

# Graduate School of Arts and Sciences

*Programs and Policies*

2017–2018



BULLETIN OF YALE UNIVERSITY

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# THE PRESIDENT AND FELLOWS OF YALE UNIVERSITY

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

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Douglas Alexander Warner III, B.A., Hobe Sound, Florida

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# THE OFFICERS OF YALE UNIVERSITY

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*Effective August 27, 2017*

# THE ADMINISTRATION OF THE GRADUATE SCHOOL

## OFFICE OF THE DEAN

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Susan Hacking, M.S., Senior Manager of Communication and Alumni Affairs

Susanne Olsen, Senior Executive Assistant to the Dean

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Pamela Schirmeister, Ph.D., Dean for Strategic Initiatives, the Graduate School and Faculty of Arts and Sciences; Dean of Undergraduate Education, Yale College; Senior Associate Dean of the Graduate School

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Michelle Nearon, Ph.D., Associate Dean for Graduate Student Development and Diversity; Director, Office for Graduate Student Development and Diversity

Richard G. Sleight, Ph.D., Associate Dean for Graduate Student Advising and Academic Support

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## ADMINISTRATION

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

Alexa Schlieker, M.S., Operations Manager

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Peter Salovey, Ph.D., President

Benjamin Polak, Ph.D., Provost

Tamar S. Gendler, Ph.D., Dean of the Faculty of Arts and Sciences

# SCHEDULE OF ACADEMIC DATES AND DEADLINES

## FALL TERM 2017

Aug. 21	M	New student orientation week begins Oral Performance Assessment for international students in Ph.D. programs
Aug. 23	W	Fall-term Online Course Selection (OCS) begins
Aug. 24	TH	Matriculation ceremony
Aug. 28	M	Teaching @ Yale Day: orientation for all new Teaching Fellows
Aug. 30	W	Fall-term classes begin, 8:20 a.m.
Sept. 1	F	Monday classes meet on Friday Due date to notify department of intention to submit dissertation for award of the Ph.D. in December
Sept. 4	M	Labor Day. Classes do not meet
Sept. 8	F	Final day to apply for a fall-term personal leave of absence The entire fall-term tuition charge or continuous registration fee (CRF) will be canceled for students who withdraw from the Graduate School on or before this date or who are granted a leave of absence effective on or before this date
Sept. 13	W	Fall-term Online Course Selection (OCS) ends Final day for registration. A fee of \$50 is assessed for course schedules accepted after this date
Sept. 15	F	Final day to file petitions for M.A., M.S., and M.Phil. degrees to be awarded in December
Sept. 22	F	One-half of the fall-term full-tuition charge will be canceled for students who withdraw from the Graduate School on or before this date or who are granted a medical leave of absence effective on or before this date. The CRF is not prorated
Oct. 2	M	Due date for dissertations to be considered by the Degree Committee for award of the Ph.D. in December Final date for the faculty to submit grades to replace grades of Temporary Incomplete (TI) awarded during the previous academic year
Oct. 17	T	October recess begins, 5:20 p.m.
Oct. 23	M	Classes resume, 8:20 a.m.
Oct. 27	F	Midterm Final day to change enrollment in a fall-term course from Credit to Audit or from Audit to Credit Final day to withdraw from a fall-term course One-quarter of the fall-term full-tuition charge will be canceled for students who withdraw from the Graduate School on or before this date or who are granted a medical leave of absence effective on or before this date. The CRF is not prorated Teaching appointments will not appear on the transcripts of students who withdraw from the assignment on or before this date
Nov. 2	TH	Readers' Reports are due for dissertations to be considered by the Degree Committee for award of the Ph.D. in December
Nov. 8	W	Final day to withdraw a degree petition for degrees to be awarded in December

Nov. 9	TH	Oral Proficiency Assessment for international students in all GSAS degree programs
Nov. 13	M	Departmental recommendations are due for candidates for December degrees Deadline for departments to return Degree Recommendation Forms for December degrees to registrar
Nov. 17	F	November recess begins, 5:20 p.m.
Nov. 27	M	Classes resume, 8:20 a.m. Final day to submit petitions for extended registration and Dissertation Completion status for the spring term
Dec. 14	TH	Classes end, 5:20 p.m.
Dec. 15	F	Final examinations begin
Dec. 20	W	Examinations end. Winter recess begins
Dec. 21	TH	Date of December degree award

## SPRING TERM 2018

Jan. 2	T	Final grades for fall-term courses due Final day that faculty may submit a request for the assignment of a grade of Temporary Incomplete
Jan. 10	W	Spring-term Online Course Selection (OCS) begins
Jan. 15	M	Martin Luther King Jr. Day. Administrative offices are closed
Jan. 16	T	Spring-term classes begin, 8:20 a.m. Teaching @ Yale Day: orientation for all new Teaching Fellows
Jan. 19	F	Monday classes meet on Friday
Jan. 25	TH	Final day to apply for a spring-term personal leave of absence The entire spring-term tuition charge or CRF will be canceled for students who withdraw from the Graduate School on or before this date or who are granted a leave of absence effective on or before this date
Jan. 26	F	Spring-term Online Course Selection (OCS) ends Final day for registration. A fee of \$50 is assessed for course schedules accepted after this date
Feb. 9	F	One-half of the spring-term full-tuition charge will be canceled for students who withdraw from the Graduate School on or before this date or who are granted a medical leave of absence effective on or before this date. The CRF is not prorated
Feb. 15	TH	Due date to notify department of intention to submit dissertation for award of the Ph.D. in May
Mar. 1	TH	Final day to file petitions for M.A.S., M.A., M.S., and M.Phil. degrees to be awarded in May
Mar. 9	F	Midterm Final day to change enrollment in a spring-term course from Credit to Audit or from Audit to Credit Final day to withdraw from a spring-term course Spring recess begins, 5:20 p.m. One-quarter of the spring-term full-tuition charge will be canceled for students who withdraw from the Graduate School on or before this date or who are granted a medical leave of absence effective on or before this date. The CRF is not prorated Teaching appointments will not appear on the transcripts of students who withdraw from the assignment on or before this date

Mar. 15	TH	Due date for dissertations to be considered by the Degree Committee for award of the Ph.D. in May
Mar. 26	M	Classes resume, 8:20 a.m.
Apr. 13	F	Readers' Reports are due for dissertations to be considered by the Degree Committee for award of the Ph.D. in May
Apr. 16	M	Oral Proficiency Assessment for international students in all GSAS degree programs
Apr. 19	TH	Deadline for departments to return Degree Recommendation Forms for May graduation
Apr. 20	F	Final day to withdraw a degree petition for degrees to be awarded in May
May 1	T	Final day to submit Dissertation Progress Reports Final day to submit petitions for extended registration and Dissertation Completion status for the next academic year
May 3	TH	Classes end, 5:20 p.m.
May 4	F	Final examinations begin
May 9	W	Final examinations end
May 11	F	Final grades for spring-term courses are due for candidates for terminal M.A.S., M.A., and M.S. degrees to be awarded at Commencement
May 20	SU	Graduate School Convocation
May 21	M	University Commencement Date of May degree award
May 31	TH	Final grades for spring-term courses and full-year courses are due Final day that faculty may submit a request for the assignment of a grade of Temporary Incomplete

## A MESSAGE FROM THE DEAN

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

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

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

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

Lynn Cooley, Ph.D.

*Dean, Graduate School of Arts and Sciences*

*C.N.H. Long Professor of Genetics and Professor of Cell Biology and of Molecular, Cellular, and Developmental Biology*

# THE GRADUATE SCHOOL OF ARTS AND SCIENCES

The Yale Graduate School of Arts and Sciences is one of fourteen schools composing Yale University and the only one that awards the degrees of Doctor of Philosophy, Master of Philosophy, Master of Arts, 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-six departments and programs offer courses of study leading to the Ph.D. degree. There are seventeen programs that terminate with the master's degree.

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

The Graduate School community has grown vigorously since the early twentieth century; today it comprises more than 2,800 graduate students and a faculty of 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 mission of the Graduate School of Arts and Sciences is to seek students of the highest intellectual promise and achievement of all backgrounds, from across the nation and around the world, and to educate them to be scholars, teachers, and leaders for many sectors of society. The larger aim of this enterprise is to prepare and stimulate each new generation to perpetuate and advance human knowledge and to contribute to the health and development of the human community.



## YALE AND THE WORLD

The Yale Graduate School has always comprised an international community, but it recognizes as well that now, more than ever, advanced scholarship must occur on transnational grounds. It is increasingly important that we prepare our students to participate in a global economy of research and knowledge and that we create institutional channels through which such participation can flourish. In addition to formal student exchanges that enable graduate students to perform research and fieldwork abroad, individual faculty members, departments, and the School participate in collaborative efforts with international partners.

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

## A Global University

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

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

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

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

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

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

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

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

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

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

## THE DEAN

Lynn Cooley, [grad.dean@yale.edu](mailto:grad.dean@yale.edu)

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

## ASSOCIATE AND ASSISTANT DEANS FOR ACADEMIC AFFAIRS

Pamela Schirmeister, Dean for Strategic Initiatives, the Graduate School and Faculty of Arts and Sciences; Dean of Undergraduate Education, Yale College; Senior Associate Dean of the Graduate School, [pamela.schirmeister@yale.edu](mailto:pamela.schirmeister@yale.edu)

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Robert Harper-Mangels, Assistant Dean, [robert.harper-mangels@yale.edu](mailto: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. Dean Schirmeister oversees initiatives linking the schools in the Faculty of Arts and Sciences, including the Teaching Fellow Program.

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

Dean Sleight oversees individual student progress and academic support services.

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

## **DIRECTORS OF GRADUATE STUDIES (DGS)**

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

## **GRADUATE STUDENT DEVELOPMENT AND DIVERSITY**

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

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

## **MCDUGAL GRADUATE STUDENT CENTER**

Founders Hall, 135 Prospect St., 2nd floor, 203.432.BLUE (2583),  
[mcdougal.center@yale.edu](mailto: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 fifty McDougal Fellows

in five offices who create programs and services for the graduate community through collaborative offices of Development and Diversity, Career Strategy, Graduate Student Life, and the Center for Teaching and Learning.

## Graduate Student Life

Lisa Brandes, Assistant Dean for Student Affairs and Director, McDougal Center,  
Founders Hall, 135 Prospect St., 2nd floor, 203.432.2583, [mcdougal.center@yale.edu](mailto:mcdougal.center@yale.edu)  
Jennifer Mendelsohn, Associate Director, McDougal Center, Founders Hall, 135  
Prospect St., 2nd floor, 203.432.2583, [mcdougal.center@yale.edu](mailto:mcdougal.center@yale.edu)  
<http://gsas.yale.edu/life-yale/graduate-student-life-office>  
<http://gsas.yale.edu/events>

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

In collaboration with the Office of the Vice President for Student Life, the assistant dean for student affairs coordinates general campus services for graduate students, serving as a graduate student advocate and departmental liaison for graduate housing, dining services, health services, athletics, security, chaplains, child care, and parking and transit. The assistant dean and staff are available to answer questions or help with any problems that students may have, including speaking individually about issues concerning their life at Yale and other personal matters and concerns. The Graduate Student Life office also assists departmental recruitment activities and organizes new student orientation, GS Dean's social events, and other events for the Graduate School community, including the Graduate School's participation in the University's Commencement exercises.

## ADMISSIONS

Leah Phinney, Director, 307 Warner House, 1 Hillhouse Ave., 203.432.2771,  
[graduate.admissions@yale.edu](mailto:graduate.admissions@yale.edu)  
Lisa Furino, Assistant Director, 302 Warner House, 1 Hillhouse Ave., 203.432.2771,  
[graduate.admissions@yale.edu](mailto:graduate.admissions@yale.edu)  
<http://gsas.yale.edu/admission-graduate-school>

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

## **BUSINESS OPERATIONS**

Mary Magri, Lead Administrator for the Dean's Administration, Warner House, 1 Hillhouse Ave., 203.432.6346, [mary.magri@yale.edu](mailto:mary.magri@yale.edu)

Alexa Schlieker, Operations Manager, Warner House, 1 Hillhouse Ave., 203.436.9376, [alexa.schlieker@yale.edu](mailto:alexa.schlieker@yale.edu)

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

## **FINANCIAL AID**

Jennifer Brinley, Director, 106 Warner House, 1 Hillhouse Ave., 203.432.7980, [gradfinaid@yale.edu](mailto: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**

Shonna Marshall, Associate University Registrar for Student Support, 246 Church St., 203.436.8036, [registrar.gsas@yale.edu](mailto:registrar.gsas@yale.edu)

Claudia Schiavone, Assistant University Registrar, 246 Church St., 203.432.2743, [registrar.gsas@yale.edu](mailto: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**

Pamela Schirmeister, Senior Associate Dean of the Graduate School, [pamela.schirmeister@yale.edu](mailto:pamela.schirmeister@yale.edu)

Howard el-Yasin, Assistant Director, 203.432.2757, [howard.el-yasin@yale.edu](mailto:howard.el-yasin@yale.edu)  
[teaching.fellows@yale.edu](mailto: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 assistant director of the Teaching Fellow Program or their associate dean.

## **AFFILIATED OFFICES**

### **Office of Career Strategy**

Hyun Ja Shin, Director, Graduate and Postdoctoral Career Services,  
[careerstrategy@yale.edu](mailto:careerstrategy@yale.edu)

Brian Frenette, Senior Associate Director, Graduate and Postdoctoral Career Services,  
[careerstrategy@yale.edu](mailto:careerstrategy@yale.edu)

55 Whitney Ave., 3rd floor

<http://ocs.yale.edu>

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

### **Yale Center for Teaching and Learning**

Jennifer Frederick, Executive Director, [jennifer.frederick@yale.edu](mailto:jennifer.frederick@yale.edu)

Sterling Memorial Library, 301 York St. entrance

<http://ctl.yale.edu>

The Yale Center for Teaching and Learning (CTL) supports teaching excellence across the campus and unites Yale's work in online education with the University's other pedagogical initiatives. Several units within the CTL are focused exclusively on professional development and skill-based training for graduate and professional school students.

## **GRADUATE AND POSTDOCTORAL TEACHING DEVELOPMENT**

Suzanne Young, Director

301 York St.

<http://ctl.yale.edu/teaching>

This CTL unit offers a full range of training, consultation, and teacher development services to teaching fellows and postdoctoral fellows at Yale. The professional staff and

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

On the CTL website, graduate students will find a variety of online teaching resources, including a calendar of events, descriptions of the CTL programs, a “Teaching How-To” for new and returning teachers, and modules on important teaching topics. The CTL connects with graduate students through its blog, Facebook page, and Twitter account, all of which are accessible at <http://ctl.yale.edu/teaching>. All graduate students also receive its occasional e-newsletter about upcoming and new programs and events. In addition, Yale is part of a national network that aims to broaden and diversify training opportunities for graduate students and postdocs in the sciences. The Center for the Integration of Research, Teaching and Learning (CIRTL) Network (<https://www.cirtl.net>) brings future faculty from across the nation to online and in-person training in science education. These programs complement and extend the CTL’s offerings, and allow Yale scholars to participate in diverse and enriching learning communities.

#### **GRADUATE WRITING LABORATORY**

Elena D. Kallestinova, Assistant Dean and Director, 301 York St., 203.432.7725,  
[elena.kallestinova@yale.edu](mailto:elena.kallestinova@yale.edu), [grad.writing@yale.edu](mailto:grad.writing@yale.edu)  
<http://ctl.yale.edu/writing/graduate>

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

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

## Center for Language Study

Nelleke Van Deusen-Scholl, Director; Associate Dean, Yale College; 203.432.6456,  
[nelleke.vandeusen-scholl@yale.edu](mailto:nelleke.vandeusen-scholl@yale.edu)

James Tierney, Director, English Language Program, [james.tierney@yale.edu](mailto:james.tierney@yale.edu)  
 Dow Hall, 370 Temple St.  
<http://cls.yale.edu>

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

## COMMITTEES

Currently four standing committees are concerned with the policies and procedures of the Graduate School; as with all standing committees, their deliberations are



confidential. Student members of these committees are selected by the Graduate Student Assembly.

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

**The Degree 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 Policies and Regulations).

**The Committee on Regulations and Discipline** Composed of three graduate students, three faculty members, normally one from each division, and an associate dean, the committee reviews violations of the regulations governing academic and personal conduct (see Personal Conduct, under Policies and Regulations).

## GRADUATE STUDENT ASSEMBLY (GSA)

gsa@yale.edu  
<http://gsa.yale.edu>

Students in the Graduate School are represented collectively by the Graduate Student Assembly, which provides a forum for students to address issues across the Graduate School and University. It consults with the dean and other administrators on proposed changes in Graduate School policy, raises concerns expressed by the student body, nominates the student members of all Graduate School standing committees, and administers a conference travel fund for graduate students. Representatives to the assembly are elected by students in individual departments and degree programs. Each department or program has at least one student representative, with additional representatives allotted proportionally by size of the student population.

## GRADUATE-PROFESSIONAL STUDENT SENATE (GPSS)

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

The Graduate and Professional Student Senate (GPSS or “Yale Senate”) is composed of student-elected representatives from each of the thirteen graduate and professional schools at Yale. Any student enrolled in these schools is eligible to run for a senate seat during fall elections. As a governing body, the GPSS advocates for student concerns and advancement within Yale, represents all graduate and professional students to the outside world, and facilitates interaction and collaboration among the schools through social gatherings, academic or professional events, and community service. GPSS meetings occur on alternating Thursdays and are open to the entire graduate and

professional school community, as well as representatives from the Yale administration. GPSS also oversees the management of the Graduate and Professional Student Center at Yale (GPSCY), located at 204 York Street. GPSCY provides office and event space for GPSS and other student organizations and houses Gryphon's Pub.

## DEGREE-GRANTING DEPARTMENTS AND PROGRAMS

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

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

The requirements of individual departments also may change from time to time, with the approval of the Graduate School. After such approval has officially been given, students in that department or program will receive written notification. All changes in departmental degree requirements occurring after the publication closing date of the *Graduate School of Arts and Sciences Programs and Policies* bulletin are posted on the departments' websites. General changes to degree requirements will be posted on the Graduate School's website.

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 <http://yale.edu/oci> for the most recent information.

Fall-term courses are indicated by the letter "a," spring-term courses by the letter "b"; summer courses are indicated by the letter "c." 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 (81 Wall St., [jacqueline.goldsby@yale.edu](mailto:jacqueline.goldsby@yale.edu))

### **Director of Graduate Studies**

Daphne Brooks (81 Wall St., [daphne.brooks@yale.edu](mailto:daphne.brooks@yale.edu))

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

**Associate Professors** Aimee Cox, Crystal Feimster, Anthony Reed, Edward Rugemer

**Assistant Professor** Rizvana Bradley

**Lecturers** Aaron Carico, Heather Vermeulen

### **FIELDS OF STUDY**

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

### **SPECIAL ADMISSIONS REQUIREMENTS**

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

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

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

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

## SPECIAL REQUIREMENTS FOR THE PH.D. DEGREE

Students will be subject to the combined Ph.D. supervision of the African American Studies department and the relevant participating department or program. The student's academic program will be decided in consultation with an adviser, the DGS of African American Studies, and the DGS of the participating department or program and must be approved by all three. Students are required to take five courses in African American Studies, generally at least one course each term. Any variance in scheduling requires DGS approval. Core courses are (1) *Theorizing Racial Formations* (AFAM 505/AMST 643), 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. 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 / AMST 643a, Theorizing Racial Formations** Daphne Brooks

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 550b / FILM 714b, Race, Affect, and Cinema** Rizvana Bradley

This seminar draws out the importance of the recent "affective turn" in emergent theoretical discourses, in order to think about the organization of emotion and feeling within cinema, particularly cinema that foregrounds questions of race and racial intimacy. We are especially interested in thinking about the relationship between race and feeling, as well as the development of minor feelings, racial affect, and black affect. Course readings take up many of the key texts within affect theory, but we try to make explicit connections to the examples of racial affect we see emerging within cinema.

### **AFAM 563b / AMST 651b / ENGL 951b, Ralph Ellison in Context** Robert Stepto

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

### **AFAM 584b / SOCY 584b, 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.

**AFAM 605b / AMST 686b / HIST 769b, Introduction to Documentary Studies**

Matthew Jacobson and Anna Duensing

This mixed graduate/undergraduate seminar surveys documentary work in three media – film, photography, and sound – since the 1930s, focusing on the documentary both as a cultural form with a history of its own and as a parcel of skill sets and storytelling and production practices to be studied and mastered. Readings and discussions cover important scholarly approaches to documentary as a genre, as well as close readings of documentaries themselves and practitioners' guides to various aspects of documentary work. Topics include major trends in documentary practice across the three media, documentary ethics, aesthetics and truth-claims, documentary's relationship to the scholarly disciplines and to journalism, and documentary work as political activism. Class meetings include screenings/viewings/soundings of documentary works, and practitioners' panels and workshops with Yale documentarians (including Charles Musser, Zareena Grewal, Elihu Rubin, Gretchen Berland, and Laura Wexler) and local New Haven documentarians such as Jake Halpern (Yale '97, *This American Life*). Students' final projects may take the form of a traditional scholarly paper on some aspect of documentary history or a particular documentary producer, or an actual piece of documentary work – a film treatment, a brief video, a set of photographs, a sound documentary, or script.

**AFAM 650a / ENGL 949a, Afro-Modernisms** Anthony Reed

This course considers key debates, texts, and institutions that have shaped African American culture in the twentieth and twenty-first centuries. Possible topics include the New Negro movement, the Black Arts movement, black internationalism, canon formation, and Afro-futurism.

**AFAM 687a / AMST 701a / HIST 751a, "Race" and "Races" in American Studies**

Matthew Jacobson

This reading-intensive seminar examines influential scholarship across disciplines on "the race concept" and racialized relations in American culture and society. Major topics include the cultural construction of race; race as both an instrument of oppressions and an idiom of resistance in American politics; the centrality of race in literary, anthropological, and legal discourse; the racialization of U.S. foreign policy; "race mixing" and "passing," vicissitudes of "whiteness" in American politics; the centrality of race in American political culture; and "race" in the realm of popular cultural representation. Writings under investigation include classic formulations by scholars like Lawrence Levine and Ronald Takaki, as well as more recent work by Saidiya Hartman, Robin Kelley, and Ann Fabian. Seminar papers give students an opportunity to explore in depth the themes, periods, and methods that most interest them.

**AFAM 743b / AMST 654b / ENGL 952b, American Artists and the African American**

**Book** Robert Stepto

Visual art in African American books since 1900. Artists include Winold Reiss, Aaron Douglas, E.S. Campbell, Tom Feelings, and the FSA photographers of the 1930s and '40s. Topics include Harlem Renaissance book art, photography and literature, and children's books. Research in collections of the Beinecke Library and the Yale Art Gallery is encouraged.

**AFAM 773a / SOCY 630a, 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.

**AFAM 813b / AMST 875b / MUSI 811b, Critical Approaches to Popular Music**

Michael Veal

This seminar applies the different themes and discourses relevant to the study of popular music, including cultural studies, ethnomusicology, media, technology, music theory, gender studies, art history, and music history. The seminar is organized in workshop fashion, with student discussants drawing on the various discourses to contextualize specific album-length recordings assigned each week. The seminar is designed to help students master the variety of theoretical approaches that render popular music comprehensible.

**AFAM 817b / HIST 741b, Slavery and Abolition in the Atlantic World** Edward

Rugemer

An introduction to the central themes of the historiography on slavery in the Americas during the eighteenth and nineteenth centuries. Readings include books and articles that have an explicitly comparative focus, as well as single-region studies. Themes include master/slave relations, African American cultures, resistance and rebellion, economic life, and the politics of slavery.

**AFAM 822b / AFST 651b / FREN 951b, The Francophone African Novel** Christopher

Miller

A comprehensive study of the novel—its discourse, aesthetics, and history—in colonial and postcolonial francophone Africa. Authors include Lamine Senghor, Ousmane Socé, Ousmane Sembène, Ferdinand Oyono, Ahmadou Kourouma, Yambo Ouologuem, Mariama Bâ, Aminata Sow Fall, Fatou Diome, Calixthe Beyala, Alain Mabanckou. Readings in French; course conducted in English.

**AFAM 839b / HSAR 785b, 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*.

**AFAM 846a / AFST 747a / CPLT 725a / FREN 946a, Postcolonial Theory and Its**

**Literature** Christopher Miller

A survey of theories relevant to colonial and postcolonial literature and culture. The course focuses on theoretical models (Orientalism, hybridity, *métissage*, *créolité*, “minor literature”), but also gives attention to the literary texts from which they are derived



(francophone and anglophone). Readings from Said, Bhabha, Spivak, Mbembe, Amselle, Glissant, Deleuze, Guattari. Conducted in English.

**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  
309 Luce Hall, 203.432.9903  
<http://african.macmillan.yale.edu>  
M.A.

## Chair

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

## Director of Graduate Studies

David Simon (203.432.5243, [david.simon@yale.edu](mailto:david.simon@yale.edu))

## Director of Program in African Languages

Kiarie Wa'Njogu (203.432.0110, [john.wanjogu@yale.edu](mailto:john.wanjogu@yale.edu))

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

**Associate Professors** Theodore Cohen (*Epidemiology*), Kaveh Khoshnood (*Epidemiology*), Daniel Magaziner (*History*), Urania Magriples (*Obstetrics, Gynecology & Reproductive Sciences*), Elijah Paintsil (*Pediatrics; Epidemiology; Pharmacology*), Sunil Parikh (*Public Health; Internal Medicine*), Jonathan Wyrzten (*Sociology*)

**Assistant Professors** Katharine Baldwin (*Political Science*), Louisa Lombard (*Anthropology*), Hani Mowafi (*Emergency Medicine*), Doruk Ozgediz (*Surgery; Pediatrics*), Tracy Rabin (*Internal Medicine*), Jeremy Schwartz (*Internal Medicine*), Sheela Shenoj (*Internal Medicine*), Brian Wood (*Anthropology*)

**Lecturers** Anne-Marie Foltz (*Epidemiology & Public Health*), 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 Forestry & Environmental Studies, Law, Management, and Public Health.

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

### **SPECIAL ADMISSIONS REQUIREMENT**

The GRE General Test is required.

### **SPECIAL REQUIREMENTS FOR THE M.A. DEGREE**

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

The program requires sixteen courses: two compulsory introductory interdisciplinary seminars, Research Methods in African Studies (AFST 501) and Topics in African Studies (AFST 764) or an alternate course, as specifically designated by the DGS; four courses of instruction in an African language; four courses in one of the foregoing areas of concentration; four other approved courses offered in the Graduate School or professional schools; and two terms of directed reading and research (AFST 590 and AFST 900) during which students will complete the required thesis. A student who is able to demonstrate advanced proficiency in an African language may have the language requirement waived and substitute four other approved courses. The choice of courses must be approved by the DGS, with whom students should consult as soon as possible in the first term.

### **THE MASTER'S THESIS**

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

Students must submit their thesis for joint evaluation by the adviser and a second reader, who is chosen by the student in consultation with the DGS.

## PROGRAM IN AFRICAN LANGUAGES

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

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

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

## COURSES

### **AFST 548b / SOCY 548b, Islamic Social Movements** Jonathan Wyrzten

Social movement theory used to analyze the emergence and evolution of Islamic movements from the early twentieth century to the present. Organization, mobilization, political process, and framing of political, nonpolitical, militant, and nonmilitant movements; transnational dimensions of Islamic activism. Case studies include the Muslim Brotherhood, Hamas, Hizbollah, Al-Qaeda, Gulen, Al-Adl wal-Ihsann, Islamic State, and others.

### **AFST 573b / SOCY 563b, Imperialism, Insurgency, and State Building in the Middle East and North Africa** Jonathan Wyrzten

The historical evolution of political order from Morocco to Central Asia in the past two centuries. Focus on relationships between imperialism, insurgency, and state building. Ottoman, European, and nationalist strategies for state building; modes of local resistance; recent transnational developments; American counterinsurgency and nation-building initiatives in the region.

### **AFST 651b / AFAM 822b / FREN 951b, The Francophone African Novel** Christopher Miller

A comprehensive study of the novel – its discourse, aesthetics, and history – in colonial and postcolonial francophone Africa. Authors include Lamine Senghor, Ousmane Socé, Ousmane Sembène, Ferdinand Oyono, Ahmadou Kourouma, Yambo Ouologuem, Mariama Bâ, Aminata Sow Fall, Fatou Diome, Calixthe Beyala, Alain Mabanckou. Readings in French; course conducted in English.

### **AFST 747a / AFAM 846a / CPLT 725a / FREN 946a, Postcolonial Theory and Its Literature** Christopher Miller

A survey of theories relevant to colonial and postcolonial literature and culture. The course focuses on theoretical models (Orientalism, hybridity, *métissage*, *créolité*, “minor literature”), but also gives attention to the literary texts from which they are derived

(francophone and anglophone). Readings from Said, Bhabha, Spivak, Mbembe, Amselle, Glissant, Deleuze, Guattari. Conducted in English.

**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 900b, Master's Thesis** David Simon

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

**AFST 942b / CPLT 986b / FREN 942b, Decolonizing Memory** Jill Jarvis

This seminar introduces students to theories of memory, testimony, and trauma by bringing key works on these topics into dialogue with literary texts by writers of the former French and British empires in Africa. Literary readings may include works by Djebbar, Ouologuem, Farès, Salih, Head, Aidoo. Theoretical readings by Arendt, Adorno and Horkheimer, Agamben, Césaire, Derrida, Fanon, Foucault, Mbembe, Spivak.

**AFST 951a or b, Directed Reading and Research** David Simon

By arrangement with faculty.

**SWAH 610a, Beginning Kiswahili I** Staff

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** Staff

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** Staff

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** Staff

Continuation of SWAH 630.

**SWAH 650a, Advanced Kiswahili I** Staff

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** Staff

Continuation of SWAH 650.

**SWAH 670a and SWAH 671b, Topics in Kiswahili Literature** Staff

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** Staff

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** Staff

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** Staff

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** Staff

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** Staff

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** Staff

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 or b, Topics in Yorùbá Literature and Culture** Staff

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.

**YORU 680a, Advanced Topics in Yorùbá Literature and Culture** Staff

A course for students with advanced proficiency in Yorùbá who are interested in discussion and research in Yorùbá at a level not covered by existing courses. A term paper or its equivalent is required.

**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

230 Hall of Graduate Studies, 203.432.1186

<http://americanstudies.yale.edu>

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

### Chair

Kathryn Dudley (230 HGS, 203.432.1186)

### Director of Graduate Studies

Joanne Meyerowitz (230 HGS, 203.432.1186)

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

**Associate Professors** Laura Barraclough, Crystal Feimster, Zareena Grewal, Daniel HoSang, Elihu Rubin, Tisa Wenger

**Assistant Professors** Greta LaFleur, Albert Laguna, Dixa Ramirez

**Lecturer** James Berger

### FIELDS OF STUDY

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

### SPECIAL ADMISSIONS REQUIREMENT

A twenty-page writing sample is required with the application.

### SPECIAL REQUIREMENTS FOR THE PH.D. DEGREE

During the first two years of study students are required to take twelve term courses; at least half of these courses must be in American Studies. First-year students are also required to take AMST 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.

### American Studies and Film and Media Studies

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

## MASTER'S DEGREES

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

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

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

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

More information is available on the department's website, <http://americanstudies.yale.edu>.

## COURSES

### **AMST 600a, American Scholars** Zareena Grewal

"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 601b, Interdisciplinary Research in American Studies** Laura Barraclough and Greta LaFleur

A practical forum on incorporating interdisciplinary methods and modes of analysis into research in American studies. Students develop article-length projects of their own design.

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

A continuing collective research project, a cultural studies "laboratory," that has been running since the fall of 2003. The group, made up of graduate students and faculty from several disciplines, meets regularly to discuss common readings, to develop collective and individual research projects, and to present that research publicly. The general theme for the working group is globalization and culture, with three principal aspects: (1) the globalization of cultural industries and goods, and its consequences for patterns of everyday life as well as for forms of fiction, film, broadcasting, and music; (2) the trajectories of social movements and their relation to patterns of migration, the rise of global cities, the transformation of labor processes, and forms of ethnic,

class, and gender conflict; (3) the emergence of and debates within transnational social and cultural theory. The specific focus, projects, and directions of the working group are determined by the interests, expertise, and ambitions of the members of the group, and change as its members change. There are a small number of openings for second-year graduate students. Students interested in participating should contact michael.denning@yale.edu.

**AMST 643a / AFAM 505a, Theorizing Racial Formations** Daphne Brooks

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.

**AMST 650a / HIST 807a, Resistance, Rebellion, and Survival Strategies in Modern Latin America** Gilbert Joseph

An interdisciplinary examination of new conceptual and methodological approaches to such phenomena as peasants in revolution, millenarianism, “banditry,” refugee movements, and transnational migration.

**AMST 651b / AFAM 563b / ENGL 951b, Ralph Ellison in Context** Robert Stepto

This seminar pursues close readings of Ralph Ellison’s essays, short fiction, and novels. The “in context” component of the seminar involves working from the Benston and Sundquist volumes on Ellison to discern a portrait of the modernist African America Ellison investigated, with at least Richard Wright, James Baldwin, and Romare Bearden also in view. Texts include Ellison’s *Collected Essays, Flying Home and Other Stories, Invisible Man*, and *Juneteenth*; K. Benston, *Speaking for You*; E. Sundquist, *Cultural Contexts for Ralph Ellison’s Invisible Man*; and A. Nadel, *Invisible Criticism: Ralph Ellison and the American Canon*.

**AMST 654b / AFAM 743b / ENGL 952b, American Artists and the African American Book** Robert Stepto

Visual art in African American books since 1900. Artists include Winold Reiss, Aaron Douglas, E.S. Campbell, Tom Feelings, and the FSA photographers of the 1930s and ’40s. Topics include Harlem Renaissance book art, photography and literature, and children’s books. Research in collections of the Beinecke Library and the Yale Art Gallery is encouraged.

**AMST 686b / AFAM 605b / HIST 769b, Introduction to Documentary Studies**

Matthew Jacobson and Anna Duensing

This mixed graduate/undergraduate seminar surveys documentary work in three media — film, photography, and sound — since the 1930s, focusing on the documentary both as a cultural form with a history of its own and as a parcel of skill sets and storytelling and production practices to be studied and mastered. Readings and discussions cover important scholarly approaches to documentary as a genre, as well as close readings of documentaries themselves and practitioners’ guides to various aspects of documentary work. Topics include major trends in documentary practice across the three media, documentary ethics, aesthetics and truth-claims, documentary’s relationship to the scholarly disciplines and to journalism, and documentary work as political activism. Class meetings include screenings/viewings/soundings of documentary works, and practitioners’ panels and workshops with Yale documentarians (including Charles Musser, Zareena Grewal, Elihu Rubin, Gretchen Berland, and Laura Wexler) and

local New Haven documentarians such as Jake Halpern (Yale '97, *This American Life*). Students' final projects may take the form of a traditional scholarly paper on some aspect of documentary history or a particular documentary producer, or an actual piece of documentary work—a film treatment, a brief video, a set of photographs, a sound documentary, or script.

