC 118, or equivalent such as Directed Studies.

PLSC 640a, Advanced Topics in Modern Political Philosophy Giulia Oskian

Advanced survey of selected topics in political philosophy. The focus is on political realism with special attention to the problems of order, conflict, and faction. The role of statecraft and the role of political ethics are also considered. Close analysis of the writings of Thucydides, Machiavelli, and *The Federalist* along with selected critical studies.

PLSC 698a, International Political Economy Didac Queralt

This course examines how domestic and international politics influence the economic relations between states. It addresses the major theoretical debates in the field and introduces the chief methodological approaches used in contemporary analyses. We focus attention on four types of cross-border flows and the policies and international institutions that regulate them: the flow of goods (trade policy), the flow of capital (financial and exchange rate policy), the flow and location of production (foreign investment policy), and the flow of people (immigration policy).

PLSC 705a, Introduction to Political Economy John Roemer

An introduction to techniques of microeconomic modeling, as applied to problems in political economy and political science. This course is independent of PLSC 518. 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 topics in distributive justice. Prerequisite: differential calculus and/or the Political Science Math Camp. Microeconomics at the intermediate level is helpful but not mandatory.

PLSC 709a, 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 714a, 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 725b / ECON 790b, Empirical Political Economy 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.

PLSC 756a, 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 777a, Comparative Politics I: Research Design Isabela Mares

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 Elizabeth Nugent

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 / ENV 836a / HIST 965a, Agrarian Societies: Culture, Society, History, and Development Kalyanakrishnan Sivaramakrishnan, Elisabeth Wood, and Marcela Echeverri Munoz

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.

PLSC 793a, Governing China Daniel Mattingly

Study of the politics of contemporary China with a focus on recent research. Topics include authoritarianism, representation, local governance, elite politics, censorship, propaganda, protest, and the rule of law.

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 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 810a, The Politics of Public Policy Joshua Kalla

An introduction to research and theorizing in the field of public policy, centering on the United States in comparative perspective, with an emphasis on processes of long-term policy development. Topics and issues to be covered include American 'exceptionalism,' power and organized economic interests, tax and economic policy, and the welfare state.

PLSC 837a, Gender Politics Andrea Aldrich

Exploration of theoretical and empirical work in political science to study the relationship between gender and politics in the United States and around the world. Topics include women's representation in legislative and executive branch politics in democratic regimes; the impact of gender stereotypes on elections and public opinion; conditions that impact the supply and demand of candidates across genders; and the underrepresentation of women in political institutions.

PLSC 859a, Confronting America's Constitutional Crisis Bruce Ackerman

An examination of the statutory and constitutional reforms required to reinvigorate democratic accountability and individual liberty in the United States. Enrollment

limited to thirty. Permission of the instructor required. Meets on the Law School calendar. *Also LAW 21390.*

PLSC 868b / AMST 724b / WGSS 724b, Gender and Sexuality in American Politics and Policy Dara Strolovitch

This seminar familiarizes students with foundational work on and approaches to the study of gender and sexuality in American politics and public policy. It explores empirical work that addresses these topics, a range of theoretical and epistemological approaches to them, and the social scientific methods that have been used to examine them. It explores the history, findings, and controversies in research about gender and sexuality in American politics and political science, examining work within several subfields of American politics (e.g., political development; public law; political behavior; legislative studies; public policy; interest groups and social movements), important work from other disciplines, and research that does not fit neatly into traditional disciplinary categories, paying particular attention to the implications of this “messiness” for the study of gender, sexuality, and politics. We are attentive to the complicated histories of science and social science when it comes to the study of gender and sexuality and to the ways in which gender and sexuality intersect with other politically relevant categories, identities, and forms of marginalization, such as race, ethnicity, class, and ideological and partisan identification.

Psychology

Kirtland Hall, 203.432.4500
<http://psychology.yale.edu>
 M.S., M.Phil., Ph.D.

Chair

Tyrone Cannon (203.432.4545, tyrone.cannon@yale.edu)

Director of Graduate Studies

Jennifer Richeson (203.432.6686, jennifer.richeson@yale.edu)

Professors Woo-kyoung Ahn, John Bargh, Paul Bloom, Thomas Brown (*Emeritus*), Tyrone Cannon, B.J. Casey, Marvin Chun, Margaret Clark, John Dovidio (*Emeritus*), Jutta Joormann, Alan Kazdin (*Emeritus*), Frank Keil, Joshua Knobe (*Philosophy*), Marianne LaFrance (*Emerita*), Gregory McCarthy, Jennifer Richeson, Peter Salovey, Laurie Santos, Brian Scholl, Nicholas Turk-Browne, Tom Tyler (*Law School*), Karen Wynn (*Emerita*)

Associate Professors Arielle Baskin-Sommers, Steve Chang, Yarrow Dunham, Avram Holmes

Assistant Professors Molly Crockett, Dylan Gee, Maria Gendron, Julian Jara-Ettinger, Samuel McDougle, Robert Rutledge, Ilker Yildirim

Lecturers Richard Aslin (*Senior Lecturer*), Stephanie Lazzaro, Kristi Lockhart (*Senior Lecturer*), Mary O'Brien

Affiliated Faculty Alan Anticevic (*Psychiatry*), Amy Arnsten (*Neuroscience*), Christopher Benjamin (*Neurology*), Tori Brescoll (*School of Management*), Philip Corlett (*Psychiatry*), Ravi Dhar (*School of Management*), Tamar Gendler (*Philosophy*), Walter Gilliam (*Child Study Center*), Carlos Grilo (*Psychiatry*), Jeannette Ickovics (*Public Health*), Dan Kahan (*Law School*), Robert Kerns (*Veterans Administration Medical Center*), Hedy Kober (*Psychiatry*), John Krystal (*Psychiatry*), Becca Levy (*Public Health*), Ifat Levy (*Neuroscience*), Lawrence Marks (*Environmental Health Sciences*), Linda Mayes (*Child Study Center*), Carolyn Mazure (*Psychiatry*), James McPartland (*Child Study Center*), George Newman (*School of Management*), Nathan Novemsky (*School of Management*), Helena Rutherford (*Child Study Center*), Wendy Silverman (*Child Study Center*), Dana Small (*Psychiatry*), Jane Taylor (*Psychiatry*), Fred Volkmar (*Child Study Center*), Gideon Yaffe (*Law School*)

FIELDS OF STUDY

Fields include clinical psychology; cognitive psychology; developmental psychology; neuroscience; and social/personality psychology.

SPECIAL REQUIREMENTS FOR THE PH.D. DEGREE

In order to allow students to be trained in accordance with their 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.

CLINICAL GRADUATE STUDENT INTERNSHIPS

Registered students undertaking their required clinical internships (usually in their sixth year) are typically not eligible for Graduate School stipend funding, since these are paid internships. However, clinical internship stipends for sixth-year students that fall below the current year's Psychology stipend will be topped up to the current year's Psychology stipend. Students will be considered to have fulfilled the final requirement for the degree after successfully completing their internship (typically in July) and will be awarded degrees the following December. They will not be registered in the Graduate School during the fall term in which their degrees are conferred.

COMBINED PH.D. PROGRAMS

Psychology offers a combined Ph.D. degree program with African American Studies. For the combined program with African American Studies, students must apply to the African American Studies department, with Psychology indicated as the secondary department.

Psychology also offers a combined Ph.D. degree program with Philosophy. Students interested in this combined degree can apply to the Philosophy department or the Psychology 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. If a student applies to the Philosophy department for the combined degree program, that student should also contact one or more Psychology faculty members with compatible interests so that a suitable adviser in Psychology can be identified prior to an admissions decision.

Students enrolled in the combined 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.

Questions about the combined degree programs may be directed to the directors of graduate studies in the participating departments prior to application.

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.

The Department of Psychology does not admit students for a terminal master's degree. If, however, a student admitted to the Ph.D. program leaves the program prior to completion of the doctoral degree, the student may be eligible to receive a terminal master's degree upon completion of the academic requirements as stated above.

Program materials are available online at <http://psychology.yale.edu>.

COURSES

PSYC 509b, 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 518a, Multivariate Statistics Julian Jara-Ettinger

This is a practical course in statistics that covers classical null-hypothesis significance testing (e.g., binomial and chi-squared tests), regression analyses (multiple regressions, generalized linear models, and mixed-effects models), modern statistical methods (bootstraps and cross-validation), basics of Bayesian data analysis (hierarchical Bayesian models, Bayes factors), and basics of machine learning for data analysis (principal component analysis and classifiers). This course focuses on how to intuitively understand what different tests do, how to run them using R, and how to interpret the results. The course favors intuitions over mathematical rigor, but it's impossible to teach statistics without some math.

PSYC 530a / INP 530a, Foundations of Neuroscience: Biological Bases of Human Behavior Dylan Gee

The purpose of this course is to provide students with an understanding of the biological factors underlying human cognition and behavior. Particular emphasis is placed on the mechanisms associated with individual differences in healthy functions (including emotion regulation, stress sensitivity, higher cognition, reward sensitivity, impulsivity, and social functions) and their relations with psychiatric and neurological disorders. Biological factors to be covered include genetic, neuroanatomical, neurophysiological, neurochemical, hormonal, and neuropsychological influences.

Several of the initial sessions are devoted to basic topics (e.g., neurons, neuronal signaling, brain systems), before we begin our discussion of the neural basis of behavior and cognition. We also cover seminal work on animal models for mechanistic insights into the neurobiology of human behavior. Graduate students with any neuroscience research interest are encouraged to take this course. Required of Psychology Ph.D. students in the neuroscience area.

PSYC 534a, Developmental Psychopathology Fred Volkmar, Eli Lebowitz, and Denis Sukhodolsky

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 Psychopathology Jutta Joormann

The aim of this course is to have students master information on theory and assessment for major forms of psychopathology using cognitive-behavioral approaches. The focus is on learning how behavior can be conceptualized in cognitive-behavioral terms and to review recent models and empirical findings regarding clinical disorders. Students play an active role in this process by participating in class discussions and making presentations on etiological models and empirical findings for various clinical problems.

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 Ravi Dhar and Nathan Novemsky

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 558b / INP 558b, Computational Methods in Human Neuroscience

Nick Turk-Browne

This course provides training on how to use computational science for the advanced analysis of brain imaging data, primarily from functional magnetic resonance imaging (fMRI). Topics include scientific programming, high-performance computing,

machine learning, network/graph analysis, real-time neurofeedback, nonparametric statistics, and functional alignment. Prerequisite: some prior experience with programming, data preprocessing, and basic fMRI analysis.

PSYC 602b / 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.

PSYC 605b, 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 610b / PHIL 610b, The Self Over Time: Psychological and Philosophical

Approaches Paul Bloom and Laurie Paul

What makes someone the same person over time? Philosophers and psychologists have long been fascinated by identity and the nature of the self. Philosophers ask: Are there really such things as individuals who endure over time, from cradle to grave? Or is this an illusion—is a single life nothing but a string of related individuals? If so, is it rational to value who you are now over who you might become in the distant future? In any case, how can someone undergo profound change yet remain the same person? Psychologists explore beliefs and inclinations. What is our natural understanding of personal identity and the self, and how does this change through development? How does this understanding connect to how we think about moral responsibility, love, gratitude, and guilt? What can neuroscience and cognitive science tell us about the nature of a persisting self? In this course, we explore the nature of personal identity and see what happens when philosophy meets psychology. While the course begins with introductory material, we quickly get to contemporary debates of real interest. Prerequisite: some background in psychology, philosophy, or related disciplines. Permission of the instructor required.

PSYC 625b, 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.

PSYC 626a, Topics in Law and Psychology Tom Tyler

This class is an introduction to topics in law and psychology. Topics include eyewitness identification; confessions; interrogation; jury decision-making; racism/sexism; media violence; and issues of culpability and mental illness. Enrollment limited to twenty.

Self-scheduled examination or paper option. *Note: This course follows the Law School calendar.*

PSYC 627b, The Rise and Fall of Wonder: When Early Passions for Exploration and Discovery Decay with Age Frank Keil

Research on children's minds reveals early emerging abilities that help explain the developmental origins and early growth of wonder. We consider wonder as the joy of exploration and discovery. Preschoolers and even infants are driven to learn not just facts and statistics, but also underlying causal patterns that are at the heart of many sciences. They learn not just as individuals but also as members of knowledge communities and, early on, they sense how to "harvest" knowledge from these communities. Yet, those joyous moments of discovery and exploration often fade as children grow older and cease to wonder. We explore how this decline occurs and its consequences. When people stop wondering, they fail to expand their grasps of the world and become ever more vulnerable to misunderstanding and manipulation by others. We examine possible ways to reverse the decline.

PSYC 628a, Neuroscience of Decision-Making Molly Crockett

An overview and examination of the neuroscience of decision-making. Interdisciplinary course highlighting research from cognitive neuroscience, psychology, behavioral economics, finance, marketing, computer science, and public health. Topics include utility and value, reinforcement learning, risky decision-making, impulsivity and self-control, social decision-making, psychopathology, and commercial applications (e.g., neuromarketing and neurofinance).

PSYC 632a / LING 700a, The Cognitive Science of Sign Languages Maria Pinango and Muye Zhang

Natural sign languages like American Sign Language have all of the structure and complexity of spoken languages. They are learned and processed like spoken languages, and they activate neural structures that maximally overlap with those activated by spoken languages. These findings have not only had important implications for the sociopolitical status of deaf people as a native, American minority community, but have also caused linguists and psychologists to reevaluate their most fundamental theories of language representation and processing in the mind and brain. The course introduces students to the analysis of sign languages at different levels of linguistic structure and related aspects of cognition in the visual modality. The primary goal is to encourage students—as linguists, psychologists, and cognitive scientists—to consider how natural sign languages can and must inform their linguistic theories (linguistics), models of language and cognition (psychology), and technological applications of language processing (computer science/artificial intelligence). We also consider the ways in which signing communities/deaf culture interact with the hearing world—often as marginalized minority groups—and reflect upon access to language and information as a basic human right. Prerequisite: some background in linguistic structure, cognitive science, any signed language, or permission of the instructor is preferred.

PSYC 637b, Minds, Brains, and Machines Julian Jara-Ettinger

Exploration of the implications that the brain is a kind of computer that gives rise to the mind. Readings combine classical and cutting-edge research in psychology, philosophy, and artificial intelligence.

PSYC 638a / INP 638a, Computational Models of Human Behavior Staff

Why do we do the things we do? How do we adapt to changes in the environment? And how does our happiness depend on our choices and what happens to us? How can computational models help us to gain new insights into psychological processes? The goal of this course is to use computational models to understand human behavior and its relationship to our emotions. Data is collected in a variety of tasks, including new experiments designed by students, and is analyzed using computational models.

PSYC 647b, 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 671a, The Cognitive Science of Mind Reading Laurie Santos

Examination of theory of mind from a developmental, comparative, and neural perspective. Topics include whether different representational systems underlie theory of mind capacities, how infants come to represent others' mental states, whether nonhuman animals share humanlike theory of mind capacities, and how phenomena like conformity and metacognition can be reconciled with developmental and neural findings in the domain of mind reading.

PSYC 684a, 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 685b, Introduction to Psychotherapy Mary O'Brien

Open only to doctoral students in clinical psychology. This course is designed to prepare students to conduct therapy as clinical scientists. The class blends theoretical and empirical readings with practical training in applying interventions. Evidence-based therapy processes as well as the development of nonspecific therapeutic techniques (such as communicating empathy and structuring therapy sessions) are emphasized so that these skills can be applied across a wide range of client populations and problem presentations. In this second term of the yearlong course we discuss and practice skills related to dialectical behavior therapy (DBT), psycho-educational family therapy with serious mental illness, and three evidence-based approaches to couple therapy: a cognitive behavioral approach taken by John and Julie Gottman, an acceptance-enhanced CBT approach taken by Christensen and Jacobson, and Emotionally Focused couple work by Sue Johnson. The course includes discussion of multicultural and diversity issues as they apply to these therapeutic approaches.

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, Diversity, Supervision, Consultation, and Professional Practice

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 702a or b, Current Work in Cognition Ilker Yildirim

A weekly seminar in which students, staff, and guests report on their research in cognition and information processing.

PSYC 704a or b, Current Work in Behavior, Genetics, and Neuroscience BJ Casey

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.

PSYC 708a or b, Current Work in Developmental Psychology Staff

A luncheon meeting of the faculty and graduate students in developmental psychology for reports of current research and discussion on topics of general interest.

PSYC 710a or b, Current Work in Social Psychology and Personality Molly Crockett

Faculty and students in personality/social psychology meet during lunchtime to hear about and discuss the work of a local or visiting speaker.

PSYC 720a or b, 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 718 or 719.

PSYC 724a or b, 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 725a or b, Research Topics in Human Neuroscience Gregory McCarthy

Discussion of current and advanced topics in the analysis and interpretation of human neuroimaging and neurophysiology.

PSYC 727a or b, 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.

PSYC 729a or b, 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 731a or b, 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 733a or b, Research Topics 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 735a or b, 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 737a or b, 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 739a or b, 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.

PSYC 741a or b, 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 742a or b, Research Topics in Computation and Cognition Julian Jara-Ettinger

Seminar-style discussion of recently published and unpublished research in cognitive development and computational models of cognition.

PSYC 744a or b, Research Topics in Philosophical Psychology Joshua Knobe

The lab group focuses on topics in the philosophical aspects of psychology.

PSYC 745a, 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 752a or b, Research Topics in Neuroscience of Social Behavior Steve Chang

A weekly seminar discussing recent advances in neuroscience of social behavior. We discuss recent progress in research projects by the lab members as well as go over recently published papers in depth. 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 753a or b, Research Topics in Legal Psychology Tom Tyler

This seminar is built around student research projects. Students propose, conduct, and analyze empirical research relevant to law and psychology. Grades are based upon final papers. Permission of the instructor required.

PSYC 754a or b, 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 755a or b, 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 756a or b, Research Topics in the Fundamentals of Adolescent Brain and Behavior BJ 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 757a or b, Research Topics in Social Neuroscience and Behavior Molly Crockett

Seminar-style discussion of recent research in social neuroscience and behavior, covering both recent studies from the literature and ongoing research at Yale.

PSYC 758a or b, Research Topics in Cognitive Neuroscience Nick Turk-Browne

Seminar-style discussion of recent research in cognitive neuroscience, covering both recent studies from the literature and ongoing research at Yale.

PSYC 759a or b, Research Topics in Affective Science and Culture Maria Gendron

A seminar-style discussion of recent research and theory in affective science and culture. The lab group focuses on the social and cultural shaping of emotions. We also discuss the biological constraints on variation and consistency in emotion as revealed by physiological research on emotion (in both the central and peripheral nervous system). Some discussion of current and planned research in the lab group also takes place.

PSYC 760a or b, Research Topics in Cognitive and Neural Computation

Ilker Yildirim

Lab meetings of the Cognitive & Neural Computation Laboratory at Yale.

PSYC 762a or b, Research Topics in Skill Learning Staff

This weekly seminar covers various themes in human learning, with an emphasis on motor learning, motor memory, reinforcement learning, and decision-making. We discuss recently published and ongoing research on these topics, with special attention to behavioral studies, computational models of learning, and neural correlates.

PSYC 766a or b, 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 771a or b, 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 775a or b, 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 777a or b / WGSS 767a or b, 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 778a or b, 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 801a or b, Clinical Internship (Child) Mary O'Brien

Advanced training in clinical psychology with children. Adapted to meet individual needs with location at a suitable APA-approved internship setting.

PSYC 802a or b, Clinical Internship (Adult) Mary O'Brien

Advanced training in clinical psychology with adults. Adapted to meet individual needs with location at a suitable APA-approved internship setting.

PSYC 805a, Affective Bases of Behavior Dylan Gee

Primary source readings and lectures by experts on broad and general topics in the affective bases of behavior. Open only to graduate students in clinical psychology.

PSYC 811a or b, Mood and Anxiety Disorders Practicum Mary O'Brien

This is a course for graduate students in clinical psychology. Group supervision of therapy provided at the Yale Psychology Department Clinic.

PSYC 817a or b, Other Clinical Practica Mary O'Brien

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 920a or b, First-Year Research Staff

By arrangement with faculty.

PSYC 923a or b, Individual Study: Theme Essay Staff

By arrangement with faculty.

PSYC 925a or b, Individual Tutorial Staff

By arrangement with faculty and approval of DGS.

PSYC 930a or b, Predissertation Research Staff

By arrangement with faculty.

Public Health

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 M.S., M.Phil., Ph.D.

Dean

Sten Vermund

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Christian Tschudi (203.785.6383)

Professors Serap Aksoy, Heather Allore (*Internal Medicine*), Frederick Altice (*Internal Medicine*), Paul Anastas, Robert Baltimore (*Pediatrics*), Michelle Bell (*School of the Environment*), Steven Bernstein (*Emergency Medicine*), Cynthia Brandt (*Emergency Medicine*), Richard Bucala (*Internal Medicine*), Susan Busch, Michael Cappello (*Pediatrics*), Kei-Hoi Cheung (*Emergency Medicine*), Elizabeth Claus, Paul Cleary, Theodore Cohen, Leslie Curry, Louise Dembry (*Internal Medicine*), Vincent DeVita (*Internal Medicine*), John Dovidio (*Emeritus, Psychology*), Robert Dubrow, James Dziura (*Emergency Medicine*), David Fiellin (*Internal Medicine*), Erol Fikrig (*Internal Medicine*), Howard Forman (*Radiology & Biomedical Imaging*), Alison Galvani, Alan Gerber (*Political Science*), Thomas Gill (*Internal Medicine*), Peter Glazer (*Therapeutic Radiology*), Cary Gross (*Internal Medicine*), Robert Heimer, Jeannette Ickovics, Melinda Irwin, Amy Justice (*Internal Medicine*), Edward Kaplan (*School of Management*), Trace Kershaw, Jaehong Kim (*Chemical & Environmental Engineering*), Marissa King (*School of Management*), Albert Ko, Harlan Krumholz (*Internal Medicine*), Ann Kurth (*Nursing*), Becca Levy, Judith Lichtman, Elan Louis (*Neurology*), Shuangge (Steven) Ma, Xiaomei Ma, Robert Makuch, I. George Miller (*Pediatrics*), Linda Niccolai, Saad Omer, Elijah Paintsil (*Pediatrics*), A. David Paltiel, Catherine Panter-Brick (*Anthropology*), Peter Peduzzi, Rafael Pérez-Escamilla, Melinda Pettigrew, Edieal Pinker (*School of Management*), Jeffrey Powell (*Ecology & Evolutionary Biology*), Harvey Risch, Robert Rosenheck (*Psychiatry*), Joseph Ross (*Internal Medicine*), Mark Russi (*Internal Medicine*), Peter Salovey (*Psychology*), Mark Schlesinger, Fiona Scott-Morton (*School of Management*), Eugene Shapiro (*Pediatrics*), Jody Sindelar, Donna Spiegelman, Jacob Tebes (*Psychiatry*), Jeffrey Townsend, Christian Tschudi, Prathibha Varkey (*General Medicine*), Vasilis Vasiliou, Sten Vermund, David Vlahov (*Nursing*), Kimberly Yonkers (*Psychiatry*), Heping Zhang, Hongyu Zhao, Julie Zimmerman (*Chemical & Environmental Engineering*)

Associate Professors Rene Almeling (*Sociology*), Sandy Bogucki (*Emergency Medicine*), Xi Chen, Maria Ciarleglio, Zack Cooper, Forrest Crawford, J. Lucian Davis, Mayur Desai, Andrew Dewan, Nicole Deziel, Denise Esserman, Nicola Hawley, Josephine Hoh, Manisha Juthanki-Mehta (*Infectious Diseases*), Danya Keene, Kaveh Khoshnood, Joan Monin, Ruth Montgomery (*Rheumatology*), Chima Ndumele, Marcellal Nunez-Smith (*Internal Medicine*), John Pachankis, Sunil Parikh, Robert Pietrzak (*Psychiatry*), Virginia Pitzer, Jodi Sherman (*Anesthesiology*), Megan Smith (*Psychiatry*), Andre Sofair (*Internal Medicine*), Shiyi Wang, Zuoheng (Anita) Wang, Joshua Warren, Daniel Weinberger, Marney White, Yawei Zhang (*Surgery*), Yong Zhu

Assistant Professors Peter Aronow (*Political Science*), Amy Bei, Kai Chen, Jen-hua Chu (*Internal Medicine*), Jennifer Edelman (*Internal Medicine*), Leah Ferrucci, Laura Forastiere, Abigail Friedman, Gregg Gonsalves, Nathan Grubaugh, Laying Guan, Ashley Hagaman, Evelyn Hsieh (*Internal Medicine*), Yuan Huang, Caroline Johnson, Michael Kane, Morgan Levine (*Pathology*), Fan (Frank) Li, Zeyan Liew, Sarah Lowe, Robert McDougal, Terrance Murphy (*Internal Medicine*), Krystal Pollitt, Yusof Ransome, Yasmmy Salinas, Jason Schwartz, Veronika Shabanova (*General Pediatrics*), Jamie Tam, Jacob Wallace, Joshua Wallach, Katie Wang, Wei Wei, Shannon Whirlledge (*Obstetrics, Gynecology, & Reproductive Sciences*), Xiting Yan (*Internal Medicine*), Reza Yaesoubi, Yize Zhao, Xin Zhou

FIELDS OF STUDY

Programs of study are offered in the areas of Biostatistics, Chronic Disease Epidemiology, Environmental Health Sciences, Epidemiology of Infectious Diseases, Epidemiology of Microbial Diseases, Health Informatics, Health Policy and Management, and Social and Behavioral Sciences.