**AMST 701a / AFAM 687a / HIST 751a, “Race” and “Races” in American Studies**

Matthew Jacobson

This reading-intensive seminar examines influential scholarship across disciplines on “the race concept” and racialized relations in American culture and society. Major topics include the cultural construction of race; race as both an instrument of oppressions and an idiom of resistance in American politics; the centrality of race in literary, anthropological, and legal discourse; the racialization of U.S. foreign policy; “race mixing” and “passing,” vicissitudes of “whiteness” in American politics; the centrality of race in American political culture; and “race” in the realm of popular cultural representation. Writings under investigation include classic formulations by scholars like Lawrence Levine and Ronald Takaki, as well as more recent work by Saidiya Hartman, Robin Kelley, and Ann Fabian. Seminar papers give students an opportunity to explore in depth the themes, periods, and methods that most interest them.

**AMST 723a / ENGL 833a, The Nonhuman in Literature and Culture since 1800**

Chee Dimock

Nonhuman life forms in fiction and poetry from the nineteenth century to the twenty-first, including plants and animals, “legal persons” such as corporations, large-scale phenomena such as the market and the Internet, war and environmental catastrophes, as well as intelligent machines and extraterrestrial aliens. Authors include Herman Melville, Emily Dickinson, Upton Sinclair, Elizabeth Bishop, Louise Erdrich, Richard Powers, Don DeLillo, Cormac McCarthy, Philip K. Dick, Ursula Le Guin, Octavia Butler, Dave Eggers. Theorists include Giorgio Agamben, Jane Bennett, Jacques Derrida, Donna Haraway, N. Katherine Hayles, Fredric Jameson, Brian Massumi, Timothy Morton.

**AMST 751a / ANTH 652a, American Precarity**

Kathryn Dudley

The 2016 election cast a spotlight on the political discontent of millions of Americans, a broad segment of whom are white, working-class, and residing in regions of the country marked by unprecedented precarity, an ongoing condition of economic dislocation and social insecurity. This course traces the histories of the present that have produced cross-cutting zones of abandonment and social trauma not easily pigeonholed by concepts of race, class, gender, and citizenship.

**AMST 761b / WGSS 761b, Race and Affect in the Americas**

Staff

The course explores how Latinx and Latin American/Caribbean populations have been historically imagined and racialized affectively—usually as being “hyper” emotional (but more recently as lacking any affect at all)—and the impact of this characterization on issues of power, inequality, and personhood, particularly under neoliberalism. The course examines the ways in which Latinx and Latin American populations have been produced affectively in medicine/mental health, corporate and media images, U.S. foreign policy, education, and urbanism. We analyze psychological and public health literature and consider a variety of pathological claims about Latinos’ physical and mental states and disorders; in particular, we consider concepts like “ataque de nervios” (Guarnaccia), fatalism; hysteria and the “Puerto Rican Syndrome”; and

disordered eating (obesity, body image, diabetes). We explore how concepts from the sociology and anthropology of emotion (Illouz's emotional capitalism, Berlant's lateral agency, Stewart's ordinary affects, Hochschild's emotional labor/feeling rules) operate in the case of Latinx and Latin American populations, as well as alternative ways of understanding affect in terms of racialization theories. We draw from the works of feminist/queer/critical race theorists, including bell hooks, Gloria Anzaldúa, Cherríe Moraga, and others.

**AMST 775b / ENGL 838b, Performing American Literature** Wai Chee Dimock

A broad selection of short stories, poems, and novels, accompanied by class performances, culminating in a term project with a significant writing component. "Performance" includes a wide range of activities including: staging; making digital films and videos; building websites; game design; and creative use of social media. Readings include poetry by Walt Whitman, Emily Dickinson, Yusef Komunyakaa, and Claudia Rankine; fiction by Herman Melville, F. Scott Fitzgerald, Jhumpa Lahiri, and Junot Díaz.

**AMST 796a / HIST 727a, Approaches to the History of Capitalism and Culture** Jean-Christophe Agnew

A reading-intensive seminar that draws on different disciplines (e.g., intellectual, social, and economic history; ethnography; social studies of science and technology; religious studies; cultural studies; political theory; and literature) to explore the historical intersections between capitalism and culture in the United States and elsewhere.

**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 810b / WGSS 815b, American Public Sculpture: History, Context, and Continuing Significance** Laura Wexler

Building on a new partnership between the Smithsonian Institution and Yale University, this course offers a broad-based and multidisciplinary exploration of public sculpture in the United States. Course work includes field trips and digital projects as well as readings in the scholarship of public memory, cultural heritage, conservation, and aesthetics.

**AMST 828b / PLSC 828b, American Political Development** Stephen Skowronek

An examination of patterns of political change and institutional development in the United States. The course considers patterns of reform, the political construction of interests and movements, problems of political culture, party building, and state building.

**AMST 832a and AMST 833b / 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 834b / FILM 733b, Documentary and the Environment** Charles Musser

The environmental documentary has emerged as one of cinema's most vital genres of the past ten years (in documentary, its only rivals are probably those concerned with the Second Gulf War). As the world's environment faces a growing crisis, documentary has come to serve as a key means to draw public attention to specific issues. This course combines screenings with readings on documentary such as Bill Nichols's important book *Representing Reality*. Often films have book tie-ins, and we consider how they complement each other and work together to maximize the impact of their message. Readings also focus on news items, debates, websites, and other media forms that are employed in conjunction with the films.

**AMST 835b / HIST 731b, 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 875b / AFAM 813b / MUSI 811b, Critical Approaches to Popular Music**

Michael Veal

This seminar applies the different themes and discourses relevant to the study of popular music, including cultural studies, ethnomusicology, media, technology, music theory, gender studies, art history, and music history. The seminar is organized in workshop fashion, with student discussants drawing on the various discourses to contextualize specific album-length recordings assigned each week. The seminar is designed to help students master the variety of theoretical approaches that render popular music comprehensible.

**AMST 902a or b, Prospectus Workshop** Joanne Meyerowitz

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 903a / HIST 746a, Introduction to Public Humanities** Ryan Brasseaux

What is the relationship between knowledge produced in the university and the circulation of ideas among a broader public, between academic expertise on the one hand and nonprofessionalized ways of knowing and thinking on the other? What is possible? This seminar provides an introduction to various institutional relations and to the modes of inquiry, interpretation, and presentation by which practitioners in the humanities seek to invigorate the flow of information and ideas among a public more broadly conceived than the academy, its classrooms, and its exclusive readership of specialists. Topics include public history, museum studies, oral and community history, public art, documentary film and photography, public writing and educational outreach, the socially conscious performing arts, and fundraising. In addition to core readings and discussions, the seminar includes presentations by several practitioners who are currently engaged in different aspects of the Public Humanities. With the help of Yale faculty and affiliated institutions, participants collaborate in developing and executing a Public Humanities project of their own definition and design. Possibilities might include, but are not limited to, an exhibit or installation, a documentary, a set of

walking tours, a website, a documents collection for use in public schools. Required for the M.A. with a concentration in Public Humanities.

**AMST 935a and AMST 936b / ANTH 930a and ANTH 931b, Working Group on  
Ethnography and Oral History I and II** Kathryn Dudley

A continuous workshop for advanced graduate students in Anthropology and American Studies. We discuss fieldwork experiences, analyze recordings of interviews, and share writing in progress to gather feedback and improve techniques. We attend to the methodological, representational, and ethical problems that arise in oral history and ethnography and examine critical theoretical frameworks for understanding our work as collaborative knowledge production. Since 2000, group members' research has shared several themes: a commitment to experimental representational methods; the importance of space, affect, and materiality to ethnographic and historical analysis; and field sites that explore post-industrial economies in the United States and other areas of the world. Prerequisite: permission of the instructor. One-half credit per term; meets every other week. ½ Course cr per term

# 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

## Acting Director of Graduate Studies [F]

Erik Harms

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

**Associate Professors** Erik Harms, William Honeychurch, Douglas Rogers

**Assistant Professors** Oswaldo Chinchilla, Narges Erami (*Middle East Studies*), Louisa Lombard, Brian Wood

## FIELDS OF STUDY

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

## SPECIAL REQUIREMENTS FOR THE PH.D. DEGREE

There are no required courses or seminars for archaeology and biological anthropology graduate students. However, graduate students in these subfields are expected to confer closely with their primary adviser and faculty to develop the most enriching and cogent program of courses. In sociocultural anthropology, more than three-fourths of a student's program consists of electives, including course work in other departments. Sociocultural students must take six required courses, with the remainder being



electives among Anthropology courses and other departments' courses. Admission to Ph.D. candidacy requires (1) completion of two years of course work (sixteen term courses); (2) independent study and research; (3) satisfactory performance on qualifying examinations; and (4) a dissertation research proposal submitted and approved before the end of the third year. For sociocultural anthropology students, the research proposal requirement takes the form of a field paper of approximately eighty pages in length. Qualifying examinations are normally taken at the end of the second year. For archaeology and biological anthropology subfields, they consist of eight hours written (four hours on one of the subfields, four hours on the student's special interest), and two hours oral. The sociocultural anthropology exam consists of five hours written and approximately one hour oral and is based on the six required courses.

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

## **COMBINED PH.D. PROGRAMS**

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

Admission into the combined degree program in Anthropology and African American Studies is based on mutual agreement between these two departments. Individual students will develop courses of study in consultation with their academic advisers and with the directors of graduate study for both departments. Students in the program must take core courses in Anthropology and in African American Studies, plus related courses in both departments approved by their advisory committees. In addition, they must successfully complete the African American Studies third-year Dissertation Prospectus Workshop (AFAM 895). 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](mailto:anthropology@yale.edu); website, <http://anthropology.yale.edu>.

## COURSES

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

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 501a, Anthropology and Classical Social Theory** Paul Kockelman

Readings of primary texts in classical social theory, especially the writings of Marx, Weber, and Durkheim. Particular emphasis is placed on the role of these theorists in the early development of anthropology and social science more broadly. The course is reserved for first-year graduate students in Anthropology.

**ANTH 502a, Research in Sociocultural Anthropology: Design and Methods** Helen Siu

The course offers critical evaluation of the nature of ethnographic research. Research design includes the rethinking of site, voice, and ethnographic authority.

**ANTH 531b / ARCG 531b / CLSS 815b / CPLT 547b / HIST 502b / JDST 653b / NELC 533b / RLST 803b, Slavery, Dependency, and Genocide in the Ancient and Premodern World** Noel Lenski and Benedict Kiernan

Covers the subject of class and ethnic repression from the third millennium B.C.E. to the mid-second millennium C.E. Analyzes textual, epigraphic, and iconographic sources for slavery, dependency, and genocide in Assyrian, Greek, Roman, Germanic, Angkorian, Vietnamese, Burmese, Chosun, Mayan, and Aztec cultures.

**ANTH 533b, Bilingualism in Social Context** J. Joseph Errington

The linguistic phenomenon of bilingualism is presented through broad issues in social description inseparably linked to it: growth and change in bilingual communities; bilingual usage, social identity, and allegiance; and interactional significances of bilingual speech repertoire use.

**ANTH 538a / GLBL 838a, Culture and Politics in the Contemporary Middle East**

Marcia Inhorn

This interdisciplinary seminar is designed to introduce students to some of the most pressing contemporary cultural and political issues shaping life in the Middle East and North Africa. The course aims for broad regional coverage, with particular focus on

several important nation-states (e.g., Egypt, Saudi Arabia, Afghanistan, Iran, Iraq) and Western interventions in them. Students should emerge with a keener sense of Middle Eastern regional histories and contemporary social issues, as described by leading scholars in the field of Middle Eastern studies and particularly Middle Eastern anthropology. Following a historical introduction, the course is organized around three core themes—Islam, politics, modernity—with movement from the macropolitical level of Islamic discourse and state politics to the most intimate domains of gender, family life, and contemporary youth culture. Through reading, thinking, talking, and writing about a series of book-length monographs, students gain broad exposure to a number of exigent issues in the Middle Eastern region, as well as to the ethnographic methodologies and critical theories of Middle East anthropologists. Students are graded on seminar participation, leadership of seminar discussions, two review/analysis papers, and a comparative written review of three books. Required for Council on Middle East Studies (CMES) graduate certificate students. Recommended for Middle East concentrators in other disciplines.

**ANTH 539b, Urban Ethnographies of Asia** Erik Harms

Introduction to the anthropological study of contemporary Asian cities. Focus on new ethnographies about cities in East, Southeast, and South Asia. Topics include rural-urban migration, redevelopment, evictions, social movements, land grabbing, master-planned developments, heritage preservation, utopian aspirations, social housing, slums and precariousness, and spatial cleansing.

**ANTH 541a / HIST 965a / PLSC 779a, Agrarian Societies: Culture, Society, History, and Development** Peter Perdue, Kalyanakrishnan Sivaramakrishnan, and James Scott

An interdisciplinary examination of agrarian societies, contemporary and historical, Western and non-Western. Major analytical perspectives from anthropology, economics, history, political science, and environmental studies are used to develop a meaning-centered and historically grounded account of the transformations of rural society. Team-taught.

**ANTH 575a / EAST 575a, Hubs, Mobilities, and Global Cities** Helen Siu and Sarah LeBaron von Baeyer

Analysis of urban life in historical and contemporary societies. Topics include capitalist and postmodern transformations, class, gender, ethnicity, migration, and global landscapes of power and citizenship.

**ANTH 579b / ARCG 579b, Directing Archaeological Excavations** Roderick McIntosh

Directing an archaeological excavation is one of the most complex and fraught tasks that an archaeologist will ever face. From estimating budgets, to labor relations, to massaging egos of specialists, to establishing good relations with local communities—is it any wonder that many directors long for the days when they themselves could just dig! Little wonder, then, that Sir Mortimer Wheeler's description of his paramilitary excavations rings, if not true, then nostalgic. This course reviews the many pieces that must come together, from project conceptualization through laboratory analysis, tailored for graduate students who will soon be directing their own field research.

**ANTH 600b, Contemporary Social Theory** Louisa Lombard

An overview of central themes and debates in contemporary social theory, with a focus on the integration of theory and research, rather than a hermeneutical analysis of

particular theoretical texts. Concentrating on questions of power, inequality, the self, and community, assessment of the relevance of sociological theory to advancing an understanding of the complexities of late-twentieth-century Western society. Critical theory, feminist theories, postmodernism, and the contributions of individual theorists are reviewed and critiqued.

**ANTH 615a, 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 616a, Invisible Economies: Anthropology of the Illicit** Narges Erami

In this seminar we study theories and ethnographies of marginal, hidden, secret, and invisible economies. We look at the manner in which a globalized world has created “new” economies that may be considered criminal by nation-states, as well as “old” economies that have always remained outside of the legitimate framework.

**ANTH 631b, Artisanal Capitalism** Narges Erami

The art of making things, with a focus on the recent popularity of handmade goods from around the world. Theories on modernity and technology, movement and action, and aesthetics. The practice of making Persian carpets, including their history, color and design, and relation to Islamic art.

**ANTH 632a, 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 636a / ARCG 636a / G&G 636a, 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 638b, Culture, Power, Oil** Douglas Rogers

The course analyzes the production, circulation, and consumption of petroleum in order to explore key topics in recent social and cultural theory, including globalization, empire, cultural performance, natural resource extraction, and the nature of the state. Case studies from the United States, Saudi Arabia, Nigeria, Venezuela, and the former Soviet Union, among others.

**ANTH 646a / HSAR 749a, Three Thousand Years of Mexican Feasting: 1500 B.C.E. to 1519 C.E.** Mary Miller and Oswaldo Chinchilla Mazariegos

This course sits at the cusp of anthropology and art history, considered through the lens of the most central of human activities, the consumption of food. Feasting was integral to the prehispanic peoples of Mesoamerica, who domesticated and cultivated maize, beans, chocolate, vanilla, tomatoes, chilies, and squashes, and served dogs, ducks, and turkeys on the most festive of occasions. They developed special ceramics, from elaborate tamale plates to tall chocolate pots, for ritual service, some of which then became assemblages with which to honor the dead, and sometimes preserving a performance otherwise not visible in the present. In this course, the role of food both as object of ritual and performance and as subject is examined. Seasonal celebrations, as documented in the sixteenth-century Florentine Codex, are examined alongside painted and sculpted representations of food and its rituals. Cross-cultural consideration of the feast as a conceptual category that ranges from the potlatch of the Northwest Coast peoples to modern Day of the Dead practice helps shape class discussion of Mesoamerican feasting before European contact, as does study of gender and the spatial settings of consumption. The problem of sampling and identification is considered through scientific study and practice, and vessels in New Haven and New York are explored for potential residues.

**ANTH 651b / WGSS 651b, 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 652a / AMST 751a, American Precarity** Kathryn Dudley

The 2016 election cast a spotlight on the political discontent of millions of Americans, a broad segment of whom are white, working-class, and residing in regions of the country marked by unprecedented precarity, an ongoing condition of economic dislocation and social insecurity. This course traces the histories of the present that have produced cross-cutting zones of abandonment and social trauma not easily pigeonholed by concepts of race, class, gender, and citizenship.

**ANTH 692a / ARCG 692a / NELC 537a, Imaging Ancient Worlds** Roderick McIntosh and John Darnell

The interpretation of epigraphic and archaeological material within the broader context of landscape, by means of creating a virtual model to reconstruct the sensory experiences of the ancient peoples who created the sites. Use of new technologies in

computer graphics, including 3-D imaging, to support current research in archaeology and anthropology.

**ANTH 702b / ARCG 702b, 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.

**ANTH 707a / ARCG 707a, Origins of Complex Society in West Africa**

Roderick McIntosh

Using original readings of site reports and primary source articles, we explore the great diversity of expressions of emerging complexity in prehistoric West Africa.

**ANTH 716Lb, Introduction to Archaeological Laboratory Sciences**

Roderick McIntosh and Eckart Frahm

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.

**ANTH 726a / ARCG 726a, Ancient Civilizations of the Eurasian Steppes**

William Honeychurch

Peoples of the steppe zone, stretching from Eastern Europe to Mongolia, have played a pivotal role in Old World prehistory, though much about their societies and lifeways is still shrouded in mystery. The archaeology of this macro-region has developed rapidly since the 1990s, and this course presents an overview of major topics and debates in the region based on what archaeologists currently know about Eurasian steppe societies of the past.

**ANTH 736b / ARCG 736b, Advanced Topics in Asian Archaeology**

William Honeychurch

This seminar reviews the archaeology of Asia of the Pleistocene and Holocene epochs with emphasis on East, Southeast, and South Asia. Asian archaeology remains little known to most Western researchers, although some of the earliest hominid remains and some of the most powerful states are found in that part of the world. The course emphasizes the particularities of Asian cultural sequences, while illustrating how processes in these sequences compare to those found elsewhere in the world. The diverse Asian record provides a basis for refining key concepts in anthropological archaeology, including domestication, inequality and hierarchy, heterarchy, and complexity. Topics to be covered include history and theory in Asian archaeology; the Pleistocene and paleolithic record of Asia; origins of plant and animal domestication; early farming communities; models of complexity; and early states and empires.

**ANTH 748a / ARCG 748a, Contemporary Archaeological Theory**

Richard Burger

This seminar explores contemporary theory in all of its diversity. The course examines multiple critiques of New Archaeology and its remaining legacy; the diversity of competing approaches, sometimes called postprocessualist, currently employed in the United States and the United Kingdom, including critical archaeology, the archaeology of gender, structuralist approaches, various Marxist and neo-Marxist formulations of

archaeological theory, and applications of evolutionary theory; as well as the differing trajectory of approaches outside the English-speaking world.

**ANTH 750a / ARCG 750a, Analysis of Lithic Technology** Oswaldo Chinchilla Mazariegos

This course provides an introduction to the analysis of the chipped and ground stone tools found on archaeological sites. As a laboratory course, it includes hands-on instruction: we learn how to manufacture chipped stone tools out of obsidian. We begin by reviewing the development of chipped and ground stone tool technology from the earliest simple pebble tools to historical period tools. We discuss the relevance of lithics research to issues of subsistence, craft specialization, and trade. We also discuss how these artifacts are recorded, analyzed, and drawn, and we review related studies such as sourcing and use-wear analysis.

**ANTH 756b / ARCG 756b, Regional Exchange Systems** Richard Burger

The course considers archaeological examination of exchange systems from a broad perspective. The first part involves examination of ethnographic and historic information about variation in types of exchange, as well as theoretical approaches that have been used to understand early exchange systems. Then the class discusses archaeological methods to determine evidence for exchange of goods at the local and regional levels on the basis of settlement data and information from compositional analysis. Archaeological case studies from more than one world area are examined. Open to advanced undergraduates.

**ANTH 759a / ARCG 759a, 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.

**ANTH 773b / ARCG 773b / NELC 588b, Abrupt Climate Change and Societal Collapse** Harvey Weiss

Collapse documented in the archaeological and early historical records of the Old and New Worlds, including Mesopotamia, Mesoamerica, the Andes, and Europe. Analysis of politicoeconomic vulnerabilities, resiliencies, and adaptations in the face of abrupt climate change, anthropogenic environmental degradation, resource depletion, "barbarian" incursions, or class conflict.

**ANTH 780b / ARCG 780b, Archaeology of Religion** Richard Burger

The course explores archaeological approaches to the study of religion. While the term "religion" is hard to define, it is generally agreed that religious phenomena occur in almost all cultures and that this realm played a significant part in most prehistoric cultures. In order to provide a broad vision of this theme, the course begins by considering influential schools of thought on the definition, origins, and social significance of religious behavior. The course then reviews a variety of methods that scholars may use to reconstruct ancient beliefs and rituals. The course assesses the applicability and success of these methodologies across the broad spectrum of ancient cultures representing differing degrees of sociopolitical complexity. Finally, we



explore case studies from a diverse range of ancient societies and consider the impact of religious behaviors within their broader cultural contexts.

**ANTH 785a / ARCG 785a, Archaeological Ceramics I** Anne Underhill

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

**ANTH 791a / ARCG 791a, Paleoclimate and Human Response** Roderick McIntosh

Explores the recursive interaction of climate change with human perception and manipulation of the landscape. Combines a primer on mechanisms and measures of climate change with three case studies of historical response to change at different scales.

**ANTH 810a, Mammalogy** Eric Sargis

The evolution and diversity of mammals, including primates. Origin, evolutionary history, systematics, morphology, biogeography, physiology, behavior, and ecology of major mammalian lineages. Accompanying laboratories focus on diagnostic morphological features of mammalian groups through examination of specimens from the Peabody Museum.

**ANTH 835b / E&EB 842b, 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, Topics and Issues in Evolutionary Theory** Eric Sargis

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 864b / ARCG 864b, 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 930a and ANTH 931b / AMST 935a and AMST 936b, Working Group on Ethnography and Oral History I and II** Kathryn Dudley

A continuous workshop for advanced graduate students in Anthropology and American Studies. We discuss fieldwork experiences, analyze recordings of interviews, and share writing in progress to gather feedback and improve techniques. We attend to the methodological, representational, and ethical problems that arise in oral history and ethnography and examine critical theoretical frameworks for understanding our work as collaborative knowledge production. Since 2000, group members' research has



shared several themes: a commitment to experimental representational methods; the importance of space, affect, and materiality to ethnographic and historical analysis; and field sites that explore post-industrial economies in the United States and other areas of the world. Prerequisite: permission of the instructor. One-half credit per term; meets every other week. ½ Course cr per term

**ANTH 950b, Directed Research: Preparation for Qualifying Exam** David Watts  
By arrangement with faculty.

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

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

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

**ANTH 954a or b, Directed Research in Biological Anthropology** David Watts  
By arrangement with faculty.

# Applied Mathematics

A. K. Watson Hall, 203.432.1278

<http://applied.math.yale.edu>

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

## Director of Graduate Studies

Peter Jones

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

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

**Assistant Professors** Jeremy Hoskins, Gal Mishne, Manas Rachh, Guy Wolf

## FIELDS OF STUDY

The graduate Program in Applied Mathematics comprises the study and application of mathematics to problems motivated by a wide range of application domains. Areas of concentration include the analysis of data in very high-dimensional spaces, the geometry of information, computational biology, and randomized algorithms. Topics covered by the program include classical and modern applied harmonic analysis, linear and nonlinear partial differential equations, numerical analysis, scientific computing and applications, discrete algorithms, combinatorics and combinatorial optimization, graph algorithms, geometric algorithms, discrete mathematics and applications, cryptography, statistical theory and applications, probability theory and applications, information theory, econometrics, financial mathematics, statistical computing, and applications of mathematical and computational techniques to fluid mechanics, combustion, and other scientific and engineering problems.

## SPECIAL REQUIREMENTS FOR THE PH.D. DEGREE

All students are required to: (1) complete twelve term courses (including reading courses) at the graduate level, at least two with Honors grades; (2) pass a qualifying examination on their general applied mathematical knowledge (in algebra, analysis, and probability and statistics) by the end of their second year; (3) submit a dissertation prospectus; (4) participate in the instruction of undergraduates; (5) be in residence for at least three years; and (6) complete a dissertation that clearly advances understanding of the subject it considers. Prior to registering for a second year of study, and in

addition to all other academic requirements, students must successfully complete MATH 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. The normal time for completion of the Ph.D. program is four years.

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

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

## HONORS REQUIREMENT

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

## 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.** See 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** Peter Jones

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

### **AMTH 667b / CPSC 576b / ENAS 576b, 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.

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

An overview of advances in the past decade in machine learning and automatic data-mining approaches for dealing with the broad scope of modern data-analysis challenges, including deep learning, kernel methods, dictionary learning, and bag of words/features. This year, the focus is on a broad scope of biomedical data-analysis tasks, such as single-cell RNA sequencing, single-cell signaling and proteomic analysis, health care assessment, and medical diagnosis and treatment recommendations. The seminar is based on student presentations and discussions of recent prominent publications from leading journals and conferences in the field. Prerequisite: basic concepts in data analysis (e.g., CPSC 545 or 563) or permission of the instructor.

**AMTH 765b / CB&B 562b / ENAS 561b / INP 562b / MB&B 562b / MCDB 562b / PHYS 562b, Dynamical Systems in Biology** Damon Clark and Thierry Emonet

This course covers advanced topics in computational biology. How do cells compute, how do they count and tell time, how do they oscillate and generate spatial patterns? Topics include time-dependent dynamics in regulatory, signal-transduction, and neuronal networks; fluctuations, growth, and form; mechanics of cell shape and motion; spatially heterogeneous processes; diffusion. This year, the course spends roughly half its time on mechanical systems at the cellular and tissue level, and half on models of neurons and neural systems in computational neuroscience. Prerequisite: MCDB 561 or equivalent, or a 200-level biology course, or permission of the instructor.

# Applied Physics

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

## Chair

Charles Ahn

## Director of Graduate Studies

Hui Cao (309 BCT, [hui.cao@yale.edu](mailto:hui.cao@yale.edu))

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

**Associate Professor** Corey O'Hern (*Mechanical Engineering & Materials Science*)

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

## FIELDS OF STUDY

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

## SPECIAL ADMISSIONS REQUIREMENTS

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

## INTEGRATED GRADUATE PROGRAM IN PHYSICAL AND ENGINEERING BIOLOGY (PEB)

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

## SPECIAL REQUIREMENTS FOR THE PH.D. DEGREE

The student plans a course of study in consultation with faculty advisers (the student's advisory committee). A minimum of twelve term courses is required. These courses must be full-credit graduate courses with clear technical, scientific, or mathematical

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

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

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

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

There is no foreign language requirement.

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

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

## HONORS REQUIREMENT

Students must meet the Graduate School's Honors requirement in at least two term courses (excluding Special Investigations) by the end of the second term of full-time study. An extension of one term may be granted at the discretion of the DGS.

## MASTER'S DEGREES

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

**M.S. (en route to the Ph.D.)** To qualify for the M.S., the student must pass eight term courses; no more than two may be Special Investigations. An average grade of at least High Pass is required, with at least one grade of Honors.

**Terminal Master's Degree Program** Students may also be admitted directly to a terminal master's degree program. The requirements are the same as for the M.S. en route to the Ph.D., although there are no core course requirements for students in this program. This program is normally completed in one year, but a part-time program may be spread over as many as four years. Some courses are available in the evening, to suit the needs of students from local industry.

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

## COURSES

**APHY 500b / 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.

**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 508b / 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

**APHY 548a / ENAS 850a / PHYS 548a, Solid State Physics I** Victor Henrich

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 / ENAS 851b / PHYS 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 588a, Mathematical Methods in Nanophotonics** Owen Miller

Linear algebra and eigensystems for Maxwell's equations; group theory; coupled-mode theory; causality, dispersion relations, and sum rules; equivalence and reciprocity principles; perturbation theory; quasi-static EM and plasmonics; metamaterials; computational photonics: spectral, finite-difference, finite-element, and boundary-element approaches; large-scale optimization and design.

**APHY 590b / PHYS 590b, Responsible Conduct in Research for Physical Scientists**  
Staff

Required seminar for all first-year students.

**APHY 610b / PHYS 610b, Quantum Many-Body Theory** Yoram Alhassid

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** Meng Cheng

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 633a / PHYS 633a, Introduction to Superconductivity** Daniel Prober

The fundamentals of superconductivity, including both theoretical understandings of basic mechanism and description of major applications. Topics include historical overview, Ginzburg-Landau (mean field) theory, critical currents and fields of type II superconductors, BCS theory, Josephson junctions and microelectronic and quantum-bit devices, and high-T<sub>c</sub> oxide superconductors.

**APHY 634a / PHYS 634a, Mesoscopic Physics I** Michel Devoret

Introduction to the physics of nanoscale solid state systems, which are large and disordered enough to be described in terms of simple macroscopic parameters like resistance, capacitance, and inductance, but small and cold enough that effects usually associated with microscopic particles, like quantum-mechanical coherence and/or charge quantization, dominate. Emphasis is placed on transport and noise phenomena in the normal and superconducting regimes.

**APHY 675a / PHYS 675a, Principles of Optics with Applications** Hui Cao

Introduction to the principles of optics and electromagnetic wave phenomena with applications to microscopy, optical fibers, laser spectroscopy, nanophotonics, plasmonics, and metamaterials. Topics include propagation of light, reflection and



refraction, guiding light, polarization, interference, diffraction, scattering, Fourier optics, and optical coherence.

**APHY 725b / ENAS 725b, 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 or b / PHYS 816a or b, Techniques Microwave Measurement** Staff

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*), Diana Kleiner (*Classics; History of Art*), J.G. Manning (*Classics; History*), Roderick McIntosh (*Anthropology*), Mary Miller (*History of Art*), Eric Sargis (*Anthropology; Ecology & Evolutionary Biology*), Ronald Smith (*Geology & Geophysics; Forestry & Environmental Studies*), Anne Underhill (*Anthropology*), David Watts (*Anthropology*), Harvey Weiss (*Near Eastern Languages & Civilizations; Forestry & Environmental Studies*)

**Associate Professors** Milette Gaifman (*History of Art; Classics*), William Honeychurch (*Anthropology*)

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

**Lecturers, Research Associates, and Research Scientists** Karen Foster (*Near Eastern Languages & Civilizations; History of Art*), Ellery Frahm (*Anthropology*), Lucy Salazar (*Anthropology*), David Sensabaugh (*Art Gallery*), Catherine Skinner (*Geology & Geophysics*)

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

## SPECIAL ADMISSIONS REQUIREMENTS

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

## SPECIAL REQUIREMENTS FOR THE M.A. DEGREE

Courses are drawn from the graduate programs of the participating departments and from those undergraduate courses that are also open to graduate students. Eight courses are required. Unless previously taken for credit, these will include the 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) Ecology & Evolutionary Biology, Forestry & Environmental Studies, or

Geology & Geophysics; and four electives. All students are required to participate in an approved summer field project. In addition, each student will write a master's thesis. Degree candidates are required to pay a minimum of one year of full tuition. Full-time students can complete the course requirements in one academic year, and all students are expected to complete the program within a maximum period of three academic years.

For further information, visit the Archaeological Studies 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, [cynthia.dreier@yale.edu](mailto:cynthia.dreier@yale.edu).

## Courses

**ARCG 531b / ANTH 531b / CLSS 815b / CPLT 547b / HIST 502b / JDST 653b / NELC 533b / RLST 803b, Slavery, Dependency, and Genocide in the Ancient and Premodern World** Noel Lenski and Benedict Kiernan

Covers the subject of class and ethnic repression from the third millennium B.C.E. to the mid-second millennium C.E. Analyzes textual, epigraphic, and iconographic sources for slavery, dependency, and genocide in Assyrian, Greek, Roman, Germanic, Angkorian, Vietnamese, Burmese, Chosun, Mayan, and Aztec cultures.

**ARCG 579b / ANTH 579b, Directing Archaeological Excavations** Roderick McIntosh  
Directing an archaeological excavation is one of the most complex and fraught tasks that an archaeologist will ever face. From estimating budgets, to labor relations, to massaging egos of specialists, to establishing good relations with local communities — is it any wonder that many directors long for the days when they themselves could just dig! Little wonder, then, that Sir Mortimer Wheeler's description of his paramilitary excavations rings, if not true, then nostalgic. This course reviews the many pieces that must come together, from project conceptualization through laboratory analysis, tailored for graduate students who will soon be directing their own field research.

**ARCG 636a / ANTH 636a / G&G 636a, 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 692a / ANTH 692a / NELC 537a, Imaging Ancient Worlds** Roderick McIntosh and John Darnell

The interpretation of epigraphic and archaeological material within the broader context of landscape, by means of creating a virtual model to reconstruct the sensory experiences of the ancient peoples who created the sites. Use of new technologies in computer graphics, including 3-D imaging, to support current research in archaeology and anthropology.