SPECIAL REQUIREMENTS FOR THE PH.D. DEGREE

Generally the first two years of the Ph.D. program 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 Responsibility, and 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 600). 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 must achieve a High Pass average. (This applies to courses taken after matriculation in the Graduate School and during the nine-month academic year.)

Teaching and research experiences are regarded as an integral aspect of the graduate training program. All students are required to serve as teaching fellows for a minimum of two terms at the TF level 10 or 20, typically during years two and three. Depending on their funding sources, students may be expected to teach additional terms after they have fulfilled the academic teaching requirement but would not be required to teach more than four terms over the first five years. 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 serve as graduate research assistants in year three. Other exceptions may be granted after two terms of teaching are completed, with the approval of the DGS. During the first term of teaching, students must attend a training session conducted by the Poorvu Center for Teaching and Learning. First-year students are encouraged to

focus their efforts on course work and are not permitted to serve as teaching fellows. A Ph.D. student who has fulfilled the teaching requirement is not permitted to serve as a teaching fellow without special permission from the DGS. In the rare instances this exception is approved, the student will only be allowed to serve at the TF-10 level.

At the end of years one and two, advisers will be asked to complete a progress report for each student evaluating the student's academic progress and describing the student's 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, generally after qualifying exams, 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 (GSEC) 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 below, 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 GSEC. Students who have been admitted to candidacy are 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 by the student to the DAC. (At the adviser's discretion, other invited faculty may be present.) Upon completion of the closed defense, the chair/adviser of the DAC submits the recommendation to the DGS 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 GSEC are required to attend the presentation.

Required Course Work

BIOSTATISTICS

Ph.D. students in Biostatistics (BIS) have the choice of two pathways: the *Biostatistics Standard Pathway* and the *Biostatistics Implementation and Prevention Science Methods Pathway*. In each pathway students must complete a minimum of sixteen courses (not including BIS 525, BIS 526, BIS 695, and EPH 600). Course waivers must be recommended by the academic adviser and approved by the DGS.

Required courses (or their equivalents) for both pathways are: BIS 525 and BIS 526, Seminar in Biostatistics and Journal Club; BIS 610, Applied Area Readings for Qualifying Exams; BIS 623, Advanced Regression Models (or S&DS 612, Linear Models); BIS 628, Longitudinal and Multilevel Data Analysis; BIS 643, Theory of Survival Analysis; BIS 678, Statistical Practice I; BIS 691, Theory of Generalized Linear Models; BIS 695, Summer Internship in Biostatistical Research; EPH 508, Foundations of Epidemiology and Public Health; EPH 600, Research Ethics and Responsibility; EPH 608, Frontiers of Public Health; and S&DS 610, Statistical Inference. Students entering the doctoral program with an M.P.H. are exempt from EPH 608. Students with prior graduate-level epidemiology courses may be exempt from EPH 508.

Students in the *Biostatistics Standard Pathway* will be required to complete BIS 681, Statistical Practice II. In consultation with their academic adviser, students also choose a minimum of six additional electives that will best prepare them for dissertation work.

Students in the *Biostatistics Implementation and Prevention Science Methods Pathway* will be required to complete BIS 537, Statistical Methods for Causal Inference; BIS 629, Advanced Methods for Implementation and Prevention Science; BIS 631, Advanced Topics in Causal Inference Methods; and EMD 533, Implementation Science. In consultation with their adviser, students also choose a minimum of three additional electives. Strongly recommended electives are: BIS 536, Measurement Error and Missing Data; BIS 557, Computational Statistics; BIS 567, Bayesian Statistics; BIS 646, Nonparametric Statistical Methods and Their Applications; CDE 516, Principles of Epidemiology II; CDE 534, Applied Analytic Methods in Epidemiology; EMD 538, Quantitative Methods for Infectious Disease Epidemiology; HPM 570, Cost-Effectiveness Analysis and Decision-Making; HPM 586, Microeconomics for Health Policy and Management; HPM 587, Advanced Health Economics; HPM 611, Policy Modeling; SBS 541, Community Health Program Evaluation; SBS 574, Developing a Health Promotion and Disease Prevention Intervention; SBS 580, Qualitative Research Methods in Public Health; SBS 676, Questionnaire Development; S&DS 541, Probability Theory; S&DS 565, Applied Data Mining and Machine Learning; and S&DS 600, Advanced Probability.

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 Chronic Disease Epidemiology (CDE) must complete a minimum of seventeen courses (not including EPH 600). Course waivers must be recommended by the academic adviser and approved by the DGS.

Required courses (or their equivalents) are: CDE 516, Principles of Epidemiology II; CDE 534, Applied Analytic Methods in Epidemiology; CDE 610, Applied Area Readings for Qualifying Exams; CDE 617, Developing a Research Proposal*; CDE 619, Advanced Epidemiologic Research Methods; CDE 650, Introduction to Evidence-Based Medicine and Health Care; EHS 502/CDE 502, Physiology for Public Health; EPH 508, Foundations of Epidemiology and Public Health; and EPH 600, Research Ethics and Responsibility. Students must also complete course work that introduces them to the breadth of public health (EPH 608, Frontiers of Public Health). Students entering the doctoral program with an M.P.H. may be exempt from EPH 608. In addition, in

consultation with their dissertation adviser, students choose three 600-level course units in Biostatistics[†] (or equivalent as approved by the adviser and the DGS), as well as five additional electives that will best prepare them for their dissertation research.

* CDE 617 is not required of students funded by the Yale AIDS Prevention Training Program. Those students must take an additional elective in order to meet the seventeen-course requirement.

[†] S&DS 563, Multivariate Statistical Methods for the Social Sciences, is an option to fulfill the statistics course requirement.

ENVIRONMENTAL HEALTH SCIENCES

Ph.D. students in Environmental Health Sciences (EHS) must take a minimum of thirteen courses (not including EHS 525, EHS 526, and EPH 600). However, more courses may be required by a student's adviser. Students have a choice of two areas of specialization: *Environmental Epidemiology and Exposure Science*, and *Environmental and Molecular Toxicology*. For both areas of specialization, required courses (or approved substitutions) are: EHS 503, Public Health Toxicology; EHS 507, Environmental Epidemiology; EHS 508, Environmental and Occupational Exposure Science; EHS 525 and EHS 526, Seminar and Journal Club in Environmental Health; EHS 545, Molecular Epidemiology; EPH 505, Biostatistics in Public Health; EPH 508, Foundations of Epidemiology and Public Health; and EPH 600, Research Ethics and Responsibility. Students must also complete course work that introduces them to the breadth of public health (EPH 608, Frontiers of Public Health). Students entering the doctoral program with an M.P.H. may be exempt from EPH 608. Ph.D. students enrolled in EHS 503, EHS 525, and EHS 526 may be assigned additional readings.

In addition, all students are required to complete two research rotations during the first year: EHS 619 and EHS 620. At the end of the research rotation students give a presentation and are graded based on their rotation work and presentation.

Students specializing in *Environmental Epidemiology and Exposure Science* must choose a minimum of four electives from the following suggested courses: BIS 505, Biostatistics in Public Health II; BIS 623, Advanced Regression Models; BIS 628, Longitudinal and Multilevel Data Analysis; CDE 516, Principles of Epidemiology II; CDE 520, Case-Based Learning for Genetic and Environmental Diseases; CDE 534, Applied Analytic Methods in Epidemiology; CDE 617, Developing a Research Proposal; EHS 502, Physiology for Public Health; EHS 511, Principles of Risk Assessment; EHS 530, Air Pollution and Public Health; EHS 531, Meta-research: Evaluating and Improving Research; EHS 547, Climate Change and Public Health; EHS 560, Methods in Climate Change and Health Research; EHS 563, Biomarkers of Exposure, Effect, and Susceptibility in the Epidemiology of Noncommunicable Disease; EHS 566, Causal Inference Methods in Public Health Research; EHS 568, Introduction to GIS for Public Health; ENV 755, Modeling Geographic Space; and ENV 756, Modeling Geographic Objects.

Students specializing in *Environmental and Molecular Toxicology* must choose a minimum of four electives from the following suggested courses: BIS 505, Biostatistics in Public Health II; CDE 520, Case-Based Learning for Genetic and Environmental Diseases; CDE 617, Developing a Research Proposal; EHS 502, Physiology for Public Health; EHS 511, Principles of Risk Assessment; EHS 530, Air Pollution and Public

Health; EHS 531, Meta-research: Evaluating and Synthesizing Research; EHS 537, Water, Sanitation, and Global Health; EHS 547, Climate Change and Public Health; EHS 560, Methods in Climate Change and Health Research; EHS 563, Biomarkers of Exposure, Effect, and Susceptibility in the Epidemiology of Noncommunicable Disease; and EHS 567, Fundamentals of Green Engineering and Green Chemistry.

EPIDEMIOLOGY OF MICROBIAL DISEASES

Ph.D. students in Epidemiology of Microbial Diseases (EMD) must complete a minimum of ten courses (not including EPH 600). Course waivers must be recommended by the academic adviser and approved by the 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 the student's 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, EMD 671, and EMD 672) are graded and account for three of the required ten courses.

Students are required to complete course work in epidemiology (EPH 508, Foundations of Epidemiology and Public Health; or CDE 516, Principles of Epidemiology II). In addition, students must complete course work that introduces them to the breadth of public health (EPH 608, Frontiers of Public Health). Students entering the doctoral program with an M.P.H. may be exempt from EPH 608. 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 schools or departments may also be appropriate: CDE 617, Developing a Research Proposal; EMD 531, Genomic Epidemiology of Infectious Diseases; EMD 533, Implementation Science; EMD 538, Quantitative Methods for Infectious Disease Epidemiology; EMD 539, Introduction to Public Health Surveillance; EMD 548, Observing Earth from Space; EMD 550, Biology of Insect Disease Vectors; EMD 553, Transmission Dynamic Models for Understanding Infectious Diseases; EMD 567, Tackling the Big Three: Malaria, TB, and HIV in Resource-Limited Settings; EMD 582, Political Epidemiology; EMD 625, How to Develop, Write, and Evaluate an NIH Proposal; HPM 570, Cost-Effectiveness Analysis and Decision-Making; MGT 611, Policy Modeling; and S&DS 538, Probability and Statistics.

HEALTH POLICY AND MANAGEMENT

Ph.D. students in Health Policy and Management (HPM) are required to develop expertise in one of three areas of specialization: *Economics*; *Organizational Theory and Management*; or *Political and Policy Analysis*.

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 sixteen, 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 Studies Executive Committee, 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 three of the sixteen courses.

Courses required of all students are: EPH 508, Foundations of Epidemiology and Public Health; EPH 600, Research Ethics and Responsibility; EPH 608, Frontiers of Public Health; and HPM 617 and HPM 618, Colloquium in Health Services Research. Students entering the program with an M.P.H. degree may be exempt from EPH 608. (EPH 600, HPM 617, and HPM 618 do not count toward the total number of required courses).

HPM 610, Applied Area Readings, is required of all second-year students. Additionally, all HPM students are expected to attend the departmental research seminar for faculty and the doctoral research seminar.

A minimum of four courses in Methods and Statistics are required. Suggested courses are: BIS 623, Advanced Regression Models; BIS 628, Longitudinal and Multilevel Data Analysis; ECON 556, Topics in Empirical Economics and Public Policy; ECON 558, Econometrics; HPM 583, Methods in Health Services Research; PLSC 500, Quantitative Methods I: Research Design and Data Analysis; PLSC 503, Quantitative Methods II: Foundations of Statistical Inference; PLSC 504, Advanced Quantitative Methods; SBS 580, Qualitative Research Methods in Public Health; SOCY 580, Introduction to Methods in Quantitative Sociology; SOCY 581, Intermediate Methods in Quantitative Sociology; SOCY 582, Statistics III: Advanced Quantitative Analysis for Social Scientists; S&DS 563, Multivariate Statistical Methods for the Social Sciences; and S&DS 565, Applied Data Mining and Machine Learning.

A minimum of four courses in Health Policy and Management, all with Ph.D. readings, are required. Suggested courses are: EPH 510, Health Policy and Health Care Systems; HPM 514, Health Politics, Governance, and Policy; HPM 560, Health Economics and U.S. Health Policy; HPM 570, Cost-Effectiveness Analysis and Decision-Making; HPM 573, Advanced Topics in Modeling Health Care Decisions; HPM 587, Advanced Health Economics; HPM 590, Economics, Addiction, and Policy; HPM 597, Capstone Course in Health Policy; and HPM 688, Managing Health Care in Complex Systems.

Areas of Specialization

Students in HPM must complete a minimum of four courses, all with Ph.D. readings, in their chosen area of specialization.

In *Economics*, required courses (or their equivalents) are: ECON 545, Microeconomics; and ECON 558, Econometrics (which may count as a Methods and Statistics class or as an area of specialization 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 such as: MGMT 758, Foundations of Behavioral Economics; and PSYC 553, Behavioral Decision-Making I: Choice. In *Industrial Organization*: ECON 600, Industrial Organization I; and ECON 601, Industrial Organization II. In *Labor Economics*, ECON 630, Labor Economics I; and ECON 631, Labor Economics II. In *Public Finance*, two courses from: ECON 556, Topics in Empirical Economics and Public Policy; ECON 680, Public Finance I; and ECON 681,

Public Finance II. In consultation with the student's adviser, other courses may be substituted.

In *Organizational Theory and Management*, four courses are required, selected in consultation with the student's adviser.

In *Political and Policy Analysis*, four courses are required, selected in consultation with the student's adviser. Suggested courses are: PLSC 800, Introduction to American Politics; PLSC 801, Political Preferences and American Political Behavior; and PLSC 803, American Politics III: Institutions.

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 area of specialization. Typically these are taken in the summer after two years of course work.

SOCIAL AND BEHAVIORAL SCIENCES

Ph.D. students in Social and Behavioral Sciences (SBS) must complete a minimum of fifteen courses (not including EPH 600) from the following courses or their equivalents. Course waivers must be recommended by the academic adviser and approved by the DGS.

Required courses (or their equivalents) are: CDE 534, Applied Analytic Methods in Epidemiology; CDE 617, Developing a Research Proposal*; EPH 508, Foundations of Epidemiology and Public Health; EPH 600, Research Ethics and Responsibility; SBS 580, Qualitative Research Methods in Public Health; SBS 610, Applied Area Readings for Qualifying Exams; and SBS 699, Advanced Topics in Social and Behavioral Sciences. Students must also complete course work that introduces them to the breadth of public health (EPH 608, Frontiers of Public Health). Students entering the doctoral program with an M.P.H. may be exempt from EPH 608. In addition, in consultation with their dissertation adviser, students choose five advanced-level (600 or above) statistics or methods courses (from Biostatistics, Psychology, Political Science, Sociology, Anthropology, or Statistics and Data Science†) as well as three additional electives that will best prepare them for their dissertation research.

Students supported by training grants may be subject to additional requirements and should discuss with the principal investigator of the grant whether there are training-specific requirements.

* CDE 617 is not required of students funded by the Yale AIDS Prevention Training Program. Those students must take an additional elective in order to meet the fifteen-course requirement.

† S&DS 563, Multivariate Statistical Methods for the Social Sciences, is an option to fulfill the statistics course requirement.

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 time frame 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. The purpose of these rotations/internships is to learn research approaches and methodologies and/or to allow the student time to determine if the faculty's research interests are compatible with the student's research interests. These rotations/internships are usually done during the summer between the first and second years of medical school. 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 in order to possess 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 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 courses or other appropriate courses during this time, 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 it can be done earlier with approval of the Ph.D. adviser and the DGS.

Prospectus Timeline

Following completion of the qualifying exam, students should focus on the prospectus, which must be approved by the Public Health Graduate Studies Executive Committee (GSEC) before the end of the student's 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 GSEC. All M.D./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).

MASTER'S DEGREES

M.Phil. The M.Phil. is awarded to doctoral 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 four concentrations: Biostatistics (a two-year program), Chronic Disease Epidemiology (a one-year program), Epidemiology of Infectious Diseases (a one-year program), and Health Informatics (a two-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 programs in Chronic Disease Epidemiology and Epidemiology of Infectious Diseases) or in at least two full-term graduate courses (for students enrolled in the two-year programs in Biostatistics and Health Informatics). 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, Chronic Disease Epidemiology, or Epidemiology of Microbial Diseases 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 the other departments, 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. WITH CONCENTRATION IN BIOSTATISTICS

This two-year program provides training in clinical trials, epidemiologic methodology, implementation science, statistical genetics, and mathematical models for infectious diseases. Students have a choice of two pathways: the *Biostatistics Standard Pathway* and the *Biostatistics Implementation and Prevention Science Methods Pathway*. Part-time enrollment is permitted.

Course Requirements

The Biostatistics concentration requires the completion of fifteen required courses (not including BIS 525, BIS 526, BIS 695, EPH 100, and EPH 600). Required courses (or approved substitutions) for both pathways are: BIS 525 and BIS 526, Seminar in Biostatistics and Journal Club; BIS 623, Advanced Regression Models (or S&DS 612, Linear Models); BIS 628, Longitudinal and Multilevel Data Analysis; BIS 630, Applied Survival Analysis (or BIS 643, Theory of Survival Analysis); BIS 678, Statistical Practice I; BIS 679, Advanced Statistical Programming in SAS and R; BIS 681, Statistical Practice II; BIS 695, Summer Internship in Biostatistical Research; EPH 508, Foundations of Epidemiology and Public Health; EPH 600, Research Ethics and Responsibility; EPH 608, Frontiers of Public Health; S&DS 541, Probability Theory

(or S&DS 600, Advanced Probability, or S&DS 551, Stochastic Process); and S&DS 542, Theory of Statistics (or S&DS 610, Statistical Inference). Students entering the program with an M.P.H. may be exempt from EPH 508.

Students in the *Biostatistics Standard Pathway* must complete three electives in Statistics and Data Science. Suggested electives are: S&DS 555, Introductory Machine Learning; S&DS 563, Multivariate Statistical Methods for the Social Sciences; S&DS 565, Applied Data Mining and Machine Learning; S&DS 612, Linear Models (cannot fulfill elective requirement if used to substitute for BIS 623); or any other S&DS 600-level course. Students must also select two electives in Biostatistics. Suggested electives are: BIS 557, Computational Statistics; BIS 567, Bayesian Statistics; BIS 643, Theory of Survival Analysis (cannot fulfill elective requirement if used to substitute for BIS 630); BIS 646, Nonparametric Statistical Methods and their Applications; and BIS 691, Theory of Generalized Linear Models.

Students wishing to complete a thesis may enroll in BIS 649 and BIS 650, Master's Thesis Research. This would be an additional requirement and cannot replace any of the required courses noted above. All students who complete a thesis will be required to present their research during a public seminar organized by the Biostatistics department.

Students in the *Biostatistics Implementation and Prevention Science Methods Pathway* must complete the ten required courses listed above in addition to: BIS 629, Advanced Methods for Implementation and Prevention Science; and EMD 533, Implementation Science. Students will also be required to take one elective from the following: BIS 536, Measurement Error and Missing Data; BIS 537, Statistical Methods for Causal Inference; and BIS 631, Advanced Topics in Causal Inference Methods. Students will also be required to take two electives from the following: CDE 516, Principles in Epidemiology II; CDE 534, Applied Analytic Methods in Epidemiology; EMD 538, Quantitative Methods for Infectious Disease Epidemiology; HPM 570, Cost-Effectiveness Analysis and Decision-Making; HPM 586, Microeconomics for Health Policy and Health Management; HPM 587, Advanced Health Economics; HPM 611, Policy Modeling; SBS 541, Community Health Program Evaluation; SBS 574, Developing a Health Promotion and Disease Prevention Intervention; SBS 580, Qualitative Research Methods in Public Health; SBS 676, Questionnaire Development; and S&DS 565, Applied Data Mining and Machine Learning.

A master's thesis is strongly recommended in place of BIS 681 and one elective.

Students in both pathways will also be required to attend a Professional Skills Seminar, EPH 100 (details provided in the first term).

TERMINAL M.S. WITH CONCENTRATION IN CHRONIC DISEASE EPIDEMIOLOGY

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. Part-time enrollment is permitted.

Course Requirements

The Chronic Disease Epidemiology concentration requires the completion of ten courses (not including CDE 525, CDE 526, and EPH 600), including a capstone course.* Required courses (or approved substitutions) are: CDE 516, Principles of Epidemiology II; CDE 525 and CDE 526, Seminar in Chronic Disease Epidemiology; CDE 617, Developing a Research Proposal (or CDE 600, Independent Study or Directed Readings); EPH 508, Foundations of Epidemiology and Public Health; EPH 600, Research Ethics and Responsibility; and EPH 608, Frontiers of Public Health. Students must also complete three quantitative courses from the following list (in consultation with the student's adviser, other courses may be approved): BIS 536, Measurement Error and Missing Data; BIS 537, Statistical Methods for Causal Inference; BIS 621, Regression Models for Public Health; BIS 628, Longitudinal and Multilevel Data Analysis; BIS 630, Applied Survival Analysis; and S&DS 563, Multivariate Statistical Methods for the Social Sciences.

In addition, students must complete two electives in Chronic Disease Epidemiology and one additional elective chosen in consultation with the student's adviser. Suggested CDE electives are: CDE 502, Physiology for Public Health; CDE 532, Epidemiology of Cancer; CDE 534, Applied Analytic Methods in Epidemiology; CDE 535, Epidemiology of Heart Disease and Stroke; CDE 545, Health Disparities by Race and Social Class: Application to Chronic Disease Epidemiology; CDE 551, Global Noncommunicable Disease; CDE 562, Nutrition and Chronic Disease; CDE 572, Obesity Prevention and Lifestyle Interventions; CDE 597, Genetic Concepts in Public Health; and CDE 650, Introduction to Evidence-Based Medicine and Health Care.

* In the capstone course CDE 617, 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.

TERMINAL M.S. WITH CONCENTRATION IN EPIDEMIOLOGY OF INFECTIOUS DISEASES

This one-year program offers two areas of specialization: a quantitative area aims to provide quantitatively focused research training in the epidemiology of infectious diseases, focusing on the analysis of communicable disease data as well as modeling and simulation; and a clinical area aims to provide research training for clinicians and clinical trainees interested in furthering their research expertise. Part-time enrollment is permitted.

Course Requirements

The Epidemiology of Infectious Diseases concentration consists of ten courses (not including EPH 600, Research Ethics and Responsibility, and EMD 525/EMD 526, a yearlong seminar in Infectious Disease Epidemiology).

The required courses (or approved substitutions) for the quantitative area of specialization include: BIS 623, Advanced Regression Models; BIS 630, Applied Survival Analysis; EMD 517 and EMD 518, Principles of Infectious Diseases I and II; EMD 525 and EMD 526, Seminar in Epidemiology of Microbial Diseases; EMD 533, Implementation Science (or EMD 539, Introduction to Public Health Surveillance);

EMD 538, Quantitative Methods for Infectious Disease Epidemiology; EMD 600, Independent Study or Directed Readings (or EMD 563, Laboratory and Field Studies in Infectious Diseases); EPH 508, Foundations of Epidemiology and Public Health; EPH 600, Research Ethics and Responsibility; EPH 608, Frontiers of Public Health; one elective; and a capstone project.