**ARCG 701a / CLSS 875a / HSAR 568a, Cleopatra: A Legend for All Time** Diana Kleiner

The life of a queen who became a celebrity and remains a legend serves as the starting point for an exploration of art and architecture produced in Egypt and Rome during

the late Hellenistic period and early Roman Empire. Cleopatra was antiquity's greatest female star and one of the most famous women who ever lived. While the full panorama of her life is forever lost, Cleopatra comes alive in surviving works of ancient art and other remains of what was once an opulent material culture. Every generation has its own Cleopatra, and the mythical Egyptian queen's reinvention in later art, literature, and film is also considered. Qualified undergraduates who have taken Roman Art: Empire, Identity, and Society; Roman Architecture; or eClavdia: Women in Ancient Rome, may be admitted with permission of the instructor.

**ARCG 702b / ANTH 702b, 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 707a / ANTH 707a, Origins of Complex Society in West Africa**

Roderick McIntosh

Using original readings of site reports and primary source articles, we explore the great diversity of expressions of emerging complexity in prehistoric West Africa.

**ARCG 716Lb, Introduction to Archaeological Laboratory Sciences**

Roderick McIntosh and Eckart Frahm

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 726a / ANTH 726a, Ancient Civilizations of the Eurasian Steppes**

William Honeychurch

Peoples of the steppe zone, stretching from Eastern Europe to Mongolia, have played a pivotal role in Old World prehistory, though much about their societies and lifeways is still shrouded in mystery. The archaeology of this macro-region has developed rapidly since the 1990s, and this course presents an overview of major topics and debates in the region based on what archaeologists currently know about Eurasian steppe societies of the past.

**ARCG 736b / ANTH 736b, Advanced Topics in Asian Archaeology**

William Honeychurch

This seminar reviews the archaeology of Asia of the Pleistocene and Holocene epochs with emphasis on East, Southeast, and South Asia. Asian archaeology remains little known to most Western researchers, although some of the earliest hominid remains and some of the most powerful states are found in that part of the world. The course emphasizes the particularities of Asian cultural sequences, while illustrating how processes in these sequences compare to those found elsewhere in the world. The diverse Asian record provides a basis for refining key concepts in anthropological archaeology, including domestication, inequality and hierarchy, heterarchy, and complexity. Topics to be covered include history and theory in Asian archaeology; the Pleistocene and paleolithic record of Asia; origins of plant and animal domestication; early farming communities; models of complexity; and early states and empires.

**ARCG 748a / ANTH 748a, Contemporary Archaeological Theory** Richard Burger

This seminar explores contemporary theory in all of its diversity. The course examines multiple critiques of New Archaeology and its remaining legacy; the diversity of competing approaches, sometimes called postprocessualist, currently employed in the United States and the United Kingdom, including critical archaeology, the archaeology of gender, structuralist approaches, various Marxist and neo-Marxist formulations of archaeological theory, and applications of evolutionary theory; as well as the differing trajectory of approaches outside the English-speaking world.

**ARCG 750a / ANTH 750a, Analysis of Lithic Technology** Oswaldo Chinchilla Mazariegos

This course provides an introduction to the analysis of the chipped and ground stone tools found on archaeological sites. As a laboratory course, it includes hands-on instruction: we learn how to manufacture chipped stone tools out of obsidian. We begin by reviewing the development of chipped and ground stone tool technology from the earliest simple pebble tools to historical period tools. We discuss the relevance of lithics research to issues of subsistence, craft specialization, and trade. We also discuss how these artifacts are recorded, analyzed, and drawn, and we review related studies such as sourcing and use-wear analysis.

**ARCG 756b / ANTH 756b, Regional Exchange Systems** Richard Burger

The course considers archaeological examination of exchange systems from a broad perspective. The first part involves examination of ethnographic and historic information about variation in types of exchange, as well as theoretical approaches that have been used to understand early exchange systems. Then the class discusses archaeological methods to determine evidence for exchange of goods at the local and regional levels on the basis of settlement data and information from compositional analysis. Archaeological case studies from more than one world area are examined. Open to advanced undergraduates.

**ARCG 759a / ANTH 759a, 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 762b / EMD 548b / G&G 562b, Observing Earth from Space** Ronald Smith

A practical introduction to satellite image analysis of Earth's surface. Topics include the spectrum of electromagnetic radiation, satellite-borne radiometers, data transmission and storage, computer image analysis, the merging of satellite imagery with GIS and applications to weather and climate, oceanography, surficial geology, ecology and epidemiology, forestry, agriculture, archaeology, and watershed management.

**ARCG 773b / ANTH 773b / NELC 588b, Abrupt Climate Change and Societal Collapse** Harvey Weiss

Collapse documented in the archaeological and early historical records of the Old and New Worlds, including Mesopotamia, Mesoamerica, the Andes, and Europe. Analysis of politicoeconomic vulnerabilities, resiliencies, and adaptations in the face of

abrupt climate change, anthropogenic environmental degradation, resource depletion, “barbarian” incursions, or class conflict.

**ARCG 780b / ANTH 780b, Archaeology of Religion** Richard Burger

The course explores archaeological approaches to the study of religion. While the term “religion” is hard to define, it is generally agreed that religious phenomena occur in almost all cultures and that this realm played a significant part in most prehistoric cultures. In order to provide a broad vision of this theme, the course begins by considering influential schools of thought on the definition, origins, and social significance of religious behavior. The course then reviews a variety of methods that scholars may use to reconstruct ancient beliefs and rituals. The course assesses the applicability and success of these methodologies across the broad spectrum of ancient cultures representing differing degrees of sociopolitical complexity. Finally, we explore case studies from a diverse range of ancient societies and consider the impact of religious behaviors within their broader cultural contexts.

**ARCG 785a / ANTH 785a, Archaeological Ceramics I** Anne Underhill

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

**ARCG 791a / ANTH 791a, Paleoclimate and Human Response** Roderick McIntosh

Explores the recursive interaction of climate change with human perception and manipulation of the landscape. Combines a primer on mechanisms and measures of climate change with three case studies of historical response to change at different scales.

**ARCG 844a / CLSS 848a / HSAR 831a, Ancient Greek Festivals** Jessica Lamont and Carolyn Laferriere

One of the most prominent expressions of ancient Greek piety was the festival, in which poetry was sung, athletic and artistic contests were held, animals sacrificed, and group identities negotiated and reaffirmed. In the Archaic and Classical periods, festivals could be minor, local, single-day undertakings, or weeklong, multi-city affairs; yet in each instance, they were an expression of communal identity, competition, and devotion to the gods. Poetry and sculpture served to commemorate these events long after the festival itself had passed, and early literary genres and artistic styles took root within and developed alongside the festivals, gods, and individuals whom they were intended to commemorate. Bringing together literary, archaeological, art historical, and anthropological evidence, this interdisciplinary seminar considers Archaic and Classical Greek festivals within their social, historical, and religious contexts. We pay particular attention to the literary and historical texts (hymns, the “recension” of Homeric epic in festival contexts, Attic tragedy and comedy, epinician, etc.) and the visual representations that commemorate and describe the major festivals in Greece, as well as to the particular ways that festivals exploited visual, olfactory, auditory, tactile,

or gustatory reactions in their worshippers to provoke specific interactions with the divine.

**ARCG 864b / ANTH 864b, 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.

# Architecture

Rudolph Hall, 203.432.2288  
<http://architecture.yale.edu/phd>  
M.Phil., Ph.D.

## Dean

Deborah Berke

## Director of Doctoral Studies

Alan Plattus (710 Rudolph, 203.432.2290, [alan.plattus@yale.edu](mailto:alan.plattus@yale.edu))

**Professors** Michelle Addington, Deborah Berke, Mario Carpo, Peggy Deamer, Keller Easterling, Peter Eisenman, Kurt Forster, Alan Plattus, Robert A. M. Stern, Anthony Vidler

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

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

## FIELDS OF STUDY

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

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

## ADMISSION REQUIREMENTS

Applicants must have appropriate academic credentials (a master's degree or equivalent in Architecture, Engineering, Environmental Design, or, exceptionally, in a related field). 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), a test that includes a section on spoken English. The TOEFL requirement may be waived only for applicants who, prior to matriculation at Yale, will have received a baccalaureate degree or its international equivalent from a college or university where English is the primary language of instruction. Applicants must have studied in residence at the baccalaureate institution for at least three years to receive the waiver. A



waiver will not be granted on the basis of an advanced degree (such as M.A., M.S., or Ph.D.) from any institution.

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

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

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

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

## **SCHOOL OF ARCHITECTURE SUMMER PREPARATION COURSES FOR INCOMING PH.D. STUDENTS**

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

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

## **SPECIAL REQUIREMENTS FOR THE PH.D. DEGREE**

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

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

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

do independent readings with individual faculty members on their specific areas of interest.

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

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

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

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

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

## **GRADUATE RESEARCH ASSISTANT AND TEACHING FELLOW EXPERIENCE**

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

## **MASTER'S DEGREE**

**M.Phil.** The Master of Philosophy degree is awarded en route to the Ph.D. The minimum requirements for this degree are that a student has completed

all requirements for the Ph.D., except the teaching fellow assignments and the dissertation.

## REQUIRED COURSES

All Ph.D. students are required to take the following courses. For a complete list of Architecture courses, see the School of Architecture bulletin, available online at <http://bulletin.yale.edu>; and Online Course Information (OCI) at <https://students.yale.edu/oci>.

### **ARCH 551a, Ph.D. Seminar I** Staff

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

### **ARCH 552b, Ph.D. Seminar II** Staff

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

### **ARCH 553a, Ph.D. Seminar III** Staff

1 credit. (Required in, and limited to, Ph.D. second year, fall term.) Seminar content to be announced.

### **ARCH 554b, Ph.D. Dissertation Preparation** Staff

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

# Astronomy

52 Hillhouse Avenue, 203.432.3000

<http://astronomy.yale.edu>

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

## Chair

Sarbani Basu

## Director of Graduate Studies

Robert Zinn [F] (203.432.3017, [robert.zinn@yale.edu](mailto:robert.zinn@yale.edu))

Jeffrey Kenney [Sp] (203.432.3013, [jeff.kenney@yale.edu](mailto:jeff.kenney@yale.edu))

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

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

**Assistant Professor** Jessi Cisewski (*Statistics & Data Science*)

## FIELDS OF STUDY

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

## SPECIAL ADMISSIONS REQUIREMENTS

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

## SPECIAL REQUIREMENTS FOR THE PH.D. DEGREE

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

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

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

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

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

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

Students are encouraged to take graduate courses in physics or related subjects. On an irregular basis, special topic courses and seminars are offered, which provide the opportunity to study some fields in greater depth than is possible in standard courses. To achieve both breadth and depth in their education, students are encouraged to take a few courses beyond their second year of study.

There is no foreign language requirement. A written comprehensive examination, normally taken at the end of the fourth term of graduate work, tests the student's familiarity with the entire field of astronomy and related branches of physics and mathematics. Particular attention will be paid to the student's performance in the field in which the student plans to do research. An oral examination, held a few weeks after the written examination, is based on the student's chosen field of research. Satisfactory performance in these examinations, an acceptable record in course and research work, and an approved dissertation prospectus are required for admission to candidacy for the Ph.D. degree. The dissertation should present the results of an original and thorough investigation, worthy of publication. Most importantly, it should reflect the candidate's capacity for independent research. An oral dissertation defense is required.

Teaching experience is an integral part of graduate education in astronomy. All students are required to serve as teaching fellows for four terms. Both the level of teaching assignments and the scheduling of teaching are variable and largely determined by the needs of the department. Most students will teach in each of their first three terms and complete their fourth teaching assignment sometime after the qualifying exam.

## HONORS REQUIREMENT

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

## MASTER'S DEGREES

**M.Phil.** Upon application, the department will recommend for the award of the M.Phil. degree any student who has completed all the requirements of the Ph.D. degree except the oral 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), including at least one research project (ASTR 580). The student should have a grade average of High Pass in the courses and a grade of High Pass or above in the research project.

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

## COURSES

### **ASTR 500a, The Physics of Astrophysics** Sarbani Basu

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 510a, Stellar Populations** Robert Zinn

The stellar population of our galaxy and the galaxies of the local group. The properties of stars and star clusters, stellar evolution, and the structure and evolution of our galaxy.

### **ASTR 518b, Stellar Dynamics** Marla Geha

The dynamics and evolution of star clusters; structure and dynamics of our galaxy; theories of spiral structure; dynamical evolution of galaxies.

### **ASTR 525a or b, Advanced Statistical Methods for Astronomy** Paolo Coppi

Statistical techniques for extracting the maximum signal from data. Non-Gaussian probability distributions, optimal noise reduction techniques, period-finding, and parameter estimation using Bayesian and Monte Carlo Markov chain methods. Prerequisite: experience with programming. Open to undergraduates with permission of the instructor.

### **ASTR 530b, Galaxies** Jeffrey Kenney

The structure and morphology of galaxies, stellar populations, interstellar media, star formation, central black holes, galaxy mergers, and galaxy properties as a function of environment.

### **ASTR 555b, Observational Astronomy** Pieter Van Dokkum

The design and use of optical telescopes, cameras, spectrographs, and detectors to make astronomical observations. The reduction and analysis of photometric and spectroscopic observations.

### **ASTR 565a, 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 570a / PHYS 570a, High-Energy Astrophysics** Priyamvada Natarajan

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.

**ASTR 575b, Exoplanets** Gregory Laughlin

In recent years hundreds of exoplanets have been discovered orbiting around other stars. This course reviews the physics of planetary orbits, current exoplanet detection techniques, recent progress in characterizing exoplanet interiors and atmospheres, and the implications of these findings for our understanding of planet formation and evolution.

**ASTR 580a or b, Research** Staff

By arrangement with faculty.

**ASTR 710a and ASTR 711b, Professional Seminar** Debra Fischer

A weekly seminar covering science and professional issues in astronomy.

# Biomedical Engineering

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

## Chair

Jay Humphrey

## Director of Graduate Studies

Richard Carson ([richard.carson@yale.edu](mailto:richard.carson@yale.edu))

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

**Associate Professors** Joerg Bewersdorf (*Cell Biology*), Robin de Graaf, Tarek Fahmy, Rong Fan, Anjelica Gonzalez, Themis Kyriakides (*Pathology*), Kathryn Miller-Jensen, Xenophon Papademetris

**Assistant Professors** Stuart Campbell, Michael Choma, Chi Liu, Michael Mak, Michael Murrell, Steven Tommasini, Jiangbing Zhou

## FIELDS OF STUDY

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

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

For course listings, 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](mailto:karin.reinisch@yale.edu))

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

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

**Assistant Professors** David Baddeley, Topher Carroll, Shangqin Guo, Chenxiang Lin, Malaiyalam Mariappan, Peter Takizawa, Jie Yao

## FIELDS OF STUDY

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

## SPECIAL ADMISSIONS REQUIREMENTS

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

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

within the interdepartmental graduate program in Biological and Biomedical Sciences (BBS), <http://bbs.yale.edu>.

## **SPECIAL REQUIREMENTS FOR THE PH.D. DEGREE**

Students are required to take at least five graduate-level courses. No specific curriculum of courses is required, but CBIO 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 and the writing of the dissertation and its oral defense, the formal submission of copies of the written dissertation to the Graduate School, and the deposit of an additional copy with the department. Laboratory rotations and thesis research may be conducted outside of the department.

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

In addition to all other requirements, students must successfully complete CBIO 901 (First-Year Introduction to Research – Ethics: Scientific Integrity in Biomedical Research) prior to the end of their first year of study. In their fourth year of study, all students must successfully complete B&BS 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 500/CBIO 501/CBIO 502 sequence (Molecules to Systems; three terms, counts as one course), 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 (First-Year Introduction to Research—Grant Writing and Scientific Communication), CBIO 901 (First-Year Introduction to Research—Ethics: Scientific Integrity in Biomedical Research), 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 BBSB tracks. Program materials are available upon request to the Director of Graduate Studies, Department of Cell Biology, Yale University, PO Box 208002, New Haven CT 06520-8002.

## COURSES

### **CBIO 500a and CBIO 501b and CBIO 502a, Molecules to Systems** Peter Takizawa

This course is designed to provide medical students with a current and comprehensive review of biologic structure and function at the cellular, tissue, and organ system levels. Areas covered include structure and organization of cells; regulation of the cell cycle and mitosis; protein biosynthesis and membrane targeting; cell motility and the cytoskeleton; signal transduction; cell adhesion; cell and tissue organization of organ systems. Clinical correlation sessions, which illustrate the contributions of cell biology to specific medical problems, are interspersed in the lecture schedule. Histophysiology laboratories provide practical experience with an understanding of exploring cell and tissue structure. The course is offered only to M.D. and M.D./Ph.D. students. It runs for three terms from September to December of the next academic year to coincide with the School of Medicine curriculum. Registration and the release of grades takes place in the third term. The course is equivalent to two graduate credits.

### **CBIO 599a and CBIO 600b and CBIO 601b, Frontiers** Fred Gorelick, Karin Finberg, and Jonathan Bogan

The course emphasizes the connections between diseases and basic science using a lecture and seminar format. It is designed for students who are committed to a career in medical research, those who are considering such a career, or students who wish to explore scientific topics in depth. The first half of the course is organized in four- to five-week blocks that topically parallel CBIO 500 and 501. Examples of blocks from past years include "Diseases of protein folding" and "Diseases of ion channels." Each topic is introduced with a lecture given by the faculty. The lecture is followed by sessions in which students review relevant manuscripts under the supervision of a faculty mentor. The second half of the course focuses on the relationship of basic science to disease processes while emphasizing translational and clinical research. In addition, sessions are devoted to academic careers and cover subjects such as obtaining an academic position,

promotions, and grant writing. The course is open to M.D. and M.D./Ph.D. students who are taking or have taken the CBIO 500/501/502 sequence. Student evaluations are based on attendance, participation in group discussions, formal presentations, and a written review of an NIH proposal. It is equivalent to two graduate credits.

**CBIO 602a / MB&B 602a / MCDB 602a, Molecular Cell Biology** Charles Lusk, Michael Caplan, Pietro De Camilli, Thomas Pollard, Peter Takizawa, David Calderwood, James Rothman, Valerie Horsley, Thomas Melia, Megan King, and Josephina Van Wolfswinkel

A comprehensive introduction to the molecular and mechanistic aspects of cell biology for graduate students in all programs. Emphasizes fundamental issues of cellular organization, regulation, biogenesis, and function at the molecular level.

**CBIO 603a / MCDB 603a, Seminar in Molecular Cell Biology** Megan King, Michael Caplan, Pietro De Camilli, Thomas Pollard, Peter Takizawa, David Calderwood, James Rothman, Valerie Horsley, Thomas Melia, Charles Lusk, and Josephina Van Wolfswinkel

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

**CBIO 604b, Systems Cell Biology** Agnes Vignery

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, Charles Lusk, and Christopher Burd

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 611b, Vascular Cell Biology** Martin Schwartz

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

**CBIO 655a / GENE 655a, Stem Cells: Biology and Application** In-Hyun Park

This course is designed for first-year or second-year students to learn the fundamentals of stem cell biology and to gain familiarity with current research in the field. The course is presented in a lecture and discussion format based on primary literature. Topics include stem cell concepts, methodologies for stem cell research, embryonic stem cells, adult stem cells, cloning and stem cell reprogramming, and clinical applications of stem cell research. Prerequisites: undergraduate-level cell biology, molecular biology, and genetics.

**CBIO 900a / GENE 900a / MCDB 900a, First-Year Introduction to Research – Grant Writing and Scientific Communication** Valerie Horsley

Grant writing, scientific communication, and laboratory rotation talks for Molecular Cell Biology, Genetics, and Development track students.

**CBIO 901b / GENE 901b / MCDB 901b, First-Year Introduction to Research – Ethics: Scientific Integrity in Biomedical Research** Joerg Bewersdorf

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

**CBIO 911a / GENE 911a / MCDB 911a, First Laboratory Rotation** Valerie Horsley

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

**CBIO 912a / GENE 912a / MCDB 912a, Second Laboratory Rotation** Valerie Horsley

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

**CBIO 913b / GENE 913b / MCDB 913b, Third Laboratory Rotation** Valerie Horsley

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

# Cellular and Molecular Physiology

Sterling Hall of Medicine B147, 203.785.4041

<http://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](mailto:david.zenisek@yale.edu))

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

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

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

## FIELDS OF STUDY

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

## SPECIAL ADMISSIONS REQUIREMENTS

We welcome applications from students with backgrounds in the biological, chemical, and/or physical sciences. These include majors in biology, biochemistry, physiology, genetics, chemistry, physics, mathematics, engineering, computer science, and psychology. Courses in biology, biochemistry, organic and physical chemistry, and mathematics through calculus are recommended. The GRE General Test is required. To enter the Ph.D. program, students will apply to the Molecular Medicine,

Pharmacology, and Physiology track within the interdepartmental graduate program in Biological and Biomedical Sciences (BBS), <http://bbs.yale.edu>.

## **SPECIAL REQUIREMENTS FOR THE PH.D. DEGREE**

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

Students are expected to design a suitable program of courses in consultation with a faculty adviser. The director of graduate studies (DGS) will provide general oversight of the course selections. These courses will provide a coherent background for the expected area of thesis research and also satisfy the department's subject and proficiency requirements. Students must satisfactorily pass at least six graduate-level courses, including C&MP 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** 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** Frederick Sigworth

The course focuses on understanding the processes that transfer molecules across membranes at the cellular, molecular, biophysical, and physiological levels. Students learn about the different classes of molecular machines that mediate membrane transport, generate electrical currents, or perform mechanical displacement. Emphasis is placed on the relationship between the molecular structures of membrane proteins



and their individual functions. The interactions among transport proteins in determining the physiological behaviors of cells and tissues are also stressed. Molecular motors are introduced and their mechanical relationship to cell function is explored. Students read papers from the scientific literature that establish the connections between mutations in genes encoding membrane proteins and a wide variety of human genetic diseases.

**C&MP 570b / NBIO 570b, Sensory Physiology** David Zenisek

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

**C&MP 600a and C&MP 601b, Medical Physiology Case Conferences** Nancy Carrasco

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

**C&MP 610a and C&MP 611b, Medical Research Scholars Program: Mentored Clinical Experience** Erica Herzog

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

**C&MP 630a or b / PATH 680a or b / PHAR 502a or b, Seminar in Molecular Medicine, Pharmacology, and Physiology** Susumu Tomita

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

primary disciplines (i.e., physiology: normal function; pathology: abnormal function; and pharmacology: intervention).

**C&MP 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.

**C&MP 710b / MB&B 710b, Electron Cryo-Microscopy for Protein Structure**

**Determination** Frederick Sigworth

Understanding cellular function requires structural and biochemical studies at an ever-increasing level of complexity. The course is an introduction to the concepts and applications of high-resolution electron cryo-microscopy. This rapidly emerging new technique is the only method that allows biological macromolecules to be studied at all levels of resolution from cellular organization to near atomic detail. Counts as 0.5 credit. ½ Course cr

# Chemical & Environmental Engineering

Dunham Laboratory, 203.432.4252  
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*), Edgar Hertwich, 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** Chinedum Osuji, André Taylor, Corey Wilson

**Assistant Professors** Drew Gentner, Amir Haji-Akbari, Shu Hu, Desirée Plata, Mingjiang Zhong

**Lecturers** Aniko Bezur, Paul Whitmore

## **FIELDS OF STUDY**

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

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

For course listings, see Engineering & Applied Science.

# Chemistry

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

## Chair

Gary Brudvig (1 SCL, 203.432.3912, [chemistry.chair@yale.edu](mailto:chemistry.chair@yale.edu))

## Director of Graduate Studies

Elsa Yan ([elsa.yan@yale.edu](mailto:elsa.yan@yale.edu))

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

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

**Lecturers** Paul Anastas, 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 ADMISSIONS REQUIREMENTS

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

## SPECIAL REQUIREMENTS FOR THE PH.D. DEGREE

A foreign language is not required. Three term courses are required in each of the first two terms of residence. Courses are chosen according to the student's background and research area. To be admitted to candidacy a student must (1) receive at least two term grades of Honors, exclusive of those for research; (2) pass one oral examination (preparative chemistry students) or two oral examinations (physical chemistry students) by the end of the second year of study; and (3) submit a thesis prospectus no later than the end of the third year of study. Remaining degree requirements include completing a formal proposal (inorganic, organic, and chemical biology students), a

written thesis describing the research, and an oral defense of the thesis. The ability to communicate scientific knowledge to others outside the specialized area is crucial to any career in chemistry. Therefore, all students are required to teach a minimum of two terms at a TF level 20. Students may be required by their advisers to teach in additional terms, but would not be required to teach more than five terms over their first five years. All students are required to take CHEM 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 upon request to the Director of Graduate Studies, Department of Chemistry, Yale University, PO Box 208107, New Haven CT 06520-8107.

## COURSES

### **CHEM 505a, Alternative Energy** Gary Brudvig

Design principles for molecular components of alternative energy devices. Climate change and our alternative energy future. Light energy conversion, energy transfer, and charge separation in photosynthesis. Dioxygen evolution in photosystem II. Biofuels: bioethanol, biodiesel, hydrogenase. Interaction of light with semiconductors. Fast spectroscopy to probe interfacial electron transfer. Computational design and characterization. Solar cells for electricity, photo-catalysis, biomimetic water oxidation. Hydrogen economy. Team-taught.

### **CHEM 518a, Advanced Organic Chemistry** William Jorgensen

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

### **CHEM 521a, Chemical Biology** Jason Crawford and Alanna Schepartz

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 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 528a, Natural Products Synthesis** Seth Herzon

Survey of natural products syntheses, with an emphasis on those that contain unique strategies, transformations, or reagents. Key transformations are introduced in the context of various syntheses. Retrosynthetic analysis and synthetic planning are discussed.

**CHEM 529b, Special Topics in Chemical Biology** Timothy Newhouse and David Spiegel

Current topics at the interface of chemistry, biology, and medicine with an emphasis on synthetic biology approaches.

**CHEM 530b, 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** Jonathan Ellman and Seth Herzon

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 540a, Molecules and Radiation I** Kurt Zilm

An integrated treatment of quantum mechanics and modern spectroscopy. Basic wave and matrix mechanics, perturbation theory, angular momentum, group theory, time-dependent quantum mechanics, selection rules, coherent evolution in two-level systems, line shapes, and NMR spectroscopy.

**CHEM 542b, Molecules and Radiation II** Mark Johnson

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 548a, Nuclear Magnetic Resonance in Liquids** 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.

**CHEM 552a, Organometallic Chemistry** Robert Crabtree

A survey of the organometallic chemistry of the transition elements and of homogeneous catalysis.

**CHEM 553b, Small Molecule X-ray Crystallography** Patrick Holland and 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** Patrick Holland

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 556b, Biochemical Rates and Mechanisms** J. Patrick Loria

An advanced treatment of enzymology. Topics include transition state theory and derivation of steady-state and pre-steady-state rate equations. The role of entropy and enthalpy in accelerating chemical reactions is considered, along with modern methods for the study of enzyme chemistry. These topics are supplemented with in-depth analysis of the primary literature.

**CHEM 557b, Modern Coordination Chemistry** Nilay Hazari

The principles of modern inorganic chemistry. Main group and transition element chemistry: reactions, bonding, structure, and spectra.

**CHEM 559b, Biophysics** Elsa Yan

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

**CHEM 560La, Advanced Instrumentation Laboratory I** Mark Johnson

A laboratory course introducing physical chemistry tools used in the experimental and theoretical investigation of large and small molecules. Modules include electronics, vacuum technology, optical spectroscopy and lasers, and computer programming.

**CHEM 562La or b, Laboratory in Instrument Design and the Mechanical Arts** Kurt Zilm and David Johnson

Familiarization with modern machine shop practices and techniques. Use of basic metalworking machinery and instruction in techniques of precision measurement and properties of commonly used metals, alloys, and plastics.

**CHEM 564La or b, Advanced Mechanical Instrumentation** Kurt Zilm and David Johnson

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

**CHEM 565La or b, Introduction to Glass Blowing** Patrick Vaccaro and Daryl Smith

The course provides a basic introduction to the fabrication of scientific apparatus from glass. Topics covered include laboratory setup, the fundamental skills and techniques of glass blowing, the operation of glass fabrication equipment, and requisite safety procedures.

**CHEM 570a, Quantum Chemistry** Victor Batista

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

**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.

**CHEM 600a or b, Research Seminars** Staff

Presentation of a student's research results to the student's adviser and fellow research group members. Extensive discussion and literature review are normally a part of the series.

**CHEM 720a and CHEM 721b, Current Topics in Organic Chemistry** Staff

A seminar series based on invited speakers in the general area of organic chemistry.

**CHEM 730a and CHEM 731b, Molecular Science Seminar** Staff

A seminar series based on invited speakers in the areas of physical, inorganic, and biological chemistry.

**CHEM 740a and CHEM 741b, Seminar in Chemical Biology** Staff**CHEM 750a and CHEM 751b, Biophysical Chemistry Seminar** Staff**CHEM 760a and CHEM 761b, Seminar in Inorganic Chemistry** Staff**CHEM 990a or b, Research** Staff

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



# Classics

402 Phelps Hall, 203.432.0977  
[www.yale.edu/classics](http://www.yale.edu/classics)  
 M.A., M.Phil., Ph.D.

## Chair

Emily Greenwood

## Director of Graduate Studies

Irene Peirano Garrison [F]  
 Egbert Bakker [Sp]

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

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

**Assistant Professors** Andrew Johnston, Jessica Lamont (*Visiting*)

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

**Affiliated Faculty and Secondary Appointments** Harold Attridge (*Divinity School*), Adela Yarbro Collins (*Divinity School; Emerita*), John J. Collins (*Divinity School*), Dimitri Gutas (*Near Eastern Languages & Civilizations*), John Hare (*Divinity School*), Susan Matheson (*Curator of Ancient Art, 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.

## ADMISSION REQUIREMENTS

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

## GRADING AND GOOD STANDING

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

## REQUIREMENTS FOR THE PH.D. DEGREE IN CLASSICAL ART AND ARCHAEOLOGY

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

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

## COMBINED PROGRAMS

### Classics and Comparative Literature

#### ADMISSION REQUIREMENTS

Prerequisites for admission through the Department of Classics: same as for Classical Philology. (For admission requirements in the Department of Comparative Literature, consult the DGS of that department.) After admission to the Department of Classics,

qualified students may apply to be admitted to this combined program, normally during the first term of residence; the directors of graduate studies of both departments should be consulted before application to the combined program is made.

#### **REQUIREMENTS FOR THE PH.D. DEGREE IN CLASSICS AND COMPARATIVE LITERATURE**

1. Diagnostic sight translations in Greek and Latin (these are taken before the beginning of the first and third terms and are meant to assess the student's proficiency and progress in both languages).
2. A 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. All students at the end of each term of dissertation research and writing will present their work in progress in a "chapter colloquium," which will mimic the prospectus defense in format (i.e., a discussion with interested faculty of a presubmitted chunk of written work). If no chapter or written work is presentable at the time of the colloquium, the student would have to justify this.

## **Classics and History**

The combined degree program in Classics and History, with a concentration in Ancient History, is offered by the Departments of Classics and History for students wishing to pursue graduate study in the history of the ancient Mediterranean and western

Eurasia. Prospective students may apply through either the Department of History or the Department of Classics.

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

Students are called on to complete course work in two ancient languages, historical theory, intra- and interdisciplinary skills, and fundamental research seminars. Interdisciplinary expertise is fostered through the annual seminar coordinated through the Yale 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.

#### ADMISSION REQUIREMENTS

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

#### REQUIREMENTS FOR THE COMBINED PH.D. DEGREE IN CLASSICS AND HISTORY

1. A minimum of fourteen term courses, including: (i) the historical methods and theory course, *Approaching History* (HIST 500); (ii) 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, *vel sim.*; an advanced course in a non-classical ancient language (no more than one such course may be used in fulfillment of this requirement). Students are

- also encouraged to take advantage of educational opportunities outside of Yale (American Numismatic Society Summer Seminar; an archaeological excavation, e.g., the Gabii project); (v) four courses (at least two of which must be research seminars) in the history of the ancient Mediterranean world; historical courses that have a heavy skill component may be used concurrently to fulfill the skills requirement; (vi) two courses outside of ancient Mediterranean history that cover two separate disciplinary areas. These courses will be in the history of different periods or different regions, or in other disciplines of the humanities or social sciences outside of history, or in the physical sciences. Possibilities include (but are not limited to): social sciences (economics, anthropology, sociology, environmental science, statistics); religion (religious studies, Divinity School, Jewish studies); law (history of law, comparative law, international law); Near Eastern languages and civilizations (Egyptian language, Hebrew, Aramaic, Syriac, Arabic); anthropology and archaeology (cultural anthropology, archaeological sciences); physical and biological sciences (paleoclimatology, ecology and forestry, genetics, medicine).
2. Classics proseminar offering an introduction to the discipline of Classics and its various subdisciplines, to be taken in the first year in residence (not for credit).
  3. Reading examinations in German, and in either French or Italian. The first (in either language) is to be passed by the end of the second term in residence, the second by the end of the fourth term in residence.
  4. Translation examinations in two ancient languages. For students admitted through Classics, these must be Greek and Latin. For students admitted through History, at least one must be either Greek or Latin. Greek and Latin examinations will be based on the Ancient History Greek and Latin reading lists and will consist of four passages in each language, at least one of which will be poetry and one documentary (epigraphy/papyrology). Some History students may find that expertise in another language – such as Hebrew, Aramaic/Syriac, Demotic, Coptic, Classical Armenian, or Sanskrit – is most beneficial for their research and teaching trajectory. Reading lists for these non-classical languages will be devised by the student in collaboration with the faculty adviser and other relevant member(s) of the Yale faculty, and fixed in writing no later than the end of the fourth term in residence. Examinations in these languages will also consist of four passages to be set and evaluated by faculty expert in the given language. Translation exams in all languages must be taken at the beginning of the fifth term in residence.
  5. A general examination in Ancient History during the third year and no later than the end of the sixth term in residence. This is to be broken into one major and two minor fields. For the major field students must prepare an 8,000-word essay in advance of the oral examination. For each of the minor fields, students must prepare a syllabus for an undergraduate class. The written essays and syllabi must be submitted by a fixed date, typically on the Friday before Thanksgiving or spring break. Oral exams will be completed shortly afterward to ensure time for the completion of the dissertation prospectus.
  6. A dissertation prospectus by the end of the sixth term in residence.
  7. A dissertation. All students at the end of each term of dissertation research and writing will present their work in progress in a “chapter colloquium,” which will mimic the prospectus defense in format (i.e., a discussion with interested faculty of

a presubmitted chunk of written work). If no chapter or written work is presentable at the time of the colloquium, the student would have to justify this.

## Classics and Philosophy

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

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

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

### REQUIREMENTS OF THE CLASSICS TRACK OF THE CLASSICS AND PHILOSOPHY PROGRAM

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

the fifth term in residence and consisting of one hourlong oral examination on nonphilosophical Greek and Latin works from the list (which may be taken in two parts, one half-hour exam on Greek and one half-hour exam on Latin) and one hourlong oral examination on philosophical Greek and Latin works from the list, to be completed by the end of the fifth term in residence. Students may choose to take the nonphilosophical Greek and/or Latin half-hour component of their oral examination in conjunction with taking the history of Greek or Latin literature, along with the Classical Philology cohort, in May of the year in which the corresponding history is taken.

7. One of the two qualifying papers required for the Ph.D. in Philosophy by the end of the sixth term in residence; this paper should be on a philosophical topic other than ancient philosophy.
8. Oral examinations/special fields in two areas of concentration selected by the candidate in consultation with the DGS in Classics and the program committee, one of which must be in ancient philosophy and which will in addition include a written component, while the other must cover a classical topic other than ancient philosophy, by the end of the sixth term in residence.
9. A dissertation prospectus, by the end of the seventh term in residence.
10. A dissertation. All students at the end of each term of dissertation research and writing will present their work in progress in a "chapter colloquium," which will mimic the prospectus defense in format (i.e., a discussion with interested faculty of a presubmitted chunk of written work). If no chapter or written work is presentable at the time of the colloquium, the student would have to justify this.

## Classics and Renaissance Studies

### ADMISSION REQUIREMENTS

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

### REQUIREMENTS FOR THE PH.D. DEGREE IN CLASSICS AND RENAISSANCE STUDIES

1. Diagnostic sight translations in Greek and Latin (these are taken before the beginning of the first and third terms and are meant to assess the student's proficiency and progress in both languages).
2. A proseminar offering an introduction to the discipline of Classics and its various subdisciplines.
3. Sixteen term courses, divided equally between Classics and Renaissance Studies: (i) eight courses in Classics; (ii) including two yearlong surveys (four courses) of Greek and Latin literature; (iii) at least three seminars; (iv) eight courses in Renaissance Studies; (v) two terms of the Renaissance Studies Core Course; (vi) six additional term courses to be taken in at least two disciplines (such as literature, history, history of art, music, religious studies, etc.); one of these courses should meet the normal Classics requirements of a course in classical art or archaeology; (vii) of these sixteen courses, fourteen must be taken in the first two years of study; the last two, which must be Classics 800-level seminars, are to be taken in the third year, normally one in each term.



4. Literary proficiency in Italian, as examined by Renaissance Studies, and in a second language, normally German or French.
5. Oral examinations in Greek and Latin literature, based on the syllabus covered by the survey courses, drawn from the Classics and Renaissance Studies Ph.D. reading list. These are to be taken closely following the surveys in the respective literatures, as follows: the first, at the end of the second term (May of the first year), the second at the end of the fourth term (May of the second year).
6. Translation examinations in Greek and Latin, based on the Classics and Renaissance Studies Ph.D. reading list, by the end of the fifth term in residence.
7. Oral examinations on special fields appropriate to both disciplines, by the beginning of the sixth term. Seventy-five minutes on three or four topics in classical Greek and Latin literature; and forty-five minutes (three fifteen-minute questions) on Renaissance topics to be divided between at least two disciplines, i.e., literature, history, history of art, etc., selected in consultation with the directors of graduate studies in both disciplines. One of the fields studied will be related to the student's dissertation topic. In addition to the oral exam, the student will be asked to write a short summary of 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. All students at the end of each term of dissertation research and writing will present their work in progress in a "chapter colloquium," which will mimic the prospectus defense in format (i.e., a discussion with interested faculty of a presubmitted chunk of written work). If no chapter or written work is presentable at the time of the colloquium, the student would have to justify this.

For information about the Ph.D. program in Graeco-Arabic Studies, please contact Professor Gutas, 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 602b / MDVL 563b, Advanced Latin Paleography** Barbara Shailor

The challenges of using hand-produced Latin manuscripts in research, with an emphasis on texts from the late Middle Ages. Gothic cursive scripts and book hands ca. 1200–ca. 1500; fragments of unidentified codices; complex or composite codices with heavy interlinear and marginal annotations. Manuscripts and fragments selected largely from collections in the Beinecke Library. Prerequisite: CLSS 601 or permission of the instructor.

### **CLSS 607a / LING 513a / NELC 562a, Indo-European Linguistics** Kevin Van Bladel

An introduction to the inner workings and prehistory of the Indo-European languages both as a language family and in individual branches. It is a course in historical linguistics devoted to the best understood of language families, Indo-European. The emphasis is on using the theoretical framework obtained by this knowledge, especially through practical applications for readers of ancient languages such as Greek, Latin, Hittite, Sanskrit, Avestan, and Middle Persian.

### **CLSS 807b / HIST 511b / RLST 514b, Hellenistic Civilization and the Jews** Joseph Manning and John Collins

This seminar examines two incidents in the Hellenistic world that can be construed as persecution of the Jews. The first was in the years 167–164 B.C.E., when the Seleucid Antiochus Epiphanes tried to suppress the traditional Jewish cult in Jerusalem. The second was in Alexandria in 38 C.E., when the Jewish community came under attack from its Gentile neighbors and the Roman authorities. The seminar examines these incidents in the context of Seleucid and Roman policies toward subject peoples.

### **CLSS 815b / ANTH 531b / ARCG 531b / CPLT 547b / HIST 502b / JDST 653b / NELC 533b / RLST 803b, Slavery, Dependency, and Genocide in the Ancient and Premodern World** Noel Lenski and Benedict Kiernan

Covers the subject of class and ethnic repression from the third millennium B.C.E. to the mid-second millennium C.E. Analyzes textual, epigraphic, and iconographic sources for slavery, dependency, and genocide in Assyrian, Greek, Roman, Germanic, Angkorian, Vietnamese, Burmese, Chosun, Mayan, and Aztec cultures.

### **CLSS 821b, *Odyssey*** Egbert Bakker

A reading of the Homeric *Odyssey* with special attention to the nature and function of the narrative of Odysseus' wanderings and the unity of the poem.

### **CLSS 848a / ARCG 844a / HSAR 831a, Ancient Greek Festivals** Jessica Lamont and Carolyn Laferriere

One of the most prominent expressions of ancient Greek piety was the festival, in which poetry was sung, athletic and artistic contests were held, animals sacrificed, and group identities negotiated and reaffirmed. In the Archaic and Classical periods, festivals could be minor, local, single-day undertakings, or weeklong, multi-city affairs; yet in each instance, they were an expression of communal identity, competition, and devotion to the gods. Poetry and sculpture served to commemorate these events long after the festival itself had passed, and early literary genres and artistic styles took root within and developed alongside the festivals, gods, and individuals whom they were intended to commemorate. Bringing together literary, archaeological, art historical, and anthropological evidence, this interdisciplinary seminar considers Archaic and Classical Greek festivals within their social, historical, and religious contexts. We

pay particular attention to the literary and historical texts (hymns, the “recension” of Homeric epic in festival contexts, Attic tragedy and comedy, epinician, etc.) and the visual representations that commemorate and describe the major festivals in Greece, as well as to the particular ways that festivals exploited visual, olfactory, auditory, tactile, or gustatory reactions in their worshippers to provoke specific interactions with the divine.

**CLSS 857a, Vergil’s *Aeneid*** Christina Kraus and David Quint

A close reading of selected books of the epic, concentrating on Vergilian poetics. Particular themes include intertextuality; figures of speech and thought; narrative structure and meaning; repetition; *ekphrasis* and simile; the relationship between poetics and politics. Weekly readings include key secondary material that has shaped the interpretation of the poem. Students should read the whole poem in Latin before the seminar begins.

**CLSS 875a / ARCG 701a / HSAR 568a, Cleopatra: A Legend for All Time** Diana Kleiner

The life of a queen who became a celebrity and remains a legend serves as the starting point for an exploration of art and architecture produced in Egypt and Rome during the late Hellenistic period and early Roman Empire. Cleopatra was antiquity’s greatest female star and one of the most famous women who ever lived. While the full panorama of her life is forever lost, Cleopatra comes alive in surviving works of ancient art and other remains of what was once an opulent material culture. Every generation has its own Cleopatra, and the mythical Egyptian queen’s reinvention in later art, literature, and film is also considered. Qualified undergraduates who have taken Roman Art: Empire, Identity, and Society; Roman Architecture; or eClavdia: Women in Ancient Rome, may be admitted with permission of the instructor.

**CLSS 879a / PHIL 736a, Stoicism** Brad Inwood

Stoicism was one of the most important philosophical movements in the ancient Graeco-Roman world and has exercised great influence on European philosophy (and culture more generally) since the Renaissance. This course is a high-level introduction to ancient Stoicism, open equally to those who have a reading knowledge of Greek and/or Latin (as relevant) and those who don’t.

**CLSS 881a, Proseminar: Classical Studies** Irene Peirano

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 882a, Graduate Works in Progress Colloquium** Irene Peirano

Students precirculate work-in-progress material from their prospectus or dissertation and present it to the class. Open to all students in years 3 and above.

**CLSS 895a, Survey of Greek and Latin Historical Sources** Noel Lenski

Familiarizes students with the major sources for Greek and Roman history in the original languages. Covers material to be tested on comprehensive examinations for the Ph.D. in the combined program in Classics and History.

**CLSS 898a, Graduate Latin Survey I** Christina Kraus

A survey of Latin literature from the earliest texts to the sixth century C.E., with the main focus on the period from the second century B.C.E. to the second century C.E.

Diachronic, synchronic, generic, and topical models of organization. Prepares for the comprehensive examinations in Classics for those majoring in both literatures or concentrating on Latin. Prerequisite: at least two term courses in Latin numbered in the 400s.

**CLSS 899b, Graduate Latin Survey II** Kirk Freudenburg

A continuation of CLSS 898.

**CLSS 900a or b, Directed Reading** Staff

By arrangement with faculty.

**GREK 743a, Homer's *Iliad*** Egbert Bakker

Reading of selected books of the *Iliad*, with attention to Homeric language and style, the Homeric view of heroes and gods, and the reception of Homer in antiquity.

**GREK 790a, Greek Syntax and Stylistics** Victor Bers

Stylistics analysis and extended prose composition in imitation of particular genres and "subgenres," concentrating on classical Attic prose. Students enrolled in this course are normally required to attend and do the work in GREK 390, a review of accidence and syntax, elementary composition, and stylistic analysis of Greek prose of the fifth and fourth centuries B.C.E., including a comparison of "prosaic" and "poetic" syntax.

**LATN 786b, Roman Didactic, from Cato to Ovid** Kirk Freudenburg

A study of works of Latin prose and verse that purport to teach and convey expertise by adopting both the pose and methods of a teacher instructing students. The course studies the serious didactic works, in both prose and poetry, of Cato, Varro, Lucretius, and Vergil, as well as the mock didactic works of Horace and Ovid that make fun of the didactic form by exploiting its humorous potentials.

**LATN 790b, Latin Syntax and Stylistics** Joseph Solodow

A systematic review of syntax and an introduction to Latin style. Selections from Latin prose authors are read and analyzed, and students compose short pieces of Latin prose. For students with some experience reading Latin literature who desire a better foundation in forms, syntax, idiom, and style.

# 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

Ayesha Ramachandran

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

**Associate Professor** Moira Fradinger

**Assistant Professors** Robyn Creswell, Marta Figlerowicz, Ayesha Ramachandran

**Lecturers** Peter Cole, Jan Hagens

**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*), Paul Fry (*English*), Alice Kaplan (*French*), Tina Lu (*East Asian Languages & Literatures*), John MacKay (*Slavic Languages & Literatures*), Giuseppe Mazzotta (*Italian*), Christopher Miller (*French*), Joseph Roach (*English*), Maurice Samuels (*French*), Henry Sussman (*Visiting; German*), Ruth Bernard Yeazell (*English*)

## FIELDS OF STUDY

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

## SPECIAL ADMISSIONS REQUIREMENTS

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

## SPECIAL REQUIREMENTS FOR THE PH.D. DEGREE

Students must successfully complete fourteen term courses, including the departmental proseminar (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 the departmental faculty at large, the dissertation completes the degree. Its initial step is a dissertation prospectus, to be submitted and approved by the dissertation director and a standing faculty committee no later than halfway through the seventh term of study. Admission to candidacy for the Ph.D. is granted after six terms of residence and the completion of all requirements (courses, languages, orals, prospectus) except the dissertation.

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

## COMBINED PH.D. PROGRAMS

### Comparative Literature and Classics

**Course work** Students concentrating in Comparative Literature and Classics are required to complete fourteen graduate term courses (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** Students must pass the Film and Media Studies oral examination. They must also pass the six-field Comparative Literature oral examination, with at least one examiner

from the core Comparative Literature faculty; at least three fields involving literary topics, and readings including poetry, fiction, and drama; the other topics may be on film or film-related subjects; some lists may combine film and literature.

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

## Comparative Literature and Renaissance Studies

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

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

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

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

## MASTER'S DEGREES

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

**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](mailto:stacey.hampton@yale.edu).

## COURSES

**CPLT 547b / ANTH 531b / ARCG 531b / CLSS 815b / HIST 502b / JDST 653b / NELC 533b / RLST 803b, Slavery, Dependency, and Genocide in the Ancient and Premodern World** Noel Lenski and Benedict Kiernan

Covers the subject of class and ethnic repression from the third millennium B.C.E. to the mid-second millennium C.E. Analyzes textual, epigraphic, and iconographic sources for slavery, dependency, and genocide in Assyrian, Greek, Roman, Germanic, Angkorian, Vietnamese, Burmese, Chosun, Mayan, and Aztec cultures.

**CPLT 561a / GMAN 663a, Performance and Postdramatic Theater** Katrin Trüstedt

This course explores the “postdramatic theatre” (Hans-Thies Lehmann) of Heiner Müller, Elfriede Jelinek, René Pollesch, and others. In close readings of *Hamletmaschine*, *Die Schutzbefohlenen*, and *Kill Your Darlings* we trace how the appearance of bodies and media on stage is foregrounded instead of the dramatic plot, and how the emphasis on the theatrical apparatus questions the primacy of dramatis personae and the theatrical illusion. Readings of dramatic texts and analyses of performance videos are accompanied by discussions of theoretical texts on performativity, theatricality, and subjectification. Topics include the history of theater, play, and drama; conceptions of performance and theatricality; subjectivity and authority; and the reentry of the text within the theatrical play.

**CPLT 587a / GMAN 713a, World Literature in German Context** Kirk Wetters

The concept of world literature, from its origins in the eighteenth-century cosmopolitanism of Herder and Goethe up to contemporary critical debates (Apter, Casanova, Cheah, Damrosch, Dharwadker, I. Hesse, Moretti, Mufti, Pollock, Said, Spivak). World literature in relation to national, German-language, and German-Jewish literature. Translation, untranslatability, the effect of markets, diaspora, politics. Literary critical readings are supplemented by exemplary literary texts in multiple genres. Student contributions based on individual linguistic backgrounds.

**CPLT 589a / GMAN 645a, Walter Benjamin and the Modernization of Nineteenth-Century Paris** Henry Sussman

The radical modernization of Paris under the Second Empire (1851–70) as seen through the eyes of Walter Benjamin. Focus on Benjamin’s Arcades Project, a compendium that charted developments such as Parisian mass transit and streamlined traffic, the construction of apartment houses, and the dissemination of mass media. Readings from other literary texts on the same events include works by Balzac, Zola, and Aragon.

**CPLT 621a / GMAN 602a, Books, Displays, and Systems Theory** Henry Sussman

A status report on the book as a medium in an age of cybernetic technology and virtual reality. The contentious no-man’s-land between books and contemporary systems.

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

A continuing collective research project, a cultural studies “laboratory,” that has been running since the fall of 2003. The group, made up of graduate students and faculty from several disciplines, meets regularly to discuss common readings, to develop

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

**CPLT 639b / ITAL 705b / WGSS 740b, Gender and Genre in Renaissance Love Poetry**

Ayesha Ramachandran

This course interrogates a persistent theme in the literature of the European Renaissance: the love for a much-desired, frequently unobtainable beloved. How and why does love – erotic yearning, sexual passion, unfulfilled desire, religious devotion – become a key subject and metaphor from the fourteenth to the seventeenth century? Focusing on two main poetic genres of the Renaissance – the lyric and the epic-romance – we investigate how questions of desire, love, and gendered subjectivity become a potent means for articulating psychological, social, political, philosophic, and spiritual concerns. Engaging with normative views of gender, erotic discourse, and romantic love from a long historical perspective, this course investigates the development of modern poetry and sexuality in conjunction with each other.

**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 653a, Comparative Creole Literatures: Indian Ocean, North Africa, Caribbean**

Shawkat Toorawa

This course brings the literary and linguistic-political development of Creole literatures in the Indian Ocean, principally Mauritius, into conversation with similar developments in the Caribbean, especially Martinique. We also juxtapose North African literature, where French coexists with literary Arabic and colloquial Arabic.

**CPLT 654a / NELC 556a, Classics: The Arabic-Islamic World** Shawkat Toorawa

Survey of the literary tradition of the Arabic-Islamic world (West Asia, North Africa, and Muslim Spain). Prose and poetry from the Qur'an to the Arabian Nights; attention to the interdependence of the works and their cultural setting, the agendas authors pursued, and the characters they portrayed.

**CPLT 673a / SPAN 629a, Golden Age Theater** Roberto González Echevarría

The development and apogee of the Spanish *comedia*, as well as contemporary minor subgenres such as the *auto sacramental* and the *entremés*. Exploration of how the theater synthesizes post-Garcilaso lyric, the *commedia dell'arte*, renaissance epic, the *romancero*, Spanish history, and the European renaissance literary tradition. Works by Cervantes, Lope de Vega, Tirso de Molina, Guillén de Castro, Mira de Amescua, Juan Ruiz de Alarcón, Luis Quiñones de Benavente, Pedro Calderón de la Barca, and Sor Juana Inés de la Cruz. Comparison with English and French theater is encouraged.

**CPLT 675a / SPAN 660a, El Quijote en español** Roberto González Echevarría

A detailed and contextualized reading of Cervantes's masterpiece conducted entirely in Spanish. The study of this iconic text familiarizes students with its literary and cultural values and Cervantes's language.

**CPLT 686b / JDST 856b, Jewish Literary Masterpieces** Hannan Hever

Exploration of the nature of Jewish identity through a literary prism, focusing on novels, stories, poetry, and homilies. Study of texts written over a three thousand year period by Jews living in the Middle East, Europe, and America, from biblical writings through modern works composed by Franz Kafka, Philip Roth, as well as Israeli literature. Special attention given to the role of gender, minority identities, and the idea of nationalism. Taught in translation, readings in English.

**CPLT 690b / JDST 838b / RLST 762b, Politics of Modern Hebrew Literature**

Hannan Hever

An overview of the poetics, culture, history, and political dynamics of modern Hebrew literature over the past 250 years. No background in Jewish literature and Jewish culture is required. All readings in English.

**CPLT 699a / GMAN 603a / PHIL 602a, Heidegger's Being and Time** Martin

Häggglund

A systematic, chapter-by-chapter study of Heidegger's *Being and Time*, arguably the most important work of philosophy of the twentieth century. All the major themes of the book are addressed in detail, with a particular emphasis on care, time, death, and the meaning of being.

**CPLT 705a / ITAL 781a, *The Decameron*** Millicent Marcus

An in-depth study of Boccaccio's text as a journey in genre in which the writer surveys all the storytelling possibilities available to him in the current repertory of short narrative fiction – ranging from ennobling example to flamboyant *fabliaux*, including hagiography, aphorisms, romances, anecdotes, tragedies, and practical jokes – and self-consciously manipulates those forms to create a new literary space of astonishing variety, vitality, and subversive power. In the relationship between the elaborate frame-story and the embedded tales, theoretical issues of considerable contemporary interest emerge – questions of gendered discourse, narratology, structural pastiche, and reader response among them. *The Decameron* is read in Italian or in English. Close attention is paid to linguistic usage and rhetorical techniques in this foundational text of the vernacular prose tradition.

**CPLT 706a / ITAL 700a, *The New Map of the World: Vico's Poetic Philosophy***

Giuseppe Mazzotta

This course examines Vico's thought globally and in the historical context of the late Renaissance and the Baroque. Starting with Vico's *Autobiography*, working to his University Inaugural Orations, *On the Study of Methods of Our Time*, the seminar delves into his juridical-political texts and submits the second *New Science* (1744) to a detailed analysis. Some attention is given to Vico's poetic production and the encomia he wrote. The overarching idea of the seminar is the definition of Vico's new discourse for the modern age. To this end, discussion deals prominently with issues such as Baroque encyclopedic representations, the heroic imagination, the senses of "discovery," the redefinition of "science," the reversal of neo-Aristotelian and neo-Platonic poetics, the crisis of the Renaissance, and the role of the myth.

**CPLT 725a / AFAM 846a / AFST 747a / FREN 946a, *Postcolonial Theory and Its Literature*** Christopher Miller

A survey of theories relevant to colonial and postcolonial literature and culture. The course focuses on theoretical models (Orientalism, hybridity, *métissage*, *créolité*, "minor literature"), but also gives attention to the literary texts from which they are derived (francophone and anglophone). Readings from Said, Bhabha, Spivak, Mbembe, Amselle, Glissant, Deleuze, Guattari. Conducted in English.

**CPLT 809b / ITAL 668b, *Translating the Renaissance*** Staff

Would there have been a Renaissance without translation? We approach this question by beginning with the first modern treatise on translation, by the Florentine chancellor Leonardo Bruni, and moving on to consider the role of translation in Florence's and Tuscany's growing cultural and political mastery over the peninsula – and in Italy's cultural domination of Europe. We go on to explore the translation of "medieval" into "early modern" Europe, the translation of visual into verbal material, and the role of gender in the practice of translation. Students engage in their own translation projects as we dedicate the last part of the seminar to the diffusion of the Petrarchan sonnet tradition in early modern Europe.

**CPLT 810b / ITAL 643b, *Renaissance Literature, Philosophy, and Art*** Staff

Self-representations of radical novelty in Renaissance texts of literary, philosophical, and visual culture. Outlines of the path to modernity in works by Petrarch, Alberti, Leonardo, Machiavelli, Castiglione, Ariosto, Michelangelo, Aretino, Veronica Franco,

Tasso, Cellini, Artemisia Gentileschi, Moderata Fonte, Bruno, Campanella, Galileo, and Vico.

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

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

**CPLT 843a / HIST 614a, Methods in Book History: The Early Modern Book in Manuscript and Print** Kathryn James

This course offers a collections-based introduction to the material culture of the early modern book in print and manuscript, while exploring questions of evidence, canonicity, disciplinary formation, and the social construction of knowledge. Focusing primarily on early modern Britain and Yale’s British collections, the course offers students a detailed understanding of English paleography and bibliography, early modern manuscript and print culture, and the disciplinary histories that have informed the collection and study of early modern British texts.

**CPLT 855a / ENGL 884a, Modernism, Realism, Imperial Crisis** Joseph Cleary

An investigation of the connections between the crises of realism and the historical novel, the emergence of high modernism, magical realism, and various forms of postcolonial historical narrative considered in the wider global context of inter-imperial conflict, anti-imperial struggle, and the restructuring of the world capitalist system. The seminar combines literary readings, critical theory, and contemporary studies on “world literature” to explore ruptures and developments in modern fiction and the politics of empire in Europe, the Caribbean, Latin America, and Asia.

**CPLT 868b / GMAN 620b, Speaking for Others: Advocacy and Representation in Law and Literature** Rüdiger Campe

Speaking for others (representing others) before a third party (judge or audience) is a basic constellation in Western literature rooted in legal, political, and religious practices. Speaking for others has been an alternative to and can function as reinterpretation of our usual dual idea of communication (*Me* speaking to *You* about Something in the world, G.H. Mead). Readings address the history and structure of speaking for others in three major sections: (1) ancient rhetoric and the Christian figure of speaking-for (Christ, the “paraclete”): Aristotle and Quintilian on rhetoric; Aeschylus, Eumenides; the Gospel of St. John; (2) political representation and speaking for others in (early) modern times: Hobbes and Rousseau on representation; Schiller,

Don Carlos; Hölderlin, Empedocles; and (3) the critique of speaking for others in contemporary theory and literature: the Deleuze-Foucault debate on advocacy in the public space; Kafka, *The Trial* and related texts; Celan, *The Meridian* and related poems; Canetti on literature as art of becoming-the-other.

**CPLT 882a / ENGL 709a / RUSS 882a, What Happened to Race, Class, and**

**Gender? Keywords of Recent Critical Theory** Ayesha Ramachandran and Marta Figlerowicz

What *did* happen to race, class, and gender? This course examines the persistence of older theoretical frameworks such as Marxism or feminism in current critical discourse. It also explores new critical keywords—biopolitics, affect, the Anthropocene, and others—that now help structure theoretical debates in the humanities. Intended as a fast-paced, reading-heavy introduction to recent critical theory, the course will help graduate students in literature acquire a better sense of their field of study and reflect upon the methodologies they will use in their dissertation projects. Readings include the work of older theorists such as Jacques Derrida, Theodor Adorno, Michel Foucault, Judith Butler, and Donna Haraway, as well as recent ones such as Jasbir Puar, Sianne Ngai, Tiqqun, Paolo Virno, and Dipesh Chakrabarty.

**CPLT 904a, Psychoanalysis: Key Concepts and Their Circulation among the**

**Disciplines** 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 political theory, film studies, gender studies, 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 the difference between neurosis, perversion, and psychosis). Main examples from other disciplines are the theory of ideology and theories of sexual difference and gender. Commentators and readers of Freud and Lacan are consulted as secondary sources (Michel Arrivé, Guy Le Gaufey, Jean Laplanche, André Green, Markos Zafiroopoulos, and others).

**CPLT 907a / FILM 796a / GMAN 678a, Media Archaeologies: The Visual and the**

**Environmental** Francesco Casetti and Rüdiger Campe

The seminar aims at retracing two divergent cultural processes: how and why, starting from the discovery of artificial perspective, an increasing number of cultural practices were devoted to making the world visible; and correlatively how and why, starting from the first half of the nineteenth century, visibility increasingly met with the resistance of other modes of accessing the world through the human body and the role of the environment? These two trajectories are retraced through a special attention to the media that were on the forefront of these cultural processes: from Brunelleschi's mirror to Alberti's window and grid, from camera obscura to Galileo's telescope, from Panorama to Phantasmagoria, from the optical toys of the nineteenth century to the increasing implication of art into social and political questions. The seminar privileges the cultural practices that underpin both the trust in visibility and the discovery of environmentality, and it gives due attention to the political questions that the changing

fortunes of the optical media imply. The seminar is the first part of a two-year project and will be followed next year by an analysis of the prevalence of the environmental dimension in contemporary media.

**CPLT 913b / FILM 690b, Radical Cinemas of Latin America** Moira Fradinger

An introductory overview of Latin American cinema, with an emphasis on post-World War II films produced in Cuba, Argentina, Brazil, and Mexico. Examination of each film in its historical and aesthetic aspects, and in light of questions concerning national cinema and “third cinema.” Examples from both pre-1945 and contemporary films. Conducted in English; knowledge of Spanish and Portuguese helpful but not required.

**CPLT 917b / FILM 601b, Foundational Texts in Film and Media Studies** Dudley Andrew

The course sets in place some undergirding for students who want to anchor their film interest to the professional discourse of this field. A coordinated set of topics in film theory is interrupted first by the often discordant voice of history and second by the obtuseness of the films examined each week. Films themselves take the lead in our discussions.

**CPLT 925b, The Practice of Literary Translation** Peter Cole

Intensive readings in the history and theory of translation paired with practice in translating. Case studies from ancient languages (the Bible, Greek and Latin classics), medieval languages (classical Arabic literature), and modern languages (poetic texts).

**CPLT 932b / FILM 839b / GMAN 653b, Scandinavian Cinema and Television** Katie Trumpener

Contemporary Scandinavian film and television examined in relation to earlier cinematic highpoints. Europe’s first art cinema, early Scandinavian film was catalyzed and sustained by modernist breakthroughs in theater, literature, and painting. Contemporary cinema and television (Dogma films; Nordic Noir television; experimental music and genre film) continue to develop innovative aesthetic, funding, and exhibition models. The course explores regionally specific ideas about acting, visual culture, and the role of art; feminism and the social contract; historical forces and social change. Films by Bergman, Dreyer, Sjöström, Sjöberg, Vinterberg, von Trier, Östlund, Kaurismäki, Kjartansson; as well as contemporary television series selected by students.

**CPLT 935b / FILM 755b, 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.

**CPLT 940b / SPAN 913b, Magical Realism and Its Sequels in Modern Latin American Fiction** Roberto González Echevarría

The course concentrates on the major writers who practiced what is called “magical realism”—Alejo Carpentier, Gabriel García Márquez, Carlos Fuentes, and others—



after studying the trend's antecedents in the colonial, post-independence, and early twentieth century. The role of Jorge Luis Borges in the beginnings of magical realism, the works of writers such as Miguel Ángel Asturias and Juan Rulfo, and those of more recent writers who rejected the trend, such as Roberto Bolaño and Fernando Vallejo. The considerable critical corpus on the topic is studied. In Spanish.

**CPLT 953b / EALL 823b, 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.

**CPLT 986b / AFST 942b / FREN 942b, Decolonizing Memory** Jill Jarvis

This seminar introduces students to theories of memory, testimony, and trauma by bringing key works on these topics into dialogue with literary texts by writers of the former French and British empires in Africa. Literary readings may include works by Djébar, Ouologuem, Farès, Salih, Head, Aidoo. Theoretical readings by Arendt, Adorno and Horkheimer, Agamben, Césaire, Derrida, Fanon, Foucault, Mbembe, Spivak.



# Computational Biology and Bioinformatics

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<http://cbb.yale.edu>  
 M.S., Ph.D.

## Directors of Graduate Studies

Mark Gerstein (Bass 432A, 203.432.6105, [mark.gerstein@yale.edu](mailto:mark.gerstein@yale.edu))  
 Hongyu Zhao (300 George St., Suite 503, 203.785.3613, [hongyu.zhao@yale.edu](mailto:hongyu.zhao@yale.edu))

**Professors** James Aspnes (*Computer Science*), Joseph Chang (*Statistics & Data Science*), Kei-Hoi Cheung (*Emergency Medicine*), Ronald Coifman (*Mathematics; Computer Science*), Donald Engelman (*Molecular Biophysics & Biochemistry*), Richard Flavell (*Immunobiology*), Alison Galvani (*Public Health*), Mark Gerstein (*Biomedical Informatics; Molecular Biophysics & Biochemistry; Computer Science*), Antonio Giraldez (*Genetics*), Murat Gunel (*Neurosurgery; Genetics*), William Jorgensen (*Chemistry*), Douglas Kankel (*Molecular, Cellular & Developmental Biology*), Haifan Lin (*Cell Biology; Genetics*), Elias Lolis (*Pharmacology*), Shuangge Ma (*Public Health*), Andrew Miranker (*Molecular Biophysics & Biochemistry*), Anna Pyle (*Molecular Biophysics & Biochemistry*), Lynne Regan (*Molecular Biophysics & Biochemistry; Chemistry*), Valerie Reinke (*Genetics*), Gordon Shepherd (*Neuroscience*), Abraham Silberschatz (*Computer Science*), Dieter Söll (*Molecular Biophysics & Biochemistry; Chemistry*), Günter Wagner (*Ecology & Evolutionary Biology*), Heping Zhang (*Public Health; Statistics & Data Science*), Hongyu Zhao (*Public Health; Genetics*), Steven Zucker (*Computer Science; Electrical Engineering; Biomedical Engineering*)

**Associate Professors** Chris Cotsapas (*Neurology*), Forrest Crawford (*Public Health*), Thierry Emonet (*Molecular, Cellular & Developmental Biology*), Steven Kleinstein (*Pathology*), Yuval Kluger (*Pathology*), Michael Krauthammer (*Pathology*), Jun Lu (*Genetics*), James Noonan (*Genetics*), Corey O'Hern (*Mechanical Engineering & Materials Science; Physics*), Jeffrey Townsend (*Public Health*), Zuoheng (Anita) Wang (*Public Health*)

**Assistant Professors** Murat Acar (*Molecular, Cellular & Developmental Biology*), Julien Berro (*Molecular Biophysics & Biochemistry*), Damon Clark (*Molecular, Cellular & Developmental Biology*), Smita Krishnaswamy (*Genetics*)

## FIELDS OF STUDY

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

## **SPECIAL ADMISSIONS REQUIREMENTS**

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

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

## **INTEGRATED GRADUATE PROGRAM IN PHYSICAL AND ENGINEERING BIOLOGY (PEB)**

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

## **SPECIAL REQUIREMENTS FOR THE PH.D. DEGREE**

With the help of a faculty advisory committee, each student plans a program that includes courses, seminars, laboratory rotations, and independent reading. Students are expected to gain competence in three core areas: (1) computational biology and bioinformatics, (2) biological sciences, and (3) informatics (including computer science, statistics, and applied mathematics). While the courses taken to satisfy the core areas of competency may vary considerably, all students are required to take the following courses: CB&B 562, CB&B 740, 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, except that there are no requirements for fulfilling laboratory research rotations, serving as a teaching assistant, or completing a Ph.D. dissertation. Terminal M.S. students will be expected to complete an M.S. project, including a project report. Completion of the terminal M.S. degree will typically take four terms of full-time study. Applicants should contact the CB&B registrar before submitting an M.S. application.

## COURSES

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** Simon Mochrie

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 555a / CPSC 553a / GENE 555a, Machine Learning for Biology** Smita Krishnaswamy

This course introduces biology as a systems and data science through open computational problems in biology, the types of high-throughput data that are being produced by modern biological technologies, and computational approaches that may be used to tackle such problems. We cover applications of machine-learning methods in the analysis of high-throughput biological data, especially focusing on genomic and proteomic data, including denoising data; nonlinear dimensionality reduction for visualization and progression analysis; unsupervised clustering; and information

theoretic analysis of gene regulatory and signaling networks. Students' grades are based on programming assignments, a midterm, a paper presentation, and a final project.

**CB&B 561a / MB&B 561a / MCDB 561a / PHYS 561a, Introduction to Dynamical**

**Systems in Biology** Thierry Emonet, Damon Clark, and Jonathon Howard

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.