The required courses for the clinical area of specialization include: EPH 505, Biostatistics in Public Health; BIS 505, Biostatistics in Public Health II (or CDE 534, Applied Analytic Methods in Epidemiology); EMD 517 and EMD 518, Principles of Infectious Diseases I and II; EMD 567, Tackling the Big 3: Malaria, TB, and HIV in Resource-Limited Settings (or EMD 533, Implementation Science); EMD 530, Health Care Epidemiology: Improving Health Care Quality through Infection Prevention (or EMD 536, Investigation of Disease Outbreaks); EMD 525 and EMD 526, Seminar in Epidemiology of Microbial Diseases; EMD 600, Independent Study or Directed Readings (or EMD 563, Laboratory and Field Studies in Infectious Diseases); EPH 508, Foundations of Epidemiology and Public Health; EPH 600, Research Ethics and Responsibility; EPH 608, Frontiers of Public Health; one elective; and a capstone project.

There are two capstone course options: (1) students will develop an NIH-style research proposal focusing on a topic related to infectious disease epidemiology (EMD 625, How to Develop, Write, and Evaluate an NIH Proposal); or (2) students may elect to enroll in EMD 563, Laboratory and Field Studies in Infectious Diseases, which will provide students with hands-on training in laboratory or epidemiological research techniques.

TERMINAL M.S. WITH CONCENTRATION IN HEALTH INFORMATICS

This two-year program provides well-rounded training in health informatics, with a balance of core courses from such areas as information sciences, clinical informatics, clinical research informatics, consumer health and population health informatics, and data science, and more broadly health policy, social and behavioral science, biostatistics, and epidemiology. First-year courses survey the field; the typical second-year courses are more technical and put greater emphasis on mastering the skills in health informatics. Part-time enrollment is not permitted.

Course Requirements

The Health Informatics concentration consists of a total of fourteen courses (excluding EPH 600, Research Ethics and Responsibility): eight required courses, four electives, and satisfactory completion of a yearlong capstone project.

Six of the eight required courses are: BIS 633, Population and Public Health Informatics; BIS 634, Computational Methods for Informatics; CB&B 740, Introduction to Health Informatics; CB&B 750, Core Topics in Biomedical Informatics; EPH 508, Foundations of Epidemiology and Public Health; and EPH 608, Frontiers of Public Health. Other courses for this program are in development; as they are approved, the DGS will inform students of the additional required course. Students who have demonstrated a mastery of topics covered by the required courses may substitute more advanced courses. Students must receive written permission from the DGS and their adviser prior to enrolling in the substitute courses.

Four electives are required. Suggested electives are: BIS 540, Fundamentals of Clinical Trials; BIS 557, Computational Statistics; BIS 567, Bayesian Statistics; BIS 621,

Regression Models for Public Health; BIS 628, Longitudinal and Multilevel Data Analysis; BIS 643, Theory of Survival Analysis; BIS 679, Advanced Statistical Programming in SAS and R; BIS 691, Theory of Generalized Linear Models; CB&B 555, Unsupervised Learning for Big Data; CB&B 567, Topics in Deep Learning: Methods and Biomedical Applications; CB&B 645, Statistical Methods in Computational Biology; CDE 566, Causal Inference Methods in Public Health Research; CPSC 477, Natural Language Processing; CPSC 546, Data and Information Visualization; CPSC 564, Topics in Foundations of Machine Learning; EMD 533, Implementation Science; EPH 510, Health Policy and Health Care Systems; HPM 560, Health Economics and U.S. Health Policy; HPM 570, Cost-Effectiveness Analysis and Decision-Making; IMED 625, Principles of Clinical Research; MGT 534, Personal Leadership; MGT 656, Management of Software Development; NURS 922, Introduction to Clinical Research Informatics; S&DS 530, Data Exploration and Analysis; S&DS 555, Introductory Machine Learning; S&DS 562, Computational Tools for Data Science; S&DS 565, Applied Data Mining and Machine Learning; S&DS 583, Time Series with R/Python; S&DS 584, Applied Graphical Models; S&DS 610, Statistical Inference; S&DS 663, Computational Mathematics for Data Science; S&DS 664, Information Theory; and S&DS 670, Theory of Deep Learning.

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.elliott@yale.edu.

REQUIRED COURSES

For a complete list of Public Health courses, see the School of Public Health bulletin, available online at <https://bulletin.yale.edu>; and Yale Course Search at <https://courses.yale.edu>.

All Ph.D. students are required to take the following courses. Students entering the program with an M.P.H. may be exempt from EPH 608.

EPH 600a, Research Ethics and Responsibility Christian Tschudi

This course seeks to introduce major concepts in the ethical conduct of research and some of the personal and professional issues that researchers encounter in their work. Sessions are run in a seminar/discussion format. Prerequisite: doctoral student or postdoctoral status only. o Course cr

EPH 608a, Frontiers of Public Health Staff

This course is designed to expose students to the breadth of public health and is required of M.S. and Ph.D. students who do not have prior degrees in public health. It explores the major public health achievements in the last century in order to provide students with a conceptual interdisciplinary framework by which effective interventions are developed and implemented. Case studies and discussions examine the advances across public health disciplines including epidemiology and biostatistics, environmental and behavioral sciences, and health policy and management services that led to these major public health achievements. The course examines global and national trends in the burden of disease and underlying determinants of disease, which pose new challenges; and it covers new approaches that are on the forefront of addressing current and future public health needs.

Religious Studies

451 College Street, 203.432.0828
<http://religiousstudies.yale.edu>
 M.A., M.Phil., Ph.D.

Chair

Frank Griffel

Director of Graduate Studies

Christine Hayes [F]
 Noreen Khawaja [Sp]

Professors Joel Baden (*Divinity*), Gerhard Bowering, John J. Collins (*Divinity*), Stephen Davis, Carlos Eire, Steven Fraade, Paul Franks (*Philosophy*), Bruce Gordon (*Divinity*), Philip Gorski (*Sociology*), Frank Griffel, John Hare (*Divinity*), Christine Hayes, Jennifer Herdt (*Divinity*), Noel Lenski (*Classics*), Nancy Levene, Kathryn Lofton, Ivan Marcus, Andrew McGowan (*Divinity*), Laura Nasrallah, Sally Promey (*American Studies*), Chloë Starr (*Divinity*), Gregory Sterling (*Divinity*), Harry Stout, Kathryn Tanner (*Divinity*), Shawkat Toorawa (*Near Eastern Languages & Civilizations*), Miroslav Volf (*Divinity*)

Associate Professors Zareena Grewal (*American Studies*), Willie Jennings (*Divinity*), Noreen Khawaja, Hwansoo Kim, Eliyahu Stern, Tisa Wenger (*Divinity*), Travis Zadeh

Assistant Professors Maria Doerfler, Supriya Gandhi, Eric Greene, Nicole Turner

Senior Lecturers John Grim (*School of the Environment*), Margaret Olin, Mary Evelyn Tucker (*School of the Environment*)

Lecturers Jimmy Daccache, Felicity Harley-McGowan (*Divinity*)

FIELDS OF STUDY

Students must enroll in one of the following fields of study: American Religious History, Asian Religions, Early Mediterranean and West Asian Religions, Hebrew Bible/Old Testament, Islamic Studies, Medieval and Modern Judaism, Philosophy of Religion, Religion and Modernity, Religious Ethics, and Theology.

SPECIAL REQUIREMENTS FOR THE PH.D. DEGREE

Students are required to take a minimum of twelve term courses that meet the Graduate School Honors requirement, including RLST 510, Method and Theory, normally taken in a student's first year. 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. In the field of American Religious History, students must demonstrate proficiency in two skilled areas. Typically students study two foreign languages, but occasionally students study one foreign language and one technical knowledge area directly related to their proposed dissertation, such as musicology, financial accounting, or a performance art. 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, Religion and Modernity, 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 three terms as an academic requirement and one term as a financial requirement 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.

Program materials are available online at <http://religiousstudies.yale.edu>.

COURSES

RLST 510b, Method and Theory Hwansoo Kim

Required seminar for doctoral students in Religious Studies. Others admitted with instructor's permission.

RLST 616a / HIST 603a / JDST 806a / MDVL 603a, Jews and Christians in the Formation of Europe, 500–1500 Ivan Marcus

This seminar explores how medieval Jews and Christians interacted as religious societies between 500 and 1500.

RLST 619b / CLSS 872b / HIST 513b / MDVL 513b / NELC 683b, Law and History, Law in History: Premodern Civilizations through the Lens of Legal Historiography Maria Doerfler and Travis Zadeh

This seminar invites students into a comparative exploration of the intersection of law, history, and historiography in the ancient and premodern world. Sessions explore these links across a variety of linguistic and geographic settings, including those of ancient and medieval India, China, Persia, Greece, and Rome, as well as in different political, religious, literary, and archaeological contexts. The seminar constructs the category of law expansively to encompass civic, religious, and hybrid forms of legislation. In the process, we seek to explore, *inter alia*, questions of the relevance of history for the study of law, history's deployment in the context of legal writings, and law's concomitant relevance for historiography; the use of theoretical models, including those forged in

modern and postmodern contexts, for the study of law and legal historiography; and the implications of discourses about law and history in premodernity for contemporary, post-secular societies.

RLST 626b / AFAM 626b / HIST 721b, African American Religious History

Nicole Turner

African American religions have been central to the African American experience since Africans arrived in North America. An amalgam of traditional African religions, Christianity, Islam, Judaism, and African American ingenuity, African American religions are dynamic and multifaceted. Although they are often depicted as sources of black resilience and emblems of black resistance, they have also been critiqued for marginalizing and racializing black people, as well as encoding archaic gender paradigms and reinforcing class divisions. This course explores the ways histories of African American religions have produced these various interpretive frames. Questions that animate the course include: What role have African American religions played in African American life? How have scholars studied the history of African American religions and ultimately shaped the discourse about African American religious life, and by extension African American history? The course engages foundational works, such as Albert Raboteau's *Slave Religion* and Evelyn Brooks Higginbotham's *Righteous Discontent*, as well as newer works like Judith Weisenfeld's *New World A-Coming* and Matthew Harper's *The End of Days*.

RLST 635a, Philosophical Fragments Nancy Levene

The point of departure for this course is Kierkegaard's 1844 work, *Philosophical Fragments, or A Fragment of Philosophy*. We read the book together with some of the works it refers to and presupposes, as well as works with which it can be freely associated. Concepts taken up include truth, history, interpretation, god, person, paradox, dialectic, irony, and creativity.

RLST 653a / EGYPT 514a, Gnostic Texts in Coptic Daniel Bohac

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: EGYPT 510 or equivalent.

RLST 658b / EGYPT 512b, 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: EGYPT 510b or equivalent.

RLST 679a / HIST 579a, Popular Religion in Europe, 1300–1700 Carlos Eire

Readings and discussion in recent scholarship on the history of religion in the Christian West in the late medieval and early modern periods.

RLST 705a / AMST 705a / HIST 582a, Readings in Religion in American Society, 1600–2018 Harry Stout and Kenneth Minkema

This seminar explores intersections of religion and society in American history from the colonial period to the present as well as methodological problems important to their study. It is designed to give graduate students a working knowledge of the field, ranging from major recent studies to bibliographical tools. In short, the seminar is a broad readings course surveying religion in American history from colonization

to the present. It is not a specialized research seminar, but it does require a basic understanding of historiography.

RLST 715b, 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.

RLST 717a, 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.

RLST 720a, The Qur'an and Its Interpretation Gerhard Bowering

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.

RLST 722a, Al-Ghazali's Impact on Islamic Thought Frank Griffel

RLST 739b / HIST 575b, Jonathan Edwards and American Puritanism Harry Stout and Kenneth Minkema

This course offers students an opportunity for intensive reading in and reflections upon the significance of early America's premier philosophical theologian through an examination of the writings of the Puritans, through engagement with Edwards's own writings, and through selected recent studies of Euro-Indian contact. Through primary and secondary literature, the course familiarizes students with the life and times of Edwards and encourages reading and discussion about his background, historical and intellectual contexts, and legacy.

RLST 751b / JDST 721a or b / NELC 703, 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.

RLST 752a / NELC 702a, Mishnah Seminar: Tractate Megillah Steven Fraade

Study of rabbinic texts treating rules for the public recitation and translation of the Scroll of Esther on the holiday of Purim and of other sacred scriptures and translations throughout the year, with special attention to the relation between law and ritual

and the narrativity of both. *EMWAR area of concentration designations: STHJ, RabJud, ScrInterp*. Prerequisite: reading fluency in ancient Hebrew.

RLST 763a / JDST 701a, 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.

RLST 772a / JDST 760a, Rabbinics Research Seminar Christine Hayes

An in-depth survey of research debates and of methods and resources employed in the study of classical (pre-Geonic) rabbinic literature of all genres. Required of graduate students in ancient Judaism. Prerequisites: knowledge of Hebrew and Aramaic, ability to read academic Hebrew, and permission of the instructor.

RLST 773a / HIST 596a / JDST 761a / MDVL 596a, 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.

RLST 775a / CPLT 688a / JDST 842a, What is Political Theology? Hannan Hever

This course investigates the theological aspects of modern political ideologies. It takes its title from the controversial work of the German political thinker Carl Schmitt, who argued that theological assumptions stood behind the veneer of secular politics. Concepts such as sovereignty, citizenship, universalism, law, and the state of exception have been said to have their provenance in Jewish and Christian concepts of God, election, Messiah, the commandment, and antinomianism. In recent years the study of the theological origins of political concepts has become important for both those seeking to critique the neutrality of certain western-democratic institutions as well as those hoping to better understand the relationship between religion and politics. Subjects covered in the course include sovereignty, universalism, law, election, commandment, messianism, and nationalism. Readings focus on the work of modern political thinkers such as Benedict Spinoza, Thomas Hobbes, and Bruno Bauer, whose normative works assumed a direct relationship between the political and the theological, as well as those who have theorized the very idea of political-theology, such as Martin Buber, Alain Badiou, Slavoj Žižek, Daniel Boyarin, and Giorgio Agamben.

RLST 777b / HIST 590b / JDST 764b / MDVL 590b, 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.

RLST 797b / HIST 597b / JDST 861b, Twentieth-Century Jewish Politics

David Sorkin

This seminar explores major aspects of twentieth-century Jewish politics with an emphasis on new forms of political practice.

RLST 826a / SMTC 523a, Intermediate Syriac I Jimmy Daccache

This two-term course is designed to enhance students' knowledge of the Syriac language by reading a selection of texts, sampling the major genres of classical Syriac literature. By the end of the year, students are familiar with non-vocalized texts and are capable of confronting specific grammatical or lexical problems. Prerequisite: SMTC 521 or knowledge of Syriac.

RLST 840a / SMTC 520a, Introductory Ugaritic Jimmy Daccache

The Ugaritic texts from the Bronze Age found at Ras Shamra on the Mediterranean coast of Syria provide the earliest well-attested example of the use of alphabet writing. The Ugaritic corpus comprises more than 2,000 texts of several genres (myths, rituals, incantations, "scientific" manuals, letters, administrative documents, and others), written in a "cuneiform" script. This course completes the introduction to the Ugaritic language. Students have the opportunity to improve their knowledge of Ugaritic literature by reading and analyzing texts in its major genres, with special emphasis on mythological texts.

RLST 890a or b, Religion and Modernity Noreen Khawaja

Seminar for students working at the intersection of religion, philosophy, and politics in modernity. Readings and topics change from year to year.

RLST 961a or b, Directed Readings: American Religious History Staff

RLST 962a or b, Directed Readings: EMWAR Staff

Directed readings in Early Mediterranean and West Asian Religions.

RLST 963a or b, Directed Readings: Asian Religions Staff

RLST 964a or b, Directed Readings: Ethics Staff

RLST 965a or b, Directed Readings: Judaic Studies Staff

RLST 966a or b, Directed Readings: Islamic Studies Staff

RLST 968a or b, Directed Readings: Old Testament/Hebrew Bible Staff

RLST 969a or b, Directed Readings: Philosophy of Religion Staff

RLST 970a or b, Directed Readings: Religion and Modernity Staff

RLST 971a or b, Directed Readings: Theology Staff

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, Carlos Eire, Roberto González Echevarría, Bruce Gordon, David Scott Kastan, Christina Kraus, Lawrence Manley, Giuseppe Mazzotta, Robert Nelson, David Quint

Faculty associated with the program Rolena Adorno, Emily Bakemeier, Marisa Bass, Paola Bertucci, R. Howard Bloch, Leslie Brisman, Paul Bushkovitch, Ardis Butterfield, Judith Colton (*Emerita*), Carlos Eire, Paul Freedman, Roberto González Echevarría, Bruce Gordon, Emily Greenwood, K. David Jackson, Maija Jansson (*Emerita*), Jacqueline Jung, David Scott Kastan, Christina Kraus, Noel Lenski, Lawrence Manley, J.G. Manning, John Matthews (*Emeritus*), Giuseppe Mazzotta, Isaac Nakhimovsky, Robert Nelson, Catherine Nicholson, David Quint, Ayesha Ramachandran, Ellen Rosand, Christopher Semk, Nicola Suthor, Jane Tylus, Keith Wrightson (*Emeritus*)

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.

This is a combined degree program. To be considered for admission to this program, applicants must indicate both Renaissance Studies and one of the participating departments/programs listed above.

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 (DGS) in Renaissance Studies, and the DGS 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 (RNST 500/RNST 501), 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 seminar (RNST 500/RNST 501), 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, CPLT 515) 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 (RNST 500/RNST 501) 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 seminar [RNST 500/RNST 501]) 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 FREN 610 (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 seminar (RNST 500/RNST 501), 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 seminar (RNST 500/RNST 501), 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, Italian, and another European language. Students whose areas of interest do not include Italy are encouraged to learn Italian, but may request replacing Italian with another modern European language that is more relevant to their research.

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 seminar (RNST 500/RNST 501), 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 Studies. 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 seminar (RNST 500/RNST 501); 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 Studies, 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 seminar (RNST 500/RNST 501), 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: SPAN 790, Methodologies of Modern Foreign Language Teaching, and SPAN 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. Students doing the combined degree program may elect to devote their departmental course work to either Hispanic or Luso-Brazilian literatures or do a combination of both in a distribution to be determined in consultation with their departmental adviser(s). Of the seven courses taken in Renaissance Studies, two must be the Renaissance Studies core seminar (RNST 500/RNST 501), 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 DGS 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

The two-term Renaissance Studies core seminar (RNST 500/RNST 501) is offered every other year.

Slavic Languages and Literatures

Arnold Hall, 304 Elm Street, 203.432.1300, slavic.department@yale.edu

<http://slavic.yale.edu>

M.A., M.Phil., Ph.D.

Chair

John MacKay

Director of Graduate Studies

Molly Brunson

Professors Edyta Bojanowska, Katerina Clark, Harvey Goldblatt, John MacKay

Associate Professor Molly Brunson

Assistant Professors Marijeta Bozovic, Jinyi Chu

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 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, Church Slavonic, and RUSS 834, Aspects of Russian Grammar and Teaching Methodology, 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.

Students who have done graduate work elsewhere may petition the department for up to three 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 seven- to ten-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 website.

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.

Teaching Since faculty consider teaching to be an integral part of graduate training, all graduate students are expected to teach for a total of four terms. (In most cases, this teaching takes place in the third and fourth years of study.) Students are typically assigned to two terms of language teaching, during which they are mentored and trained by a lead language lector, and two terms of literature/culture teaching, for which they either run discussion sections for large-enrollment lecture courses (e.g., Tolstoy and Dostoevsky) or serve as instructor-apprentices in undergraduate seminars.

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 in this bulletin and the department's website. 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.

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, the student may be eligible to receive a terminal master's degree. The student must have completed at least fifteen term courses in Russian literature and linguistics, chosen in consultation with the DGS. 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 website, <http://slavic.yale.edu>.

COURSES

RUSS 607a, 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.

RUSS 621a, The Inventory of Tradition in Post-Soviet Nation States Katerina Clark

The breakup of the Soviet Union in 1991 resulted in a number of independent countries that had never been countries before, or not for several centuries. In the ensuing decades, politicians, historians, and culture makers in each of these countries produced narratives that claim a separate national identity and chart its history over a long stretch of time, though in many instances the country as a geopolitical unit was a Soviet fabrication. The course looks at the countries of Central Asia, Russia, and Ukraine. It discusses how each of the countries covered has generated revised accounts of the past that disaggregate ethnic, linguistic, or cultural imbrications with neighboring countries. It also considers the aftereffects of empire in this process. As much as possible, course materials are available in Russian, but all are available in English translation.

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.

RUSS 681a, Russian Romantic Poetry Marijeta Bozovic and Jinyi Chu

This seminar explores Russian romantic poetry in cultural and international contexts. We study the philosophical foundations; the preoccupation with various temporalities; the longing for total art bounded by lyric form; aesthetics and politics; and other topics. Readings include the works of Aleksandr Pushkin, Mikhail Lermontov, Fedor Tiutchev, Konstantin Batiushkov, Evgenii Baratynskii, as well as Vasilii Zhukovskii, Nikolai Nekrasov, Afanasy Fet, and others. The approach emphasizes prosody, genre, and medium as well as the dissemination of ideas across media and cultures.

Weekly practices involve close reading, research, theoretical reframing, and ongoing collaborative participation and presentations.

RUSS 689b, Russian Symbolist Poetry Marijeta Bozovic

This graduate seminar explores Russian Symbolist poetry in cultural and international contexts. We study the philosophical foundations (Nietzsche, Solovyov); the preoccupation with various temporalities (modernity); the longing for total art (Wagner) bounded by lyric form; aestheticism; utopianism; decadence; and other topics. Our readings include the works of Vladimir Solovyov, Valery Bryusov, Konstantin Balmont, Fedor Sologub, Zinaida Gippius, Mikhail Kuzmin, Vyacheslav Ivanov, Andrei Bely, and Aleksandr Blok – as well as of “post-Symbolists” Nikolai Gumilyov, Anna Akhmatova, Osip Mandelstam, and Marina Tsvetaeva. Our approach emphasizes prosody, genre, and medium as well as the dissemination of ideas across media and cultures. Weekly practices involve close reading, research, theoretical reframing, and ongoing collaborative participation and presentations.

RUSS 692b, Modernist Culture in Russia Jinyi Chu

This course offers an interdisciplinary overview of modernist culture in Russia. Focus is on how poets, prose writers, artists, intellectuals, and politicians (from Merezhkovsky to Stravinsky, from Diaghilev to Lenin) interacted with each other and how imperial Russia developed its own modernist culture in global context. Topics include institutions of art and media; literary journals and groups; translation and book market; theater as industry; European thoughts in Russia; theosophy and literature; modernist sexuality; prerevolutionary urban culture; gentry life; dance, music, costume design; Russia between East and West; revolution and modernism. Students establish an in-depth understanding of the cultural milieu in Russia from the 1890s to the 1910s and are introduced to the scholarly discourses on Russian modernism.

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.

RUSS 699b / CPLT 677b, The Performing Arts in Twentieth-Century Russia

Katerina Clark

The course covers ballet, opera, theater, mass spectacle, and film, as well as theory of the performing arts, including selections from the writings of some of the most famous Russian directors and choreographers, such as Constantine Stanislavsky, Vsevolod Meyerhold, and Michel Fokine. It also includes their major productions and some of the most important Russian plays of the twentieth century (e.g., by Anton Chekhov, Vladimir Mayakovsky, Mikhail Bulgakov) and works by contemporary dramatists. All readings are available in both English and Russian. No knowledge of Russian required. Students taking the course for credit in Comparative Literature can write their papers on texts in other languages.

RUSS 704b, Petersburg Myth Russian Lit Katerina Clark

SLAV 900a or b, Directed Reading Staff

By arrangement with faculty.

Sociology

493 College Street, 203.432.3323

<http://sociology.yale.edu>

M.A., M.Phil., Ph.D.

Chair

Grace Kao

Director of Graduate Studies

Philip Gorski

Professors Julia Adams, Jeffrey Alexander, Elijah Anderson, Scott Boorman, Nicholas Christakis, Philip Gorski, Grace Kao, Philip Smith

Associate Professors Rene Almeling, Emily Erikson, Jonathan Wrytzen

Assistant Professors Daniel Karell, Alka Menon, Rourke O'Brien, Emma Zang

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 542, SOCY 578, SOCY 580, SOCY 581) 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 the student completes the course requirements.

Program materials are available at <http://sociology.yale.edu>.