**CB&B 562b / AMTH 765b / ENAS 561b / INP 562b / MB&B 562b / MCDB 562b /**

**PHYS 562b, Dynamical Systems in Biology** Damon Clark and Thierry Emonet

This course covers advanced topics in computational biology. How do cells compute, how do they count and tell time, how do they oscillate and generate spatial patterns? Topics include time-dependent dynamics in regulatory, signal-transduction, and neuronal networks; fluctuations, growth, and form; mechanics of cell shape and motion; spatially heterogeneous processes; diffusion. This year, the course spends roughly half its time on mechanical systems at the cellular and tissue level, and half on models of neurons and neural systems in computational neuroscience. Prerequisite: MCDB 561 or equivalent, or a 200-level biology course, or permission of the instructor.

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

**Research** Susan Kaech

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 647b / BIS 645b / GENE 645b, Statistical Methods in Human Genetics**

Hongyu Zhao

Probability modeling and statistical methodology for the analysis of human genetics data are presented. Topics include population genetics, single locus and polygenic inheritance, linkage analysis, quantitative trait analysis, association analysis, haplotype analysis, population structure, whole genome genotyping platforms, copy number variation, pathway analysis, and genetic risk prediction models. Prerequisites: genetics; BIS 505; S&DS 541 or equivalent; or permission of the instructor.

**CB&B 711a and CB&B 712b and CB&B 713b, Lab Rotations** Hongyu Zhou

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

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

Richard Shiffman

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 745b / AMTH 745b / CPSC 745b, Advanced Topics in Machine Learning and Data Mining** Smita Krishnaswamy and Guy Wolf

An overview of advances in the past decade in machine learning and automatic data-mining approaches for dealing with the broad scope of modern data-analysis challenges, including deep learning, kernel methods, dictionary learning, and bag of words/features. This year, the focus is on a broad scope of biomedical data-analysis tasks, such as single-cell RNA sequencing, single-cell signaling and proteomic analysis, health care assessment, and medical diagnosis and treatment recommendations. The seminar is based on student presentations and discussions of recent prominent publications from leading journals and conferences in the field. Prerequisite: basic concepts in data analysis (e.g., CPSC 545 or 563) or permission of the instructor.

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

The course focuses on providing an introduction to common unifying themes that serve as the foundation for different areas of biomedical informatics, including clinical, neuro-, and genome informatics. The course is designed for students with significant computer experience and course work who plan to build databases and computational tools for use in biomedical research. Emphasis is on understanding basic principles underlying informatics approaches to interoperability among biomedical databases and software tools, standardized biomedical vocabularies and ontologies, biomedical natural language processing, modeling of biological systems, high-performance computation in biomedicine, and other related topics.

**CB&B 752b / CPSC 752b / MB&B 752b / MCDB 752b, Biomedical Data Science: Mining and Modeling** Mark Gerstein

Biomedical data science encompasses the analysis of gene sequences, macromolecular structures, and functional genomics data on a large scale. It represents a major practical application for modern techniques in data mining and simulation. 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 (108 AKW, 203.432.1283, [vladimir.rokhlin@yale.edu](mailto:vladimir.rokhlin@yale.edu))

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

**Associate Professors** Mahesh Balakrishnan, Minlan Yu

**Assistant Professors** Wenjun Hu,\* Julian Jara-Ettinger,\* Amin Karbasi,\* Smita Krishnaswamy,\* Sahand Negahban,\* Ruzica Piskac, Mariana Raykova, Jakub Szefer\*

**Senior Lecturers** Kyle Jensen,\* Stephen Slade

**Lecturers** Benedict Brown, James Glenn, Scott Petersen, Brad Rosen, Andrew Sherman, Xiyin Tang [Sp]

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

† A joint appointment with another department.

## FIELDS OF STUDY

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

## RESEARCH FACILITIES

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

## SPECIAL ADMISSIONS REQUIREMENTS

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

## SPECIAL REQUIREMENTS FOR THE PH.D. DEGREE

There is no foreign language requirement. To be admitted to candidacy, a student must (1) pass ten courses (including CPSC 690 and CPSC 691) with at least two grades of Honors, the remainder at least High Pass, including three advanced courses in an area of specialization; (2) take six advanced courses in areas of general computer science; (3) successfully complete a research project in CPSC 690, 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](mailto:cs-admissions@cs.yale.edu).

## COURSES

**CPSC 512a / ECON 562a, Designing the Digital Economy** Eric Weyl

Information technology is transforming how almost every market works: finance has been transformed by algorithmic trading and bitcoin, ridesharing is changing the nature of public transportation, Amazon is revolutionizing logistics, and Airbnb is now the most valuable accommodation provider in the world. This transformation, which has been led by start-ups and newly dominant technology companies, inherently



combines technical and economic aspects, as entrepreneurs take advantage of the potential of technology to facilitate exchanges that were previously infeasible. This crash course in the key tools from economics and computer science that are being used to design digital markets exposes students to a range of concrete and topical practical problems in the area.

**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 525b, Cloud Networking and Computing** Minlan Yu

Study of critical technology trends and new challenges in cloud and data center designs for different trade-offs of performance, scalability, manageability, and cost in the networking layers and big data analytical frameworks. Consideration of cloud infrastructure, including network topology, network traffic management, network management, transport protocols, programmable switches, network functions, virtualization, network reliability, and security.

**CPSC 526a, Building Distributed Systems** Staff

Ubiquitous services such as Google, Facebook, and Amazon run on the back of massive distributed systems. This course covers the fundamental principles, abstractions, and mechanisms that inform the design of such systems, as well as the practical details of real-world implementations. Technical topics covered include properties such as consistency, availability, durability, isolation, and failure atomicity; as well as protocols such as RPC, consensus, consistent hashing, and distributed transactions. The final project involves implementing a real-world distributed service.

**CPSC 527a, Object-Oriented Programming** Staff

Object-oriented programming as a means to efficient, reliable, modular, reusable code. Use of classes, derivation, templates, name-hiding, exceptions, polymorphic functions, and other features of C++.

**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 533a, Computer Networks** Yang Yang

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 537a, Introduction to Database Systems** Abraham 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 539b, Software Engineering** Ruzica Piskac

Introduction to building a large software system in a team. Learning how to collect requirements and write a specification. Project planning and system design. Increasing software reliability: debugging, automatic test generation. Introduction to type systems, static analysis, and model checking.

**CPSC 540b, Numerical Computation** Stanley Eisenstat

Algorithms for numerical problems in the physical, biological, and social sciences: solution of linear and nonlinear systems of equations, interpolation and approximation of functions, numerical differentiation and integration, optimization.

**CPSC 545a, Introduction to Data Mining** Guy Wolf

A study of algorithms and systems that allow computers to find patterns and regularities in databases, to perform prediction and forecasting, and to improve their performance generally through interaction with data.

**CPSC 553a / CB&B 555a / GENE 555a, Machine Learning for Biology** Smita Krishnaswamy

This course introduces biology as a systems and data science through open computational problems in biology, the types of high-throughput data that are being produced by modern biological technologies, and computational approaches that may be used to tackle such problems. We cover applications of machine-learning methods in the analysis of high-throughput biological data, especially focusing on genomic and proteomic data, including denoising data; nonlinear dimensionality reduction for visualization and progression analysis; unsupervised clustering; and information theoretic analysis of gene regulatory and signaling networks. Students' grades are based on programming assignments, a midterm, a paper presentation, and a final project. Prerequisite: GENE 760 or permission of the instructor.

**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 556b / ENAS 951b, Wireless Communications** 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 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 568b, Computational Complexity** Dana Angluin

Introduction to the theory of computational complexity. Basic complexity classes, including polynomial time, nondeterministic polynomial time, probabilistic polynomial time, polynomial space, logarithmic space, and nondeterministic logarithmic space. The roles of reductions, completeness, randomness, and interaction in the formal study of computation.

**CPSC 570a, Artificial Intelligence** Dragomir Radev

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

**CPSC 572b, Intelligent Robotics** Brian Scassellati

Introduction to the construction of intelligent, autonomous systems. Sensory-motor coordination and task-based perception. Implementation techniques for behavior selection and arbitration, including behavior-based design, evolutionary design, dynamical systems, and hybrid deliberative-reactive systems. Situated learning and adaptive behavior.

**CPSC 574b, Computational Intelligence for Games** Staff**CPSC 575a / ENAS 575a, 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 667b / ENAS 576b, 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 578a, Computer Graphics** Holly Rushmeier

Introduction to the basic concepts of two- and three-dimensional computer graphics. Topics include affine and projective transformations, clipping and windowing, visual perception, scene modeling and animation, algorithms for visible surface determination, reflection models, illumination algorithms, and color theory.

**CPSC 579b, 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 610a, 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 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 679a, Computational Issues in 3-D Design and Fabrication** Staff

This course focuses on computational methods for designing and fabricating 3-D objects. The course considers the data structures and algorithms for the complete process, from specifying physical source material to the production of a new physical object. The process begins with obtaining the shapes of existing 3-D objects in digital form using active 3-D scanning or photogrammetry. The digital shape is then edited with a variety of local operators and global filters. The shape description is then prepared for input to a numerically controlled machine. Production by various means is considered, including fused deposition modeling (FDM), milling, and laser cutting.

**CPSC 690a, Independent Project I** Staff

By arrangement with faculty.

**CPSC 691a, Independent Project II** Staff

By arrangement with faculty.

**CPSC 692a, Independent Project** Staff

Individual research for students in the M.S. program. Requires a faculty supervisor and the permission of the director of graduate studies.

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

An overview of advances in the past decade in machine learning and automatic data-mining approaches for dealing with the broad scope of modern data-analysis challenges, including deep learning, kernel methods, dictionary learning, and bag of words/features. This year, the focus is on a broad scope of biomedical data-analysis tasks, such as single-cell RNA sequencing, single-cell signaling and proteomic analysis, health care assessment, and medical diagnosis and treatment recommendations. The seminar is based on student presentations and discussions of recent prominent publications from leading journals and conferences in the field. Prerequisite: basic concepts in data analysis (e.g., CPSC 545 or 563) or permission of the instructor.

**CPSC 752b / CB&B 752b / MB&B 752b / MCDB 752b, Biomedical Data Science: Mining and Modeling** Mark Gerstein

Biomedical data science encompasses the analysis of gene sequences, macromolecular structures, and functional genomics data on a large scale. It represents a major practical application for modern techniques in data mining and simulation. 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 800a or b, Directed Readings** Staff

By arrangement with faculty.

**CPSC 990a, Ethical Conduct of Research for Master's Students** Holly Rushmeier

This course meets on four consecutive Fridays: Sept. 8, 15, 22, and Oct. 6.

**CPSC 991a / MATH 991a, Ethical Conduct of Research** Vladimir Rokhlin

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# East Asian Languages and Literatures

308 Hall of Graduate Studies, 203.432.2860

<http://eall.yale.edu>

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

## Chair

Tina Lu

## Director of Graduate Studies

Edward Kamens

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

**Assistant Professors** Lucas Bender, Michael Hunter, Seth Jacobowitz

**Senior Lecturer** Pauline Lin

**Lecturer** Stephen Poland

**Senior Lectors** Hsiu-hsien Chan, Min Chen, Seungja Choi, Koichi Hiroe, Angela Lee-Smith, Rongzhen Li, Ninghui Liang, Fan Liu, Yoshiko Maruyama, Michiaki Murata, Hiroyo Nishimura, Masahiko Seto, Jianhua Shen, Mari Stever, Wei Su, Haiwen Wang, Yu-lin Wang Saussy, Peisong Xu, Yongtao Zhang, William Zhou

**Senior Lector** Chuanmei Sun

**Lector** Aoi Saito

## FIELDS OF STUDY

Fields for doctoral study are Chinese literature and Japanese literature. (See also the Combined Ph.D. Program in Film and Media Studies.) Although the primary emphasis is on these East Asian subjects, the department welcomes applicants who are seeking to integrate their interests in Chinese or Japanese literature with interdisciplinary studies in such fields as history, history of art, linguistics, religious studies, comparative literature, film and media studies, theater studies, literary theory and criticism, and the social sciences.

## SPECIAL ADMISSIONS REQUIREMENTS

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

## SPECIAL REQUIREMENTS FOR THE PH.D. DEGREE

During the first three years of study, students are required to take at least fourteen term courses. Usually students complete twelve term courses in the first and second years, and then take two tutorials or two seminars in the third year. Students concentrating in Chinese or Japanese literature are encouraged to take at least one term course in Western literature or literary theory. By the end of the second year, all students must

prove their proficiency in a language other than their primary language of study that is relevant to their course of study and is approved by the director of graduate studies (DGS). By the end of the third year, students specializing in premodern Japanese literature must pass a reading test in literary Chinese. At the end of the second full academic year, the student must take a written examination in the language of 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, 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://call.yale.edu>.

### COURSES

Courses in Chinese, Japanese, and Korean languages at the elementary, intermediate, and advanced levels are listed in *Yale College Programs of Study*.

**CHNS 570a, Introduction to Literary Chinese I** Michael Hunter

Reading and interpretation of texts in various styles of literary Chinese (*wenyan*), with attention to basic problems of syntax and literary style. Prerequisite: CHNS 151b or 153b or equivalent.

**CHNS 571b, Introduction to Literary Chinese II** Pauline Lin

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 510b, Man and Nature in Chinese Literature** Kang-i Sun Chang

An exploration of man and nature in traditional Chinese literature, with special attention to aesthetic and cultural meanings. Topics include the concept of nature and literature; Neo-Daoist self-cultivation; poetry and Zen (Chan) Buddhism; travel in literature; loss, lament, and self-reflection in song lyrics; nature and the supernatural in classical tales; love and allusions to nature; religious pilgrimage and allegory. All readings in translation; no knowledge of Chinese required. Some Chinese texts provided for students who read Chinese.

**EALL 511a, Women and Literature in Traditional China** Kang-i Sun Chang

This course focuses on major women writers in traditional China, as well as representations of women by male authors. Topics include the power of women's writing; women and material culture; women in exile; courtesans; Taoist and Buddhist nuns; widow poets; the cross-dressing women; the female body and its metaphors; foot binding and its implications; women's notion of love and death; the aesthetic of illness; women and revolution; women's poetry clubs; the function of memory in women's literature; problems of gender and genre. All readings in translation; no knowledge of Chinese required. Some Chinese texts provided for students who read Chinese.

**EALL 512a, Ancient Chinese Thought** Michael 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 513a, 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 536a, Japanese Poetry and Poetics** Edward Kamens

Core concepts and traditions of classical Japanese poetry explored through the medium of translation. Readings from anthologies and treatises of the ninth through early twentieth century. Attention to recent critical studies in transcultural poetic theory. Inspection and discussion of related artifacts in the Beinecke Library and the Yale Art Gallery.



**EALL 555b, Japanese Modernism** Seth Jacobowitz

Japanese literature and art from the 1920s through the 1940s. The avant-garde and mass culture; popular genre fiction; the advent of new media technologies and techniques; effects of Japanese imperialism, militarism, and fascism on cultural production; experimental writers and artists and their resistance to, or complicity with, the state.

**EALL 565b, Japanese Literature after 1970** Staff

Study of Japanese literature published between 1970 and the present. Writers may include Murakami Ryu, Maruya Saiichi, Shimada Masahiko, Nakagami Kenji, Yoshimoto Banana, Yamada Eimi, Murakami Haruki, and Medoruma Shun. No knowledge of Japanese required.

**EALL 599b, Decolonizing East Asia** Stephen Poland

This course explores how literary and cinematic works engaged with, promoted, critiqued, and struggled with empire and colonization in East Asia from the late-nineteenth century to the present. We explore how the very ideas of “literature” and “cinema” in East Asia were entangled with the rise of the Japanese empire in the context of imperial rivalry with Europe, and how these categories were contested and transformed by writers and filmmakers in colonial and postcolonial contexts. The course also examines how discourses of empire and colonization continued to be relevant in post-WWII cultural works grappling with the neoimperialism of Soviet-American Cold War order. Finally, we consider questions of empire and colonization after the Cold War, especially in terms of the rise of China and continued relevance of past imperial formations in twenty-first-century cultural production.

**EALL 603b, Readings in Classical Chinese Poetry** Kang-i Sun Chang

Study of successive appropriations and reorientation of Chinese poetic forms in the major genres, such as song lyric (ci) and vernacular lyric (qu) traditions, traced from early foundations to those written in later times. Topics include the creation of cultural values and identities, problems of authorship and authority, exile and poetic writing, reception, and material culture. Readings in Chinese; discussion in English.

**EALL 608b, Sages of the Ancient World** Michael Hunter

Comparative survey of the embodiment and performance of wisdom by ancient sages. Distinctive features and common themes in discourses about wisdom from China, India, the Near East, Egypt, Greece, and Rome. Topics include teaching, scheming, and dying.

**EALL 617b, *The Plum in the Golden Vase*** Tina Lu

Close reading of the late-sixteenth-century erotic novel *The Plum in the Golden Vase* in translation. The novel as a window on sixteenth-century Chinese society. Discussion of sexuality, commerce, and material culture. No knowledge of Chinese required.

**EALL 625a, Chinese Poetic Form, 1490–1990** Kang-i Sun 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 657a, Meiji Literature and Visual Culture** Seth Jacobowitz

Introduction to the literature and visual culture of Meiji Japan (1868–1912), including novels, poetry, calligraphy, woodblock prints, painting, photography, and cinema. The relationship between theories and practices of fine art and literature; changes in word and image relations; transformations from woodblock to movable-type print culture; the invention of photography and early forms of cinematic practice.

**EALL 715a, Readings in Modern Japanese Literature** Seth Jacobowitz

Readings from a selection of representative texts from modern to contemporary Japanese literature with a focus on comprehension, translation, critical reception, and close reading. Students have the opportunity to select a few texts of interest in consultation with the instructor.

**EALL 720b, Studies in Premodern Japanese Literature** Edward Kamens

A research seminar. Students pursue individual topics in pre-seventeenth-century literature and share readings and analyses for discussion on a rotating basis. Prerequisite: proficiency in reading literary Japanese.

**EALL 740b, Topics in Early Chinese Literature** Michael Hunter

An examination of key texts and problems in the study of early Chinese literature. Primary sources vary from year to year but could include the *Shijing*, *Chuci*, *Shiji*, early sources of anecdotal literature, and the *fu*. Discussions and papers are in English. This course may be repeated for credit.

**EALL 823b / CPLT 953b, 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 850b, Theory in/and East Asia** Stephen Poland

This seminar engages with the question of what “Theory” might mean in the context of East Asian cultural studies. Many critiques have been made of the way “traveling theory” serves as a Euro-American universal applied to the “raw material” of East Asian texts, or as a transdisciplinary common language in the humanities and social sciences. We take this notion as a starting point to explore the intersections and interactions of “Theory” and “East Asia.” Questions include: What is Theory? Who gets to theorize? How have thinkers in East Asia engaged with Theory? How has Theory engaged with East Asia? What have been the major issues and debates in Theory, and how can they apply to scholarship on East Asian cultural production? How can the work of thinkers in/of East Asia offer critiques of Theory, and what problems arise from such challenges? These questions will also be situated in the historical context of disciplinary formation and the creation of Area Studies in universities in the United States. Readings are primarily in English, but may also include Japanese, Chinese, or Korean depending on student interest and language abilities.

**EALL 892a / FILM 874a, Japanese New Wave Cinema** Stephen Poland

This course explores the “New Wave” in Japanese cinema in the context of the rise of “new wave” across cinemas in the American sphere in the period roughly between 1955 and 1975. It focuses on both local contexts and global flows in the turn to experimental

filmmaking in Japan, paying particular attention to how films sought to make social and political interventions in both content and form. We analyze New Wave films and critical writing by asking what they can tell us about Japan's postwar, high-speed economic growth, student and counterculture movements, and place in the Cold War order. We also consider what the Japanese New Wave tells us about the possibilities of cinema: its global simultaneity, transcultural movement, and historical trajectory. Topics include the legacy of World War II in Japan and cinema as a mode for narrating history; the rise of global youth culture in the context of postwar economic growth; cinema and protest against the U.S.-Japan Security Treaty; the aesthetic use of sex, violence, and politics to shock mainstream culture; documentary as a site for radical experimentation; the studio system, independent filmmaking, and transformations of the Japanese film industry; and what is meant by "modernist" and "avant-garde" in New Wave cinema.

**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 571b, Readings in Literary Japanese** Jeffrey Niedermaier

Close analytical reading of a selection of texts from the Nara through Tokugawa period: prose, poetry, and various genres. Introduction of *kanbun*. Prerequisite: JAPN 570 or equivalent.

**JAPN 736a, Poetry and Poetics** Edward Kamens

Readings in classical poetry, treatises, and commentaries; offered in conjunction with EALL 536 for students with proficiency in literary Japanese.

## 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](mailto:jing.tsu@yale.edu))

### Acting Chair [F]

Fabian Drixler ([fabian.drixler@yale.edu](mailto:fabian.drixler@yale.edu))

### Director of Graduate Studies

Peter Perdue (RKZ 242, 617.905.3702, [peter.c.perdue@yale.edu](mailto:peter.c.perdue@yale.edu))

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

**Associate Professors** William Honeychurch (*Anthropology*), Andrew Quintman (*Religious Studies*), Chloë Starr (*Divinity*)

**Assistant Professors** Lucas Bender (*East Asian Languages & Literatures*), Eric Greene (*Religious Studies*), Denise Ho (*History*), Michael Hunter (*East Asian Languages & Literatures*), Seth Jacobowitz (*East Asian Languages & Literatures*), Daniel Mattingly (*Political Science*)

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

**Lecturers** Abigail Coplin, Leland Rogers, Holly Stephens, Dominik Wallner

**Senior Lector II** Seungja Choi

**Senior Lectors** Hsiu-hsien Chan, Min Chen, Koichi Hiroe, Angela Lee-Smith, Rongzhen Li, Ninghui Liang, Fan Liu, Yoshiko Maruyama, Michiaki Murata, Hiroyo Nishimura, Masahiko Seto, Jianhua Shen, Mari Stever, Wei Su, Haiwen Wang, Yu-lin Wang Saussy, Peisong Xu, Yongtao Zhang, William Zhou

**Lectors** Aoi Saito, Chuanmei Sun

## FIELDS OF STUDY

The Master of Arts (M.A.) program in East Asian Studies is a multidisciplinary program offering a concentrated course of study designed to provide a broad understanding of the people, history, culture, contemporary society, politics, and economy of China, Japan, or a transnational region within East Asia. This program is designed for students preparing to go on to the doctorate in one of the disciplines of East Asian Studies (e.g., anthropology; economics; history; history of art; language

and literature, including comparative literature, film studies, and theater studies; political science; sociology; etc.), as well as for those students seeking a terminal M.A. degree before entering the business world, the media, government service, or a professional school.

## **COURSE OF STUDY FOR THE M.A. DEGREE**

The East Asian Studies graduate program is designed to be completed in either a one-year or a two-year track. The two-year track requires the preparation of a master's thesis and is therefore ideal for students who are keen to pursue focused, independent research under the guidance of a faculty member. It also provides students with an opportunity to pursue additional disciplinary and language training. Students who enter the two-year track with a strong command of one East Asian language will be encouraged to consider beginning a second (or third) language.

In general, students focus their course work on the study of China, Japan, or transnational East Asia. Some students may prefer to focus their course work on one or two disciplines, in addition to language study and courses focused on East Asia. Others may create a highly interdisciplinary program, taking courses in traditional disciplines such as history, literature, political science, art history, or anthropology, as well as in Yale's professional schools.

Applicants to the East Asian Studies graduate program must indicate on their application whether they are applying to the one-year or the two-year track.

## **REQUIREMENTS FOR THE M.A. DEGREE: ONE-YEAR TRACK**

The program of study for completion of the degree on the one-year track consists of eight term courses that must include two terms of language study at or above Yale's third-year level (unless the language requirement has already been met through previous study or native fluency), plus six other courses selected from the University's offerings of advanced language study and seminars related to East Asia at the graduate level. For those who meet the language requirement at matriculation, two of the required eight courses may be advanced training in a particular discipline (e.g., economics, history, political theory, statistics, etc.) with no explicit focus on East Asia, but related to the student's professional goals. The course of study must be approved by the director of graduate studies (DGS).

## **Special Requirements**

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

## **REQUIREMENTS FOR THE M.A. DEGREE: TWO-YEAR TRACK**

The program of study for completion of the degree on the two-year track consists of sixteen term courses that must include four terms of language study, two terms of which must be at Yale's fourth-year level (unless the language requirement has already been met through previous study or native fluency), plus twelve other courses selected from the University's offerings of advanced language study and seminars related to East Asia at the graduate level. Students who have achieved advanced proficiency in one East Asian language are strongly encouraged to pursue study of a second East

Asian language, but for those who have met the language requirement in one language at matriculation, two of the required sixteen courses may be advanced training in a particular discipline (e.g., economics, history, political theory, statistics, etc.) with no explicit focus on East Asia, but related to the student's professional goals. The course of study must be approved by the director of graduate studies (DGS).

## Special Requirements

Students must earn four Honors grades ("H") over the course of their four terms at Yale. Honors grades earned in any language course cannot be counted toward satisfying this requirement, except with the permission of the DGS. A master's thesis is also required.

## Master's Thesis

A master's thesis is required of students enrolled in the two-year degree program. The master's thesis is based on research in a topic approved by the DGS and advised by a faculty member with specialized competence in the chosen topic. M.A. students must register for EAST 900, which may count toward the sixteen required courses. EAST 900 may not be taken for audit. Students may register for an additional independent study to prepare topics and begin research. The master's thesis must be prepared according to CEAS guidelines and is due in the student's second year on an early-May date as specified by CEAS.

## JOINT-DEGREE PROGRAMS

The Council on East Asian Studies (CEAS) collaborates with three of Yale's professional schools – Forestry & Environmental Studies, Law, and Public Health – and has developed joint-degree programs that offer a strong connection between two demanding courses of study while also fulfilling the requirements of each separate school. Only students enrolled in the two-year track of the East Asian Studies M.A. degree program are eligible for a joint degree.

Each joint program leads to the simultaneous award of two graduate professional degrees: the M.A. in East Asian Studies from the Graduate School of Arts and Sciences, and an M.F., M.E.M., M.E.Sc., M.F.S., J.D., or M.P.H. from the relevant professional school. Students can earn the two degrees simultaneously in less time than if they were pursued sequentially.

With the exception of the joint M.A./J.D. program, which requires four years, completion of all requirements takes three years. Typically candidates spend the first year in one program and the second year in the partner program. During the third and final year of study, students register in one program each term. Joint-degree students are guided in this process by a committee composed of the DGS and a faculty member of the relevant professional school.

Candidates must submit formal applications to both the Graduate School and the relevant professional school and be admitted separately to each school, i.e., each school makes its decision independently. It is highly recommended that students apply to and enter a joint-degree program from the outset, although it is possible to apply to the second program once matriculated at Yale.

Program materials are available upon request to the Council on East Asian Studies, Yale University, PO Box 208206, New Haven CT 06520-8206; e-mail, [eastasian.studies@yale.edu](mailto:eastasian.studies@yale.edu); website, <http://ceas.yale.edu>. Applications are available online at <http://gsas.yale.edu/admission-graduate-school>; e-mail, [graduate.admissions@yale.edu](mailto:graduate.admissions@yale.edu).

## COURSES

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

**EAST 575a / ANTH 575a, Hubs, Mobilities, and Global Cities** Helen Siu and Sarah LeBaron von Baeyer

Analysis of urban life in historical and contemporary societies. Topics include capitalist and postmodern transformations, class, gender, ethnicity, migration, and global landscapes of power and citizenship.

**EAST 596a / SOCY 596a, Wealth and Poverty in Modern China** Deborah Davis

The underlying causes and consequences of the changing distribution of income, material assets, and political power in contemporary China. Substantive focus on inequality and stratification. Instruction in the use of online Chinese resources relevant to research. Optional weekly Chinese language discussions. Prerequisite: permission of the instructor.

**EAST 900a or b, Master's Thesis** Staff

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** Staff

By arrangement with faculty and with approval of the DGS.

# Ecology and Evolutionary Biology

Osborn Memorial Laboratories, 203.432.3837

<http://eeb.yale.edu>

M.S., Ph.D.

## Chair

Paul Turner

## Director of Graduate Studies

David Vasseur

**Professors** Richard Bribiescas (*Anthropology*), Nicholas Christakis (*Sociology*), Michael Donoghue, Alison Galvani (*Public Health*), Vivian Irish (*Molecular, Cellular & Developmental Biology*), Thomas Near, David Post, Jeffrey Powell, Richard Prum, Eric Sargis (*Anthropology*), Oswald Schmitz (*Forestry & Environmental Studies*), David Skelly (*Forestry & Environmental Studies*), Stephen Stearns, Paul Turner, J. Rimas Vaisnys (*Electrical Engineering*), Günter Wagner

**Associate Professors** Forrest Crawford (*Public Health*), Walter Jetz, James Noonan (*Genetics*), Jeffrey Townsend (*Public Health*), David Vasseur

**Assistant Professors** Liza Comita (*Forestry & Environmental Studies*), Alvaro Sanchez, Carla Staver

**Senior Lecturer** Marta Martínez Wells

**Lecturers** Adalgisa Caccone, Linda Puth

## FIELDS OF STUDY

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

## SPECIAL ADMISSIONS REQUIREMENTS

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

## SPECIAL REQUIREMENTS FOR THE PH.D. DEGREE

Each entering student, in consultation with the director of graduate studies (DGS), develops a specific program of courses, seminars, laboratory research, and independent reading tailored to the student's interests, background, and goals. There are normally no foreign language requirements. All first-year students carry out two research rotations. Students have the option of a rotation over their first summer. Students must participate in (1) E&EB 500 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 H must be earned in two of these. Teaching experience is regarded as an integral part of the graduate training program. All students are required to teach three courses, normally at a level 20, typically during their first two years of study.

By the middle of the fourth term of study, each student organizes a formal pre-prospectus consultative meeting with 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 Center for Science and Social Science Information.

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

## HONORS REQUIREMENT

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

## MASTER'S DEGREE

**M.S. (en route to the Ph.D.)** Students must pass ten graduate-level courses. At least four courses must be taken for a grade, and students must earn Honors in two courses and maintain an overall average of High Pass. Required courses are: E&EB 500, Advanced Topics in Ecology and Evolutionary Biology; 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. A minimum of five additional graduate-level courses (four taken for a grade) are required.

Additional information on the department, faculty, courses, and facilities is available from 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](mailto: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**

David Vasseur

Topics to be announced. Graded Satisfactory/Unsatisfactory.

**E&EB 510a / S&DS 501a, Introduction to Statistics: Life Sciences** 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 523b, Laboratory for Principles of Evolution, Ecology, and Behavior** Marta Wells

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

**E&EB 525b, Evolutionary Biology** Jeffrey Powell and Alvaro Sanchez

An overview of evolutionary biology as the discipline uniting all of the life sciences. Evolution explains the origin of life and Earth's biodiversity, and how organisms acquire adaptations that improve survival and reproduction. This course uses reading and discussion of scientific papers to emphasize that evolutionary biology is a dynamic science, involving active research to better understand the mysteries of life. We discuss principles of population genetics, paleontology, and systematics; application of evolutionary thinking in disciplines such as developmental biology, ecology, microbiology, molecular biology, and human medicine.

**E&EB 528b, Ecology and Evolution of Infectious Disease** Paul Turner

Overview of the ecology and evolution of pathogens (bacteria, viruses, protozoa) and their impact on host populations. Topics include theoretical concepts, ecological and evolutionary dynamics, molecular biology, and epidemiology of ancient and emerging diseases.

**E&EB 545b, Responsible Conduct of Research** David Vasseur

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 575b, Biological Oceanography** Staff

Exploration of a range of coastal and pelagic ecosystems. Relationships between biological systems and the physical processes that control the movements of water and productivity of marine systems. Anthropogenic impacts on oceans, such as the effects of fishing and climate change. Includes three Friday field trips.

**E&EB 608a, Biology of Feathers** Richard Prum

**E&EB 610a, Evolutionary Functional Genomics, Cell Types, and Homology** Günter Wagner

Functional genomics has opened the opportunity to assess the activity state of all genes in the genomes in a largely scalable way. Many cell types, tissues, and characters can readily be assessed across many species, leading to a new field of evolutionary or comparative functional genomics. At the same time this new field of data analysis can be used to address many deep issues in organismic evolution, like the evolution of cell types, the homology among cell types, etc. In this seminar we review the current state of published literature as it pertains to the evolutionary analysis of transcriptomes and epigenetic marks and their bearing on issues of cell and tissue evolution and homology.

**E&EB 620a, Evolutionary and Ecological Genetics** Jeffrey Powell

Topics related to analyzing molecular genetic data to answer questions in evolution and ecology. Methods to detect selection in DNA sequences and other molecular data, and landscape genetics, overlaying genetic data on ecological maps from global imaging. Other topics will be determined by interests of participants.

**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 673b, 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.

**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 705b, Plant Ecology** Ann Staver

Plant ecology is the study of plant interactions with their environment, at the level of individuals, and of how plant-plant interactions mediate environmental interactions at the level of populations, communities, and ecosystems. The course incorporates empirical and theoretical perspectives, emphasizing the empirical origins of concepts in plant ecology and effective empirical tests of conceptual and mathematical predictions. Students read the primary scientific literature extensively, both for content and to build familiarity with methodological standards and the scientific writing.

**E&EB 713b, Spatial and Environmental Data Analysis in Conservation and Biodiversity Science** Walter Jetz

The course provides an introduction and hands-on exposure to computational and statistical approaches for the analysis of biodiversity data in a geographical, environmental, and conservation context. After a general overview of relevant hot topics and questions in conservation and ecology and their associated methodologies and data sources, we introduce a set of example questions that we then address with a variety of datasets and methods. A particular focus is the analysis of species distributions and abundances in changing landscapes using remotely sensed environmental information. Beyond broadly available data and methods, students explore new biodiversity-relevant remote-sensing products under development with NASA and prototype tools available through the Yale-based Map of Life project and its partnership with the Google Earth Engine team. Participants gain hands-on experience in spatial analysis and modeling relevant for biodiversity and conservation science and learn about key associated concepts and potential pitfalls. Case studies from forestry, species distribution modeling, biodiversity, and remote sensing data processing. The course meets weekly for 2–3 hours, day and time to be determined. The first organizational meeting takes place on January 20 at 2 pm in OML 201; if you are interested in the course but unable to attend the organizational meeting, please contact the instructor at [walter.jetz@yale.edu](mailto:walter.jetz@yale.edu). Prerequisite: open to advanced undergraduates and graduate students (postdocs also welcome) with an interest in advancing their data analysis and

modeling skill set and at least some experience in GIS and statistical analysis in R (or willingness to acquire it).

**E&EB 810a or b, Dynamics of Evolving Systems** J. Rimas Vaišnys

An introduction to the ways evolving biological systems can be described, modeled, and analyzed by using a dynamical systems approach. To use currently fashionable terminology, we develop an individual-based model of the behavior of biological populations, which leads to evolution as an emergent property. In this approach it is possible to construct populations of varying individuals, which can then be combined into larger assemblages, and to modify both the overall environment and the environments at the lower levels, so that aspects often neglected in modeling evolution can be explored and related to any available observational data. Extensive use of the software package Mathematica, but prior experience with the program is not required.

**E&EB 842b / ANTH 835b, 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.

**E&EB 900a or b, First-Year Introduction to Research and Rotations** David Vasseur

**E&EB 901a, Research Rotation I** David Vasseur

**E&EB 902b, Research Rotation II** David Vasseur

**E&EB 903b, Independent Study** David Vasseur

By arrangement with faculty. Approval of DGS required.

**E&EB 930a or b / G&G 703a or b, Seminar in Systematics** Jacques Gauthier

A seminar on using molecular evolutionary models in Bayesian phylogenetic analyses. Topics are chosen by the participants but may include “models” in phylogenetics, understanding and comparison of model selection criteria, effects of model under- and overparameterization on parameter value estimates and phylogenetic inferences, and accommodating model uncertainty and model-averaging.

**E&EB 950a, Second-Year Research** David Vasseur

By arrangement with faculty.

**E&EB 960b, Studies in Evolutionary Medicine I** Stephen Stearns

The first term of a two-term course that begins in January. Students learn the major principles of evolutionary biology and apply them to issues in medical research and practice by presenting and discussing original papers from the current research literature. Such issues include lactose and alcohol tolerance; the hygiene hypothesis and autoimmune disease; human genetic variation in drug response and pathogen resistance; spontaneous abortions, immune genes, and mate choice; parental conflicts over reproductive investment mediated by genetic imprinting; life history trade-offs and the evolution of aging; the evolution of virulence and drug resistance in pathogens; the evolutionary genetics of humans and their pathogens; the ecology and evolution of disease; the evolutionary origin of diseases; and the emergence of new diseases. Students develop a research proposal based on one of their own questions in the spring term, spend the summer on a research project related to their research proposal, and write a paper based on the results of their research in the fall term. Credit and grades

are awarded for each term. Only students who have engaged in summer research projects may enroll in the fall term. Admission is by competitive application only. Forms are available on the E&EB department website.

## Economics

28 Hillhouse Avenue, 203.432.3575

<http://economics.yale.edu>

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

### Chair

Dirk Bergemann (28 Hillhouse, 203.432.3571)

### Director of Graduate Studies

Truman Bewley (30 Hillhouse, Rm. 30, 203.432.3719, [truman.bewley@yale.edu](mailto:truman.bewley@yale.edu))

**Professors** Joseph Altonji, Donald Andrews, Dirk Bergemann, Steven Berry, Truman Bewley, Xiaohong Chen, Zhiwu Chen (*Management*), Ray Fair, Howard Forman (*Public Health*), John Geanakoplos, Pinelope Goldberg, Timothy Guinnane, Philip Haile, Johannes Hörner, Jonathan Ingersoll (*Management*), Gerald Jaynes, Dean Karlan, Yuichi Kitamura, Alvin Klevorick, Samuel Kortum, Naomi Lamoreaux, Giovanni Maggi, Costas Meghir, Robert Mendelsohn (*Forestry & Environmental Studies*), Giuseppe Moscarini, William Nordhaus, Peter Phillips, Benjamin Polak, Mark Rosenzweig, Larry Samuelson, Robert Shiller, Anthony Smith, Aleh Tsyvinski, Edward Vytlačil, Ebonya Washington, Fabrizio Zilibotti

**Associate Professors** Konstantinos Arkolakis, Eduardo Faingold, Amanda Kowalski

**Assistant Professors** Timothy Armstrong, José-Antonio Espín-Sánchez, Mira Frick, Zhen Huo, Mitsuru Igami, Ryota Iijima, Daniel Keniston, Ilse Lindenlaub, Yusuke Narita, Michael Peters, Nicholas Ryan, Joseph Shapiro

### FIELDS OF STUDY

Fields include economic theory, including microeconomics, macroeconomics, mathematical economics; econometrics; economic history; labor economics; industrial organization; financial economics; behavioral finance; public economics; public finance; international trade; international finance; economic development; behavioral economics; law and economics.

### SPECIAL ADMISSIONS REQUIREMENTS

Please see <http://economics.yale.edu/graduate/application-info>.

### SPECIAL REQUIREMENTS FOR THE PH.D. DEGREE

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.

## 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.

## 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. 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, General Economic Theory: Microeconomics** Truman Bewley and Mira Frick

Introduction to optimization methods and partial equilibrium. Theories of utility and consumer behavior production and firm behavior. Introduction to uncertainty and the economics of information, and to noncompetitive market structures.

**ECON 501b, General Economic Theory: Microeconomics** Johannes Horner and Ryota Iijima

General equilibrium and welfare economics. Allocation involving time. Public sector economics. Uncertainty and the economics of information. Introduction to social choice.

**ECON 510a, General Economic Theory: Macroeconomics** Anthony Smith and Zhen Huo

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

**ECON 511b, General Economic Theory: Macroeconomics** Giuseppe Moscarini  
Theories of saving, investment, portfolio choice, and financial markets. Longer-run developments; economic growth, capital accumulation, income distribution.

**ECON 520a, Advanced Microeconomic Theory I** Mira Frick

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** Juuso Valimaki 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** Anthony Smith and 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** Fabrizio Zilibotti

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 (GEI). 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 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 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** Fabrizio Zilibotti

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** Yuichi Kitamura

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

**ECON 553a, Econometrics IV: Time Series Econometrics** Peter Phillips

A sequel to ECON 552, the course proceeds to research level in time series econometrics. Topics include an introduction to ergodic theory, Wold decomposition, spectral theory, martingales, martingale convergence theory, mixing processes, strong laws, and central limit theory for weak dependent sequences with applications to econometric models and model determination.

**ECON 554b, Econometrics V** Xiaohong Chen

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** Yuichi Kitamura, Timothy Armstrong, and Yusuke Narita

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 Booser

Application of statistical analysis to economic data. Basic probability theory, linear regression, specification and estimation of economic models, time series analysis, and forecasting. The computer is used. For IDE students.

**ECON 559b, Development Econometrics (IDE)** Michael Boozer**ECON 561b, Computational Methods in Economics** Anthony Smith

How to use computational methods to solve and analyze dynamic economic models. The first part of the course covers standard tools of numerical analysis that are useful in economics (minimization of functions, root-finding, interpolation, approximation of functions, integration, simulation). The second shows how to use these tools to study dynamic economic problems in macroeconomics, finance, labor economics, public finance, and industrial organization, paying special attention to methods for solving stochastic dynamic programming problems and for computing equilibria in economic models with heterogeneous actors.

**ECON 562a / CPSC 512a, Designing the Digital Economy** Eric Weyl

Information technology is transforming how almost every market works: finance has been transformed by algorithmic trading and bitcoin, ridesharing is changing the nature of public transportation, Amazon is revolutionizing logistics, and Airbnb is now the most valuable accommodation provider in the world. This transformation, which has been led by start-ups and newly dominant technology companies, inherently combines technical and economic aspects, as entrepreneurs take advantage of the potential of technology to facilitate exchanges that were previously infeasible. This crash course in the key tools from economics and computer science that are being used to design digital markets exposes students to a range of concrete and topical practical problems in the area.

**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** Naomi Lamoreaux and 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 600a, Industrial Organization I** Philip Haile

Begins by locating the study of industrial organization within the broader research traditions of economics and related social sciences. Alternative theories of decision making, of organizational behavior, and of market evolution are sketched and contrasted with standard neoclassical theories. Detailed examination of the determinants and consequences of industrial market structure.

**ECON 601b, Industrial Organization II** Steven Berry and Soheil Ghili

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 630a, Labor Economics** Konstantinos Meghir

Topics include static and dynamic approaches to demand, human capital and wage determination, wage income inequality, unemployment and minimum wages, matching and job turnover, immigration and international trade, unions, implicit contract theory, and efficiency wage hypothesis.

**ECON 631b, Labor Economics** Joseph Altonji and Yusuke Narita

Topics include static and dynamic models of labor supply, human capital wage function estimation, firm-specific training, compensating wage differentials, discrimination, household production, bargaining models of household behavior, intergenerational transfers, and mobility.

**ECON 640a or b, Prospectus Workshop in Labor Economics and Public Finance**  
Staff

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

**ECON 670a / MGMT 740a, Financial Economics I** Jonathan Ingersoll

Current issues in theoretical financial economics are addressed through the study of current papers. Focuses on the development of the problem-solving skills essential for research in this area.

**ECON 672b / MGMT 745b, Behavioral Finance** Nicholas Barberis

Much of modern financial economics works with models in which agents are rational, in that they maximize expected utility and use Bayes's law to update their beliefs. Behavioral finance is a large and active field that studies models in which some agents are less than fully rational. Such models have two building blocks: limits to arbitrage, which make it difficult for rational traders to undo the dislocations caused by less rational traders; and psychology, which catalogues the kinds of deviations from full rationality we might expect to see. We discuss these two topics and then consider a number of applications: asset pricing (the aggregate stock market and the cross-section of average returns); individual trading behavior; and corporate finance (security issuance, corporate investment, and mergers).

**ECON 674b / MGMT 746b, Financial Crises** Gary Gorton 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 675a, Models of Operations Research and Management** Vahideh Manshadi

The course exposes students to main stochastic modeling methods and solution concepts used to study problems in operations research and management. The first half of the class covers analysis of queuing models such as Markovian queues, networks of queues, and queues with general arrival or service distributions, as well as approximation techniques such as heavy traffic approximation. The second half focuses on control of stochastic processes; it covers finite and infinite-horizon dynamic programming problems, and special classes such as linear quadratic problems, optimal stopping, and multi-armed bandit problems.

**ECON 680a, Public Finance I** Joseph Shapiro

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** Staff

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 720a, International Trade I** Giovanni Maggi and Lorenzo Caliendo

This course covers the theory of international trade, policy, and institutions. Discussion of Classical, Neo-classical, and more recent imperfect-Competition-Scale-Economies-based static models of trade. The course presents dynamic extensions of some of the models that explore the relations among trade, innovation, and growth. The analytics of trade policy issues, such as gains from trade, tariffs and quotas, customs unions and free trade areas, and the political economy of trade policy making, are discussed.

**ECON 721b, International Trade II** Konstantinos Arkolakis

The course covers empirical topics in international trade with particular emphasis on current research areas. Topics include tests of international trade theories; studies of the relationship between international trade, labor markets, and income distribution; recent trade liberalization episodes in developing countries; empirical assessment of various trade policies, such as VERs and Anti-Dumping; productivity (and its relation to international trade liberalization); and exchange rates, market integration, and international trade. Methodologically, the course draws heavily on empirical models used in the fields of industrial organization and to a lesser degree labor economics; taking these courses is thus recommended though not required.

**ECON 724b, International Finance** Konstantinos Arkolakis

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** Daniel Keniston and Mark Rosenzweig  
Development theory at both aggregate and sectoral levels; analysis of growth, employment, poverty, and distribution of income in both closed and open developing economy contexts.

**ECON 731b, Economic Development II** A. Mushfiq Mobarak  
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 732a or b, Advanced Economic Development** Daniel Keniston  
Examines the models of classical and modern economists to explain the transition of developing economies into modern economic growth, as well as their relevance to income distribution, poverty alleviation, and human development.

**ECON 737b, 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 739a and ECON 740b, Climate Change Economics** William Nordhaus and Robert Mendelsohn

The course reviews several modern valuation studies that are central to the estimation of the economic damages from climate change. The aim is to train students to deal with quantitative economic analysis and modeling. Students form teams of two and choose a study; gather the data and methods of that study from the authors or a journal; and then reproduce the published results. The teams study the theory and empirical analysis, gather the data and modeling to replicate the results, and determine how sensitive the results are to the assumptions and specifications. The course meets every other week for the entire year to give students time to analyze their studies and present their results. Prerequisites: econometrics and relevant courses in economics.

**ECON 756a or b, Prospectus Workshop in Development** Staff  
Workshop for students doing research in development to present and discuss work.

**ECON 790b, Political Economy I** Ebonya Washington  
An overview of the field of empirical political economy. While students are expected to familiarize themselves with the most prevalent models in the field, the emphasis in this course is on the applied work. Students attain a working knowledge of the literature, learn to critically evaluate the literature, and most importantly develop the skills to come up with interesting, workable, and theoretically grounded research questions that will push that literature forward.

**ECON 791a / PLSC 595a, Theories of Distributive Justice** John Roemer  
This year, we spend the first half of the course (or so) reading and discussing Thomas Piketty's *Capital in the Twenty-First Century* (2014). We then survey the main egalitarian theories of distributive justice proposed by economists and political philosophers since J. Rawls, including A. Sen, R. Dworkin, G.A. Cohen, R. Arneson, and S. Scheffler. We subject these theories to economic and philosophical analysis. Prerequisite: intermediate microeconomics or PLSC 517.

**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

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

## Chair

Leandros Tassiulas

## Director of Graduate Studies

Hongxing Tang (hong.tang@yale.edu)

**Professors** Richard Barker (*Emeritus*), James Duncan, Jung Han, Roman Kuc, Tso-Ping Ma, Rajit Manohar, A. Stephen Morse, Kumpati Narendra, Mark Reed, Peter Schultheiss (*Emeritus*), Lawrence Staib, Hongxing Tang, Leandros Tassiulas, J. Rimas Vaisnys, Y. Richard Yang

**Associate Professors** Richard Lethin (*Adjunct*), Sekhar Tatikonda

**Assistant Professors** Wenjun Hu, Amin Karbasi, Jakub Szefer, Fengnian Xia

## FIELDS OF STUDY

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

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

For course listings, see Engineering & Applied Science.

# Engineering & Applied Science

Dunham Laboratory, 203.432.4252

<http://seas.yale.edu>

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

## Dean

T. Kyle Vanderlick

## Deputy Dean

Vincent Wilczynski

## BIOMEDICAL ENGINEERING

### Chair

Jay Humphrey

### Director of Graduate Studies

Richard Carson ([richard.carson@yale.edu](mailto:richard.carson@yale.edu))

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

**Associate Professors** Joerg Bewersdorf (*Cell Biology*), Robin de Graaf, Tarek Fahmy, Rong Fan, Anjelica Gonzalez, Themis Kyriakides (*Pathology*), Kathryn Miller-Jensen, Xenophon Papademetris

**Assistant Professors** Stuart Campbell, Michael Choma, Chi Liu, Michael Mak, Michael Murrell, Steven Tommasini, Jiangbing Zhou

## CHEMICAL & ENVIRONMENTAL ENGINEERING

### Chair

Jaehong Kim

### Director of Graduate Studies

Paul Van Tassel ([paul.vantassel@yale.edu](mailto:paul.vantassel@yale.edu) ([paulvantassel@yale.edu](mailto:paulvantassel@yale.edu)))

**Professors** Eric Altman, Paul Anastas, Michelle Bell, Ruth Blake, Menachem Elimelech, Gary Haller (*Emeritus*), Edgar Hertwich, 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** Chinedum Osuji, André Taylor, Corey Wilson

**Assistant Professors** Drew Gentner, Amir Haji-Akbari, Shu Hu, Desirée Plata, Mingjiang Zhong

**Lecturers** Aniko Bezur, Paul Whitmore

## 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,\* Julie Dorsey, Stanley Eisenstat, Joan Feigenbaum, Michael Fischer, David Gelernter, Mark Gerstein,\* Rajit Manohar,\* Drew McDermott, Dragomir Radev, Vladimir Rokhlin,† Holly Rushmeier, Brian Scassellati, Martin Schultz (*Emeritus*), Zhong Shao, Avi Silberschatz, Daniel Spielman, Leandros Tassiulas,\* Y. Richard Yang, Steven Zucker†

**Associate Professors** Mahesh Balakrishnan, Minlan Yu

**Assistant Professors** Wenjun Hu,\* Julian Jara-Ettinger,\* Amin Karbasi,\* Smita Krishnaswamy,\* Sahand Negahban,\* Ruzica Piskac, Mariana Raykova, Jakub Szefer\*

**Senior Lecturers** Kyle Jensen,\* Stephen Slade

**Lecturers** Benedict Brown, James Glenn, Scott Petersen, Brad Rosen, Andrew Sherman, Xiyin Tang [Sp]

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

† A joint appointment with another department.

**ELECTRICAL ENGINEERING****Chair**

Leandros Tassiulas

**Director of Graduate Studies**

Hongxing Tang (hong.tang@yale.edu)

**Professors** Richard Barker (*Emeritus*), James Duncan, Jung Han, Roman Kuc, Tso-Ping Ma, Rajit Manohar, A. Stephen Morse, Kumpati Narendra, Mark Reed, Peter Schultheiss (*Emeritus*), Lawrence Staib, Hongxing Tang, Leandros Tassiulas, J. Rimas Vaisnys, Y. Richard Yang

**Associate Professors** Richard Lethin (*Adjunct*), Sekhar Tatikonda

**Assistant Professors** Wenjun Hu, Amin Karbasi, Jakub Szefer, Fengnian Xia

**MECHANICAL ENGINEERING & MATERIALS SCIENCE****Chair**

Udo Schwarz

**Director of Graduate Studies**

Jan Schroers (jan.schroers@yale.edu)

**Professors** Charles Ahn, Ira Bernstein (*Emeritus*), Juan Fernández de la Mora, Alessandro Gomez, Sohrab Ismail-Beigi, Shun-Ichiro Karato, Marshall Long, Brian Scassellati, Jan Schroers, Udo Schwarz, Mitchell Smooke

**Associate Professors** Aaron Dollar, Corey O'Hern

**Assistant Professors** Eric Brown, Judy Cha, Rebecca Kramer-Bottiglio, Madhusudhan Venkadesan

**Lecturers** Beth Anne Bennett, Kailasnath Purushothaman, Joseph Zinter

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

## CHEMICAL & ENVIRONMENTAL ENGINEERING

### Fields of Study

Fields include nanomaterials, soft matter, interfacial phenomena, biomolecular engineering, 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, computer engineering, computer architecture, hardware security, and VLSI design and testing.

## MECHANICAL ENGINEERING & MATERIALS SCIENCE

### Fields of Study

**Fluids and thermal sciences** Suspensions; electrospray theory and characterization; electrical propulsion applications; electrified and magnetized interfaces of electrically conducting liquids and ferrofluids; combustion and flames; computational methods for fluid dynamics and reacting flows; turbulence; laser diagnostics of reacting and nonreacting flows; and magnetohydrodynamics.

**Soft matter/complex fluids** Jamming and slow dynamics in gels, glasses, and granular materials; mechanical properties of soft and biological materials; and structure and dynamics of 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 properties of two-dimensional layered materials; amorphous metals and nanomaterials including nanocomposites, characterization of crystallization and other phase transformations; nanoimprinting; atomic-scale investigations of surface interactions and properties; classical and quantum nanomechanics; nanotribology; nanostructured energy applications; nanoparticle synthesis for energy applications; combinatorial materials science; and in situ transmission electron and scanning probe microscopy.

**Robotics/mechatronics** Machine and mechanism design; dynamics and control; robotic grasping and manipulation; human-machine interface; rehabilitation robotics; haptics; 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 one term, typically during year two. Teaching duties normally involve assisting in laboratories or discussion sections and grading papers and are not expected to require more than ten hours per week. Students are not permitted to teach during the first year of study.

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

## CORE COURSE REQUIREMENTS FOR THE PH.D. DEGREE

**Biomedical Engineering** Physiological Systems (ENAS 550), Physical and Chemical Basis of Bioimaging and Biosensing (ENAS 510). One of these courses may be taken in the second year. In addition, there is a math requirement that must be met by taking Biomedical Data Analysis (ENAS 549), Mathematical Methods I (ENAS 500), or Advanced Engineering Mathematics (ENAS 505) in the first year.

**Chemical & Environmental Engineering (Chemical track)** Mathematical Methods I (ENAS 500), Classical and Statistical Thermodynamics (ENAS 521), Energy, Mass, and Momentum Processes (ENAS 603), Chemical Reaction Engineering (ENAS 602).

**Chemical & Environmental Engineering (Environmental track)** Water Chemistry (ENAS 638), Biological Processes in Environmental Engineering (ENAS 641), Environmental Physicochemical Processes (ENAS 642). In addition, there is a math requirement that must be met by taking one of the following courses in the first year: Mathematical Methods I (ENAS 500), Applied Spatial Statistics (F&ES 781), Multivariate Statistical Analysis in the Environmental Sciences (F&ES 758), Data Exploration and Analysis (S&DS 530), or Multivariate Statistics for Social Sciences (S&DS 563).

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

**Electrical Engineering (Computer Engineering track)** Two of the following three courses: Introduction to VLSI System Design (ENAS 875), Computer Architectures for



Cognitive Processing and Machine Learning (ENAS 907), Computer Organization and Architecture (ENAS 967).

**Electrical Engineering (Microelectronics track)** Two of the following four courses: Photonics and Optical Electronics (ENAS 511), Heterojunction Devices (ENAS 718), Solid State Physics I (ENAS 850), Semiconductor Silicon Devices and Technology (ENAS 986).

**Electrical Engineering (System and Signals track)** Linear Systems (ENAS 902), Stochastic Processes (ENAS 502).

**Mechanical Engineering & Materials Science** Students must demonstrate competence in one of four areas: Fluid and Thermal Sciences, Soft Matter/Complex Fluids, Materials Science, or Robotics/Mechatronics. As a minimum requirement, students must take at least one of the following courses in the first year of study: Intelligent Robotics Laboratory (CPSC 573), Classical and Statistical Thermodynamics (ENAS 521), Biological Physics (ENAS 541), Polymer Physics (ENAS 606), Synthesis of Nanomaterials (ENAS 615), Statistical Physics II (PHYS 628), 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), Forces on the Nanoscale (ENAS 787), Soft Condensed Matter Physics (ENAS 848), Solid State Physics I (ENAS 850), Solid State Physics II (ENAS 851), Linear Systems (ENAS 902) – if not used to satisfy the math requirement – and Systems and Control (ENAS 936). In addition, there is a math requirement that must be met by taking Mathematical Methods I (ENAS 500), Mathematical Methods of Physics (PHYS 506), or Linear Systems (ENAS 902), depending on the research area.

## HONORS REQUIREMENT

Students must meet the Honors requirement in at least two term courses (excluding Special Investigations) by the end of the second term of full-time study. An extension of one term may be granted at the discretion of the DGS.

## MASTER'S DEGREES

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

**M.S. (en route to the Ph.D.)** To qualify for the M.S., the student must pass eight term courses; no more than two may be Special Investigations. An average grade of at least High Pass is required, with at least one grade of Honors.

**Terminal Master's Degree Program** Students may also be admitted directly to a terminal master's degree program. The requirements are the same as for the M.S. en route to the Ph.D., although there are no core course requirements for students in this program. This program is normally completed in one year, but a part-time program may be spread over as many as four years. Some courses are available in the evening, to suit the needs of students from local industry.

Program materials are available upon request to the Office of Graduate Studies, School of Engineering & Applied Science, Yale University, PO Box 208267, New Haven CT 06520-8267; e-mail, [engineering@yale.edu](mailto:engineering@yale.edu); website, <http://seas.yale.edu>.

## COURSES

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

### **ENAS 500b / APHY 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 508b / APHY 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 510a, Physical and Chemical Basis of Bioimaging and Biosensing** Douglas Rothman

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 511a, Physics and Devices of Optical Communication** Jung Han

A survey of the enabling components and devices that constitute modern optical communication systems. Focus on the physics and principles of each functional unit, its current technological status, design issues relevant to overall performance, and future directions. Permission of the instructor required.

### **ENAS 513a, Introduction to Analysis** Staff

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

### **ENAS 514b, Real Analysis** Staff

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

### **ENAS 517b / MB&B 517b / MCDB 517b / PHYS 517b, Methods and Logic in Interdisciplinary Research** Staff

This half-term PEB class is intended to introduce students to integrated approaches to research. Each week, the first of two sessions is student-led, while the second session is led by faculty with complementary expertise and discusses papers that use different approaches to the same topic (for example, physical and biological or experiment and theory). Counts as 0.5 credit toward graduate course requirements. ½ Course cr

### **ENAS 518a / MB&B 635a, Quantitative Approaches in Biophysics and Biochemistry** Nikhil Malvankar and Yong Xiong

The course offers an introduction to quantitative methods relevant to analysis and interpretation of biophysical and biochemical data. Topics covered include statistical testing, data presentation, and error analysis; introduction to dynamical systems; analysis of large datasets; and Fourier analysis in signal/image processing and macromolecular structural studies. The course also includes an introduction to basic

programming skills and data analysis using MATLAB. Real data from research groups in MB&B are used for practice. Prerequisites: MATH 120 and MB&B 600 or equivalents, or permission of the instructors.

**ENAS 521b, Classical and Statistical Thermodynamics** Shu Hu

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 541b / CB&B 523b / MB&B 523b / PHYS 523b, Biological Physics** Simon Mochrie

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 550a / C&MP 550a / MCDB 550a / PHAR 550a, Physiological Systems** 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 553a, Immuno-Engineering** Tarek Fahmy

An advanced class that introduces immunology principles and methods to engineering students. The course focuses on biophysical principles and biomaterial applications in understanding and engineering immunity. The course is divided into three parts. The first part introduces the immune system: organs, cells, and molecules. The second part

introduces biophysical characterization and quantitative modeling in understanding immune system interactions. The third part focuses on intervention, modulation, and techniques for studying the immune system with emphasis on applications of biomaterials for intervention and diagnostics.

**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 561b / AMTH 765b / CB&B 562b / INP 562b / MB&B 562b / MCDB 562b /**

**PHYS 562b, Dynamical Systems in Biology** Damon Clark and Thierry Emonet

This course covers advanced topics in computational biology. How do cells compute, how do they count and tell time, how do they oscillate and generate spatial patterns? Topics include time-dependent dynamics in regulatory, signal-transduction, and neuronal networks; fluctuations, growth, and form; mechanics of cell shape and motion; spatially heterogeneous processes; diffusion. This year, the course spends roughly half its time on mechanical systems at the cellular and tissue level, and half on models of neurons and neural systems in computational neuroscience. Prerequisite: MCDB 561 or equivalent, or a 200-level biology course, or permission of the instructor.

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

**Physiology: Molecular Machines in Human Disease** Frederick Sigworth

The course focuses on understanding the processes that transfer molecules across membranes at the cellular, molecular, biophysical, and physiological levels. Students learn about the different classes of molecular machines that mediate membrane transport, generate electrical currents, or perform mechanical displacement. Emphasis is placed on the relationship between the molecular structures of membrane proteins and their individual functions. The interactions among transport proteins in determining the physiological behaviors of cells and tissues are also stressed. Molecular motors are introduced and their mechanical relationship to cell function is explored. Students read papers from the scientific literature that establish the connections between mutations in genes encoding membrane proteins and a wide variety of human genetic diseases.

**ENAS 575a / CPSC 575a, 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.

**ENAS 576b / AMTH 667b / CPSC 576b, 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.

**ENAS 595b, Engineering Mathematics** J. Rimas Vaišnys

This course is designed for graduate students who have had an introduction to complex variables and partial differential equations. It explores features of complex functions useful in engineering applications and applies them to such problems as numerical transforms and their inversion, conformal mapping, and solution of Laplace equations in three dimensions. Mathematica, because it can provide seamless transitions between analytical, numerical, and graphical methods, is introduced and used extensively in the course. Prerequisite: ENAS 500 or equivalent.

**ENAS 600a, Computer-Aided Engineering** Marshall Long

Aspects of computer-aided design and manufacture (CAD/CAM). The computer's role in the mechanical design and manufacturing process; commercial tools for two- and three-dimensional drafting and assembly modeling; finite-element analysis software for modeling mechanical, thermal, and fluid systems.

**ENAS 602a, Chemical Reaction Engineering** Lisa Pfefferle

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 Balou

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

**ENAS 640b, Aquatic Chemistry** Gaboury Benoit

A detailed examination of the principles governing chemical reactions in water. Emphasis is on developing the ability to predict the aqueous chemistry of natural and perturbed systems based on a knowledge of their biogeochemical setting. Focus is on inorganic chemistry, and topics include elementary thermodynamics, acid-base equilibria, alkalinity, speciation, solubility, mineral stability, redox chemistry, and surface complexation reactions. Illustrative examples are taken from the aquatic chemistry of estuaries, lakes, rivers, wetlands, soils, aquifers, and the atmosphere. A standard software package used to predict chemical equilibria may also be presented.

**ENAS 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 649a, Policy Modeling** Edward Kaplan

Building on earlier course work in quantitative analysis and statistics, Policy Modeling provides an operational framework for exploring the costs and benefits of public

policy decisions. The techniques employed include “back of the envelope” probabilistic models, Markov processes, queuing theory, and linear/integer programming. With an eye toward making better decisions, these techniques are applied to a number of important policy problems. In addition to lectures, assigned articles and text readings, and short problem sets, students are responsible for completing a take-home midterm exam and a number of cases. In some instances, it is possible to take a real problem from formulation to solution, and compare the student’s own analysis to what actually happened. Prerequisites: Decision Analysis and Game Theory, Data Analysis and Statistics, or a demonstrated proficiency in quantitative methods.

**ENAS 660b, Green Engineering and Sustainability** Staff

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 704b, Theoretical Fluid Dynamics** Juan Fernández de la Mora

Derivation of the equations of fluid motion from basic principles. Potential theory, viscous flow, flow with vorticity. Topics in hydrodynamics, gas dynamics, stability, and turbulence.

**ENAS 725b / APHY 725b, 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.

**ENAS 748a, Applied Numerical Methods II** Beth Anne Bennett

The derivation, analysis, and implementation of numerical methods for the solution of ordinary and partial differential equations, both linear and nonlinear. Additional topics such as computational cost, error estimation, and stability analysis are studied in several contexts throughout the course. ENAS 747 is not a prerequisite.

**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 848b / PHYS 528b, Soft Condensed Matter Physics** Eric Brown

An introduction to the physics and phenomenology of soft condensed matter: classical systems with mesoscale structure where thermal fluctuations and interfacial forces play essential roles. Discussion of applications to materials science/engineering, nanotechnology, and molecular/cellular biology. Essential concepts from statistical thermodynamics, classical mechanics, and electricity and magnetism are reviewed/developed as needed.

**ENAS 850a / APHY 548a / PHYS 548a, Solid State Physics I** Victor Henrich

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 / APHY 549b / PHYS 549b, 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** Rajit Manohar

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 912a, Biomedical Image Processing and Analysis** James Duncan

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 951b / CPSC 556b, Wireless Communications** 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 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 PEB involves hands-on laboratory modules with students working in pairs. A biology student is paired with a physics or engineering student; a computation/theory student is paired with an experimental student. The modules are devised so that a range of skills is acquired, and students learn from each other. Modules are hosted in faculty laboratories.

**ENAS 994b, Mechatronics Laboratory** Madhusudhan Venkadesan

Hands-on synthesis of control systems, electrical engineering, and mechanical engineering. Review of Laplace transforms, transfer functions, software tools for solving ODEs. Review of electronic components and introduction to electronic instrumentation. Introduction to sensors; mechanical power transmission elements; programming microcontrollers; PID control.



# English Language and Literature

Linsly-Chittenden Hall, 203.432.2233  
<http://english.yale.edu>  
 M.A., M.Phil., Ph.D.

## Chair

Langdon Hammer

## Director of Graduate Studies

Caleb Smith (106a LC, 203.432.2226)

**Professors** Jessica Brantley, Leslie Brisman, David Bromwich, Ardis Butterfield, Jill Campbell, Janice Carlisle, Joe Cleary, Michael Denning, Wai Chee Dimock, Roberta Frank, Paul Fry, Jacqueline Goldsby, Langdon Hammer, Margaret Homans, Amy Hungerford, David Scott Kastan, Jonathan Kramnick, Lawrence Manley, Stefanie Markovits, Alastair Minnis, Stephanie Newell, John Durham Peters, Caryl Phillips, David Quint, Joseph Roach, Marc Robinson, John Rogers, Caleb Smith, Robert Stepto, Katie Trumpener, Michael Warner, Ruth Bernard Yeazel

**Associate Professors** Catherine Nicholson, Anthony Reed, R. John Williams

**Assistant Professors** Marta Figlerowicz, Benjamin Glaser, 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 ADMISSIONS REQUIREMENTS

Application should be accompanied by scores from the GRE and the GRE “Literature in English” subject test, a personal statement of purpose, and a writing sample of up to twenty pages.

## SPECIAL REQUIREMENTS FOR THE PH.D. DEGREE

In order to fulfill the basic requirements for the program, a student must:

1. Complete twelve courses – six courses with at least one grade of Honors and a maximum of one grade of Pass by July 15 following the first year; at least twelve courses with grades of Honors in at least four of these courses and not more than one Pass by July 15 following the second year. One of these twelve courses must be The Teaching of English (ENGL 990). Courses selected must include one medieval, one early-modern, one eighteenth- and/or nineteenth-century, one twentieth- and/or twenty-first-century.
2. Satisfy the language requirement by the end of the second year. Two languages appropriate to the student’s field of specialization, each to be demonstrated by (a) *passing a translation exam* administered by a Yale language department or (for languages not tested elsewhere at Yale) by the English department; (b) *passing an advanced literature course at Yale* (graduate or upper-level undergraduate, with 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.
6. Submit a dissertation.

Upon completion of all predissertation requirements, including the prospectus, students are admitted to candidacy for the Ph.D. Admission to candidacy must take place by the end of the third year of study.

## COMBINED PH.D. PROGRAMS

### English and African American Studies

The Department of English Language and Literature also offers, in conjunction with the Department of African American Studies, a combined Ph.D. degree in English Language and Literature and African American Studies. For further details, see African American Studies.

### English and Film and Media Studies

The Department of English Language and Literature also offers, in conjunction with the Film and Media Studies Program, a combined Ph.D. degree in English Language and Literature and Film and Media Studies. For further details, see Film and Media Studies.

### English and Renaissance Studies

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

## MASTER'S DEGREES

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

**M.A. (en route to the Ph.D.)** Students enrolled in the Ph.D. program may receive the M.A. upon completion of seven courses with at least one grade of Honors and a maximum of one grade of Pass, and the passing of one foreign language.

**Terminal Master's Degree Program** Students enrolled in the master's degree program must complete either seven term courses or six term courses and a special project within the English department (one or two of these courses may be taken in other departments with approval of the DGS). There must be at least one grade of Honors, and there may not be more than one grade of Pass. Students must also demonstrate proficiency in one foreign language (as described under Ph.D. Requirements, above).