COURSES

SOCY 508b / PLSC 505b, Qualitative Field Research Staff

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 530a or b, Computational Sociology Staff

The combination of digital (and digitized) data, computationally driven analytical techniques, and groundbreaking scholarship has given rise to the field of computational social science (CSS). Some CSS research engages core sociological theories and questions, which, in turn, is helping to develop computational sociology. This course provides an introduction to computational sociology. We review recent scholarship in computational sociology and CSS; learn the skills necessary for conducting original computational sociology research; and discuss the new, imaginative, and previously unconsidered questions, project designs, and logics of inference afforded by computational sociology. Topics include digital data collection, the use of historical and archival data, neural networks, text and image analysis, and digital experiments.

SOCY 542b, Sociological Theory Jonathan Wyrzten

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.

SOCY 545a, Race, Medicine, and Technology Alka Menon

Medicine and technology are important sources of authority and institutionalization in modern societies. Drawing insights from across sociological subfields and adjacent disciplines, the course offers an in-depth investigation of race, medicine, and technology in the twentieth and twenty-first centuries. This course examines the role of medicine and related technologies in defining race and perpetuating racism. We trace how race became an important component of biomedical research in the United States. We also follow particular medical technologies across borders of time and space, using them to understand race and nationhood in transnational perspective. Taking a broad view of technology, we analyze cutting-edge, state-of-the-art technologies alongside older, more mundane technologies and infrastructures. Ultimately, we consider how medical technologies are not just treatments for individual patients but also windows into broader social and cultural structures and processes.

SOCY 554a or b, Research Topics on Human Nature and Social Networks

Nicholas Christakis

This seminar focuses on ongoing research projects in human nature, behavior genetics, social interactions, and social networks.

SOCY 560a or b / PLSC 734, Comparative Research Workshop Julia Adams

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 website 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.

SOCY 578b, Logic of Empirical Social Research Rourke O'Brien

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.

SOCY 580b, Introduction to Methods in Quantitative Sociology Staff

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.

SOCY 584b / AFAM 584, 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.

SOCY 595a or b, Stratification and Inequality Workshop Staff

In this workshop we present and discuss ongoing empirical 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.

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.

SOCY 628a or b, Workshop in Cultural Sociology Staff

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.

SOCY 629a / AMST 690a / WGSS 629a, Politics of Reproduction Rene Almeling

Reproduction as a process that is simultaneously biological and social, involving male and female bodies, family formation, and powerful social institutions such as medicine, law, and the marketplace. Sociological research on reproductive topics such as pregnancy, birth, abortion, contraception, infertility, reproductive technology, and aging. Core sociological concepts used to examine how the politics of reproduction are shaped by the intersecting inequalities of gender, race, class, and sexuality.

SOCY 630a / AFAM 773, Workshop in Urban Ethnography Elijah Anderson

The ethnographic interpretation of urban life and culture. Conceptual and methodological issues are discussed. Ongoing projects of participants are presented in a workshop format, thus providing participants with critical feedback as well as the opportunity to learn from and contribute to ethnographic work in progress. Selected ethnographic works are read and assessed.

SOCY 636b / E&EB 636b, Biosocial Science Nicholas Christakis

This seminar (with limited enrollment, but open to anyone) covers topics at the intersection of the natural and social sciences, including behavior genetics, gene-environment interactions, social epigenetics, and diverse other topics.

SOCY 647b, Social Processes Scott Boorman

Focus is on identifying and exploring robust alternatives/complements to the rational choice models that have come to dominate so much of the analysis of social (including organizational) processes in recent years. Specifically, emphasis is placed on a range of mathematical models and related analytic approaches originating outside of the rational choice literature—in fields such as social network analysis, evolutionary biology, organization theory, and the law. Possible starting points include the Boorman-Levitt network matching model and its applications to nonprofits and complex statutes; weak ties models of job information transmission and other information transfer in elite social networks; and “garbage can” models of the internal problem-solving dynamics of complex organizations.

SOCY 653a, Workshop in Advanced Sociological Writing and Research Philip Smith

This class concerns the process of advanced writing and research that converts draft material into work ready for publication, preferably in refereed journals, or submission as a substantial grant proposal. It investigates problem definition, the craft of writing, the structure of argument and data presentation, and the nature of persuasion more generally. The aim is to teach a professional orientation that allows work that is

promising to become truly polished and compelling within the full range of sociological genres. Prerequisite: permission of the instructor; participants must enter the class with suitable draft material for group analysis and discussion.

SOCY 656b, Professional Seminar Philip Smith

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.

SOCY 659b, Law and Sociology Monica Bell

This course introduces sociological perspectives on law, legal institutions, and regulated individuals and groups. The course, which includes lecture, small-group discussion, and seminar components, is divided into three parts. Part I focuses on fundamental concepts in sociology and the sociological analysis of law, covering topics such as class, culture, solidarity, legitimacy, bureaucracy, power, social control, and social capital. Part II provides a very brief introduction to sociological methods (qualitative and quantitative), with emphasis on learning to interpret and critique empirical research. Part III, the largest portion of the class, applies theory and methods to contemporary legal institutions and social problems. It covers a wide variety of topics, including understandings of law in everyday life, neighborhoods and residential segregation, race and racism, gender and sexuality, stigmatization and discrimination, diversity and affirmative action, poverty and the welfare state, housing law and housing inequality, family law and inequality, violence, policing, punishment, and immigration enforcement. In addition to a final exam or paper, students are expected to submit a small number of reading responses, participate in several small-group class discussions, and give one presentation during the latter half of the course. Permission of the instructor required. *Also LAW 21368.*

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

Jesús Velasco

Director of Graduate Studies

Aníbal González-Pérez

Professors Rolena Adorno, Roberto González Echevarría, Aníbal González-Pérez, K. David Jackson, Noël Valis, Jesús Velasco

Senior Lector I 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, with a specialization in either of the two 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 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 four courses taken outside the department. Also required is a reading knowledge of Latin and a second language, which may be Portuguese or another language-literature. 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 four courses during the third and fourth years of study. At least three of these must be courses in the beginning language sequence; 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. The fourth course may be a literature or culture course taught through a teaching fellowship.

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.

M.A. (en route to the Ph.D.) The M.A. en route is awarded upon the satisfactory completion of eight term courses and the language requirements (Latin and one other language).

COURSES

PORT 652a / CPLT 657a, Clarice Lispector: The Short Stories K. David Jackson
This course is a seminar on the complete short stories of Clarice Lispector (1920–1977), a master of the genre and one of the major authors of twentieth-century Brazil known for existentialism, mysticism, and feminism.

PORT 933a, Brazilian Novel of the Twenty-First Century K. David Jackson
Changing narratives, themes, styles, and aesthetic ideals in current Brazilian prose and poetry. The writers' attempts to express or define a personal, national, and global consciousness influenced by the return of political democracy to Brazil. Focus on readings published within the past five years.

PORT 964b, Machado de Assis: The Literary World K. David Jackson
A study, in translation, of the novelistic world of J.M. Machado de Assis (1839–1908), considered the master of the Brazilian novel, examining his philosophical stance (skepticism and Menippean satire), narrative innovations (use of graphics, emblems, emptying content, etc.), social critique, encyclopedic referentiality, and contributions to modern prose. We read selected short stories and novels as well as critical essays and studies of Machado's five major novels (called "Carioca quintet"). Students with Portuguese may read in the original.

SPAN 500b, History of the Spanish Language Oscar Martin
The evolution of modern Spanish from spoken Latin, the origin and development of philology as the foundational discipline of literary studies, the rise of linguistics as a positivist field, the separation of linguistics from literary studies, and the fracturing of Romance studies into separate language and culture fields. In Spanish.

SPAN 533a, Garcilaso and Poetry Roberto Gonzalez Echevarria

A careful reading of Garcilaso's brief but influential corpus of poetry to examine why and how it had such a revolutionary effect on all subsequent poetry in Spanish, particularly during the Golden Age. Garcilaso's impact is studied in the works of San Juan de la Cruz, Fray Luis de León, Lope de Vega, Luis de Góngora, Francisco de Quevedo, Calderón de la Barca, and Sor Juana Inés de la Cruz. Concomitantly the seminar considers the current state of the study of poetry by reading the work of twentieth-century theoreticians and critics such as M.H. Abrams, Amado Alonso, Dámaso Alonso, Harold Bloom, Cleanth Brooks, Paul de Man, T.S. Eliot, Helmut Hatzfeld, Martin Heidegger, Jacques Derrida, Roman Jakobson, Leo Spitzer, Karl Vossler, and William Wimsatt. In Spanish.

SPAN 658b / CPLT 969b / FREN 658b / MDVL 658b / NELC 684, Law and the Science of the Soul: Iberian and Mediterranean Connections Jesus Velasco

This seminar suggests a research project to investigate the affinity between the legal discipline and the science of the soul, or, if you wish, between the science of the soul and the body of law. The point of departure for our framing argument—the existence of this affinity—is that at different moments in history, the legal science (in the form of legal scholarship, religious law, or even legislation) has toiled to appropriate cognitive processes (the external senses, for instance) and post-sensorial operations (imagination, fantasy, memory, etc.). However, this appropriation has become, at different moments in history, so naturalized, so dissolved, so automatized, that it has become invisible for us, and that, because of this invisibility, the affinity can continue doing a political work that is not always evident to us readers, citizens, and clients of the law. In this seminar we read Iberian and Mediterranean primary sources from different confessions, in different languages, and within different legal and political backgrounds—from pre-Socratic thinkers to al-Ghazali, from Averroes and Maimonides to Alfonso X, from Parisian theologians to Spinoza, etc. Likewise, we read theoretical work that allow us to conceptualize the kind of research we are doing.

SPAN 746b, The Specter of Poetry: Gustavo Adolfo Bécquer, Rosalía de Castro, Antonio Machado, and Juan Ramón Ji Noel Valis

An exploration and close reading of four great Spanish poets of the nineteenth and twentieth centuries, situating them within the pertinent literary traditions and movements of the period such as romanticism, symbolism, and modernism. Readings include Bécquer's *Rimas*, de Castro's *En las orillas del Sar*, Machado's *Soledades*, *Galerías*, and *Campos de Castilla*, and Jiménez's *Diario de un poeta recién casado*. In Spanish.

SPAN 812b, The Polemics of Possession in Early Spanish American Narrative Rolena Adorno

Fundamental writings on the Spanish Indies from Columbus's "Letter of Discovery" of 1493 to the writings by authors of indigenous American heritage in the first quarter of the seventeenth century: their observations of New World realities, their debates about the meanings and rights of Spanish sovereignty, and their literary relationships to one another. The concept of "the polemics of possession"—their varied claims to territorial, political, cultural, and/or literary authority—orients the readings of the seminar. Prose texts by Cristóbal Colón, Hernán Cortés, Bartolomé de las Casas, Juan Ginés de Sepúlveda, Hernán Pérez de Oliva, Álgar Núñez Cabeza de Vaca, Bernal Díaz del Castillo, El Inca Garcilaso de la Vega, and Felipe Guaman Poma de Ayala are complemented by Alonso de Ercilla's enduring narrative epic poem. In Spanish.

SPAN 901a / CPLT 904a / FILM 617a / FREN 875a, Key Concepts in Psychoanalysis:**Tools for the Critical Humanities** Moira Fradinger

Working with primary sources mainly from the Freudian and Lacanian corpuses, this seminar is an introduction to key concepts of psychoanalytic theory, ending with an exploration of the afterlife of these concepts in other disciplines, focusing on one or two concrete examples. Students gain proficiency in what has been called “the language of psychoanalysis,” as well as the tools to assess how these concepts have been translated into the language of disciplines such as aesthetic criticism, political theory, film studies, gender studies, theory of ideology, sociology, etc. Concepts to be studied include the unconscious, the ego, identification, the drive, the death drive, repetition, the imaginary, the symbolic, the real, and *jouissance*. Depending on the interests of the group, others can be added (such as neurosis, perversion, fetishism, psychosis, anti-psychiatry, etc.). Commentators, readers, and critics of Freud and Lacan are also consulted (Michel Arrivé, Guy Le Gaufey, Jean Laplanche, André Green, Markos Zafiroopoulos, and others).

SPAN 913a / CPLT 940a, Realismo mágico – Magical Realism

Roberto Gonzalez Echevarria

Latin American novels and short stories from the 1920s to the 1990s in which the fantastic appears, derived from avant-garde tendencies, anthropology, and popular Afro-Hispanic religions (*santería*) and a Catholic tradition of miracles. Theoretical texts by Franz Roh, Sigmund Freud, Marcel Mauss, Jorge Luis Borges, Alejo Carpentier, Arturo Usler Pietri, Gabriel García Márquez, and Roberto González Echevarría. Prose fiction by Miguel Ángel Asturias, Borges, Lydia Cabrera, Carpentier, García Márquez, João Guimarães Rosa, and Juan Rulfo, among others. Novels such as *El reino de este mundo*, *Cien años de soledad*, and *Aura*, and short story collections such as *Cuentos negros de Cuba*, *Leyendas de Guatemala*, and *Guerra del tiempo*. Conducted in Spanish; course work for students in departments other than Spanish and Portuguese in English. Open to undergraduates.

SPAN 974b, Narrative and Journalism in Spanish America: Bicentennial Readings

Anibal González-Pérez

A study of the narrative-journalism relation in Spanish America from the early nineteenth to the early twenty-first century. Topics include definitions of journalistic discourse; the “law of dissimulation”; journalism and the self; journalism versus genealogy; journalism and avant-garde writing; testimonial and documentary fiction. Readings from works by J.J. Fernández de Lizardi, Ricardo Palma, Heriberto Frías, José Martí, Rubén Darío, Roberto Arlt, Jorge Luis Borges, Julio Cortázar, Gabriel García Márquez, Elena Poniatowska, Tomás Eloy Martínez, Laura Restrepo. In Spanish.

Statistics and Data Science

24 Hillhouse Avenue, 203.432.0666

<http://statistics.yale.edu>

M.A., M.S., Ph.D.

Chair

Harrison Zhou

Directors of Graduate Studies

Andrew Barron (24 Hlh, andrew.barron@yale.edu)

John Emerson (24 Hlh, john.emerson@yale.edu)

Professors Donald Andrews (*Economics*), Andrew Barron, Jeffrey Brock (*Mathematics*), Joseph Chang, Katarzyna Chawarska (*Child Study Center*), Xiaohong Chen (*Economics*), Nicholas Christakis (*Sociology*), Ronald Coifman (*Mathematics*), James Duncan (*Radiology & Biomedical Imaging*), John Emerson (*Adjunct*), Debra Fischer (*Astronomy*), Alan Gerber (*Political Science*), Mark Gerstein (*Molecular Biophysics & Biochemistry*), Anna Gilbert, John Hartigan (*Emeritus*), Theodore Holford (*Biostatistics*), Edward Kaplan (*School of Management/Operations Research*), Harlan Krumholz (*Internal Medicine*), John Lafferty, Peter Phillips (*Economics*), David Pollard (*Emeritus*), Nils Rudi (*School of Management*), Jasjeet Sekhon, Donna Spiegelman (*Biostatistics*), Daniel Spielman, Hemant Tagare (*Radiology & Biomedical Engineering*), Van Vu (*Mathematics*), Heping Zhang (*Biostatistics*), Hongyu Zhao (*Biostatistics*), Harrison Zhou, Steven Zucker (*Computer Science*)

Associate Professors Peter Aronow (*Political Science*), Forrest Crawford (*Biostatistics*), Sahand Negahban, Sekhar Tatikonda, Yihong Wu

Assistant Professors Elisa Celis, Zhou Fan, Joshua Kalla (*Political Science*), Amin Karbasi (*Electrical Engineering*), Roy Lederman, Vahideh Manshadi (*School of Management/Operations*), Fredrik Savje (*Political Science*), Ilker Yildirim (*Psychology*)

FIELDS OF STUDY

Fields of study include 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, data mining and machine learning, neural nets, network science, optimization, statistical computing, and graphical models and methods.

SPECIAL REQUIREMENTS FOR THE PH.D. DEGREE IN STATISTICS AND DATA SCIENCE

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 S&DS 551 (Stochastic Processes), S&DS 600 (Advanced Probability), S&DS 610 (Statistical Inference), S&DS 612 (Linear Models), S&DS 625 (Statistical Case Studies), and S&DS 661 (Data Analysis), and requires that students take S&DS 626 (Practical Work). Substitutions are possible with the permission of the director of graduate

studies (DGS); courses from other complementary departments such as Mathematics and Computer Science are encouraged.

The qualifying examination consists of three parts: a written report on an analysis of a data set, one or more written examination(s), and an oral examination. The examinations are taken as scheduled by the department. 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 for several terms to acquire professional training. All students are required to teach the equivalent of a TF-20, usually as two TF-10s (regardless of the nature of their funding). This teaching is typically completed in the first two years of study, although the actual timing is at the discretion of the DGS. Students who require additional support from the Graduate School after their second year will be required to teach an additional TF-10 for each term of support, up to a maximum of TF-80 within the first five years (including the academic teaching requirement).

MASTER'S DEGREES

M.A. (en route to the Ph.D. in Statistics and Data Science) 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.

M.A. in Statistics (en route to the Ph.D. in other areas of study) Pursuit of this degree requires an application process managed by the DGS of Statistics and Data Science followed by approval from the DGSs from both programs and the cognizant Graduate School dean. This degree is awarded upon completion of eight term courses in Statistics, chosen in consultation with the DGSs, with all grades HP or higher. Most of these courses should be in addition to the requirements of the primary Ph.D. program. This degree also has an academic teaching fellow requirement, to be determined by the DGSs from both programs and the cognizant Graduate School dean.

Terminal M.A. in Statistics Students are also admitted directly to a terminal master of arts program in Statistics. To qualify for the M.A., the student must successfully complete an approved program of eight term courses with an average grade of HP or higher and receive at least one grade of Honors, chosen in consultation with the DGS. Full-time students must take a minimum of four courses per term. Part-time students are also accepted into the master of arts program. See Degree Requirements: Terminal M.A./M.S. Degrees, under Policies and Regulations.

Terminal M.S. in Statistics and Data Science Students are also admitted directly to a terminal master of science program in Statistics and Data Science. To qualify for the M.S., the student must successfully complete an approved program of twelve term courses with an average grade of HP or higher and receive at least two grades of Honors, chosen in consultation with the DGS. Full-time students must take a minimum of four courses per term. Part-time students are also accepted into the

program. See Degree Requirements: Terminal M.A./M.S. Degrees, under Policies and Regulations.

Program information is available online at <http://statistics.yale.edu>.

COURSES

S&DS 500b, Introductory Statistics Ethan Meyers

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.

S&DS 501a / E&EB 510a, Introduction to Statistics: Life Sciences Walter Jetz and

Jonathan Reuning-Scherer

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.

S&DS 502a, Introduction to Statistics: Political Science Jonathan Reuning-Scherer

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. *Note:* S&DS 501–506 offer 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 S&DS 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.

S&DS 503a, 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. *Note:* S&DS 501–506 offer 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 S&DS 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.

S&DS 505a, Introduction to Statistics: Medicine Ethan Meyers and

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. *Note:* S&DS 501–506 offer 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 S&DS 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.

S&DS 506a, Introduction to Statistics: Data Analysis Elena Khusainova and Jonathan Reuning-Scherer

An introduction to probability and statistics with emphasis on data analysis. *Note:* S&DS 501–506 offer 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 S&DS 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.

S&DS 510b, An Introduction to R for Statistical Computing and Data Science Jay Emerson

An introduction to the R language for statistical computing and graphics. R is a widely accepted language for advanced statistical computing and data science in industry as well as in a wide range of academic disciplines. This course is a useful complement (concurrently or in advance to many courses in S&DS. One-half credit; meets for eight weeks. ½ Course cr

S&DS 520b, Intensive Introductory Statistics Joseph Chang

An introduction to statistical reasoning designed for students with particular interest in data science and computing. Using the R language, topics include exploratory data analysis, probability, hypothesis testing, confidence intervals, regression, statistical modeling, and simulation. Computing is taught and used extensively throughout the course. Application of statistical concepts to the analysis of real-world data science problems.

S&DS 523b, YData: An Introduction to Data Science John Lafferty and Elena Khusainova

Computational, programming, and statistical skills are no longer optional in our increasingly data-driven world; they are essential for opening doors to manifold research and career opportunities. This course aims to dramatically enhance students' knowledge and capabilities in fundamental ideas and skills in data science, especially computational and programming skills and inferential thinking. It emphasizes the development of these skills while providing opportunities for hands-on experience and practice. The course is designed to be accessible to students with little or no background in computing, programming, or statistics, but also engaging for more technically oriented students through extensive use of examples and hands-on data analysis. Python 3 is the computing language used. Enrollment is limited.

S&DS 530a or b / PLSC 530a or b, Data Exploration and Analysis Staff

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.

S&DS 538a, Probability and Statistics Joseph Chang

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: after or concurrently with MATH 118 or MATH 120.

S&DS 540a, An Introduction to Probability Theory Harrison Zhou

Introduction to probability theory. Topics include probability spaces, random variables, expectations and probabilities, conditional probability, independence, discrete and continuous distributions, central limit theorem, Markov chains, and probabilistic modeling. *This course may be appropriate for non-S&DS graduate students.* Prerequisite: MATH 115 or equivalent.

S&DS 541a, Probability Theory Yihong Wu and Winston Lin

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.

S&DS 542b, Theory of Statistics William Brinda and 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: S&DS 541.

S&DS 551b / ENAS 502b, Stochastic Processes Joseph Chang

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.

S&DS 555a, Introductory Machine Learning John Lafferty

This course covers the key ideas and techniques in machine learning without the use of advanced mathematics. Basic methodology and relevant concepts are presented in lectures, including the intuition behind the methods. Assignments give students hands-on experience with the methods on different types of data. Topics include linear regression and classification, tree-based methods, clustering, topic models, word embeddings, recurrent neural networks, dictionary learning, and deep learning. Examples come from a variety of sources including political speeches, archives of scientific articles, real estate listings, natural images, and others. Programming is central to the course and is based on the Python programming language.

S&DS 562b, Computational Tools for Data Science Roy Lederman

An introduction to computational tools for data science. The analysis of data using regression, classification, clustering, principal component analysis, independent component analysis, dictionary learning, topic modeling, dimension reduction, and network analysis. Optimization by gradient methods and alternating minimization. The application of high-performance computing and streaming algorithms to the analysis of large data sets. Prerequisites: linear algebra, multivariable calculus, and programming.

S&DS 563b, 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 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.

S&DS 565a or b, Applied 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 S&DS 542.

S&DS 573b, YData: Analysis of Baseball Data Ethan Meyers

The field of data science aims to extract insights from large data sets that often contain random variation. Baseball is a game that contains a high degree of randomness, and because professional baseball has been played since the nineteenth century, a large amount of data has been collected about players' performance. In this class we use baseball data to understand key concepts in data science including data visualization, data wrangling, and statistical inference. To understand these concepts, we analyze data that include season-level statistics going back to the 1870s, play-by-play statistics going back to the 1930s, and pitch trajectory statistics going back to 2006. The course uses the Python programming language and is paced to be accessible to students who have previously taken or are currently enrolled in S&DS 523. Co-requisite: S&DS 523.

S&DS 600a, Advanced Probability Sekhar Tatikonda

Measure theoretic probability, conditioning, laws of large numbers, convergence in distribution, characteristic functions, central limit theorems, martingales. Some knowledge of real analysis is assumed.

S&DS 610a, Statistical Inference Zhou Fan

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 S&DS 541 is assumed.

S&DS 611b, Selected Topics in Statistical Decision Theory Harrison Zhou

Recent developments in statistical decision theory, including nonparametric estimation, high-dimensional (non)linear estimation, low rank and sparse matrices estimation, covariance matrices estimation, graphical models, and network analysis. Prerequisite: S&DS 610.

S&DS 612a, Linear Models William Brinda

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.

S&DS 625a, Statistical Case Studies Jay Emerson

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. Enrollment limited; requires permission of the instructor.

S&DS 626a or b, Practical Work Jay Emerson

Individual one-term projects, with students working on studies outside the department, under the guidance of a statistician.

S&DS 627a and S&DS 628b, Statistical Consulting Jay 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 (S&DS 627 and 628) and receive one credit at the end of the year. Enrollment limited; requires permission of the instructor. ½ Course cr per term

S&DS 631b, Optimization and Computation

An introduction to optimization and computation motivated by the needs of computational statistics, data analysis, and machine learning. This course provides foundations essential for research at the intersections of these areas, including the asymptotic analysis of algorithms, an understanding of condition numbers, conditions for optimality, convex optimization, gradient descent, linear and conic programming, and NP hardness. Model problems come from numerical linear algebra and constrained least squares problems. Other useful topics include data structures used to represent graphs and matrices, hashing, automatic differentiation, and randomized algorithms. Prerequisites: multivariate calculus, linear algebra, probability, and permission of the instructor. Enrollment is limited, with preference given to graduate students in Statistics and Data Science.