## COURSES

For expanded course descriptions, please visit the English department website: <http://english.yale.edu/courses>.

**ENGL 519b, Medieval Manuscripts and Literary Forms** Jessica Brantley

This course investigates the relation between manuscript studies and traditional literary criticism. It includes an introduction to working with medieval manuscripts (no prior experience required) and continues with a series of case studies that ask what thinking about manuscripts can contribute to literary scholarship. Manuscripts to be considered include the Ellesmere Chaucer, the Douce 104 *Piers Plouman*, the Vernon MS (a devotional miscellany), the Book of Brome (a household miscellany), the York Register (cycle drama), and Cotton Nero A.x. (the Gawain-poet).

**ENGL 526a, History and Theory of the Lyric, Medieval and Modern** Langdon Hammer and Ardis Butterfield

Comparative study of lyric poetry in the medieval and modern periods, in French and English, with equal emphasis on theory and practice, in order to explore basic questions in poetics: Is it possible to define lyric poetry across periods? What is lost and gained by doing so? What can contemporary debates in poetics teach us about medieval literature? What can medieval literature contribute to contemporary poetics? Topics include poetry and music, the idea of voice, the relation between lyric and dramatic monologue, and the imaginative possibilities and technical demands of archival research. Theoretical readings focus on the debate between genre theory and historicism in recent criticism, with reference also to sound studies and new formalism. Readings in medieval poetry include troubadour and *trouvère* poetry, and a selection of anonymous English, French, and Latin songs and graffiti; readings in modern poetry focus on Ezra Pound, Wallace Stevens, and Susan Howe. All medieval texts are available in translation.

**ENGL 546b, Chaucer's *Canterbury Tales* and Three Earlier Poems: Discourses of Dissent** Alastair Minnis

A study of *The Book of the Duchess*, *The House of Fame*, and *The Legend of Good Women*, in addition to a substantial selection of *Canterbury Tales*. These texts are related to the “discourses of dissent” current in Chaucer’s day, an age of extreme political, social, and intellectual turmoil.

**ENGL 578b, Renaissance Poetry and Poetics** Catherine Nicholson

Between 1500 and 1645, vernacular verse was reinvented – by poets, pedagogues, literary theorists, publishers, and readers – as a self-conscious and self-authorizing national literary tradition. This seminar explores the celebrated achievements, failed experiments, forgotten controversies, and historical accidents that conspired to make rude rhyme newly legible (and audible) as English poetry.

**ENGL 588b, Material Texts** Staff

This course focuses on the material culture of reading, writing, and printing from 1400 to 1900 in England and America, although students are welcome to develop their own topics based upon the Beinecke’s collections. We do hands-on research, drawing on the extraordinary collections of manuscripts and printed texts in the Beinecke. The course offers students an opportunity to explore archives and develop publishable projects relevant to their future research. Topics include theories of materiality; fetishism and relics; “persons” and “things”; the bible and the body; authorship and anonymity; writing as a material practice; the manuscript production and circulation of poetry from John Donne to Emily Dickinson; graffiti; letter-writing.

**ENGL 600a, Non-Shakespearean Shakespeare** David Kastan

The seminar looks at a number of plays that have been attributed to Shakespeare (on early title pages, in seventeenth-century booksellers' catalogues, or in seventeenth- and eighteenth-century editions of Shakespeare's works), almost all of which he is now (generally) thought not to have written. We explore the conditions of play making in early modern England; historical and theoretical accounts of authorship; questions of style (particularly, what might it mean to think of something as "Shakespearean"?); a set of bibliographic concerns about the publishing and printing of playbooks; the various media in which we engage plays (from the early modern theater to digital facsimiles of the early texts); and, not least, a miscellaneous group of plays worthy of study in their own right but largely ignored except for the question of authorship.

**ENGL 709a / CPLT 882a / RUSS 882a, What Happened to Race, Class, and**

**Gender? Keywords of Recent Critical Theory** Ayesha Ramachandran and Marta Figlerowicz

What *did* happen to race, class, and gender? This course examines the persistence of older theoretical frameworks such as Marxism or feminism in current critical discourse. It also explores new critical keywords—biopolitics, affect, the Anthropocene, and others—that now help structure theoretical debates in the humanities. Intended as a fast-paced, reading-heavy introduction to recent critical theory, the course will help graduate students in literature acquire a better sense of their field of study and reflect upon the methodologies they will use in their dissertation projects. Readings include the work of older theorists such as Jacques Derrida, Theodor Adorno, Michel Foucault, Judith Butler, and Donna Haraway, as well as recent ones such as Jasbir Puar, Sianne Ngai, Tiqqun, Paolo Virno, and Dipesh Chakrabarty.

**ENGL 717b, Loves of the Plants: Imagining Flora, 1735–1835** Jill Campbell

Study of literary treatments of plant life between Carl Linneaus and Charles Darwin. Special focus on botany and gender; new systems of classification; the aesthetics of flowers in poetry and the decorative arts; the movement of plants around the globe through imperial trade and settler colonialism; medicinal and commercial uses of plants; and nascent environmentalism. Readings include poems by William Cowper, Erasmus Darwin, William Wordsworth, and Charlotte Smith; prose fiction by Daniel Defoe, Henri Bernardin de Saint-Pierre, and Johann Wyss; and samples of reference works and treatises. Opportunities for students to explore related topics through independent research.

**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 729a, Literature and Philosophy from Locke to Kant** Jonathan Kramnick  
This is a class on epistemology, aesthetics, and literary form. We read major works in empiricism and moral philosophy alongside poetry and fiction in several genres. We ask, for example, how do poetry, fiction, and the visual arts recruit and account for perceptual experience or consider material and natural objects? What happens when the empirical psychology of consciousness or the categories of the sublime, beautiful, and picturesque take narrative or poetic form? What sort of ethical models follow from formal or generic decisions? We focus throughout on how these topics have been discussed across the history of literary studies, and we pay close attention to current debates in the field, including those prompted by new formalisms and materialisms, critical race studies, cognitive literary studies, and the digital humanities. Authors include Locke, Behn, Defoe, Pope, Addison, Hume, Burke, Sterne, Smith, Kant, and Wordsworth.

**ENGL 807b, Charles Dickens and George Eliot** Stefanie Markovits  
Overview of the works of Charles Dickens and George Eliot through exploration of a series of paired texts that allow perspective on two different approaches to a variety of novelistic modes, including the *Bildungsroman*, the historical novel, and the political novel.

**ENGL 810b, Victorian Poetry** Leslie Brisman  
The major Victorian poets, Tennyson and Browning, in the context of the romanticism they inherited and transformed. A selection of other Victorians whose genius or popularity warrants attention, including Morris, the Rossettis, Hardy, Swinburne, Hopkins, and Barrett Browning.

**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 to include Henry Fielding, Jane Austen, Henry James, Edith Wharton, Oscar Wilde, and Virginia Woolf. Painters to 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 833a / AMST 723a, The Nonhuman in Literature and Culture since 1800** Wai Chee Dimock

Nonhuman life forms in fiction and poetry from the nineteenth century to the twenty-first, including plants and animals, “legal persons” such as corporations, large-scale phenomena such as the market and the Internet, war and environmental catastrophes, as well as intelligent machines and extraterrestrial aliens. Authors include Herman Melville, Emily Dickinson, Upton Sinclair, Elizabeth Bishop, Louise Erdrich, Richard Powers, Don DeLillo, Cormac McCarthy, Philip K. Dick, Ursula Le Guin, Octavia Butler, Dave Eggers. Theorists include Giorgio Agamben, Jane Bennett, Jacques Derrida, Donna Haraway, N. Katherine Hayles, Fredric Jameson, Brian Massumi, Timothy Morton.

**ENGL 838b / AMST 775b, Performing American Literature** Wai Chee Dimock

A broad selection of short stories, poems, and novels, accompanied by class performances, culminating in a term project with a significant writing component. “Performance” includes a wide range of activities including: staging; making digital films and videos; building websites; game design; and creative use of social media. Readings include poetry by Walt Whitman, Emily Dickinson, Yusef Komunyakaa, and Claudia Rankine; fiction by Herman Melville, F. Scott Fitzgerald, Jhumpa Lahiri, and Junot Díaz.

**ENGL 866b, Whitman and Dickinson** Michael Warner

Readings in the poetry and prose of Walt Whitman and Emily Dickinson. We study their works, careers, and contexts, including their relation to the nineteenth-century culture of verse—a topic that has been newly invigorated by “historical poetics.” Scholarly understanding of both poets has been revised in recent years in connection with the digitization of their work, so we study the history, development, and design of the Walt Whitman Archive and the Emily Dickinson Archive. We also look at critical debates about both writers, including the long history of comment about their relation to sexuality, gender, and queerness.

**ENGL 884a / CPLT 855a, Modernism, Realism, Imperial Crisis** Joseph Cleary

An investigation of the connections between the crises of realism and the historical novel, the emergence of high modernism, magical realism, and various forms of postcolonial historical narrative considered in the wider global context of inter-imperial conflict, anti-imperial struggle, and the restructuring of the world capitalist system. The seminar combines literary readings, critical theory, and contemporary studies on “world literature” to explore ruptures and developments in modern fiction and the politics of empire in Europe, the Caribbean, Latin America, and Asia.

**ENGL 922b / FILM 802b, Studies in Sound and Voice** John Peters

Since the late nineteenth century, human and nonhuman voices have been technically amplified, recorded, distorted, enhanced, synthesized, and measured for purposes of art, science, and politics. This class explores classic and recent books and essays on the media of sound and culture, with a particular focus on the voice. We are guided by two fundamental questions: How do voices get into bodies and bodies into voices? How do media capture something whose existence amounts to vibrations and whose essence involves disappearance? The voice is a key but conflicted site for defining what it means to be a human being. This complex organ or apparatus depends on lungs, brain, vocal tract, emotion, training, and culture. The voice implicates physics and music, communication and culture, anatomy and art. It raises questions about beauty,

identity, power, religion, art, poetry, style, culture, race, gender, and age. Animals and machines have voices; so may the stars.

**ENGL 933b, Realism** Marc Robinson

A study of European and American dramatic realism, from its beginnings in the 1870s through its radical revision in the twenty-first century. Works by Ibsen, Zola, Tolstoy, Chekhov, Hauptmann, Belasco, and Shaw, as well by María Irene Fornés, Franz Xaver Kroetz, Annie Baker, Richard Maxwell, David Levine, and other contemporary figures. Readings in pertinent theory and criticism; discussion of nineteenth- and twentieth-century staging practices; and, when possible, video viewings of important recent productions.

**ENGL 949a / AFAM 650a, Afro-Modernisms** Anthony Reed

This course considers key debates, texts, and institutions that have shaped African American culture in the twentieth and twenty-first centuries. Possible topics include the New Negro movement, the Black Arts movement, black internationalism, canon formation, and Afro-futurism.

**ENGL 951b / AFAM 563b / AMST 651b, Ralph Ellison in Context** Robert Stepto

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

**ENGL 952b / AFAM 743b / AMST 654b, American Artists and the African American Book** Robert Stepto

Visual art in African American books since 1900. Artists include Winold Reiss, Aaron Douglas, E.S. Campbell, Tom Feelings, and the FSA photographers of the 1930s and '40s. Topics include Harlem Renaissance book art, photography and literature, and children's books. Research in collections of the Beinecke Library and the Yale Art Gallery is encouraged.

**ENGL 973b / FILM 973b, Modernity and the Time of Literature** Robert 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 978b, Reading, Attention, and Distraction** Caleb Smith

Recent efforts to defend and renovate the critical humanities – reparative reading, surface reading, postcritique, and so on – have made a watchword of attention. It is said that the best reading practices are characterized not by the canons they build or by the theories they develop but by the styles of receptivity they cultivate. The study of the arts is coming to be understood as a kind of therapy, the antidote to mass distraction, and as an ethics, a way of becoming more humble and more humane. This seminar explores what is gained and what is lost when criticism takes disciplined attentiveness as its norm. We begin with an overview of contemporary debates about the hermeneutics of suspicion and its alternatives (Sedgwick, Hayles, Best and Marcus, Love, Felski). We move on to piece together a partial genealogy of attentiveness, taking a special interest in questions of secularism and secularity, from classical and medieval spiritual exercises through romanticism and modernism (Benjamin, Weil, Crary, Foucault, Hadot). We conclude with an extended reading of a key text, Henry Thoreau’s *Walden* (1854), drawing from historical and critical sources to consider Thoreau’s ideas about strenuous reading, ascetic self-culture, and an ethics of openness to the world.

**ENGL 980a, Criticism and the Commons** Joseph North

An introduction to the history of literary criticism and to contemporary debates about “the commons.” Our particular focus is on the ways in which sophisticated thinkers in and around the Anglo-American literary-critical tradition have sought to perceive and articulate the underlying unity of the social order.

**ENGL 982b / WGSS 850b, Sex and Citizenship** Jill Richards

This course surveys political theories of gender/sexuality through attention to citizenship, the nation-state, rights discourses, civil society, migration, biopolitics, criminality, security, and social death. The course looks to establish a foundational understanding of the conjunctures between liberal governance and the regulation of reproductive, sexual, and family life. At the same time, our wider conceptual arc takes up more recent critical debates on the entanglements of sexual intimacy, race, and national belonging. Textual selections move across a variety of disciplines, including anthropology, sociology, history, literature, critical race theory, queer theory, indigenous studies, environmental studies, and law. Key authors include Hobbes, Locke, Marx, Engels, Habermas, Arendt, Foucault, Orlando Patterson, C.B. Macpherson, Wendy Brown, Ann Laura Stoler, Saidiya Hartman, Joan Wallach Scott, Cheryl Harris, Lauren Berlant, Michael Warner, Jasbir Puar, Elizabeth Povinelli, Paul Gilroy, Pheng Cheah, Inderpal Grewal, Frank Wilderson, Salamishah Tillet, Achille Mbembe, Adriana Petryna, Lisa Marie Cacho, Mark Rifkin, José Muñoz, Dean Spade, Lisa Lowe, Talal Asad.

**ENGL 987a, What Do Poems Want? The Ekphrastic Moment** Paul Fry

Studies of *ekphrasis* – covering all literary periods – as an expression of desire for a relation to pictures and other objects that is not satisfied by the objectives of mimesis and form. Secondary literature includes Plato, Aristotle, Lessing, and modern reflections on *ekphrasis* and the orientation of art to things.



**ENGL 990a, The Teaching of English** Jill Campbell and Margaret Homans

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 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.

# European and Russian Studies

The MacMillan Center

332 Luce Hall, 203.432.3423

<http://europeanstudies.macmillan.yale.edu>

M.A.

## Chair

Francesca Trivellato (*History*)

## Director of Graduate Studies

Bruce Gordon (*Divinity; History; Religious Studies*; 334 Luce, 203.432.3423)

**Professors** Bruce Ackerman (*Law*), Julia Adams (*Sociology*), Rolena Adorno (*Spanish & Portuguese*), Vladimir Alexandrov (*Slavic Languages & Literatures*), Dudley Andrew (*Film & Media Studies*), Seyla Benhabib (*Political Science*), Dirk Bergemann (*Economics*), R. Howard Bloch (*French*), Paul Bracken (*Management*), David Bromwich (*English*), Paul Bushkovitch (*History*), David Cameron (*Political Science*), Francesco Casetti (*Humanities; Film & Media Studies*), Katerina Clark (*Slavic Languages & Literatures*), Mirjan Damaška (*Emeritus, Law*), Carolyn Dean (*History*), Carlos Eire (*History*), Paul Franks (*Philosophy*), Paul Freedman (*History*), Bryan Garsten (*Political Science*), John Geanakoplos (*Economics*), Harvey Goldblatt (*Slavic Languages & Literatures*), Bruce Gordon (*Divinity; History; Religious Studies*), Philip Gorski (*Sociology*), Timothy Guinnane (*Economics*), Stathis Kalyvas (*Political Science*), David Scott Kastan (*English*), Paul Kennedy (*History*), John MacKay (*Slavic Languages & Literatures*), Lawrence Manley (*English*), Ivan Marcus (*History*), Millicent Marcus (*Italian*), Stefanie Markovits (*English*), Robert Nelson (*History of Art*), Paul North (*German*), Steven Pincus (*History*), David Quint (*English*), Susan Rose-Ackerman (*Law*), Maurice Samuels (*French*), Frank Snowden (*History*), Timothy Snyder (*History*), Alec Stone Sweet (*Law*), Peter Swenson (*Political Science*), Francesca Trivellato (*History*), Katie Trumpener (*Comparative Literature*), Miroslav Volf (*Divinity*), Kirk Wetters (*German*), James Whitman (*History*), Keith Wrightson (*History*)

**Associate Professors** Molly Brunson (*Slavic Languages & Literatures*), Karuna Mantena (*Political Science*), Douglas Rogers (*Anthropology*), Marci Shore (*History*)

**Assistant Professors** Jennifer Allen (*History*), Marijeta Bozovic (*Slavic Languages & Literatures*), Isaac Nakhimovsky (*History*), Ayesha Ramachandran (*Comparative Literature*)

**Senior Lectors** Irina Dolgova (*Slavic Languages & Literatures*), Krystyna Illakowicz (*Slavic Languages & Literatures*), Maria Kaliambou (*Hellenic Studies*), Rita Lipson (*Slavic Languages & Literatures*), Constantine Muravnik (*Slavic Languages & Literatures*), George Syrimis (*Hellenic Studies*), Julia Titus (*Slavic Languages & Literatures*), Karen von Kunes (*Slavic Languages & Literatures*)

The European Studies Council promotes research programs about Europe's culture, history, and current affairs. The geographical scope of the council's activities extends from Ireland to Italy, and from Portugal to the lands of the former Soviet Union. The council's definition of Europe transcends conventional divisions between

Western, Central, and Eastern Europe, and includes the Balkans and Russia. The U.S. Department of Education has repeatedly designated the council a National Resource Center and a FLAS Center under its HEA Title VI program. Further information on the council and the Graduate Certificate of Concentration in European Studies is provided under Non-Degree-Granting Programs, Councils, and Research Institutes in this bulletin.

The council administers an M.A. program in European and Russian Studies. This M.A. program is unusual in its embrace of the entire spectrum of European nations and cultures. Its requirements allow students to choose a particular national or thematic focus, geared to their individual interests and language skills, but also ensure that students acquaint themselves with the traditions and issues associated with the other parts of Europe. Students specializing in Russia and Eastern Europe, for example, will concentrate their efforts in that area, but will also take courses that address Europe-wide problems or the countries of Central or Western Europe. The program is suited both to students who wish to pursue further academic studies and to students whose interests are policy-oriented.

## **FIELDS OF STUDY**

European languages and literatures; economics; history; political science; law; music; sociology and other social sciences.

## **SPECIAL REQUIREMENTS FOR THE M.A. DEGREE**

When applying to the program, students will specify as an area of primary concentration either (1) Russia and Eastern Europe, or (2) Central and Western Europe. All students must complete sixteen term courses (or their equivalent) in the various fields related to European and Russian studies. E&RS 900, Europe: Who, What, When, Where?, is required in addition to the sixteen courses and should be taken in the first year of the program. E&RS 900 is taken as Satisfactory/Unsatisfactory and may not be taken for audit.

Students are required to take at least one course in at least three of the four fields relevant to the program, that is, history (including history of art, history of science, and history of music), literature, social sciences, and law. Students can fulfill this three-field requirement by taking Europe-related graduate-level courses from across the University. One of the sixteen term courses may be taken for audit. With special approval under certain circumstances, a course graded Satisfactory/Unsatisfactory may count as one of the sixteen required courses. For students focusing on Russia and Eastern Europe, two of the sixteen required courses (excluding language courses) must concern the nations of Central and Western Europe. Conversely, for those focusing on Central and Western Europe, two courses must concern Russia and Eastern Europe.

For the purposes of this program, language courses in European languages count toward the sixteen required courses, even though they have undergraduate course numbers and undergraduate grade modes. If a student takes a language course to fulfill the 16-credit degree requirement, the language course may not be taken for audit. Students with previous language preparation may in certain cases receive documentation of their language proficiency on the basis of this work. By the time the degree is completed, all students must demonstrate at least L4 proficiency in two modern European languages other than English. Those wishing to focus on Russia

and Eastern Europe will need to demonstrate knowledge of Russian or an Eastern European language; those focusing on Central and Western Europe will need to demonstrate knowledge of one of the appropriate languages. In all cases, students are required to demonstrate proficiency in two European languages by the end of the third term at Yale. The only exception to this rule is completion of the appropriate full sequence of Yale language classes, certified by the Yale instructor or the director of graduate studies (DGS). Students who wish to take Yale department examinations in French, German, Italian, Spanish, or other West European languages should register for a complete examination (with reading, oral, and grammar portions) with the appropriate Yale department. Students with Russian competence must receive the grade of 1+ or higher on the ACTFL/ETS Rating Scale as administered by the Slavic Languages and Literatures department at Yale, including reading, oral, and grammar portions. Students with competence in an East European language (such as Polish, Czech, Ukrainian, Hungarian, and others by special arrangement) or other European languages must take Yale department-administered examinations.

In all cases, students will comply with the Policies and Regulations of the Yale Graduate School of Arts and Sciences, especially regarding degree requirements and academic standing.

Through agreements negotiated by the MacMillan Center, the European Studies Council offers joint master's degrees with the Law School, the School of Management, the School of Forestry & Environmental Studies, and the School of Public Health. Application for admission must be made to both the Graduate School and the applicable professional school, with notation made on each application that this is to be considered for the joint-degree program. Refer to <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 511a / GLBL 693a, United States and Russian Relations since the End of the Cold War** Thomas Graham

This course examines the factors—political, socioeconomic, and ideological—that have shaped U.S.-Russian relations since the end of the Cold War, as well as specific issues in bilateral relations, including arms control, counterterrorism, energy, and regional affairs. The goal is to understand the way each country constructs relations with the

other to advance its own national interests, and the implications of U.S.-Russian relations for global affairs.

**E&RS 512b, Case Studies in Russian Foreign Policy** Thomas Graham

This course examines a number of key Russian foreign policy issues from the past two hundred years. Through the examination of case studies, the course seeks to understand the permanent and contingent factors that have shaped Russia's strategic thinking and decision-making and trace evolution of that thinking up to the present day. The cases studies include (1) the Congress of Vienna and the creation of the Holy Alliance, (2) the conquest of Central Asia, (3) the penetration of Manchuria, (4) the Molotov-Ribbentrop Pact and the start of the Second World War, (5) the Cuban Missile Crisis, (6) the Prague Spring, (7) the Afghanistan war, (8) German reunification, (9), Sino-Russian partnership, (10) the post-Soviet space, and (11) the Ukraine crisis.

**E&RS 900a, Europe: Who, What, When, Where?** Bruce Gordon

An interdisciplinary seminar designed to provide broad exposure to key topics in modern European studies. Special attention is given to Eastern and Western Europe as well as the humanities and social science disciplines. The seminar is framed by some key theoretical questions, including: What are Europe's boundaries? When and where is "Europe"? Is there a narrative to European history? If so, what is it? What makes a European? The seminar also focuses on developing academic writing skills and examining research methodologies. Seminar meetings are combined with the Europe in/and the World Colloquia and feature speakers from the Yale faculty and from other academic institutions. The course is required of all first-year European and Russian Studies M.A. students but is open to all graduate and professional students.

**E&RS 940a or b, Independent Study** Staff

By arrangement with faculty.

**E&RS 950a or b, Master's Thesis** Staff

By arrangement with faculty.

# Experimental Pathology

140 Brady Memorial Laboratory, 203.785.3624

<http://medicine.yale.edu/pathology/education/graduateprogram>

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

## Chair

Jon Morrow

## Director of Graduate Studies

Themis Kyriakides (10 Amistad St., Rm. 301C, 203.737.2214)

**Professors** Richard Bucala (*Internal Medicine*), Young Choi (*Emeritus*), José Costa (*Internal Medicine/Oncology*), Gary Friedlaender (*Orthopaedics & Rehabilitation*), Patrick Gallagher (*Pediatrics*), Earl Glusac (*Dermatology*), Robert Homer, S. David Hudnall, Pei Hui, Peter Humphrey, Dhanpat Jain (*Internal Medicine*), Michael Kashgarian (*Emeritus, Molecular, Cellular & Developmental Biology*), Jung Kim (*Emeritus*), Diane Krause (*Laboratory Medicine*), Gary Kupfer (*Pediatrics*), Janina Longtine (*Molecular Diagnostics; Laboratory Medicine*), Joseph Madri (*Emeritus*), Vincent Marchesi (*Director, Boyer Center for Molecular Medicine; Cell Biology*), Jennifer McNiff (*Dermatology*), Wang Min, Gilbert Moeckel, Mark Mooseker (*Molecular, Cellular & Developmental Biology*), Raffaella Morotti, Jon Morrow, Jordan Pober (*Immunobiology; Dermatology*), Manju Prasad, David Rimm, Marie Robert (*Internal Medicine*), John Rose, Gerald Shadel (*Genetics*), John Sinard (*Ophthalmology & Visual Science*), Jeffrey Sklar (*Laboratory Medicine*), David Stern, A. Brian West (*Emeritus*), Wendall Yarbrough (*Surgery/Otolaryngology*)

**Associate Professors** Adebowale Adeniran, Marcus Bosenberg (*Dermatology*), Demetrios Braddock, Natalia Buza, Guoping Cai, Sandy Chang (*Laboratory Medicine*), Shawn Cowper (*Dermatology*), Carlos Fernandez-Hernando (*Comparative Medicine*), Liming Hao, Malini Harigopal, Anita Huttner, Steven Kleinstein, Yuval Kluger, Christine Ko (*Dermatology*), Diane Kowalski (*Surgery/Otolaryngology*), Michael Krauthammer, Gary Kupfer (*Pediatrics*), Themis Kyriakides, Angelique Levi, Don Nguyen, Vinita Parkash, Katerina Politi (*Yale Cancer Center*), Antonio Subtil-Deoliveira (*Dermatology*), Narendra Wajapeyee, Zenta Walther, Mina Xu, Qin Yan, Xuchen Zhang

**Assistant Professors** Rebecca Baldassarri, Andrea Barbieri, Ranjit Bindra (*Therapeutic Radiology*), Veerle Bossuyt, Keith Choate (*Dermatology*), Paul Cohen, Susan Fernandez, Karin Finberg, Anjela Galan (*Dermatology*), Joanna Gibson, Bonnie Gould Rothberg (*Yale Cancer Center; Medicine*), Shilpa Hattangadi (*Pediatrics*), Michael Hurwitz (*Yale Cancer Center; Medicine*), Ryan Jensen (*Therapeutic Radiology*), Anita Kamath, Samuel Katz, Marguerite Pinto, Yibing Qyang (*Internal Medicine*), Kurt Schalper, Yajaira Suarez (*Comparative Medicine*), Serena Wong

## FIELDS OF STUDY

Fields include molecular and cellular basis of diseases, including cancer; biology, biochemistry, genetics, and pathology of molecules, cells, tissues, and organ systems, including plasma membrane dynamics, mitochondrial dysfunction, signal transduction, and response to stimuli of connective tissue; assembly of viruses and their interactions with animal cells; somatic cell genetics and birth defects; biology of endothelial

cells; and computational and high-throughput approaches to understanding disease pathology.

## SPECIAL ADMISSIONS REQUIREMENTS

A strong background in basic sciences is recommended for applicants to the program, including biology, chemistry through organic and physical chemistry, mathematics through calculus, biochemistry, genetics, or immunology. GRE General Test or MCAT is required.

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

## SPECIAL REQUIREMENTS FOR THE PH.D. DEGREE

**Course requirements** Experimental Pathology students must pass PATH 640, Developing and Writing a Scientific Research Proposal; PATH 650, Cellular and Molecular Biology of Cancer; and PATH 690, Molecular Mechanisms of Disease. Passes in three additional graduate-level, one-term courses are required, which can include courses in biochemistry, genetics, immunology, cell biology, and pathology, to be chosen in consultation with the director of graduate studies (DGS), according to the student's background and interest. All requirements of the Graduate School of Arts and Sciences, including the Honors requirement, must be met. In year one, students must also take a seminar course (one in each term) and do three laboratory rotations. Prior to registering for a second year of study, students must successfully complete PATH 660, The Responsible Conduct of Research. In their fourth year of study, all students must successfully complete B&BS 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, <http://medicine.yale.edu/pathology/education/graduateprogram>.

## COURSES

### **PATH 620a and PATH 621b and PATH 622b, Laboratory Rotations in Experimental Pathology** Themis Kyriakides

Laboratory rotations for first-year graduate students.

### **PATH 640a / B&BS 640a, Developing and Writing a Scientific Research Proposal** Katarina Politi

The course covers the intricacies of scientific writing and guides students in the development of a scientific research proposal on the topic of their research. All elements of an NIH fellowship application are covered, and eligible students submit their applications for funding. Enrollment limited to fifteen. Registration allowed by prior authorization from course directors only.

### **PATH 650b, Cellular and Molecular Biology of Cancer** David Stern

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 670b, Biological Mechanisms of Reaction to Injury** S. David Hudnall, Jon Morrow, Jeffrey Sklar, Gilbert Moeckel, and Joanna Gibson

An introduction to human biology and disease as a manifestation of reaction to injury. Topics include organ structure and function, cell injury, circulatory and inflammatory responses, disordered physiology, and neoplasia.

**PATH 680a or b / C&MP 630a or b / PHAR 502a or b, Seminar in Molecular Medicine, Pharmacology, and Physiology** Susumu Tomita

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

**PATH 681a / B&BS 681a, Advanced Topics in Cancer Biology** Qin Yan

This advanced course focuses on readings and discussion on three or four major topics in cancer biology, such as targeted therapy, tumor immunology, tumor metabolism, and genomic evolution of cancer. For each topic, the class starts with an interactive lecture, followed by critical analysis of primary research literature. Recent research articles are assigned, and a student leads discussions with input from faculty who are experts in the topic area. Prerequisite: PATH 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** Narendra Wajapeyee and Demetrios Braddock

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**

Francesco Casetti

## **Director of Graduate Studies**

Brigitte Peucker (100 Wall St., Rm. 308, [brigitte.peucker@yale.edu](mailto:brigitte.peucker@yale.edu))

**Professors** Dudley Andrew, Francesco Casetti, Katerina Clark, Aaron Gerow, John MacKay, Millicent Marcus, Charles Musser, John Durham Peters, Brigitte Peucker, Katie Trumpener, Laura Wexler

**Associate Professor** R. John Williams

**Assistant Professor** Rizvana Bradley

**Senior Lecturer** Marc Lapadula

**Lecturers** Oksana Chefranova, 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, and Slavic Languages and Literatures. In addition to acquiring a firm grounding in the methods and core material of both film-media studies and another discipline, the candidate is advised to coordinate a plan of study involving comprehensive knowledge of one or more areas of specialization. Such areas include:

1. Historiography, including archival history, history of technology, silent film.
2. Aesthetics: theories of the image, adaptation, film/philosophy, avant-garde film.
3. European film: British-Irish, French, German and Nordic, Italian, Slavic.
4. American culture: Hollywood, independent film, African American cinema.
5. World film: global image exchange; cinema in Asia, Latin America, and Africa.
6. Documentary as an aesthetic, cultural, and ideological practice.
7. Cinema in its relations with other arts and other media.
8. Screen cultures, screened images, post-cinema, theory and history of media.

Through course work, examinations, and the dissertation, the candidate links a film and media specialty with material and methods coming from the participating discipline. Directors of graduate studies from both programs monitor the candidate's plans and progress.

## SPECIAL ADMISSIONS REQUIREMENTS

Combined-program applicants should familiarize themselves fully not only with the Film and Media Studies entrance requirements but with those of the other graduate program as well. Since combined-program applicants must be admitted both by Film and Media Studies and by the other department, candidates should make sure that the material they submit with the application clearly addresses the requirements and mission of both graduate programs.

The application for Film and Media Studies is administered by the Office of Graduate Admissions. All applications are to be completed online and can be accessed by visiting its website at <http://gsas.yale.edu/admission-graduate-school>. In the “Programs of Study” section of the application, the applicant should do the following: choose Film and Media Studies in Step 1 and the combined department in Step 3. All applications including writing samples are read by the admissions committees in both units.

## SPECIAL REQUIREMENTS FOR THE PH.D. DEGREE

Every student selected for the combined program is subject to the supervision of the Film and Media Studies program and the relevant participating department. A written protocol between each department and Film and Media Studies outlines the requirements and schedule to be borne in mind as a plan of study is worked out in consultation with the director of graduate studies (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 circulated to the entire Film and Media Studies Executive Committee for their information and ratification.
3. A defense of method occurs when the dissertation is nearing completion, one or two terms before submission. The purpose of this defense is to provide guidance and feedback at a critical stage, in order to assist the dissertation’s final form. At least three faculty readers meet with the student; the DGS of Film and Media Studies and the DGS of the participating department are also invited to participate. At least one examiner of the dissertation must be a member of the Film and Media Studies Executive Committee and one must be from the participating department.

The faculty in Film and Media Studies considers participation in the Teaching Fellows Program to be essential to the professional preparation of graduate students. Students normally teach in years three and four. Every student may expect to assist in two Film and Media Studies courses, one of which will almost certainly be Introduction to Film.

## MASTER'S DEGREE

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

## COURSES

**FILM 601b / CPLT 917b, Foundational Texts in Film and Media Studies** Dudley Andrew

The course sets in place some undergirding for students who want to anchor their film interest to the professional discourse of this field. A coordinated set of topics in film theory is interrupted first by the often discordant voice of history and second by the obtuseness of the films examined each week. Films themselves take the lead in our discussions.

**FILM 604b, The Film Archive** Brian Meacham

The history, theory, and working activities of a film archive. The materiality of film, the types of film elements held in film archives, and the policies and procedures of collection development, cataloging, access, exhibition, conservation, and preservation. Film archives in light of the transition to digital in production, consumption, and distribution of films. Students learn film inspection and take a film print through the archival process from acquisition to public screening.

**FILM 690b / CPLT 913b, Radical Cinemas of Latin America** Moira Fradinger

An introductory overview of Latin American cinema, with an emphasis on post-World War II films produced in Cuba, Argentina, Brazil, and Mexico. Examination of each film in its historical and aesthetic aspects, and in light of questions concerning national cinema and “third cinema.” Examples from both pre-1945 and contemporary films. Conducted in English; knowledge of Spanish and Portuguese helpful but not required.