S&DS 661b, Data Analysis Elena Khusainova

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 S&DS 542.

S&DS 664b, Information Theory Andrew Barron

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.

S&DS 674b, Applied Spatial Statistics Timothy Gregoire

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.

S&DS 690a or b, Independent Study Jay Emerson

By arrangement with faculty. Approval of DGS required.

S&DS 700a or b, Departmental Seminar Staff

Presentations of recent breakthroughs in statistics and data science. o Course cr

Women's, Gender, and Sexuality Studies

315 William L. Harkness Hall, 203.432.0845

<http://wgss.yale.edu>

M.A., M.Phil., Ph.D.

Chair

Roderick Ferguson

Director of Graduate Studies

Joseph Fischel

Professors Roderick Ferguson, Margaret Homans, Regina Kunzel, Ana Ramos-Zayas, Dara Strolovitch, Laura Wexler

Associate Professor Joseph Fischel

Assistant Professors Eda Pepi, Evren Savci

Senior Lecturer Maria Trumpler

Lecturers Melanie Boyd, Andrew Dowe, Graeme Reid

Affiliated Faculty Julia Adams (*Sociology*), Rene Almeling (*Sociology*), Carol Armstrong (*History of Art*), Daniel Botsman (*History*), Claire Bowerman (*Linguistics*), Marijeta Bozovic (*Slavic Languages & Literatures*), Daphne Brooks (*African American Studies; American Studies; Theater & Performance Studies*), Jill Campbell (*English*), Kang-i Sun Chang (*East Asian Languages & Literatures*), Becky Conekin (*History*), Aimee Cox (*African American Studies; Anthropology*), Rohit De (*History*), Crystal Feimster (*African American Studies; American Studies*), Marta Figlerowicz (*English; Comparative Literature*), Moira Fradinger (*Comparative Literature*), Jacqueline Goldsby (*English; African American Studies*), Gregg Gonsalves (*School of Medicine; Law School*), Jennifer Klein (*History*), Greta LaFleur (*American Studies*), Kathryn Lofton (*American Studies; Religious Studies*), Mary Lui (*American Studies; History*), Alka Menon (*Sociology*), Joanne Meyerowitz (*American Studies; History*), Alice Miller (*Law School; Public Health*), Tavia Nyong'o (*African American Studies; American Studies; Theater & Performance Studies*), Sally Promey (*American Studies; Religious Studies*), Jill Richards (*English*), Naomi Rogers (*History of Science & Medicine*), Alicia Schmidt Camacho (*Ethnicity, Race, & Migration; American Studies*), George Syrimis (*Hellenic Studies*), Linn Tonstad (*Divinity School*), Michael Warner (*English*)

FIELDS OF STUDY

The Program in Women's, Gender, and Sexuality Studies (WGSS) offers a combined Ph.D. in conjunction with five departments and programs: African American Studies, American Studies, Anthropology, English, and Sociology. Students pursuing the combined Ph.D. in WGSS will determine their research and doctoral foci in coordination with the directors of graduate studies in WGSS and the partnering department or program.

Women's, Gender, & Sexuality Studies critically interrogates gender and sexuality as categories of inequality, difference, and identification. Gender (the social and historical meanings of distinctions across sexes) and sexuality (the domain of sexual practices,

identities, discourses, and institutions) are studied as they intersect with class, race, nationality, religion, ability, and other zones of human and nonhuman experience.

There are no specified areas of study within the combined Ph.D. program, but students whose research interests overlap with WGSS faculty's are encouraged to apply. Current WGSS faculty concentrate on gender and sexuality as they articulate across transnational politics and security regimes; citizenship and statelessness; public law and sexual violence; public policy and political representation; kinship, reproduction, and reproductive technologies; policing, surveillance, and incarceration; social movements and protest; indigeneity, racialization, and racism; literature, language, and translation; Islam and neoliberalism; colonialism and postcolonialism.

Students may only apply for the Ph.D. in WGSS in conjunction with their application to one of the five partnering departments or programs (African American Studies, American Studies, Anthropology, English, and Sociology). The doctoral program in WGSS will begin reviewing external applications in fall 2021 for matriculation in fall 2022.

REQUIREMENTS FOR TRANSFER INTO THE COMBINED PH.D. PROGRAM

Students already pursuing a Ph.D. in one of the five partnering departments and programs listed above may apply for transfer into the combined Ph.D. in WGSS, starting in fall 2021.

Students must have already taken WGSS 600 and WGSS 900 or be enrolled in them during the term of application and submit a statement of interest describing why they wish to pursue the combined Ph.D. The statement of interest should outline a plan of completion for outstanding WGSS course requirements.

Only students in the first or second year of their degree study are eligible to apply, and preference will be given to second-year students. Students must submit their statement of interest by January 4. The WGSS graduate admissions committee will inform applicants of its decision by March 5.

SPECIAL REQUIREMENTS FOR THE PH.D. DEGREE

The WGSS combined Ph.D. student's course of study and research will be coordinated with the student's adviser, the director of graduate studies (DGS) of WGSS, and the DGS of the partnering department or program. Ideally, students should complete course work for WGSS and the partnering department or program by the end of their second year. Students are required to complete the following core courses: WGSS 600, Introduction to Women's, Gender, and Sexuality Studies; WGSS 700, Feminist and Queer Theories; WGSS 900, Colloquium and Working Group (half credit); and one WGSS-numbered elective. Students are strongly encouraged to take WGSS 800, Methods in Gender and Sexuality Studies.

In their third year, students will enroll in a term-long dissertation proposal workshop.

WGSS combined Ph.D. students will teach or serve as a teaching fellow in their third and fourth years in the program, unless their dissertation research plans require other arrangements. The courses will typically have undergraduate WGSS numbers.

Students will be admitted to candidacy when they have fulfilled all requirements of the relevant participating department or program and WGSS. The scheduling and structure of qualifying examinations will follow the protocols of the partnering department.

At least one member of the WGSS faculty or affiliated faculty will be a member of the dissertation proposal review committee; at least one faculty member of the student's dissertation committee will hold a primary, tenure, or tenure-track appointment in WGSS.

Students pursuing the combined Ph.D. with African American Studies In addition to fulfilling the course work—twelve courses over two years, including core WGSS and AFAM courses—and the teaching requirements for each program, students must also: (1) demonstrate proficiency in a language other than English by conducting substantial research in the chosen language as part of a course requirement; passing a translation test, offered each term by various language departments; or 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; and (2) pass an oral examination at the end of their third year, jointly administered by four faculty selected by the student (with at least one faculty member in African American Studies and another in WGSS). The oral exam will test on four content areas selected by the student in the student's second year of study.

Students pursuing the combined Ph.D. with Anthropology In the beginning of their second year, students should consult with directors of graduate studies in WGSS and Anthropology to coordinate the written and oral components of the qualifying exams.

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 Women's, Gender, and Sexuality Studies and the partnering department or program upon successful completion of all course work with the exception of the WGSS dissertation proposal workshop. See also Degree Requirements under Policies and Regulations.

WGSS 529a / GLBL 529a, Sexuality, Gender, Health, and Human Rights Ali 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 are required.

WGSS 600a, Introduction to Women's, Gender, and Sexuality Studies

Roderick Ferguson

Introduction to women's, gender, and sexuality studies as a field of knowledge and to the interdiscipline's structuring questions and tensions. The course genealogizes feminist and queer knowledge production, and the institutionalization of WGSS, by examining several of our key terms.

WGSS 612b / AMST 629b, Racial and Economic Justice in Transgender Health

Greta LaFleur and Ronica Mukerjee

What kind of access and exposure do transgender people have to health care services, policing, mental health, education, and public spaces, and what kind of access *should* trans people have? How do we work to close the gap between what is available, and what should be? This course considers the diverse range of health care and other basic needs of transgender and nonbinary people in a number of different institutional settings and medical contexts—prisons to K-12 public schools, gender-affirming surgeries to fertility support—with a twinned focus on how institutions render trans people and their bodies illegible or even illegal, on the one hand, and what kind of knowledge, best practices, and interventions might be implemented to remove obstacles for trans and nonbinary people seeking the care that they need, on the other. At the heart of the course is the role of racial and economic justice—in health care, and in the world more broadly—in mitigating the health and health care disparities between transgender and non-transgender patients. Enrollment capped at twenty-five.

WGSS 629a / AMST 690a / SOCY 629a, Politics of Reproduction Rene Almeling

Reproduction as a process that is simultaneously biological and social, involving male and female bodies, family formation, and powerful social institutions such as medicine, law, and the marketplace. Sociological research on reproductive topics such as pregnancy, birth, abortion, contraception, infertility, reproductive technology, and aging. Core sociological concepts used to examine how the politics of reproduction are shaped by the intersecting inequalities of gender, race, class, and sexuality.

WGSS 633b / AMST 747b / ANTH 594b, Affect and Materiality Kathryn Dudley

Recent scholarship associated with the “affective turn” and “new materialisms” raises important questions about how we, as existents entangled in imperiled ecologies, know and collectively navigate our multispecies worlds. Refusing to accept classic oppositions between mind/body, self/other, and human/nonhuman, this work has inspired anthropologically inclined scholars to rethink the ways we analyze and write about the experiential regimes of settler colonialism, racialized capitalism, and heteronormativity. Rather than reifying divergent approaches to “affect” and “materiality” as discrete fields of knowledge, this course tracks these concepts across domains of inquiry in which they have long been urgently paramount: black, indigenous, and queer studies. Our goal is to recognize and navigate the alliances, interruptions, and aporias that emerge among fellow travelers committed to the project of feeling and producing anti-imperialist histories, geographies, and ontographies.

WGSS 651a / ANTH 651a, 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.

WGSS 661b, Queer Theology Linn Tonstad

This course provides an introduction to queer theology, its theoretical grounding in queer theory, and some of the controversies and possibilities that make up its current shape. Questions considered include whether Christianity can or should be queer;

the implications of contemporary debates in queer theory over temporality, futurity, sociality, and spatiality for the shape and possibility of queer theology itself; how to use art and performance as theological sources; and the way queer theory's anti-essentialist stance shifts the stakes of debates over the theological and political status of LGBTQ+ persons. The course also considers the impact of HIV/AIDS on notions of community formation, risk, and finitude. Prerequisites: at least one term of theology at the graduate level (introduction to theology or systematic theology) or permission of the instructor; and preferably at least one course in gender studies.

WGSS 677b / PHIL 677b, Feminist Philosophy: Theories of Sex, Gender, and Sexual Orientation Robin Dembroff

This course surveys several feminist frameworks for thinking about sex, gender, and sexual orientation. We consider questions such as: Is there a tenable distinction between sex and gender? Between gender and sexual orientation? What does it mean to say that gender is a social construction, or that sexual orientation is innate? What is the place of politics in gender and sexual identities? How do these identities—and especially resistant or transgressive identities—impact the creation and revision of social categories?

WGSS 678a / AMST 626a / FILM 644a, Visuality, Embodiment, Performance: Seeing with Companions Laura Wexler

This co-taught interuniversity seminar offers in-depth engagements with recent works by leading feminist theorists and artists committed to anti-racist, anti-imperialist, activist ways of seeing, knowing, thinking, and doing. Forging a participatory, collaborative, critical practice of “seeing with companions,” it responds to provocations posed by the course materials to go beyond critique, to reconceive feminist and queer epistemologies and pedagogies, and to imagine different ways of being in the world. Readings include recent works by Ariella Azoulay, Judith Butler, Saidiya Hartman, and Diana Taylor, as well as visual artworks, performances, and films by Regina José Galindo, Arthur Jafa, Simone Leigh, Doris Salcedo, and Kara Walker, among others. Permission of instructors required.

WGSS 700b, Feminist and Queer Theories Evren Savci

This course is designed as a graduate introduction to feminist and queer thought. It is organized by a number of key terms and institutions around which feminist and queer thinking has clustered, such as the state, the law, religion, family and kinship, capitalism and labor, the body and language, knowledge and affect, globalization and imperialism, militarism and security. The “conversations” that happen around each term speak to the richness of feminist and queer theories, the multidimensionality of feminist and queer intellectual and political concerns, and the “need to think our way out of these crises,” to cite Jacqui Alexander and Chandra Mohanty. The aim is to leave students appreciating the hard labor of feminist and queer thought, and understanding the urgencies out of which such thinking emerges.

WGSS 712b / AMST 866b / HIST 775b, Readings in the History of Sexuality

Joanne Meyerowitz and Regina Kunzel

Selected topics in the history of sexuality. Emphasis on key theoretical works and recent historical literature.

WGSS 718a, Marxisms, Feminisms, and Social Reproduction Eda Pepi

This seminar focuses on the intersections and divergences of Marxist and feminist approaches to the welfare state at a time of newly intensifying anthropocenic and epidemiological crises. Historically, Marxists have had undeniably fraught analytical and political investments in both gender and the state. But socialist and Marxist feminists have relied on the thinking of Marx and Engels to develop the framework of “social reproduction” in order to expand the notion of socially necessary labor in ways that continue to shape political, economic, and cultural understandings of the welfare state. Then again, liberal feminists have too easily allied with racist state projects of neoliberal individual empowerment. The course engages critically both classical Marxist preoccupations with capitalist production as well as feminist approaches to social and biological reproduction in order to illuminate “the connection of the social and political structure with production” (MECW 5:37). In *The German Ideology* (1846), Marx and Engels identified production as contextualized within social and state structures as the cornerstone of the materialist method. Students grapple with these gendered, sexualized, and racialized concepts, methods, and implicit understandings of the social and state structures within which production, labor, and reproduction unfold. We do so at a time when the global COVID-19 pandemic has demanded the resurgence of the state, halted production, transformed labor, and isolated most of the world's population within domestic domains. In this current moment, we undertake the difficult task of suggesting ways in which we might reconfigure collective labor, universal basic income, health care, and other state and nonstate forms necessary for sustenance and daily renewal as well as for birthing and rearing the next generation.

WGSS 724b / AMST 724b / PLSC 868b, Gender and Sexuality in American Politics and Policy Dara Strolovitch

This seminar familiarizes students with foundational work on and approaches to the study of gender and sexuality in American politics and public policy. It explores empirical work that addresses these topics, a range of theoretical and epistemological approaches to them, and the social scientific methods that have been used to examine them. It explores the history, findings, and controversies in research about gender and sexuality in American politics and political science, examining work within several subfields of American politics (e.g., political development; public law; political behavior; legislative studies; public policy; interest groups and social movements), important work from other disciplines, and research that does not fit neatly into traditional disciplinary categories, paying particular attention to the implications of this “messiness” for the study of gender, sexuality, and politics. We are attentive to the complicated histories of science and social science when it comes to the study of gender and sexuality and to the ways in which gender and sexuality intersect with other politically relevant categories, identities, and forms of marginalization, such as race, ethnicity, class, and ideological and partisan identification.

WGSS 741b / AFAM 777b / AMST 707b, Race, Colorblindness, and the Academic Disciplines Daniel HoSang

Examines the ways that academic disciplines in the social sciences, humanities, and natural sciences have developed in relation to white supremacy and colonialism, and their imbrication in theories of racial hierarchy and conquest. Foregrounds the racial histories and colorblind defenses of race neutrality in fields as diverse as social psychology, the law, musicology, literary studies, sociology, and gender studies to reveal

the contradictory role of the academy in constructing, naturalizing, and reproducing frameworks of racial domination. Considers the ways that insurgent scholars and formations have contested these traditions to discredit these traditions and deploy disciplinary methods and theorizations toward emancipatory ends. Engages work by Kimberlé Crenshaw, George Lipsitz, Toni Morrison, Roderick Ferguson, and others.

WGSS 767a or b / PSYC 777a or b, 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 769a / ENGL 742a, 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, Elizabeth Inchbald, Maria Edgeworth, Jane Austen, Anna Barbauld, and Mary Shelley.

WGSS 782a / HIST 940a / HSHM 770a, Disability Histories: Research Seminar

Naomi Rogers

This course introduces students to the major issues in current disability history as well as theoretical debates in disability studies. We discuss cultural, social, and political meanings of citizenship; efforts to define and classify disabled bodies; contested notions of bodily difference; and the ways disability has and continues to be used as a metaphor for socially defined inferiority like gender, race, or sexuality. By the fourth week students have identified the topic for their research papers and discussed them in class. The next month is devoted to research and writing. We then start meeting again to read and discuss a draft of each paper.

WGSS 900a or b, Colloquium and Working Group Joseph Fischel

The course is made up of two components: the WGSS Graduate Colloquium, in which graduate students present ongoing research (meets every two to three weeks); and the WGSS Working Group, in which faculty present pre-circulated works-in-progress for critical feedback from the WGSS community (meets every two to three weeks).

NON-DEGREE-GRANTING PROGRAMS, COUNCILS, AND RESEARCH INSTITUTES

Students enrolled in the Graduate School have the opportunity to participate in a number of non-degree-granting programs, councils, and institutes at Yale.

Archaia

<http://archaia.yale.edu>

Graduate Qualification in the Study of Ancient and Premodern Cultures and Societies

Graduate Coordinators

Eckart Frahm (*Near Eastern Languages & Civilizations*)

Irene Peirano Garrison (*Classics*)

Steering Committee Oswald Chinchilla (*Anthropology*), John J. Collins (*Divinity*), Maria Doerfler (*Religious Studies*), Steven Fraade (*Religious Studies; Judaic Studies*), Eckart Frahm (*Near Eastern Languages & Civilizations*), Milette Gaifman (*Classics; History of Art*), Felicity Harley-McGowan (*Divinity*), Michael Hunter (*East Asian Languages & Literatures*), Andrew Johnston (*Classics*), Jacqueline Jung (*History of Art*), Edward Kamens (*East Asian Languages & Literatures*), Noel Lenski (*Classics; History*), Yii-Jan Lin (*Divinity*), J.G. Manning (*Classics; History*), Susan Matheson (*Yale University Art Gallery*), Laura Nasrallah (*Divinity*), Irene Peirano Garrison (*Classics*), Kevin van Bladel (*Near Eastern Languages & Civilizations*)

GRADUATE QUALIFICATION IN THE STUDY OF ANCIENT AND PREMODERN CULTURES AND SOCIETIES

Archaia: Yale Program for the Study of Ancient and Premodern Cultures and Societies 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 Archaia 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 Archaia are Anthropology, 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 Archaia 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 Archaia 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 a graduate coordinator of Archaia 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 courses, of which at least two must be seminar or seminar-type courses, chosen in consultation with 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 the Archaia coordinators 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 Archaia throughout the academic year, especially the monthly meetings of the Ancient Societies Workshop.

Students who fulfill these requirements will receive a letter from the Archaia coordinators, indicating that they have completed the work for the qualification.

CORE SEMINARS

NELC 668b / CLSS 829b / HIST 507b / LING 668b, Historical Sociolinguistics of the Ancient World Kevin van Bladel

Social history and linguistic history can illuminate each other. This seminar confers the methods and models needed to write new and meaningful social history on the basis of linguistic phenomena known through traditional philology. Students learn to diagnose general historical social conditions on the basis of linguistic phenomena occurring in ancient texts. Prerequisite: working knowledge of at least one ancient language.

RLST 619b / CLSS 872b / HIST 513b / MDVL 513b / NELC 683b, Law and History, Law in History: Premodern Civilizations through the Lens of Legal Historiography Maria Doerfler and Travis Zadeh

This seminar invites students into a comparative exploration of the intersection of law, history, and historiography in the ancient and premodern world. Sessions explore these links across a variety of linguistic and geographic settings, including those of ancient and medieval India, China, Persia, Greece, and Rome, as well as in different political, religious, literary, and archaeological contexts. The seminar constructs the category of law expansively to encompass civic, religious, and hybrid forms of legislation. In the process, we seek to explore, *inter alia*, questions of the relevance of history for the study of law, history's deployment in the context of legal writings, and law's concomitant relevance for historiography; the use of theoretical models, including those forged in modern and postmodern contexts, for the study of law and legal historiography; and the implications of discourses about law and history in premodernity for contemporary, post-secular societies.

Atmospheric Science

Advisory Committee Sarbani Basu (*Astronomy*), Michelle Bell (*School of the Environment*), Alexey Fedorov (*Earth & Planetary Sciences*), Debra Fischer (*Astronomy*), Gary Haller (*Emeritus, Chemical & Environmental Engineering*), Xuhui Lee (*School of the Environment*), Ronald Smith (*Earth & Planetary Sciences*), Mitchell Smooke (*Mechanical Engineering & Materials Science; Applied Physics*), Mary-Louise Timmermans (*Earth & Planetary Sciences*), John Wettlaufer (*Earth & Planetary Sciences; Mathematics; 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. Individuals interested in Atmospheric Science should complete the admissions requirements for the specific participating department to which they will be applying, which may include the GRE General or Subject Test. The Department of Earth and Planetary Sciences 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)

55 College Street, 203.785.5663

<https://medicine.yale.edu/bbs>

Director

Craig Roy

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, Quantitative Biology, 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 eleven 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
 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 Yale University Fellowships, National Institutes of Health (NIH) training grants, and grants from foundations and companies.

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, Quantitative Biology, 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 <https://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 <https://medicine.yale.edu/bbs/training/nihprograms>.

Program materials are available upon request to Bonnie Ellis, Associate 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; website, <https://medicine.yale.edu/bbs>.

COURSES

B&BS 640a / PATH 640a, Developing and Writing a Scientific Research Proposal

Katerina Politi and Jean-Ju Chung

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 twelve. Required of second-year graduate students in Experimental Pathology. Registration allowed by prior authorization from course directors only.

B&BS 681a / PATH 681a, Advanced Topics in Cancer Biology Kurt Schalper

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 650 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.

The Cowles Foundation

451 College Street
<http://cowles.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

Rohini Pande

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; scaling up from randomized control trial; studies of external validity; 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; general-equilibrium effects of program interventions; income distribution; domestic and international migration; the relationship between trade and development; production scale; 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 Marx Science and Social Science Library, 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 program in International and Development Economics.

Environmental Humanities

<https://environmentalhumanities.yale.edu>

Graduate Certificate in Environmental Humanities

Program Director

Paul Sabin (316 McClellan Hall; paul.sabin@yale.edu)

Director of Graduate Studies

Kalyanakrishnan Sivaramakrishnan (10 Sachem St., Rm. 128;
kalyanakrishnan.sivaramakrishnan@yale.edu)

Faculty associated with the program Laura Barraclough (*American Studies*), Paola Bertucci (*History; History of Science & Medicine*), Ned Blackhawk (*History; American Studies*), Jill Campbell (*English*), Carol Carpenter (*School of the Environment*), Benjamin Cashore (*School of the Environment*), Oksana Chefranov (Film & Media Studies), Susan Clark (*School of the Environment*), Deborah Coen (*History of Science & Medicine*), Edward Cooke, Jr. (*History of Art*), Ivano Dal Prete (*History*), Wai Chee Dimock (*American Studies; English*), Amity Doolittle (*School of the Environment*), Michael Dove (*School of the Environment; Anthropology*), Fabian Drixler (*History*), Justin Farrell (*School of the Environment*), Paul Freedman (*History*), Reinaldo Funes Monzote (*Visiting; MacMillan Center*), Jay Gitlin (*History*), John Grim (*School of the Environment*), Robert Harms (*History*), Alanna Hickey (*English*), Cajetan Iheka (*English*), Matthew Jacobson (*American Studies; African American Studies; History*), Paul Kennedy (*History*), Benedict Kiernan (*History*), Verlyn Klinkenborg (*English; School of the Environment*), Jonathan Kramnick (*English*), Douglas Kysar (*Law School*), Anthony Leiserowitz (*School of the Environment*), Katja Lindskog (*English*), J.G. Manning (*Classics; History*), Lisa Messeri (*Anthropology*), Alan Mikhail (*History*), Charles Musser (*American Studies; Film & Media Studies; Theater Studies*), Peter Perdue (*History*), John Peters (*English; Film & Media Studies*), Richard Prum (*Ecology & Evolutionary Biology*), Jennifer Raab (*History of Art*), Joanna Radin (*History of Science & Medicine; Anthropology; History*), William Rankin (*History*), Kristin Reynolds (*School of the Environment*), Carolyn Roberts (*History of Science & Medicine; African American Studies*), Douglas Rogers (*Anthropology*), Elihu Rubin (*School of Architecture; American Studies*), Paul Sabin (*History; American Studies*), Oswald Schmitz (*School of the Environment; Ecology & Environmental Biology*), Stuart Schwartz (*History*), James Scott (*Political Science; Anthropology; School of the Environment*), Kalyanakrishnan Sivaramakrishnan (*Anthropology; School of the Environment*), Gary Tomlinson (*Music; Humanities*), Mary Evelyn Tucker (*School of the Environment; Divinity School; Religious Studies*), John Wargo (*School of the Environment*), Michael Warner (*English; American Studies*), Harvey Weiss (*Near Eastern Languages & Civilizations; School of the Environment*), Kenneth Winkler (*Philosophy*), Carl Zimmer (*Adjunct; School of Medicine*)

GRADUATE CERTIFICATE IN ENVIRONMENTAL HUMANITIES

Yale Environmental Humanities aims to deepen our understanding of the ways that culture is intertwined with nature and to contribute to a broad interdisciplinary conversation about humanity and the fate of the planet. Humanities scholars have an opportunity to reshape how we think about environmental problems and “the

environment” itself. In turn, interdisciplinary dialogue with scientists and social scientists can stimulate the humanities in productive ways, raising new research questions and providing fresh ways to approach long-standing issues. As an interdisciplinary initiative, Yale Environmental Humanities draws particularly on faculty and courses from across the humanities departments, including American Studies, Anthropology, Comparative Literature and other literature departments, English, Film and Media Studies, History, History of Art, and Philosophy, as well as from professional schools, including Architecture, Divinity, Drama, Environment, and Public Health.

The Certificate in Environmental Humanities is available to students already enrolled in a Ph.D. program at Yale who seek to establish a strong foundation in environmental humanities topics and methodologies across the humanities disciplines. Students who complete the Graduate Certificate will gain skills working in interdisciplinary environmental settings and representing humanities perspectives on a broad range of environmental topics. Interested students are strongly encouraged to register for the certificate by meeting with the director of graduate studies (DGS) during their first year.

SPECIAL REQUIREMENTS FOR THE GRADUATE CERTIFICATE IN ENVIRONMENTAL HUMANITIES

Students who wish to receive the certificate must complete the following course work, research, and teaching requirements:

1. Three approved graduate or professional school courses focusing entirely or substantially on environmental themes, broadly defined. At least one of the courses should involve approximately 50 percent of its material from outside a student's home department or discipline. In consultation with the DGS and the student's Environmental Humanities adviser (who can also be their departmental adviser), each student is expected to organize their elective courses around a concentration related to their departmental course work and doctoral research. Elective courses will be chosen from a list of the environmental humanities graduate courses that are being offered each term.
2. Two terms of the Environmental Humanities certificate workshop, Topics in the Environmental Humanities (HIST 963 and HIST 964). Students must complete both a fall term and a spring term of the workshop, but the two terms of student participation need not be consecutive. Topics in the Environmental Humanities is a half-credit course that will be offered in both the fall and spring terms (one credit total). Academic credit from the workshop course typically does not count toward departmental course work requirements.
3. Students must demonstrate the capacity to pursue independent, interdisciplinary research in environmental humanities by presenting a qualifying paper at a meeting of the Environmental Humanities workshop, Graduate Research Symposium, or other approved venue.
4. Students must fulfill a teaching requirement by serving as a teaching fellow for an approved environmental humanities course or by completing an approved public humanities project. Other options are possible if appropriate teaching opportunities are not available.

Each of these requirements will require approval from the DGS of Environmental Humanities. Additional certificate program information, including the application and requirements checklist for the certificate, is available on the Environmental Humanities website (<https://environmentalhumanities.yale.edu>) or by contacting environmentalhumanities@yale.edu.

CERTIFICATE WORKSHOP

HIST 963a and HIST 964b / ANTH 963a and ANTH 964b / HSAR 841a and HSAR 842b / HSHM 691a and HSHM 692b, Topics in the Environmental Humanities Paul Sabin and Tomo Sugimoto

This is the required workshop for the Graduate Certificate in Environmental Humanities. The workshop meets six times per term to explore concepts, methods, and pedagogy in the environmental humanities, and to share student and faculty research. Each student pursuing the Graduate Certificate in Environmental Humanities must complete both a fall term and a spring term of the workshop, but the two terms of student participation need not be consecutive. The fall term each year emphasizes key concepts and major intellectual currents. The spring term each year emphasizes pedagogy, methods, and public practice. Specific topics vary each year. Students who have previously enrolled in the course may audit the course in a subsequent year. Open only to students pursuing the Graduate Certificate in Environmental Humanities.

½ Course cr per term

Film and Media Studies

53 Wall Street, Rm. 216, 203.436.4668

<http://filmstudies.yale.edu>

Graduate Certificate in Film and Media Studies

Chair

John Durham Peters

Director of Graduate Studies

Francesco Casetti

Faculty

For faculty listings, see Film and Media Studies under Degree-Granting Departments and Programs in this bulletin.

GRADUATE CERTIFICATE IN FILM AND MEDIA STUDIES

The Film and Media Studies Program gives students the tools necessary to grapple with the decisive media of the past one hundred years: from film to television to the platform-agnostic digital images of today. That knowledge is critical and practical, analytic and experimental, historical and theoretical. As an interdisciplinary program, Film and Media Studies draws on courses from Art to Comparative Literature to Slavic Languages and Literatures to American Studies, taught by a dedicated group of world-renowned faculty.

The Certificate in Film and Media Studies is open to students already enrolled in a Ph.D. program at Yale. The aim is to provide graduate students in other programs, departments, and divisions the opportunity to develop and demonstrate a degree of competence in the history and theory of film and media technologies. Interested students are strongly encouraged to register for the certificate by meeting with the director of graduate studies (DGS) during their first year.

SPECIAL REQUIREMENTS FOR THE GRADUATE CERTIFICATE IN FILM AND MEDIA STUDIES

Students who wish to receive the certificate must complete the following: (1) FILM 601, Foundations of Film and Media; (2) two electives, one of which must be drawn from the Film and Media Studies curriculum; the second may focus on media relevant to the student's own research interests, but must be approved by the DGS of Film and Media Studies; (3) FILM 605 and FILM 606, Certificate Workshop, offered only to certificate students; the workshop meets biweekly over two terms and counts as one regular course credit. Students will be required to present a qualifying paper demonstrating their capacity to do interdisciplinary work.

In approved cases, certificate students may serve as TFs in Film and Media Studies courses. However, there is no formal teaching requirement for the certificate program.

Each of these requirements will require approval from the DGS of Film and Media Studies, the DGS of the student's degree department, and a Film and Media Studies adviser. A plan for fulfilling the requirements will be worked out in advance, in

consultation with all three of the above. Students may apply to count a course they took during their first year.

Additional certificate program information is available on the Film and Media Studies website (<http://filmstudies.yale.edu>). For information on the Ph.D. program in Film and Media Studies, see Film and Media Studies under Degree-Granting Departments and Programs in this bulletin.

CERTIFICATE WORKSHOP

FILM 605	Film and Media Studies Certificate Workshop
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FILM 606	Film and Media Studies Certificate Workshop
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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 2020, 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 to gain practical experience in research. This experience provides a basis for developing a dissertation prospectus that addresses significant research questions. Students work with a faculty mentor to select a suitable placement for the summer internship. As part of the application/registration, a one-page description of the student's research plan is submitted to the DGS at least three weeks prior to starting the internship, 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. 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. As part of the application/registration, a one-page description of the student's research plan is 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, 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

Alan Gerber

Executive Committee Nicholas Christakis, John Dovidio (*Emeritus*), Heather Gerken, James Levinsohn, Jennifer Richeson, Frances Rosenbluth, 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. To achieve these ends, ISPS sponsors high-level conferences, interdisciplinary faculty seminars, targeted research projects on key policy issues, graduate and undergraduate fellowship programs, and postdoctoral appointments.

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. These programs organize many of their activities through ISPS's Policy Lab, a space for policy-oriented events, research, and collaboration. ISPS also supports the Program in Ethics, Politics, and Economics; and the Yale Interdisciplinary Center for Bioethics.

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

Nuno Monteiro

International Security Studies (ISS) at Yale was founded in 1988 and is supported by the Smith Richardson Foundation, the Jewett Foundation, and the Friends of ISS. ISS operates in partnership with the Brady-Johnson Program in Grand Strategy, directed by Beverly Gage, and is dedicated to the study of international history, grand strategy, and global security.

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 the twenty-first century.

ISS organizes an array of extracurricular activities each academic year. It hosts lectures, dinner debates, conferences, colloquia, and discussion groups. It also 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, and 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/meet-us/faculty/overview>.

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.

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

Maurice Samuels

Director of Graduate Studies

Steven Fraade

Professors Joel Baden (*Divinity*), John J. Collins (*Divinity; Religious Studies*), Steven Fraade (*Religious Studies*), Paul Franks (*Philosophy*), Christine Hayes (*Religious Studies*), Hannan Hever (*Comparative Literature*), Ivan Marcus (*History; Religious Studies*), Paul North (*German*), Maurice Samuels (*French*), David Sorkin (*History*), Laura Wexler (*Women's, Gender, & Sexuality Studies; American Studies*)

Associate Professors Elli Stern (*Religious Studies; History*), Marci Shore (*History*)

Assistant Professor Jacqueline Vayntrub (*Divinity*)

Senior Research Scholar Margaret Olin (*Divinity; History of Art; Religious Studies*)

Senior Lecturer Peter Cole (*Comparative Literature*)

Senior Lector II Shiri Goren (*Near Eastern Languages & Civilizations*)

Senior Lector I Dina Roginsky (*Near Eastern Languages & Civilizations*)

Lectors Josh Price, Orit Yeret (*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

For course offerings in the Hebrew language and in Israeli society and culture, see Near Eastern Languages and Civilizations.

JDST 701a / 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.

JDST 721a or b / NELC 703 / RLST 751b, 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.

JDST 727a, Mishnah Seminar: Tractate Megillah Steven Fraade

Study of rabbinic texts treating rules for the public recitation and translation of the Scroll of Esther on the holiday of Purim and of other sacred scriptures and translations throughout the year, with special attention to the relation between law and ritual and the narrativity of both. *EMWAR area of concentration designations: STHJ, RabJud, ScrInterp*. Prerequisite: reading fluency in ancient Hebrew.

JDST 760a / RLST 772a, Rabbinics Research Seminar Christine Hayes

An in-depth survey of research debates and of methods and resources employed in the study of classical (pre-Geonic) rabbinic literature of all genres. Required of graduate students in ancient Judaism. Prerequisites: knowledge of Hebrew and Aramaic, ability to read academic Hebrew, and permission of the instructor.

JDST 761a / HIST 596a / MDVL 596a / RLST 773a, 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.

JDST 764b / HIST 590b / MDVL 590b / RLST 777b, 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.

JDST 806a / HIST 603a / MDVL 603a / RLST 616a, Jews and Christians in the Formation of Europe, 500–1500 Ivan Marcus

This seminar explores how medieval Jews and Christians interacted as religious societies between 500 and 1500.

JDST 835a / HEBR 519a, 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.

JDST 842a / CPLT 688a / RLST 775a, What is Political Theology? Hannan Hever

This course investigates the theological aspects of modern political ideologies. It takes its title from the controversial work of the German political thinker Carl Schmitt, who argued that theological assumptions stood behind the veneer of secular politics. Concepts such as sovereignty, citizenship, universalism, law, and the state of exception have been said to have their provenance in Jewish and Christian concepts of God, election, Messiah, the commandment, and antinomianism. In recent years the study of the theological origins of political concepts has become important for both those seeking to critique the neutrality of certain western-democratic institutions as well as those hoping to better understand the relationship between religion and politics. Subjects covered in the course include sovereignty, universalism, law, election, commandment, messianism, and nationalism. Readings focus on the work of modern political thinkers such as Benedict Spinoza, Thomas Hobbes, and Bruno Bauer, whose normative works assumed a direct relationship between the political and the theological, as well as those who have theorized the very idea of political-theology, such as Martin Buber, Alain Badiou, Slavoj Žižek, Daniel Boyarin, and Giorgio Agamben.

JDST 861b / HIST 597b / RLST 797b, Twentieth-Century Jewish Politics

David Sorkin

This seminar explores major aspects of twentieth-century Jewish politics with an emphasis on new forms of political practice.

Leadership and Research Management for Physician-Scientists

M.D./Ph.D. Program

Edward S. Harkness Hall, Rm. D317, 203.737.5613

<https://medicine.yale.edu/mdphd/education/cert-physician-scientists>

Certificate in Leadership and Research Management for Physician-Scientists

Director

Barbara Kazmierczak

One part of the Yale M.D./Ph.D. joint-degree program's mission is to develop skills in our trainees that are associated with success in a broad range of physician-scientist research careers through experiential learning. The Certificate in Leadership and Research Management for Physician-Scientists was developed to provide formal training in the skills necessary for effective leadership and management of research and clinical teams. We realize that many of these skills also help our students during their M.D. and Ph.D. training period, and we therefore think it is critical that our students learn and practice these skills early in training. Although many of our students already engage in some of these training and experiential activities, the certificate allows us to evaluate and recognize their mastery of these specific skills.

Modules 1–3 are required of all M.D./Ph.D. students. Module 1: Mentoring will be offered in late spring/early summer and should be taken by students prior to the experience of mentoring a junior trainee. Module 2: Proposal Development will be offered in the fall and should be taken by students in Year 3, when they are also qualifying. Module 3: Teaching should be taken by students prior to their Teaching Fellow service.

Students will also be required to complete at least one of the four optional modules (Module 4: Communication; Module 5: Leadership and Teamwork; Module 6: Self-Management; Module 7: Nuts and Bolts of Research Management) during the course of their training. The optional modules will be offered every other year, allowing students to complete the workshops during their M.D./Ph.D. training period.

Each module includes an experiential project that must be completed as part of the certificate program. Students who complete all seven modules will receive a Certificate in Leadership and Research Management for Physician-Scientists.

Additional certificate program information is available on the M.D./Ph.D. program website: <https://medicine.yale.edu/mdphd/education/cert-physician-scientists>.

The Whitney and Betty MacMillan Center for International and Area Studies at Yale

Luce Hall, 203.432.0694

<http://macmillan.yale.edu>

Director

Steven Wilkinson (*Political Science*)

For more than eighty-five years, the Whitney and Betty MacMillan Center for International and Area Studies at Yale and its precursors have served as the University's focal point for teaching and research on cultures, languages, societies, institutions, and practices 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 the Environment, 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; Arabic Program; Baltic Studies; British Historical Studies; Canadian Studies; East Asian Studies; European Studies; Stavros Niarchos Foundation Center for Hellenic Studies; Iranian Studies; Japan at the Crossroads Project; Latin American and Iberian Studies; Middle East Studies; Project on Religious Freedom and Society in Africa; Russian, East European, and Eurasian Studies; 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; European Union Studies; Genocide Studies; Geographically based Economic Data Project (G-Econ); Gilder Lehrman Center for the Study of Slavery, Resistance, and Abolition; Center for Historical Enquiry and the Social Sciences (CHESS); Yale Research Initiative on Innovation and Scale (Y-RISE); InterAsia Initiative; Georg Walter Leitner Program in International and Comparative Political Economy; Program on Refugees, Forced Displacement, and Humanitarian Responses; and Translation Initiative.

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 more than sixty 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 less commonly taught languages.

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 twenty world-renowned academic partners. 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. Shows 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>.

- Council on African Studies
- Council on East Asian Studies
- European Studies Council
- Council on Latin American and Iberian Studies
- Council on Middle East Studies
- South Asian Studies Council
- Council on Southeast Asia Studies

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 website. 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.

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.

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.

LANGUAGE PROFICIENCY

Language proficiency in at least one language relevant to the area of concentration beyond proficiency in English is required. (For some councils and for some individual circumstances, proficiency in two languages beyond English is required.) 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, a candidate who is a native speaker of one of the area's major languages will be expected to develop language proficiency in a second major-area language.

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, students will submit their request no later than the fourth week of the term in which they plan 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

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. No later than the fourth week of the term of the expected award, candidates should demonstrate how they have 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

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
137 Rosenkranz Hall, 203.432.1425
<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 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 505, Gateway to Africa, or AFST 764, Topics 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 (DGS) 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.

COURSES

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 East Asian Studies under Degree-Granting Departments and Programs 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 nearly sixty years, it has promoted education about East Asia both in the Yale curriculum and through lectures, workshops, conferences, film series, cultural events, and other activities open to students, faculty, and the general public. With more than twenty core faculty and an equal number of language instructors spanning ten 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 East Asian Studies under Degree-Granting Departments and Programs in this bulletin.

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 and conferences.

Every year, CEAS welcomes domestic and international scholars to campus as guest lecturers, visiting fellows, research scholars, and professors. In 1999 the council initiated the CEAS Postdoctoral Associates Program, bringing talented individuals into the community of scholars at Yale to conduct research and teach advanced undergraduate seminars.

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 collections at

the Yale University Art Gallery also support classroom instruction, faculty research, and community outreach activities.

COURSES

For course listings, see East Asian Studies under Degree-Granting Departments and Programs in this bulletin.

European Studies Council

The MacMillan Center

242 Luce Hall, 203.432.3107

<http://europeanstudies.macmillan.yale.edu>

Graduate Certificate of Concentration in European Studies

Chair

Edyta Bojanowska (*Slavic Languages & Literatures; on leave*)

Acting Chair

Julia Adams (*Sociology*)

Director of Graduate Studies

Marci Shore (*History; marci.shore@yale.edu, 203.432.6792*)

Faculty and Participating Staff

For faculty listings, see 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, East European, and Eurasian Studies; and Hellenic Studies; as well as a Polish cultural initiative.

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 <https://yale.communityforce.com/Funds/Search.aspx>), 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, East Europe, Eurasia or (2) West and Central 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, candidates need to fulfill all requirements detailed below, as well as complete their 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 one modern European language, in addition to English. Students wishing to focus on Russia and East Europe must demonstrate knowledge of Russian or an East European language; those focusing on West and Central Europe must demonstrate knowledge of one of the appropriate languages. Students must demonstrate proficiency in oral (speaking/listening), reading, and writing skills.
2. Six graduate-level courses in the area of concentration, of which:
 - a. Three courses must offer transnational approaches to Europe-related issues
 - b. For students focusing on Russia and East Europe, at least one of the remaining three courses must concern the nations of West and Central Europe. For those

focusing on West and Central Europe, at least one of the remaining three courses must concern Russia and East Europe.

3. A qualifying thesis paper is required to demonstrate field-specific research ability focused on the area of concentration. After completing substantial course work in the area of concentration, students must seek approval from the council faculty adviser. The thesis should be interdisciplinary as well as focused on the area of concentration. The acceptability of an M.A. thesis needs to be approved by the council adviser. More guidelines are provided by the council.
4. Progress Reports: 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 on engagement in the relevant council's activities and planned or newly completed experience overseas in the relevant region.
5. Filing for the Award of the Graduate Certificate of Concentration: Students who intend to file for the final award of the certificate should contact the council no later than the end of the term prior to award. No later than the fourth week of the term of the expected award, students should demonstrate how they have or will have completed all the requirements in a timely fashion. At the end of the term as grades are finalized, the council will confirm that the student is cleared to receive the home degree and has fulfilled all the requirements of the certificate. Students may elect to retrieve the certificate award in person from the council after commencement. Otherwise, the council will mail the certificate award to the student after commencement.

COURSES

For course listings, see European and Russian Studies under Degree-Granting Departments and Programs in this bulletin.

For more information, contact the European Studies Council, Yale University, PO Box 208206, New Haven CT 06520-8206; european.studies@yale.edu; 203.432.3107.

Council on Latin American and Iberian Studies

The MacMillan Center

232 Luce Hall, 203.432.3420

<http://clais.macmillan.yale.edu>

Graduate Certificate of Concentration in Latin American and Iberian Studies

Chair

Claudia Valeggia (*Anthropology*)

Professors Rolena Adorno (*Spanish & Portuguese*), Ned Blackhawk (*History; American Studies*), Richard Burger (*Anthropology*), Enrique De La Cruz (*Molecular Biophysics & Biochemistry*), Carlos Eire (*History; Religious Studies*), Eduardo Fernandez-Duque (*Anthropology*), Paul Freedman (*History*), Roberto González Echevarría (*Spanish & Portuguese; Comparative Literature*), Aníbal González-Pérez (*Spanish & Portuguese*), K. David Jackson (*Spanish & Portuguese*), Gilbert Joseph (*History*), Alan Kazdin (*Psychology*), Albert Ko (*Epidemiology; Internal Medicine*), Daniel Markovits (*Law*), Stephen Pitti (*History*), Claire Priest (*Law*), Cristina Rodríguez (*Law*), Alicia Schmidt Camacho (*American Studies*), Stuart Schwartz (*History*), Claudia Valeggia (*Anthropology*), Noël Valis (*Spanish & Portuguese*), Elisabeth Wood (*Political Science*)

Associate Professors Rodrigo Canales (*Management*), Oswaldo Chinchilla Mazariegos (*Anthropology*), Ana De La O Torres (*Political Science*), Marcela Echeverri Muñoz (*History*), Anne Eller (*History*), Moira Fradinger (*Comparative Literature*), Cécile Fromont (*History of Art*), Albert Laguna (*American Studies*), Michael Murrell (*Biomedical Engineering*), Patricia Ryan-Krause (*Nursing*)

Assistant Professors Didac Queralt (*Political Science*), Emily Sellars (*Political Science*)

Senior Lectors and Lectors (Spanish & Portuguese) Sybil Alexandrov, María Pilar Asensio-Manrique, Mercedes Carreras, Ame Cividanes, Sebastián Díaz, María Jordán, Rosamaría León, Juliana Ramos-Ruano, Lissette Reymundi, Lourdes Sabé Colom, Terry Seymour, Margherita Tortora, Sonia Valle

Others Jane Edwards (*Sr. Associate Dean, Yale College; Dean, International & Professional Experience*), María José Hierro Hernández (*Lecturer, Political Science*), Jana Krentz (*Librarian, Latin American & Iberian Collections, Latinx Studies*), Florencia Montagnini (*Sr. Research Scientist, School of the Environment*), Maria Saez Marti (*Sr. Lector, Economics*)

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), Argentina (Valeggia), Brazil (Jackson, Ko, Ryan-Krause, Schwartz), the Caribbean (Echeverri Muñoz, Eller), Central America (Chinchilla, Joseph, Ryan-Krause, Wood), Colombia (Echeverri Muñoz), Cuba (Laguna), Mexico (Canales, De La O Torres, Joseph, Pitti, Schmidt Camacho, Sellars), and the Southern Cone (Fradinger). School of the Environment 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 LAIS Summer Research grants, are available to graduate and professional school students for summer research. Information on grants is available at <https://yale.communityforce.com/Funds/Search.aspx>.

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.

For more information on the Graduate Certificate, contact the Council on Latin American and Iberian Studies, Yale University, PO Box 208206, New Haven CT 06520-8206; latin.america@yale.edu; 203.432.3420.

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

Marcia Inhorn (*Anthropology*)

Professors Abbas Amanat (*History*), Harold Attridge (*Divinity*), Gerhard Bowering (*Religious Studies*), 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 (*Emeritus, Near Eastern Languages & Civilizations*), Christine Hayes (*Religious Studies*), Hannan Hever (*Comparative Literature*), Frank Hole (*Emeritus, Anthropology*), Marcia Inhorn (*Anthropology*), Anthony Kronman (*Law*), J.G. Manning (*Classics*), Ivan Marcus (*History*), Alan Mikhail (*History*), A. Mushfiq Mobarak (*School of Management*), Robert Nelson (*History of Art*), Catherine Panter-Brick (*Anthropology*), Kishwar Rizvi (*History of Art*), Maurice Samuels (*French*), Shawkat Toorawa (*Near Eastern Languages & Civilizations*), Kevin van Bladel (*Near Eastern Languages & Civilizations*), Harvey Weiss (*Near Eastern Languages & Civilizations*), Robert Wilson (*Divinity*)

Associate Professors Thomas Connolly (*French*), Robyn Creswell (*Comparative Literature*), Zareena Grewal (*American Studies*), Kaveh Khoshnood (*Public Health*), Hani Mowafi (*Emergency Medicine*), Jonathan Wyrzten (*Sociology*), Travis Zadeh (*Religious Studies*)

Assistant Professors Supriya Gandhi (*Religious Studies*), Samuel Hodgkin (*Comparative Literature*), Jill Jarvis (*French*), Elizabeth Nugent (*Political Science*), Eda Pepi (*Women's, Gender, & Sexuality Studies*), Evren Savci (*Women's, Gender, & Sexuality Studies*)

Senior Lecturers and Lecturers Karla Britton (*Architecture*), Tolga Köker (*Economics*), Nicholas Lotito (*Political Science*), Emma Sky (*Global Affairs*), Kathryn Slanski (*Near Eastern Languages & Civilizations*)

Senior Lectors (I, II) and Lectors Sarab Al Ani (*Arabic*), Muhammad Aziz (*Arabic*), Jonas Elbousty (*Arabic*), Ozgen Felek (*Turkish*), Shiri Goren (*Hebrew*), Dina Roginsky (*Hebrew*), Farkhondeh Shayesteh (*Persian*), Selim Tiryakiol (*Arabic*), Orit Yeret (*Hebrew*)

Librarians and Curators Roberta Dougherty (*Near East Collection*), Agnete Wisti 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 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: At least two years of successful study at the college level (or the equivalent) in one of the four major modern languages of the Middle East: Arabic, Hebrew, Persian, and Turkish.
2. Course work: A total of six courses in at least two disciplines on the Middle East and related issues. All courses must be completed with a passing grade.
3. Interdisciplinary research paper: A qualifying research paper that demonstrates field-specific research ability focused on the area of concentration. After having 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, students submit their request no later than the fourth week of the term in which they plan to submit the qualifying paper.

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; cristin.siebert@yale.edu.

South Asian Studies Council

The MacMillan Center

210 Luce Hall, 203.436.3517

<http://southasia.macmillan.yale.edu>

Chair

Sunil Amrith (*History*)

Professors Sunil Amrith (*History*), Tim Barringer (*History of Art*), Veneeta Dayal (*Linguistics*), Michael Dove (*School of the Environment*), Robert Jensen (*School of Management*), Alan Mikhail (*History*), A. Mushfiq Mobarak (*School of Management*), Kaivan Munshi (*Economics*), Rohini Pande (*Economics*), Kishwar Rizvi (*History of Art*), Kalyanakrishnan Sivaramakrishnan (*Anthropology*), Shyam Sunder (*School of Management*), Steven Wilkinson (*Political Science*)

Associate Professors Rohit De (*History*), Nihal DeLanerolle (*School of Medicine*), Mayur Desai (*Public Health*), Zareena Grewal (*American Studies; Religious Studies*)

Assistant Professors Subhashini Kaligotla (*History of Art*), Sarah Khan (*Political Science*), Priyasha Mukhopadhyay (*English*)

Lecturer Carol Carpenter (*School of the Environment*)

Senior Lectors Seema Khurana (*Hindi*), Swapna Sharma (*Hindi*)

Lector Aleksandar Uskokov (*Sanskrit*)

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 visit our website, <http://southasia.macmillan.yale.edu>.

COURSES

HNDI 510a, Elementary Hindi Staff

An in-depth introduction to modern Hindi, including the Devanagari script. Through a combination of graded texts, written assignments, audiovisual material, and computer-

based exercises, 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.

HNDI 520b, Elementary Hindi II Staff

Continuation of HNDI 510.

HNDI 530a, Intermediate Hindi I Swapna Sharma and Seema Khurana

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 520 or equivalent.

HNDI 532a, 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.

HNDI 540b, Intermediate Hindi II Swapna Sharma and Seema Khurana

Continuation of HNDI 530, focusing on further development of proficiency in the four language skill areas. Prerequisite: HNDI 530 or equivalent.

HNDI 542b, Accelerated Hindi II Swapna Sharma

Continuation of HNDI 532. 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 532 or equivalent.

HNDI 550a, 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 540 or permission of instructor.

HNDI 598a or b, Advanced Tutorial Staff

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 540, and submission of a detailed project proposal and its approval by the language studies coordinator.

SKRT 510a, Introductory Sanskrit I Aleksandar Uskokov

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 520/LING 525.

SKRT 520b, Introductory Sanskrit II Aleksandar Uskokov

Continuation of SKRT 510/LING 515. Focus on the basics of Sanskrit grammar; readings from classical Sanskrit texts written in the Indian Devanagari script. Prerequisite: SKRT 510/LING 515.

SKRT 530a, Intermediate Sanskrit I Aleksandar Uskokov

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 520 or equivalent.

SKRT 540b / LING 548b, Intermediate Sanskrit II Aleksandar Uskokov

Continuation of LING 538, 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 538/SKRT 530 or equivalent.

SKRT 550b, Advanced Sanskrit: Readings in Indian Philosophy and Aesthetics

Aleksandar Uskokov

This advanced language course introduces the jargon of the philosophical disciplines (theory of knowledge, metaphysics, philosophy of mind and language, philosophical theology, hermeneutics) and aesthetics in the several systems of learning in ancient and classical India, across the traditions of Hinduism, Buddhism, and Jainism. Additionally, the course introduces topics of philosophical significance in foundational texts such as the Upaniṣads, portions of the *Mahābhārata* and the *Purāṇas*, and the Buddhist *sūtra* literature. Special attention is given to matters of style, scholastic techniques, and advanced morphology and syntax. The course thus combines advanced language instruction with learning intellectual and cultural content, and it facilitates training in primary research in one of the classical languages of South Asia. Prerequisite: SKRT 540.

Council on Southeast Asia Studies

The MacMillan Center
311 Luce Hall, 203.432.3431, seas@yale.edu
<http://cseas.yale.edu>

Chair

Erik Harms (*Anthropology*)

Professors Michael Dove (*School of the Environment*), J. Joseph Errington (*Anthropology*), Benedict Kiernan (*History*), James Scott (*Political Science*), Mimi Hall Yiengpruksawan (*History of Art*)

Associate Professor Erik Harms (*Anthropology*)

Assistant Professor Alka Menon (*Sociology*)

Lecturers and Lectors (I, II) Dinny Risri Aletheiani (*Indonesian Language Studies*), Carol Carpenter (*School of the Environment*), Amity Doolittle (*School of the Environment*), Indriyo Sukmono (*Indonesian Language Studies*), Quan Tran (*American Studies*), Quang Phu Van (*Vietnamese Language Studies*)

Curators and Librarians Ruth Barnes (*Indo-Pacific Art, Yale University Art Gallery*), Brandon Miliate (*South and Southeast Asian Studies, Yale University Library*)

Yale does not offer higher degrees in Southeast Asia Studies. Instead, students apply for admission to one of the University's degree-granting departments or professional schools 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 contributes to the graduate and undergraduate curriculum with language courses, an annual seminar series, periodic conferences, cultural events, and special lectures.

Yale offers extensive library and research collections on Southeast Asia in Sterling Memorial Library, the Economic Growth Center, and the Peabody Museum of Natural History. Further information on library resources is available from Brandon Miliate, Librarian for South and Southeast Asian Studies, Sterling Memorial Library (203.432.9350, brandon.miliate@yale.edu (%20brandon.miliate@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 independent study or tutoring in other Southeast Asian languages through the Directed Independent Language Study Program or by special arrangement. Students planning to undertake field research or language study in Southeast Asia may apply to the council for summer fellowship support; see <http://cseas.yale.edu/grants-students>.

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; seas@yale.edu; or visit our website, <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* and at <http://courses.yale.edu>.

INDN 570a or b, Readings in Indonesian Staff

For students with advanced Indonesian language skills preparing for academic performance and/or research purposes. Prerequisites: advanced Indonesian and permission of the instructor.

VIET 560a, Readings in Vietnamese Quang Van

For students with advanced Vietnamese language skills who wish to engage in concentrated reading and research.

VIET 570b, Readings in Vietnamese Quang 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

Corey O'Hern (*Mechanical Engineering & Materials Science; Physics; Applied Physics; Computational Biology & Bioinformatics*)

Associate Director

Dorottya Noble

Executive Committee Julien Berro (*Molecular Biophysics & Biochemistry; Cell Biology*), Joerg Bewersdorf (*Cell Biology; Biomedical Engineering*), Enrique De La Cruz (*Molecular Biophysics & Biochemistry*), Thierry Emonet (*Molecular, Cellular, & Developmental Biology; Physics; Computational Biology & Bioinformatics*), 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*), Michael Murrell (*Biomedical Engineering*), Corey O'Hern (*Mechanical Engineering & Materials Science; Physics; Applied Physics; Computational Biology & Bioinformatics*), Thomas Pollard (*Molecular, Cellular, & Developmental Biology; 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, Quantitative Biology, Biophysics, and Structural Biology (BBS track); Biomedical Engineering; Cell Biology; Chemical & Environmental Engineering; Chemistry; 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); Molecular Medicine, Pharmacology, and Physiology (BBS track); Neuroscience (BBS track); Plant Molecular Biology (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 four core courses (see below), which all students, regardless of their undergraduate background, take together. The Integrated Workshop course (MB&B 591/ENAS 991/MCDB 591/PHYS 991) and the Methods and Logic in Interdisciplinary Research course (MB&B 517/ENAS 517/MCDB 517/PHYS 517) are typically taken in the first year. The third course, Biological Physics (ENAS 541/CB&B 523/MB&B 523/PHYS 523), and the fourth course, either Modeling Biological Systems II (MCDB 562/AMTH 765/CB&B 562/ENAS 561/INP 562/MB&B 562/PHYS 562) or Modeling Biological Systems I (CB&B 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 fourth course requirement: (1) Systems Biology of Cell Signaling (ENAS 567), (2) Biomedical Data Science: Mining and Modeling (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 Quantitative Approaches in Biophysics and Biochemistry (MB&B 635/ENAS 518) is a primer course for students entering PEB with little or no background in mathematics and computation.

In addition to the formal courses, there are a multitude of enrichment activities available to PEB students; see <http://peb.yale.edu>.

Public Humanities

<https://ph.yale.edu>

Graduate Certificate in Public Humanities

Program Directors

Matthew Jacobson

Laura Wexler

Director of Graduate Studies

Matthew Jacobson

Assistant Program Director and Assistant Director of Graduate Studies

Karin Roffman

Faculty and staff associated with the program Laura Barraclough (*American Studies; Ethnicity, Race, & Migration*), Tim Barringer (*History of Art*), Melissa Barton (*Beinecke Library; English*), Ned Blackhawk (*History; American Studies*), David Blight (*History*), Ryan Brasseaux (*American Studies*), David Bromwich (*English; Humanities*), Daphne Brooks (*American Studies; African American Studies; Women's, Gender, & Sexuality Studies*), Emily Coates (*American Studies*), Aimee Meredith Cox (*African American Studies; Anthropology*), Carolyn Dean (*History; French*), Richard Deming (*English*), Michael Denning (*American Studies*), Wai Chee Dimock (*English; American Studies*), Crystal Feimster (*American Studies; African American Studies; Women's, Gender, & Sexuality Studies*), Nicholas Forster (*African American Studies; Film & Media Studies*), Joanne Freeman (*History*), Beverly Gage (*History*), Bryan Garsten (*Political Science*), Jacqueline Goldsby (*American Studies; African American Studies; Women's, Gender, & Sexuality Studies*), Paul Grant-Costa (*Lewis Walpole Library*), Emily Greenwood (*Classics; Film & Media Studies*), Zareena Grewal (*American Studies; Ethnicity, Race, & Migration*), Jacob Hacker (*Political Science*), Langdon Hammer (*English*), Daniel HoSang (*American Studies; Ethnicity, Race, & Migration*), Matthew Jacobson (*American Studies; Ethnicity, Race, & Migration; History; African American Studies*), Kathryn James (*Beinecke Library*), Grace Kao (*Sociology; Ethnicity, Race, & Migration*), Alice Kaplan (*French; Women's, Gender, & Sexuality Studies*), Jennifer Klein (*History; Women's, Gender, & Sexuality Studies*), Nancy Kuhl (*Beinecke Library*), Albert Laguna (*American Studies; Ethnicity, Race, & Migration*), Kathryn Lofton (*Religious Studies; American Studies; Women's, Gender, & Sexuality Studies*), Mary Lui (*History; American Studies*), John MacKay (*Slavic Languages & Literatures; Film & Media Studies*), Tracey Meares (*Law School*), George Miles (*Beinecke Library*), Leah Mirakhor (*American Studies; Ethnicity, Race, & Migration*), Lucy Mulroney (*Beinecke Library*), Charles Musser (*Film & Media Studies; American Studies*), Meghan O'Rourke (*Yale Review*), Stephen Pitti (*History; American Studies*), Sally Promey (*History of Art*), Claudia Rankine (*English*), Anna Reisman (*School of Medicine*), Carolyn Roberts (*History of Science and Medicine; American Studies*), Marc Robinson (*Theater & Performance Studies; American Studies; English*), Karin Roffman (*Humanities; American Studies; English*), Douglas Rogers (*Anthropology*), Elihu Rubin (*Architecture; American Studies*), Sebastian Ruth (*School of Music*), Paul Sabin (*History*), Alicia Schmidt Camacho (*American Studies; Ethnicity, Race, & Migration*), Caleb Smith (*English; American Studies*), Timothy Snyder (*History*), Jason Stanley (*Philosophy*), Gary Tomlinson (*Music; Humanities*), John Wargo (*School of the Environment; Political Science*), Michael Warner (*English; American Studies*),

Laura Wexler (*American Studies; Women's, Gender, & Sexuality Studies*), Timothy Young (*Beinecke Library*)

GRADUATE CERTIFICATE IN PUBLIC HUMANITIES

Public Humanities at Yale trains graduate students by expanding academic discourse beyond the confines of the classroom, academic publishing, and the academic conference circuit. By cultivating a dialogue with specialists in non-academic areas, students earning a Certificate in Public Humanities are prepared for public intellectual work such as museum and gallery installation, documentary film and photography, and oral/community history. Our mission is to expand the concept of “audience” by building bridges to a wide range of local and regional institutions and their respective publics.

Public Humanities at Yale represents an interdisciplinary certificate that is open to graduate students pursuing the Ph.D., a professional school degree, or a master's degree in any department, with the approval of their director of graduate studies (DGS). Requirements for the certificate must be completed by the time that the student's dissertation (or equivalent program requirement) is filed.

The mission of Public Humanities is fivefold:

1. To offer students an expanded curriculum in the methods, practices, and skill sets associated with the Public Humanities.
2. To cultivate and articulate best practices for collaborative and creative scholarly work.
3. To create new venues for intellectual work, both within Yale and across the city and the region.
4. To create new venues for *non*-academic expertise within Yale, and thus,
5. To create new conversations and to cultivate new relationships with contiguous institutions throughout the region (museums, libraries, archives, galleries, media outlets, historical societies, performance troupes, etc.) and with non-academic individuals who have much to offer in an academic setting (artists, photographers, curators, broadcast journalists, filmmakers, writers, etc.).

Distinct areas of focus within Public Humanities at Yale include Museums and Collections, Documentary Studies, Digital Humanities, Space and Place, History and the Public, Arts Research, and Public Writing.

REQUIREMENTS OF THE CERTIFICATE PROGRAM

1. Introduction to Public Humanities, PHUM 903.
2. Methods and Theory. Students complete for a grade at least one course selected from preapproved courses offered across the University that include topical specializations such as public memory, documentary studies, documentary film, ethnography, material culture, architecture, research-based performance, art history, public history, public writing, etc. As needed, this requirement can also be fulfilled in an independent study course with one of the affiliated faculty members and with the approval of the DGS or assistant DGS.
3. Practicum (PHUM 904). In addition to course work, public humanities students are required to complete a one-term internship with one of our partnered affiliates

(to be approved by the Public Humanities DGS or assistant DGS) for practical experience in the field. Potential internships include in-house opportunities at the Beinecke Library, Sterling Memorial Library, or one of Yale's museums, or work at a regional or national institution such as a media outlet, museum, or historical society. In lieu of the internship, students may choose to complete a "micro-credential." Micro-credentials are structured as workshop series (3–5 daylong meetings over the course of a year) rather than as term courses, and include revolving offerings in topics such as oral history, collections and curation, writing for exhibits, podcast production, website design, scriptwriting from the archive, or grant writing for public intellectual work.

4. Public Humanities Capstone Project (PHUM 905). The course work and practicum/micro-credential will lead to a significant project to be approved by the DGS or assistant DGS (an exhibition, documentary, research paper, etc.) and to be presented in a public forum on its completion.
5. Teaching Component. The final requisite for the certificate is a one-term teaching component. This assignment may be fulfilled by co-teaching one of our current public humanities courses, such as Introduction to Public Humanities, Introduction to Documentary Studies, the Documentary Film Workshop, or Introduction to Digital Humanities; or by teaching a special Digital Humanities or Public Humanities section for an existing course (e.g., *The History of Right Now*); or by fulfilling duties needed by education curators of the Yale Center for British Art, Yale Art Gallery, Peabody Museum, Beinecke Library, or Schwarzman Center.

Women's, Gender, and Sexuality Studies

315 William L. Harkness Hall, 203.432.0845

<http://wgss.yale.edu>

Graduate Certificate in Women's, Gender, and Sexuality Studies

Chair

Roderick Ferguson

Director of Graduate Studies

Joseph Fischel

Faculty

For faculty listings, see Women's, Gender, and Sexuality Studies under Degree-Granting Departments and Programs in this bulletin.

GRADUATE CERTIFICATE IN WOMEN'S, GENDER, AND SEXUALITY STUDIES

The certificate is open to all students already enrolled in a graduate program at Yale; it may be of particular interest for students who do not have the prerequisites to apply to the combined Ph.D. and/or for students whose dissertations will not substantively focus on gender or sexuality. Students are encouraged to register for the certificate by meeting with the WGSS director of graduate studies (DGS) during their first year.

Students who wish to receive the certificate must complete WGSS 600, Introduction to Women's, Gender, and Sexuality Studies; WGSS 900, Colloquium and Working Group; and two WGSS-numbered or substantively themed electives. Certificate students should also present a paper at the Colloquium and Working Group and fulfill a teaching requirement. Students who fulfill these expectations will receive a letter from the DGS awarding them the certificate.

COURSES

For course listings, see Women's, Gender, and Sexuality Studies under Degree-Granting Departments and Programs in this bulletin.

Yale Center for the Study of Globalization

Betts House, 203.432.1900, globalization@yale.edu
<http://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 explores solutions to 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 accordance with this mission, the YCSG enriches the debate about globalization on campus and promotes the flow of ideas between Yale and the policy world.

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 through an activity well known in international and policy circles: Commission Diplomacy. Over a ten-year period from 2002 to 2012, the YCSG was involved in over 50 percent of the international commissions convened worldwide, and the center continues this effective work today, bringing its efforts here to the Yale community in a variety of public forums.

The YCSG's current projects include the Rockefeller Foundation Economic Council on Planetary Health, which focuses on the interconnectedness between planetary health and human well-being; a project to produce a Charter on Universal Health Coverage; and work on global drug policy reform. These highlighted activities are in addition to the center's consistent focus on global development, global trade, financial globalization, peace and security, nuclear disarmament, and climate change mitigation.

On campus, the center hosts international conferences, organizes brainstorming sessions and panels, and works constantly to bring to the Yale community individuals who have input on international policy. The center's project International Cooperation in the National Interest: In Defense of the Multilateral System is an ongoing series of lectures and public presentations at Yale by leaders of the world's multilateral institutions and the experts and scholars who have studied and analyzed them.

POLICIES AND REGULATIONS

Admissions

<http://gsas.yale.edu/admission>

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 website 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 Visiting Students for nondegree study (see Nondegree Study under Programs of Study for more information, or visit the website 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 website at <http://gsas.yale.edu/admissions/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, and transcripts from each academic institution previously attended. Some degree programs require the submission of scores from 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 to combined degree programs should consult both programs' admissions requirements and submit scores if either of the two programs require the GRE General Test and/or Subject Tests. For all programs where the GRE General Test is not accepted, any scores submitted will not be considered for the purposes of admission. For programs where the GRE General Test is optional, any scores submitted will be taken into consideration for the purposes of admission.

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). Applicants who have received or will receive an undergraduate degree from a college or university where English is the primary language of instruction are exempt from the English Language Test requirement and are not required to submit the TOEFL or IELTS. Applicants must have studied in residence at the undergraduate

institution for at least three years to qualify. 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 charges, disciplinary sanctions, and breaks or leaves of absence in educational/professional experience. When an applicant answers affirmatively to any of these questions, the Graduate School will evaluate the circumstances outlined by the applicant to determine if they are potentially relevant to the applicant's 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 Academic Regulations.

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 *Visiting Students*. Although normally admitted for full-time study, Visiting 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 for a schedule of tuition and fee charges. Students admitted to the DSR as Visiting 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 that faculty member's 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. 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 for a schedule of tuition and fee charges.

Detailed information, requirements, and access to the online DSR application are available at <https://gsas.yale.edu/admissions/non-degree-application-process/visiting->

assistant-research-var. 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 *Exchange Scholars*. Exchange Scholars 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, Renaissance Studies, and Women's, Gender, and Sexuality 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 formal joint-degree programs with the professional schools, including 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; and the Ph.D./M.B.A. program in cooperation with the School of Management. In addition, joint-degree programs with professional schools have been approved for master's students in Chemical & Environmental Engineering, European and Russian Studies, Global Affairs, and International and Development Economics, and for doctoral students in Nursing. These programs are described in the individual departmental listings.

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 M.D./Ph.D. program (see Requirements for Joint-Degree Programs, under Degree Requirements).

EXCHANGE SCHOLAR PROGRAM

<http://gsas.yale.edu/academics/exchanges/exchange-scholar-program-ivyplus-exchange>

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 website listed above. Please direct questions to Associate 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

<http://gsas.yale.edu/academics/exchanges/international-exchanges>

The Graduate School has established and continues to develop formal exchanges with a number of institutions internationally in cases where there are reciprocal academic benefits for faculty and graduate students. Yale doctoral students may participate in the international exchanges listed below. Most of them last one term or a full academic year, and a small number of exchanges are available for summers only.

All international exchange agreements must be approved in advance by the Graduate School to ensure that they meet University policies 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. Students and faculty interested in pursuing these exchanges should contact Associate Dean Jasmina Besirevic Regan (jasmina.besirevic@yale.edu).

International Exchange Programs

Anthropology

Masarykova Univerzita, Brno, Czech Republic

Chemistry

Universität Göttingen, Germany

Council on East Asian Studies

Sophia University, Tokyo, Japan; Universität Heidelberg, Germany; University of Tokyo, Japan

Earth and Planetary Sciences

University of Helsinki, Finland

Economic Growth Center

Research Institute for Economics and Business Administration, Kobe University, Japan

Economics

Aalto University, Helsinki, Finland; Institut d'Études Politiques de Paris ["Sciences Po"], France; Università Bocconi, Milan, Italy; Universität Bonn, Germany; Universität Mannheim, Germany

French

École Normale Supérieure, Paris, France; Institut d'Études Politiques de Paris ["Sciences Po"], France

German

Humboldt-Universität zu Berlin, Germany

Graduate School

Baden-Württemberg Exchange, Germany; Graduate Institute of International and Development Studies, Geneva, Switzerland; German Academic Exchange Service (DAAD), Germany; Hebrew University, Jerusalem, Israel; Royal Holloway College, University of London, England; Shanghai Jiao Tong University, China; University College London, England; Universität Konstanz, Germany

History

Institut d'Études Politiques de Paris ["Sciences Po"], France; Universität Heidelberg, Germany

Political Science

Institut d'Études Politiques de Paris ["Sciences Po"]; Nuffield College, University of Oxford, England

Religious Studies

Hebrew University, Jerusalem, Israel

Sociology

Institut d'Études Politiques de Paris ["Sciences Po"], 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, under Academic Regulations). 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 website 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.

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/Course Waivers

The Graduate School does not award transfer credit for graduate work completed before matriculation at Yale.

Non-Yale courses 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 non-Yale graduate-level work completed after receipt of the bachelor's or bachelor's-equivalent degree. Such a waiver does not affect the tuition requirement. Courses taken prior to matriculation at Yale will not appear on the student's Graduate School transcript. The Yale courses waived will be recorded on the student's transcript as waived.

Yale courses With the approval of the department, a doctoral student who is currently enrolled may petition to count up to one year of relevant course work completed in a Yale master's or professional doctoral program as partial fulfillment of the Ph.D. course requirements. 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. The dean may reduce the four-year tuition requirement by either one or two terms, based on the number of courses accepted. The courses accepted will be listed on the student's transcript.

Waived courses are not counted in determining a student's eligibility for either terminal or en route master's degrees.

Foreign 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 Degree Committee. A department cannot make exceptions to its own requirements without authorization by the 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, two-credit graduate course or two one-credit 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 academic good 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 the 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. All graduate students teaching for the first time at Yale are required to attend a “Teaching @ Yale Day” (T@YD) orientation. 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 in the Financial Aid section 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 academic good standing. In addition, they must be fluent in English. Graduate students whose native language is not English are required to meet the oral English proficiency standard before they may begin teaching. This includes teaching in foreign language courses. The standard may be met by (1) passing the Center for Language Study oral exam, (2) passing the speaking section of the iBT TOEFL, (3) passing the speaking portion of the IELTS exam, or (4) having received an undergraduate baccalaureate degree or its equivalent from an institution where the principal language of instruction is English and the student was in residence for at least three years. 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. Doctoral students who have not met the oral English proficiency standard must enroll in at least one course offered by the Center for Language Study's English Language Program each term.

Advancing or Deferring the Teaching Years

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. Students in the humanities and social sciences may also request to teach earlier (in years two through four), if there are appropriate teaching opportunities available. Such requests are subject to approval by the director of graduate studies.

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 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 director of graduate studies 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 Committee. Once the adviser and committee have approved a dissertation for submission and the director of graduate studies has been notified, the student submits the dissertation along with the degree petition and a completed set of forms based on the requirements set forth on the dissertation checklist (see https://registrar.yale.edu/sites/default/files/dissertation_checklist_and_phd_petition_master_o.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 people but not more than five, at least two of whom hold faculty appointments in the Graduate School. 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 dean. 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 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 Physics, Archaeological Studies, Computational Biology and Bioinformatics, Computer Science, East Asian Studies, Engineering & Applied Science, English, European and Russian Studies, Global Affairs, History, History of Science and Medicine, International and Development Economics (IDE), Medieval Studies, Music, Near Eastern Languages and Civilizations, Public Health, and Statistics and Data Science.

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 one-credit graduate course (for students enrolled in one-year programs), or in at least two one-credit 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 the student 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 Chemical & Environmental Engineering, European and Russian Studies, Global Affairs, International and Development Economics, and Nursing. 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 for tuition 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 normally 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 beginning 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 and of the relevant department or program. At the time of the student's affiliation with a non-biological/biomedical science department or program, permission for any adjustment to the teaching requirement must be obtained from the Graduate School. Requests for adjustments to the program's teaching requirement should be submitted by the director of graduate studies and by the director of the M.D./Ph.D. program, as part of a student's proposed plan of study, to the associate dean for graduate student advising and academic support.

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 and all 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. Program

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 submit the results of the GMAT and, if required by the prospective Ph.D. program, the results of the GRE. 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 websites 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 the 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 websites. 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 the student 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. A joint-degree student who decides not to complete both degrees 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.

PROFESSIONAL ETHICS AND RESPONSIBLE CONDUCT IN RESEARCH

Professional Ethics and 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, as noted below.

Master's and Ph.D. Students

At the start of their first year of study, all master's and Ph.D. students are required to attend a small-group discussion of professional ethics, including academic integrity, prevention of sexual misconduct, and discrimination and harassment reporting. Students must also 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 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

GScommencement@yale.edu
<https://commencement.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 mid-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. Part-time employment includes teaching outside of the Graduate School's Teaching Fellow Program. 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 the student 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, mumps, rubella, and chickenpox 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, under Degree Requirements, 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 petitioning for extended registration. Prior to petitioning, students must submit 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 the student's adviser, as well as the director of graduate studies, must complete the DPR specifying the progress the student has made in writing the dissertation and present a detailed plan for completing the dissertation in the seventh year. Seventh-year registration petitions are decided on by departments and programs. 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. Eighth-year registration petitions are approved by the Graduate School deans. Students who are approved for extended registration must register online each term and are normally expected to be in residence.

Dissertation Completion status 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, the student 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 doctoral 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 the associate dean for graduate student advising and academic support. 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 stipend 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 the 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 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 (https://registrar.yale.edu/sites/default/files/graduate_credit_request_form_o.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 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 website 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 normally 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 Registrar's Office, 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 St.) 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 <https://world-toolkit.yale.edu/resources-topic/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 Registrar's Office.

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 director of graduate studies.

- 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 the 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 normally forgo 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, the student 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 director of graduate studies 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 director of graduate studies should recommend or disapprove the plan. Recommended plans should be forwarded to the associate dean for final review. The director of graduate studies 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 chief physician or their designee, 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 non-enrollment.
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 the registrar was notified of the leave. 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 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 Yale Health chief physician or their designee. A student who wishes to take a medical leave of absence may request it from a physician at Yale Health or from the student's associate dean. The general policies governing all leaves of absence are described above. A student who is making satisfactory progress toward 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 place a student on a mandatory medical leave of absence when, on recommendation of the director of Yale Health or the chief of the Mental Health and Counseling department, the dean of the School determines that, because of a medical condition, the student is a danger to self or others, the student has seriously disrupted others in the student's residential or academic communities, or the student has refused to cooperate with efforts deemed necessary by Yale Health

and the dean to make such determinations. Each case will be assessed individually based on all relevant factors, including, but not limited to, the level of risk presented and the availability of reasonable modifications. Reasonable modifications do not include fundamental alterations to the student's academic, residential, or other relevant communities or programs; in addition, reasonable modifications do not include those that unduly burden University resources. An appeal of such a leave must be made in writing to the dean of the School no later than seven days from the effective date of the leave. An incident that gives rise to voluntary or mandatory leave of absence may also result in subsequent disciplinary action.

A student who is placed on medical leave during any term will have 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 chief physician or their designee.

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. Yale Health's spring coverage ends July 31. Ph.D. students cleared to register for the following fall term receive a Graduate School Health Award for the month of August.

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 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 associate dean for graduate student advising and academic support prior to the term of the birth or adoption. This benefit is limited to two birth or adoption events. If both parents are Ph.D. students at Yale, both may receive this benefit per birth or adoption event.

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 the associate dean the term before the planned modifications would occur.

Withdrawal and Readmission

A student may withdraw from a program of study voluntarily or may be withdrawn for cause. A student who wishes to terminate a 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 website at <http://gsas.yale.edu/forms>) are required. 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 to be recorded.

Students who are not in academic good standing will be withdrawn for cause, unless an extension or exception has been granted by the appropriate dean or the 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 a 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 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 an intent 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 the 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 the 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 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 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, computers, labs, and photocopying equipment.
6. Violation of University rules for using information technology services and facilities, including computers, the University network, software systems, virtual meetings and online teaching technology, and electronic mail. (See Information Technology Appropriate Use Policy, online at <https://your.yale.edu/policies-procedures/policies/1607-information-technology-appropriate-use-policy>.)
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, disrupting online meetings, classes, or activities with inappropriate content or

activities, 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 their 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 doors or gates, fire extinguishers, and sprinkler systems.
18. Unlawful manufacture, possession, use, or distribution of illicit drugs or alcohol, including serving underage minors, on University property or as part of any University activity. Yale is a drug-free campus.
19. Use of tobacco products on any location on campus, including outdoor spaces. Yale is a tobacco-free institution.
20. Violation of University policies for safeguarding minor children and youth on campus whereby minors are endangered or put at risk due to action or inaction.

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 the student 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 website (<http://gsas.yale.edu/academic-professional-development/professional-ethics-regulations/student-grievances>). 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 website (<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.

Office of Institutional Equity and Access

Students who believe that a student, faculty member, or staff member has engaged in discrimination or harassment other than gender discrimination or sexual misconduct may report their concerns to the Office of Institutional Equity and Access, a University-wide office that assists with dispute resolution and investigates reports of discrimination and harassment. For additional information, see <https://student-dhr.yale.edu/complaint-resolution>. 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 Graduate School is committed to the protection of free inquiry and expression in the classroom and throughout the school community. In this, the School reflects the University's commitment to and policy on freedom of expression as eloquently stated in the Woodward Report (Report of the Committee on Freedom of Expression at Yale, 1974), which states, in part:

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.

See also <https://studentlife.yale.edu/guidance-regarding-free-expression-and-peaceable-assembly-students-yale>.

FINANCING GRADUATE SCHOOL

Tuition and Fees

TUITION, 2020–2021^{*}

Full-time study, per term: \$22,250

Full-time study in IDE, per term: \$22,750

Half-time study, per term: \$11,125

Master's programs, less than half-time per term

One-quarter time study, per term: \$5,562.50

Division of Special Registration (DSR, nondegree study)

Course work, per course, per term (including audited courses): \$5,562.50

Visiting Students, per term: \$22,250

Visiting Assistants in Research, per month: \$425

FEES, 2020–2021[†]

Continuous Registration Fee (CRF), per term[‡]: \$712.50

Yale Health Hospitalization/Specialty Coverage, twelve months[§]: \$2,548

^{*} 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 Billing

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 website is <http://student-accounts.yale.edu>.

STUDENT ACCOUNT

The Student Account is a record of all the direct charges for a student's Yale education such as tuition, room, board, fees, and other academically related items assessed by offices throughout the University. It is also a record of all payments, financial aid, and other credits applied toward these charges.

Students and student-designated proxies can view all activity posted to their Student Account in real time through the University's online billing and payment system, YalePay (<https://student-accounts.yale.edu/yalepay>). At the beginning of each month, e-mail reminders to log in to YalePay to review the Student Account activity are sent to all students at their official Yale e-mail address and to all student-designated YalePay proxies. Payment is due by 4 p.m. Eastern Time on the first of the following month.

Yale does not mail paper bills or generate monthly statements. Students and their authorized proxies can generate their own account statements in YalePay in pdf form to print or save. The statements can be generated by term or for a date range and can be submitted to employers, 401K plans, 529/College Savings Plans, scholarship agencies, or other organizations for documentation of the charges.

Students can grant others proxy access to YalePay to view student account activity, set up payment plans, and make online payments. For more information, see Proxy Access and Authorization (<http://sfas.yale.edu/proxy-access-and-authorization>).

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. Students who have not paid their student account term charges by the due date will also be placed on Financial Hold. The hold will remain until the term charges have been paid in full. While on Financial Hold, the University will not fulfill requests for transcripts or provide diplomas and reserves the right to withhold registration or withdraw the student for financial reasons.

PAYMENT OPTIONS

There are a variety of options offered for making payments toward a student's Student Account. Please note:

- All bills must be paid in U.S. currency.
- Yale does *not* accept credit or debit cards for Student Account payments.
- Payments should not be made to a Student Account that are in excess of the balance due (net of pending financial aid credits). Yale reserves the right to return any overpayments.

Online Payments through YalePay

Yale's recommended method of payment is online through YalePay (<https://student-accounts.yale.edu/yalepay>). Online payments are easy and convenient and can be made by anyone with a U.S. checking or savings account. There is no charge to use this service. Bank information is password-protected and secure, and there is a printable confirmation receipt. Payments are immediately posted to the Student Account, which allows students to make payments 365/24/7 up to 4 p.m. Eastern Time on the due date of the bill, from any location, and avoid late fees.

For those who choose to pay by check, a remittance advice and mailing instructions are available on YalePay. Checks should be made payable to Yale University, in U.S. dollars, and drawn on a U.S. bank. To avoid late fees, please allow for adequate mailing time to ensure that payment is received by 4 p.m. Eastern Time on the due date.

Cash and check payments are also accepted at the Student Financial Services Cashier's Office, located at 246 Church Street. The Cashier's Office is open Monday through Friday from 8:30 a.m. to 4:30 p.m.

Yale University partners with Flywire, a leading provider of international payment solutions, to provide a fast and secure way to make international payments to a Student Account within YalePay. Students and authorized proxies can initiate international payments from the Make Payment tab in YalePay by selecting "International Payment via Flywire" as the payment method, and then selecting the country from which payment will be made to see available payment methods. International payment via Flywire allows students and authorized proxies to save on bank fees and exchange rates, track the payment online from start to finish, and have access to 24/7 multilingual customer support. For more information on making international payments via Flywire, see International Payments Made Easy at <https://student-accounts.yale.edu/sites/default/files/files/Yale%20International%20Payments%20-%20YalePay.pdf>.

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, late fees of \$125 per month will be charged for the period the bill was unpaid, as noted above.
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

A Yale Payment Plan provides parents and students with the option to pay education expenses monthly. It is designed to relieve the pressure of lump-sum payments by

allowing families to spread payments over a period of months without incurring any interest charges. Participation is optional and elected on a term basis. The cost to sign up is \$50 per term.

Depending on the date of enrollment, students may be eligible for up to five installments for the fall and spring terms. Payment Plan installments will be automatically deducted on the 5th of each month from the bank account specified when enrolling in the plan. For enrollment deadlines and additional details concerning the Yale Payment Plan, see <https://student-accounts.yale.edu/yppl>.

BILL PAYMENT AND PENDING MILITARY BENEFITS

Yale will not impose any penalty, including the assessment of late fees, the denial of access to classes, libraries, or other facilities, or the requirement that a student borrow additional funds, on any student because of the student's inability to meet their financial obligations to the institution, when the delay is due to the delayed disbursement of funding from VA under chapter 31 or 33.

Yale will permit a student to attend or participate in their course of education during the period beginning on the date on which the student provides to Yale a certificate of eligibility for entitlement to educational assistance under chapter 31 or 33 and ending on the earlier of the following dates: (1) the date on which payment from VA is made to Yale; (2) ninety days after the date Yale certifies tuition and fees following the receipt of the certificate of eligibility.

Interruption or Temporary Suspension of University Services or Programs

Certain events that are beyond the University's control may cause or require the interruption or temporary suspension of some or all services and programs customarily furnished by the University. These events include, but are not limited to, epidemics or other public health emergencies; storms, floods, earthquakes, or other natural disasters; war, terrorism, rioting, or other acts of violence; loss of power, water, or other utility services; and strikes, work stoppages, or job actions. In the face of such events, the University may, at its sole discretion, provide substitute services and programs or appropriate refunds. The decision to suspend services and programs shall be made at the sole discretion of the University.

Transcripts

Transcripts may be ordered online through the Registrar's Office; see <https://registrar.yale.edu/students/transcript-requests>.

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 sent during the month of February. Students are strongly encouraged to seek financial support from external sources (see External Fellowships and Combined Award Policy).

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 degree-granting programs.

Eligible Ph.D. students also receive a Health Award, which covers the full cost of the single-student and the Student + Child(ren) Yale Health Hospitalization/Specialty Coverage (including coverage for prescriptions), half the cost of the Student + Spouse coverage, and the Student + Child(ren) portion of the Student Family Plan. Eligible Ph.D. students with a child will also receive an annual Student Family Support subsidy in the amount of \$4,900, issued in installments of \$2,450 per term. The annual subsidy will increase by \$1,000 (\$500 per term) for each additional child under the age of six.

If Ph.D. students are enrolled in the family plan, which also insures their spouse, the family subsidy will automatically be applied to their student account to cover the spousal portion of the insurance premium. If students have other options for spousal health care, they can use the subsidy for childcare or any other family needs necessary.

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 outside 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. University Fellowships may not be deferred beyond the sixth year of registration.

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).

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, but are permitted to accept teaching positions with the Yale Summer Session or outside of the University as long as they are limited to an average of ten hours per week or less. 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 the 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 there are no alternate sources of funding and the director of graduate studies certifies that the student will submit the dissertation by the end of the sixth year of study.

The financial aid packages of many students, particularly in the science departments, may include non-University funds. Should these non-University funds become unavailable, additional University support will be provided. Doctoral students who receive additional University support during their first six years of registration will be required to do additional terms of teaching, if necessary. This additional teaching will typically be at the TF-20 level and will be required in each term that the student receives University support. Students will not be required to teach more than the equivalent of six terms at the TF-20 level during their first six years of registration. Students in good standing who require additional University support but who have already completed six terms of teaching at the TF-20 level will receive University funds with no teaching obligation. Students receiving University funds are ineligible to seek additional teaching assignments that are paid beyond the standard stipend.

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 teaching fellows, 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. Students in the humanities and social sciences may teach during their second year only when such teaching is permitted by their department. Students in years one through six may teach no more than one TF-20 assignment (up to twenty hours per week) per term. Students in the natural sciences teaching above the requirement are limited to one TF-10 assignment per term. Seventh-year students may teach up to three TF-20 assignments per year.

Students who have met their program's teaching expectation and who are supported by non-University funds may seek additional teaching assignments at the TF-10 level. Students who are teaching to fulfill a teaching obligation will have priority for available teaching assignments over those who are seeking additional teaching assignments. Students may not be appointed as lecturers 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.

Assignment Letters

Letters of assignment 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 assignment is not official until the electronic assignment letter has been transmitted via the online TFS.

Teaching Fellow Levels

All teaching fellows teach at one of two effort levels. Students assigned at the TF-10 level are expected to teach for up to 10 hours per week. Students assigned at the TF-20 level are expected to teach for up to 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 TF-10 assignment and \$8,000 for a TF-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).

International students are limited to twenty hours of on-campus employment while school is in session. On-campus employment may include required teaching assignments and other optional on-campus employment. J-1 students sponsored by Yale must also report in advance any employment opportunity to the OISS. Part-time on-campus employment opportunities may be found at <https://yalestudentjobs.org> or occasionally through the student's academic department.

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, 246 Church St.

Eligible students in the Graduate School may be able to borrow from the Federal Direct Loan Program.

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 website of the United States Department of Education (<https://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, 246 Church St.

YALE UNIVERSITY RESOURCES AND SERVICES

Living Accommodations

GRADUATE HOUSING —ON CAMPUS

<https://housing.yale.edu>

The Yale Housing Office has dormitory and apartment units available for graduate and professional students. Dormitories are single-occupancy and two-bedroom units of varying sizes and prices. They are located across the campus, from Edward S. Harkness Memorial Hall, serving the medical campus, to Helen Hadley Hall and the newly built 272 Elm Street, serving the central/science campus. Unfurnished apartments consisting of efficiencies and one-, two-, and three-bedroom apartments for singles and families are also available. Family housing is available in Whitehall and Esplanade Apartments. The Housing website is the venue for graduate housing information and includes dates, procedures, facility descriptions, floor plans, and rates. Applications for the new academic year are available beginning April 20 and can be submitted directly from the website with a Yale NetID.

The Yale Housing Office is located in Helen Hadley Hall (HHH) at 420 Temple Street and 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 (203.436.9756), 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 websites 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 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

<https://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. For up-to-date information on all options, costs, and residential and retail dining locations, visit <https://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

<https://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 health, gynecology, mental health, pediatrics, pharmacy, blood draw, 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 <https://yalehealth.yale.edu/coverage/student-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, Student Wellness, 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 <https://yalehealth.yale.edu/coverage/student-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://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 within thirty days. 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 Dependent Plans

A student may enroll the student's lawfully married spouse or civil union partner and/or legally dependent child(ren) under the age of twenty-six in one of three student dependent plans: Student + Spouse, Student + Child/Children, or 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 website (<https://yalehealth.yale.edu/resources/forms>) 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, students enrolled in the EMBA program, students enrolled in the PA Online program, 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 website (<https://yalehealth.yale.edu/resources/forms>) 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 on or *before* the first day of classes, Yale Health Hospitalization/Specialty Coverage will end retroactive to the start of the coverage period for the term. If the leave occurs anytime after the first day of classes, Yale Health Hospitalization/Specialty coverage will end on the day the registrar is notified of the leave. In either case, students may enroll in Yale Health Student Affiliate Coverage. Students must enroll in Affiliate Coverage prior to the beginning of the term unless the registrar is notified after the first day of classes, in which case, the coverage must be purchased within thirty days of the date the registrar was notified. 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 website (<https://yalehealth.yale.edu/resources/forms>). 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 website (<https://yalehealth.yale.edu/resources/forms>). 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

Proof of vaccination is a pre-entrance requirement determined by the Connecticut State Department of Public Health. Students who are not compliant with this state regulation will not be permitted to register for classes or move into the dormitories for the fall term, 2020. Please access the Incoming Student Vaccination Record form for graduate and professional students at <https://yalehealth.yale.edu/new-graduate-and-professional-student-forms>. Connecticut state regulation requires that this form be completed and signed, for each student, by a physician, nurse practitioner, or physician's assistant. The form must be completed, independent of any and all health insurance elections or coverage chosen. Once the form has been completed, the information must be entered into the Yale Medicat online system (available after June 20), and all supporting documents must be uploaded to <http://yale.medicatconnect.com>. The final deadline is August 1.

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 regulation 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 regulation will not be permitted to register for classes or move into the dormitories for the fall term, 2020.

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 given within five years of the first day of classes at Yale. Students who are not compliant with this state regulation will not be permitted to register for classes or move into the dormitories for the fall term, 2020. 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 and are over the age of twenty-nine.

TB screening The University requires tuberculosis screening for all incoming students who have lived or traveled outside of the United States within the past year.

Hepatitis B series The University recommends that incoming students receive a series of three Hepatitis B vaccinations. Students may consult their health care provider for further information.

Student Accessibility Services

<https://sas.yale.edu>

Student Accessibility Services (SAS) facilitates accommodations for all Yale students with disabilities who choose to register with the office. Registration with SAS is confidential. SAS helps arrange academic, transportation, dietary, and housing accommodations across campus. To qualify as a student with a disability, supporting documentation must be provided. The required first step for a student with a disability is completion of the registration form, which will initiate the process of obtaining disability-related accommodations; see https://yale-accommodate.symplicity.com/public_accommodation.

SAS works with students with temporary disabilities as well. At any time during a term, students with a newly diagnosed disability or recently sustained injury requiring accommodations should register following the above instructions. More information can be found at <https://sas.yale.edu>, including instructions for requesting or renewing accommodations and the guidelines for supporting documentation. You can also reach us by phone at 203.432.2324.

Office of International Students and Scholars

<https://oiss.yale.edu>

The Office of International Students and Scholars (OISS) coordinates services and support for Yale's nearly 6,000 international students, faculty, staff, and their dependents. OISS staff assist with issues related to employment, immigration, and personal and cultural adjustment, as well as serve as a source of general information about living at Yale and in New Haven. As Yale University's representative for immigration concerns, OISS helps students, faculty, and staff 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 <https://oiss.yale.edu/coming>.

OISS programs, like 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 website 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, grab a cup of coffee, 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 <https://oiss.yale.edu/about/the-international-center/international-center-room-reservations>. For information about the center, visit <https://oiss.yale.edu/about/international-center>.

Resources on Sexual Misconduct

Yale University is committed to maintaining and strengthening an educational, working, 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 <https://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

<https://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 current or past 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 individuals to the hospital or the police), as well as 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 and can provide assistance with initiating a formal or informal complaint.

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 experienced an assault, 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 Jennifer Czincz, the director of SHARE (203.432.0310, jennifer.czincz@yale.edu), Anna Seidner (203.436.8217, anna.seidner@yale.edu), Cristy Cantu (203.432.2610, cristina.cantu@yale.edu), Freda Grant (203.436.0409, freda.grant@yale.edu), or John Criscuolo (203.645.3349, john.criscuolo@yale.edu).

TITLE IX COORDINATORS

203.432.6854

Office hours: 9 a.m.–5 p.m., M–F

<https://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 sexual 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 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. In the case of imminent threat to an individual or the community, 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

<https://uwc.yale.edu>

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

<https://your.yale.edu/community/public-safety/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 Kristina Reech, the Sensitive Crimes & Support coordinator, she can be reached at 203.432.9547 during business hours or via e-mail at kristina.reech@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 <https://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 <https://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 208236, New Haven CT 06520-8236.

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 and the Physician Assistant Online Program.

For additional information, please visit <https://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 <https://divinity.yale.edu>, e-mail div.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 <https://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 <https://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 <https://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 208292, New Haven CT 06520-8292.

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 Administration at 203.432.2600. Postal correspondence should be directed to Office of Academic Administration, 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 (CERT), 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 <https://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 the Environment 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 <https://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 the Environment, 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 <https://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 and post-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 <https://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 <https://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, Doctor of Fine Arts (D.F.A.).

For additional information, please visit <https://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.), Master of Management Studies (M.M.S.). Doctor of Philosophy (Ph.D.) awarded by the Graduate School of Arts and Sciences.

For additional information, please visit <https://som.yale.edu>. Postal correspondence should be directed to Yale School of Management, PO Box 208200, New Haven CT 06520-8200.

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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, Senior Director of the Office of Institutional Equity and Access, 221 Whitney Avenue, 4th Floor, 203.432.0849. For additional information, see <https://oiea.yale.edu>.

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 Vice President for Human Resources and Administration, PO Box 208322, 2 Whitney Avenue, Suite 810, New Haven CT 06520-8322, or by calling the Yale Police Department at 203.432.4400, 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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