**FILM 711a, The Dark Lady in the Cinema** Rizvana Bradley

Starting with the central figure of what Daphne Brooks calls, “the Black(ened) Woman,” the course examines the trope of the “dark lady” in cinema, at the critical nexus of race and sexuality. We engage constructions, articulations, and representations of racialized and gendered bodies, and the themes of class, sexuality, subjection, and transformation that the image of the dark lady seems to necessarily body forth in the cinema. How does the racialized trope of black femininity—coded as excessive, unruly, unpredictable, and illegible—become the unsighted underpinning for other socially and sexually maligned bodies? We examine the production, reproduction, and circulation of the dark lady primarily in contemporary cinema, and how the imaginative figure of the dark lady is consigned to invisible or hypervisible women of color, transgendered, lesbian, and queer masculinities.

**FILM 714b / AFAM 550b, Race, Affect, and Cinema** Rizvana Bradley

This seminar draws out the importance of the recent “affective turn” in emergent theoretical discourses, in order to think about the organization of emotion and feeling within cinema, particularly cinema that foregrounds questions of race and racial intimacy. We are especially interested in thinking about the relationship between race and feeling, as well as the development of minor feelings, racial affect, and black affect. Course readings take up many of the key texts within affect theory, but we try to make explicit connections to the examples of racial affect we see emerging within cinema.

**FILM 733b / AMST 834b, Documentary and the Environment** Charles Musser

The environmental documentary has emerged as one of cinema's most vital genres of the past ten years (in documentary, its only rivals are probably those concerned with the Second Gulf War). As the world's environment faces a growing crisis, documentary has come to serve as a key means to draw public attention to specific issues. This course combines screenings with readings on documentary such as Bill Nichols's important book *Representing Reality*. Often films have book tie-ins, and we consider how they complement each other and work together to maximize the impact of their message. Readings also focus on news items, debates, websites, and other media forms that are employed in conjunction with the films.

**FILM 735a and FILM 736b / AMST 832a and AMST 833b, 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 935b, 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 765a / GMAN 592a, The Films of Fassbinder, Herzog, and Haneke** Brigitte

Peucker

Examination of representative films by three major German-language auteurs. Topics include cinema's investment in painting and theatricality; its relation to gendered, imaginary, and abject bodies and to the specificities of time and place; the fictions of the self that these auteurs construct; and how questions of identity intersect with ideology and the political. Films subtitled; all readings and discussion in English.

**FILM 778a / RUSS 695a, Russian Literature and Film in the 1920s and 1930s**

Katerina Clark

This course presents a historical overview, incorporating some of the main landmarks of the 1920s and 1930s including works by Pilnyak, Bakhtin, the Formalists, Platonov, Mayakovsky, Bulgakov, Zoshchenko, Eisenstein, Protazanov, Pudovkin, the Vasilyev "brothers," and G. Aleksandrov.

**FILM 788a / MUSI 817a, Music, Radio, and Mediation** Brian Kane

This seminar focuses on the heyday of radio—its so-called Golden Age—and considers the medium from a variety of perspectives: media theory, auditory culture, musicology, and sociology, among others. The goal is to understand how radio functioned not only as a mass medium but also as a form of mediation. Special attention is given to the role of music on the radio and to the ways that radio altered the nature of musical works.

Readings include classic texts on radio (Arnheim, Adorno, Merton, Lazarsfeld, Fanon, McLuhan) as well as more recent writing in cultural history (Douglas, Hilmes), sound studies (Mowitt, Bijsterveld), and media archaeology (Ernst). Special attention is given to the nature of the radio archive and its problems, with sessions devoted to working with source materials.

**FILM 796a / CPLT 907a / GMAN 678a, Media Archaeologies: The Visual and the Environmental** Francesco Casetti and Rüdiger Campe

The seminar aims at retracing two divergent cultural processes: how and why, starting from the discovery of artificial perspective, an increasing number of cultural practices were devoted to making the world visible; and correlatively how and why, starting from the first half of the nineteenth century, visibility increasingly met with the resistance of other modes of accessing the world through the human body and the role of the environment? These two trajectories are retraced through a special attention to the media that were on the forefront of these cultural processes: from Brunelleschi's mirror to Alberti's window and grid, from camera obscura to Galileo's telescope, from Panorama to Phantasmagoria, from the optical toys of the nineteenth century to the increasing implication of art into social and political questions. The seminar privileges the cultural practices that underpin both the trust in visibility and the discovery of environmentality, and it gives due attention to the political questions that the changing fortunes of the optical media imply. The seminar is the first part of a two-year project and will be followed next year by an analysis of the prevalence of the environmental dimension in contemporary media.

**FILM 802b / ENGL 922b, Studies in Sound and Voice** John Peters

Since the late nineteenth century, human and nonhuman voices have been technically amplified, recorded, distorted, enhanced, synthesized, and measured for purposes of art, science, and politics. This class explores classic and recent books and essays on the media of sound and culture, with a particular focus on the voice. We are guided by two fundamental questions: How do voices get into bodies and bodies into voices? How do media capture something whose existence amounts to vibrations and whose essence involves disappearance? The voice is a key but conflicted site for defining what it means to be a human being. This complex organ or apparatus depends on lungs, brain, vocal tract, emotion, training, and culture. The voice implicates physics and music, communication and culture, anatomy and art. It raises questions about beauty, identity, power, religion, art, poetry, style, culture, race, gender, and age. Animals and machines have voices; so may the stars.

**FILM 839b / CPLT 932b / GMAN 653b, Scandinavian Cinema and Television** Katie Trumpener

Contemporary Scandinavian film and television examined in relation to earlier cinematic highpoints. Europe's first art cinema, early Scandinavian film was catalyzed and sustained by modernist breakthroughs in theater, literature, and painting. Contemporary cinema and television (Dogma films; Nordic Noir television; experimental music and genre film) continue to develop innovative aesthetic, funding, and exhibition models. The course explores regionally specific ideas about acting, visual culture, and the role of art; feminism and the social contract; historical forces and social change. Films by Bergman, Dreyer, Sjöström, Sjöberg, Vinterberg, von Trier, Östlund, Kaurismäki, Kjartansson; as well as contemporary television series selected by students.

**FILM 874a / EALL 892a, Japanese New Wave Cinema** Stephen Poland

This course explores the “New Wave” in Japanese cinema in the context of the rise of “new wave” across cinemas in the American sphere in the period roughly between 1955 and 1975. It focuses on both local contexts and global flows in the turn to experimental filmmaking in Japan, paying particular attention to how films sought to make social and political interventions in both content and form. We analyze New Wave films and critical writing by asking what they can tell us about Japan’s postwar, high-speed economic growth, student and counterculture movements, and place in the Cold War order. We also consider what the Japanese New Wave tells us about the possibilities of cinema: its global simultaneity, transcultural movement, and historical trajectory. Topics include the legacy of World War II in Japan and cinema as a mode for narrating history; the rise of global youth culture in the context of postwar economic growth; cinema and protest against the U.S.-Japan Security Treaty; the aesthetic use of sex, violence, and politics to shock mainstream culture; documentary as a site for radical experimentation; the studio system, independent filmmaking, and transformations of the Japanese film industry; and what is meant by “modernist” and “avant-garde” in New Wave cinema.

**FILM 901a or b, Individual Research** Staff**FILM 973b / ENGL 973b, Modernity and the Time of Literature** Robert 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”?



# Forestry & Environmental Studies

Kroon Hall, 203.432.5100  
<http://environment.yale.edu>  
M.S., M.Phil., Ph.D.

## Dean

Ingrid Burke (Kroon, 203.432.5109)

## Director of Doctoral Studies

Karen Seto (380 Edwards St., Rm. 102, 203.432.9784, [karen.seto@yale.edu](mailto:karen.seto@yale.edu))

**Professors** Mark Ashton, Michelle Bell, Gaboury Benoit, Graeme Berlyn, Mark Bradford, Benjamin Cashore, Michael Dove, Daniel Esty, Timothy Gregoire, Edgar Hertwich, Matthew Kotchen, Xuhui Lee, Robert Mendelsohn, Chadwick Oliver, Peter Raymond, James Saiers, Oswald Schmitz, Karen Seto, David Skelly, John Wargo, Julie Zimmerman

**Associate Professor** Marian Chertow

**Assistant Professors** Craig Brodersen, Liza Comita, Justin Farrell, Eli Fenichel, Kenneth Gillingham

## FIELDS OF STUDY

Fields include agroforestry; biodiversity conservation; biostatistics and biometry; climate science; community ecology; ecosystems ecology; ecosystems management; environmental anthropology; environmental biophysics and meteorology; environmental chemistry; environmental ethics; environmental governance; environmental health risk assessment; environmental history; environmental law and politics; environmental and resource policy; forest ecology; hydrology; industrial ecology; industrial environmental management; plant physiology and anatomy; pollution management; population ecology; resource economics; energy and the environment, silviculture, social ecology; stand development, tropical ecology and conservation; urban planning; water resource management; environmental management and social ecology in developing countries; urban ecology.

## SPECIAL ADMISSIONS REQUIREMENTS

Applicants should hold a bachelor's or master's degree in a field related to natural resources, such as forestry, or in a relevant discipline of the natural or social sciences, such as biology, chemistry, economics, or mathematics. The GRE General Test is required but Subject Tests are optional.

## SPECIAL REQUIREMENTS FOR THE PH.D. DEGREE

Students are required to take F&ES 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 graduate training program in Forestry & Environmental Studies. All students are required to serve as teaching fellows (10 hours per week) for four terms. The nature of the teaching assignment is determined in cooperation with the student's major adviser and the director of doctoral studies. With the permission of the director of doctoral studies, the total teaching requirement may be reduced for students who are awarded fellowships supported by outside funding. Regardless of outside funding, all doctoral students must serve as teaching fellows for a minimum of two terms.

## MASTER'S DEGREES

**M.Phil. (en route to the Ph.D.)** Students may petition for this degree after they have passed the qualifying exam and advanced to candidacy. Applications for this master's degree are not accepted.

**M.S. (en route to the Ph.D.)** This degree is normally granted only to students who are withdrawing from the Ph.D. program. Applications for this master's degree are not accepted. Requirements that must be met for award of the M.S. are (1) successful completion of two years of course work in residence with two grades of Honors; (2) a written prospectus; (3) fulfillment of one term of the teaching requirement. Students who are eligible for or who have already received the M.Phil. will not be awarded the M.S.

For information on the terminal master's degrees offered by the Yale School of Forestry & Environmental Studies (the Master of Forestry, Master of Forest Science, Master of Environmental Management, and Master of Environmental Science degrees), visit the School's website, <http://environment.yale.edu>, or contact Admissions Director, Yale School of Forestry & Environmental Studies, 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 F&ES courses, see the School of Forestry & Environmental Studies bulletin, available online at <http://bulletin.yale.edu>; and Online Course Information (OCI) at <https://students.yale.edu/oci>.

**F&ES 900a, Doctoral Student Seminar** Karen Seto

# French

82-90 Wall Street, 3d floor, 203.432.4900

<http://french.yale.edu>

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

## Chair

Maurice Samuels

## Director of Graduate Studies

Pierre Saint-Amand [F] (82-90 Wall St., Rm. 336, 203.432.4997)

Alice Kaplan [Sp] (82-90 Wall St., Rm. 324, 203.432.4907)

**Professors** R. Howard Bloch, Ardis Butterfield (*English*), Carolyn Dean (*History*), Edwin Duval, Marie-Hélène Girard (*Visiting*), Alice Kaplan, Christopher Miller, Pierre Saint-Amand, Maurice Samuels

**Assistant Professors** Morgane Cadieu, Thomas Connolly, Jill Jarvis, Christopher Semk

**Affiliated Faculty** Dudley Andrew (*Film & Media Studies*), Carol Armstrong (*History of Art*), John Merriman (*History*)

## FIELDS OF STUDY

Fields include French literature, criticism, theory, and culture from the early Middle Ages to the present, and the French-language literatures of Africa, the Caribbean, and the Maghreb.

## SPECIAL ADMISSIONS REQUIREMENTS

A thorough command of French is expected, as well as a good preparation in all fields of French literature. Applicants should submit a twenty-page writing sample in French. This can consist of one twenty-page paper or several shorter papers that total twenty pages.

## SPECIAL REQUIREMENTS FOR THE PH.D. DEGREE

(1) Candidates must demonstrate proficiency in two languages (in addition to English and French). Proficiency is defined as the successful completion of one year of study at the college level or reading proficiency at the graduate level. Students must fulfill one language requirement no later than the beginning of their third term of study. The second language requirement must be satisfied before the prospectus can be approved. (2) During the first two years of study, students normally take sixteen term courses. These must include Old French and at least two graduate-level term courses outside the department. They may include one term of an approved language course taken as a means of fulfilling one of the language requirements, and as many as four graduate-level term courses outside the department. A grade of Honors must be obtained in at least four of the sixteen courses, two or more of which must be in courses offered by the department. (3) A qualifying oral examination takes place during the sixth term. The examination is designed to demonstrate students' mastery of the French language, their knowledge and command of selected topics in literature, and their capacity to present and discuss texts and issues. (4) After having successfully passed the qualifying oral

examination, students are required to submit a dissertation prospectus for approval, normally no later than the end of the term following the oral examination.

In order to be admitted to candidacy for the Ph.D., students must complete all predissertation requirements, including the prospectus. Students must be admitted to candidacy by the end of the seventh term.

Teaching is considered an integral part of the preparation for the Ph.D. degree, and all students are required to teach for at least one year. Opportunities to teach undergraduate courses normally become available to candidates in their third year, after consideration of the needs of the department and of the students' capacity both to teach and to fulfill their final requirements. Prior to teaching, students take a language-teaching methodology course.

## COMBINED PH.D. PROGRAM

The French department also offers three combined Ph.D.s: one in French and African American Studies (in conjunction with the Department of African American Studies), one in French and Renaissance Studies (in conjunction with the Renaissance Studies Program), and one in French and Film and Media Studies (in conjunction with the Film and Media Studies Program). Students in all of these combined degree programs are subject to all the requirements for a Ph.D. in French, with exceptions noted below. In addition, they must fulfill certain requirements particular to the combined program.

The combined Ph.D. in French and African American Studies is most appropriate for students who intend to concentrate in and write a dissertation on the literature of the francophone Caribbean. Students take sixteen term courses, including Theorizing Racial Formations (AFAM 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 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 610a, Old French** R. Howard Bloch

An introduction to the Old French language, medieval book culture, and the prose romance via study of manuscript Yale Beinecke 229, *The Death of King Arthur*, along with a book of grammar and an Old French dictionary. Primary and secondary materials are available on DVD. Work consists of a weekly in-class translation and a final exam comprised of a sight translation passage, a familiar passage from Yale 229, and a take-home essay. No previous study of Old French necessary, although a knowledge of French is essential. Conducted in English.

**FREN 840a, Renaissance Lyric: La Pléiade** Edwin Duval

The seminar focuses on a poetic revolution that sought to reinvent French lyric by purging it of all traces of its medieval origins and infusing it with the qualities, forms, and prestige of Greek and Latin lyric. We concentrate together on the best-known works by the two principal poets of this movement, Du Bellay and Ronsard, while each student works independently to become an expert on one of the lesser poets of the so-called Pléiade that formed around them. Emphasis is on close reading of some of the best poems written in French, but due attention is paid to the necessary background in poetics and literary history. Conducted in French.

**FREN 877a, The Libertine Novel** Pierre Saint-Amand

The course studies how this subgenre of the eighteenth-century novel radically transforms its more accepted model and pushed its limits. Leaving the focus of interiority, the libertine novel explores space; characters lose their psychological depth to become bodies, surfaces of pleasure. On the side of heroes and heroines, we consider the effort in the construction of libertine communities. Those experiments with the novel bring it fully into modernity.

**FREN 880b, Le poème en prose** Thomas Connolly

This seminar looks at the development of the poème en prose, from its beginnings as a response to the inadequacy of French verse forms, which were said to lend themselves poorly to the translation of ancient epic, to its emergence as an independent genre. What constitutes a prose poem, and why do we need to distinguish it from prose, poetry, and even poetic prose? Readings include work by Fénelon, Parny, Baudelaire, Bertrand, Rimbaud, Laforgue, Nerval, Mallarmé, Jacob, Michaux, Ponge, and Char, as well as Hölderlin, Poe, and Rilke.

**FREN 899b, Modernity** Maurice Samuels

The seminar studies literature and art from nineteenth-century France alongside theoretical and historical reflections to explore the significance of modernity. How did historical forces shape cultural trends? How did literature and art define what it means to be modern? Writers to be studied include Balzac, Baudelaire, Flaubert, Maupassant, and Zola. Theorists include Benjamin, Durkheim, Foucault, Marx, Simmel, and Weber. We also examine the painting of Manet and his followers. Reading knowledge of French required.

**FREN 900b / HIST 667b / WGSS 667b, History of Sexuality in Modern Europe**

Carolyn Dean

An introduction to the various lines of inquiry informing the history of sexuality. The course asks how historians and others constitute sexuality as an object of inquiry and addresses different arguments about the evolution of sexuality in Europe, including the relationship between sexuality and the state and sexuality and gender.

**FREN 942b / AFST 942b / CPLT 986b, Decolonizing Memory** Jill Jarvis

This seminar introduces students to theories of memory, testimony, and trauma by bringing key works on these topics into dialogue with literary texts by writers of the former French and British empires in Africa. Literary readings may include works by Djébar, Ouologuem, Farès, Salih, Head, Aidoo. Theoretical readings by Arendt, Adorno and Horkheimer, Agamben, Césaire, Derrida, Fanon, Foucault, Mbembe, Spivak.

**FREN 946a / AFAM 846a / AFST 747a / CPLT 725a, Postcolonial Theory and Its Literature** Christopher Miller

A survey of theories relevant to colonial and postcolonial literature and culture. The course focuses on theoretical models (Orientalism, hybridity, *métissage*, *créolité*, “minor literature”), but also gives attention to the literary texts from which they are derived (francophone and anglophone). Readings from Said, Bhabha, Spivak, Mbembe, Amselle, Glissant, Deleuze, Guattari. Conducted in English.

**FREN 951b / AFAM 822b / AFST 651b, The Francophone African Novel** Christopher Miller

A comprehensive study of the novel – its discourse, aesthetics, and history – in colonial and postcolonial francophone Africa. Authors include Lamine Senghor, Ousmane Socé, Ousmane Sembène, Ferdinand Oyono, Ahmadou Kourouma, Yambo Ouologuem, Mariama Bâ, Aminata Sow Fall, Fatou Diome, Calixthe Beyala, Alain Mabanckou. Readings in French; course conducted in English.

**FREN 980a, Seminar on the Profession** Pierre Saint-Amand

Open only to French department graduate students entering the job market, this workshop concentrates on the skills and the materials needed for candidacy. Individual and group activities throughout the fall term. Intense focus on the preparation of written materials, followed by training in performative skills. For credit (does not count toward sixteen-course requirement). Graded Satisfactory/Unsatisfactory.

## Genetics

Sterling Hall of Medicine I313, 203.785.5846

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

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

### Chair

Antonio Giraldez

### Director of Graduate Studies

Marc Hammarlund

**Professors** Allen Bale, Susan Baserga (*Molecular Biophysics & Biochemistry*), W. Roy Breg, Jr. (*Emeritus*), Lynn Cooley, Daniel DiMaio, Patrick Gallagher (*Pediatrics*), Joel Gelernter (*Psychiatry; Neuroscience*), Antonio Giraldez, Peter Glazer (*Therapeutic Radiology*), Jeffrey Gruen (*Pediatrics*), Murat Gunel (*Neurosurgery*), Karen Hirschi (*Internal Medicine/Cardiology*), Arthur Horwich, Kenneth Kidd (*Emeritus*), Haifan Lin (*Cell Biology*), Maurice Mahoney (*Emeritus*), Shrikant Mane, Michael Nitabach (*Cellular & Molecular Physiology*), Charles Radding (*Emeritus*), Valerie Reinke, Margretta Seashore (*Emerita*), Nenad Sestan (*Neuroscience*), Gerald Shadel (*Pathology*), Stefan Somlo (*Internal Medicine/Nephrology*), Joann Sweasy (*Therapeutic Radiology*), Peter Tattersall (*Laboratory Medicine*), Sherman Weissman, Tian Xu, Hongyu Zhao (*Public Health; Biostatistics*)

**Associate Professors** Martina Brueckner (*Pediatrics/Cardiology*), Keith Choate (*Dermatology*), Chris Cotsapas (*Neurology*), Valentina Greco, Marc Hammarlund, Natalia Ivanova, Mustafa Khokha (*Pediatrics*), Peining Li, Janghoo Lim, Jun Lu, Arya Mani (*Internal Medicine*), James Noonan, In-Hyun Park, Curt Scharfe, Zhaoxia Sun, Scott Weatherbee, Andrew Xiao

**Assistant Professors** Kaya Bilguvar, Sidi Chen, Smita Krishnaswamy, Monkol Lek, Bluma Lesch, Stefania Nicoli (*Internal Medicine/Cardiology*), Michele Spencer-Manzon, Siyuan Wang, Hui Zhang

### FIELDS OF STUDY

Molecular Genetics: chromosome structure and function, genetic recombination, viral genetics, DNA damage repair, ribosome biogenesis, protein folding, neurodegenerative diseases, non-coding RNA function, and the regulation of gene expression. Genomics: genome mapping, genome modification, high-throughput technology, evolutionary genetics, and functional genomics. Cellular and Developmental Genetics: limb development, kidney development, cilia function, stem cell development, genetic control of the cytoskeleton, cell death, aging, cell fate determination, cell cycle progression, cell migration, cell signaling, and growth control. Cancer Genetics: oncogenesis and tumor suppression, tumor progression and metastasis. Model Organism Genetics: forward genetic screens in *Drosophila*, *C. elegans*, yeast, zebrafish, frogs, and mouse, transposon and insertional mutagenesis, gene and protein trapping, mosaic genetics. Medical Genetics: genetic basis of human disease, chromosome rearrangements, population and quantitative genetics.



## SPECIAL ADMISSIONS REQUIREMENTS

The department welcomes applicants who have a bachelor's or master's degree in biology, chemistry, or a related field, with experience (from course work and/or research) in the field of genetics. GRE General Test scores are required. A pertinent Subject Test in Biochemistry and Molecular Biology, Biology, or Chemistry is recommended.

To enter the Ph.D. program, students apply to the Molecular Cell Biology, Genetics, and Development (MCGD) track within the interdepartmental graduate program in Biological and Biomedical Sciences (BBS), <http://bbs.yale.edu>.

## SPECIAL REQUIREMENTS FOR THE PH.D. DEGREE

The Ph.D. program in Genetics is designed to provide the student with a broad background in general genetics and the opportunity to conduct original research in a specific area of genetics. The student is expected to acquire a broad understanding of genetics, spanning knowledge of at least three basic areas of genetics, which include molecular, cellular, organismal, and population genetics. Normally this requirement is accomplished through the satisfactory completion of formal courses, many of which cover more than one of these areas. Students are required to pass at least five graduate-level courses that are taken for a grade. Advanced graduate study becomes increasingly focused on the successful completion of original research and the preparation of a written dissertation under the direct supervision of a faculty adviser along with the guidance of a thesis committee.

A qualifying examination is given during the second year of study. This examination consists of a period of directed reading with the faculty followed by the submission of two written proposals and an oral examination. Following the completion of course work and the qualifying examination, the student submits a dissertation prospectus and is admitted to candidacy for the Ph.D. degree. There is no language requirement. An important aspect of graduate training in genetics is the acquisition of communication and teaching skills. Students participate in presentation seminars and two terms (or the equivalent) of teaching at the TF-10 level. Teaching activities are drawn from a diverse menu of lecture, laboratory, and seminar courses given at the undergraduate, graduate, and medical school levels. Students are not expected to teach during their first year. In addition to all other requirements, students must successfully complete GENE 901, First-Year Introduction to Research—Ethics: Scientific Integrity in Biomedical Research, prior to the end of their first year of study. In their fourth year of study, all students must successfully complete B&BS 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 is done during the first two

years of medical school (in many cases, the first rotation is done during the summer between years one and two). No set number of research rotations is required. M.D./Ph.D. students officially affiliate with the Department of Genetics after selecting a thesis adviser and consulting with the 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: Genomic Methods for Genetic Analysis (GENE 760); Graduate Student Seminar: Critical Analysis and Presentation of Scientific Literature (2 terms; GENE 675, graded Satisfactory/Unsatisfactory); Ethics: Scientific Integrity in Biomedical Research (as part of GENE 901, graded Satisfactory/Unsatisfactory).

*Recommended courses:* Advanced Eukaryotic Molecular Biology (GENE 743); Biochemical and Biophysical Approaches in Molecular and Cellular Biology (MCDB 630); Molecules to Systems (CBIO 502); Molecular and Cellular Basis of Human Disease (CBIO 601).

*Electives:* Other courses may be taken in a wide variety of fields relevant to the biological and biomedical sciences.

**Laboratory rotations** One or more rotations are necessary to identify a thesis adviser. No set number of research rotations is required.

**Teaching** One term of teaching is required. Previous teaching while enrolled at the Yale School of Medicine may count toward this requirement at the discretion of the DGS.

**Qualifying exam** M.D./Ph.D. students take their qualifying exam in the term following the completion of their course work. The structure of the qualifying exam is identical to that for other Ph.D. students in Genetics. Students read with three faculty members for five weeks, one of whom supervises the reading on the thesis research topic, but who is not the thesis adviser. The following two weeks are devoted to writing two research proposals, one on the student's thesis research. An oral exam follows in the eighth week.

**Prospectus** M.D./Ph.D. students submit their prospectus once their qualifying exam has been completed, but no later than the 30th of June following their exam.

**Candidacy** M.D./Ph.D. students will be admitted to candidacy once they have completed their course work, obtained two Honors grades, passed their qualifying exam, and submitted their dissertation prospectus.

**Thesis committee** M.D./Ph.D. students are required to have one thesis committee meeting per year, beginning the term after passing their qualifying exam. However, students are strongly encouraged to consider having additional meetings if they feel their project could benefit from the assistance of members of the thesis committee.

## MASTER'S DEGREES

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

**M.S.** Students are not admitted for this degree. They may receive this recognition if they leave Yale without completing the qualifying exam but have satisfied the course requirements as described above, as well as the Graduate School's Honors requirement. Students who are eligible for or who have already received the M.Phil. will not be awarded the M.S.

Prospective applicants are encouraged to visit the BBS website (<http://bbs.yale.edu>), MCGD Track.

## COURSES

**GENE 555a / CB&B 555a / CPSC 553a, Machine Learning for Biology** Smita Krishnaswamy

This course introduces biology as a systems and data science through open computational problems in biology, the types of high-throughput data that are being produced by modern biological technologies, and computational approaches that may be used to tackle such problems. We cover applications of machine-learning methods in the analysis of high-throughput biological data, especially focusing on genomic and proteomic data, including denoising data; nonlinear dimensionality reduction for visualization and progression analysis; unsupervised clustering; and information theoretic analysis of gene regulatory and signaling networks. Students' grades are based on programming assignments, a midterm, a paper presentation, and a final project. Prerequisite: GENE 760 or permission of the instructor.

**GENE 625a / MB&B 625a / MCDB 625a, 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.

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

Probability modeling and statistical methodology for the analysis of human genetics data are presented. Topics include population genetics, single locus and polygenic inheritance, linkage analysis, quantitative trait analysis, association analysis, haplotype analysis, population structure, whole genome genotyping platforms, copy number variation, pathway analysis, and genetic risk prediction models. Prerequisites: genetics; BIS 505; S&DS 541 or equivalent; or permission of the instructor.

**GENE 655a / CBIO 655a, Stem Cells: Biology and Application** In-Hyun Park

This course is designed for first-year or second-year students to learn the fundamentals of stem cell biology and to gain familiarity with current research in the field. The course is presented in a lecture and discussion format based on primary literature. Topics include stem cell concepts, methodologies for stem cell research, embryonic stem cells, adult stem cells, cloning and stem cell reprogramming, and clinical applications of stem cell research. Prerequisites: undergraduate-level cell biology, molecular biology, and genetics.

**GENE 675a and GENE 676b, Graduate Student Seminar: Critical Analysis and Presentation of Scientific Literature** Valentina Greco

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** Staff

Lecture course with emphasis on mechanisms of viral replication, oncogenic transformation, and virus-host cell interactions.

**GENE 743b / MB&B 743b / MCDB 743b, Advanced Eukaryotic Molecular Biology**

Mark Hochstrasser, Matthew Simon, Patrick Sung, Seyedtaghi Takyar, 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.

**GENE 760b, Genomic Methods for Genetic Analysis** James Noonan

Introduction to the analysis and interpretation of genomic datasets. The focus is on next-generation sequencing (NGS) applications including RNA-seq, ChIP-seq, and exome and whole genome sequencing. By the end of the course, each student will be able to process and analyze large-scale NGS datasets and interpret the results. This course is intended only for graduate students who are interested in applying genomic approaches in their thesis research. At a minimum, students must have basic familiarity with working in a UNIX/Linux computing environment. Prior experience with shell scripting or a scripting language such as Perl, Python, or Ruby is strongly recommended. Interested students must contact the instructor early in the fall term to discuss their prior experience and expectations for the course. Enrollment limited to twenty. Prerequisite: permission of the instructor.

**GENE 777b / MCDB 677b, Mechanisms of Development** Valerie Reinke

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.

**GENE 900a / CBIO 900a / MCDB 900a, First-Year Introduction to Research – Grant Writing and Scientific Communication** Valerie Horsley

Grant writing, scientific communication, and laboratory rotation talks for Molecular Cell Biology, Genetics, and Development track students.

**GENE 901b / CBIO 901b / MCDB 901b, First-Year Introduction to Research – Ethics: Scientific Integrity in Biomedical Research** Joerg Bewersdorf

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

**GENE 911a / CBIO 911a / MCDB 911a, First Laboratory Rotation** Valerie Horsley

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

**GENE 912a / CBIO 912a / MCDB 912a, Second Laboratory Rotation** Valerie Horsley

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

**GENE 913b / CBIO 913b / MCDB 913b, Third Laboratory Rotation** Valerie Horsley

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

## Geology and Geophysics

Kline Geology Laboratory, 203.432.3124

<http://earth.yale.edu>

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

### Chair

Jay Ague

### Director of Graduate Studies

Jun Korenaga

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

**Associate Professors** Kanani Lee, Maureen Long, Trude Storelvmo

**Assistant Professors** Bhart-Anjan Bhullar, Pincelli Hull, Noah Planavsky, Alan Rooney

### FIELDS OF STUDY

Fields include geochemistry and petrology, geophysics, ice physics, mineral physics, seismology and geodynamics, structural geology and tectonics, paleontology and paleoecology, oceanography, meteorology, cryospheric dynamics, and climatology.

### SPECIAL ADMISSIONS REQUIREMENTS

The department welcomes applicants oriented toward the earth sciences who have a bachelor's or master's degree in such fields as biology, chemistry, engineering, mathematics, meteorology, or physics, as well as those trained in geological, geophysical, and geochemical sciences. Scores from a pertinent GRE Subject Test are desirable but not required. The TOEFL or IELTS exam is required of all applicants for whom English is a second language.

### SPECIAL REQUIREMENTS FOR THE PH.D. DEGREE

There is no formal language requirement and no required curriculum. Students plan their course of study in consultation with their adviser to meet individual interests and needs and to lay the foundations for dissertation research. At the end of the first year the faculty reviews the standing of each student. A student recommended for continuation in the Ph.D. program will be so notified. Some students may be encouraged at that time to pursue only the M.S. degree. At the end of the second year the faculty reviews each student's overall performance to determine whether 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 Geology and Geophysics. For that reason all students are required to serve as teaching fellows (5 hours per week) for two terms during the course of their predoctoral training.

In addition to all other requirements, students must successfully complete G&G 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 Geology and Geophysics, Yale University, PO Box 208109, New Haven CT 06520-8109; e-mail, [dgs@geology.yale.edu](mailto:dgs@geology.yale.edu).

## COURSES

**G&G 505La, Practical Paleontology** Marilyn Fox

½ Course cr

**G&G 510a, Introduction to Isotope Geochemistry** Alan Rooney and Noah Planavsky

An overview of the fundamental principles of stable and radiogenic isotope geochemistry. Emphasis is placed on applications to specific geologic problems, including petrogenesis, geochronology, geothermometry, surface processes, hydrology, and biogeochemistry.

**G&G 512b, Structure and Deformation of the Lithosphere** Mark Brandon

An introduction to the origin and structure of the lithosphere and continental and oceanic crust. Topics include what controls the solid versus fluid behavior of rocks during deformation, and what controls the character and motion of tectonic plates. Laboratory exercises and field trips.

**G&G 519a, Introduction to the Physics and Chemistry of Earth Materials** Shun-ichiro Karato

Basic principles that control the physical and chemical properties of Earth materials. Equation of state, phase transformations, chemical reactions, elastic properties, diffusion, kinetics of reaction, and mass/energy transport.

**G&G 521b, Geophysical Fluid Dynamics** Mary-Louise Timmermans

Examination of the equations governing rotating stratified flows with application to planetary atmospheres and oceans. Mathematical models are used to illustrate the dynamical principles of geophysical fluid phenomena such as waves, boundary layers, flow stability, turbulence, and large-scale flows. Concepts are investigated

through laboratory experiments in a rotating water tank. Prerequisite: a course in fluid mechanics (MENG 361 or equivalent) or permission of the instructor.

**G&G 522b, Physics of Weather and Climate** Trude Storelvmo

The climatic system; survey of atmospheric behavior on time scales from days (i.e., weather) to decades (i.e., climate); formulation of mathematical equations describing weather and climate with selected applications to small- and large-scale phenomena.

**G&G 523b, Climate Dynamics** Alexey Fedorov

A survey of fluid dynamics with application to circulation in the ocean and atmosphere, as well as mantle and core. Mathematical models are used to illustrate the fundamental dynamical principles of geophysical fluid phenomena such as convection, waves, boundary layers, flow stability, turbulence, and large-scale flows. The course aims to provide a general theoretical framework for understanding the structure and circulation of the ocean, atmosphere, and Earth's interior.

**G&G 525a, Introduction to Continuum Mechanics** Jacques Gauthier

Phylogeny and evolution of the major clades of vertebrates from Cambrian to recent, as inferred mainly from the fossilized remains of the musculoskeletal system (cranial, axial, and appendicular skeletons). Special attention to the evolution of vertebrate feeding, locomotor, and sensory systems.

**G&G 526a, Introduction to Earth and Planetary Physics** Kanani Lee

An introduction to the structure and dynamics of Earth and other planets in the context of cosmic evolution. Review of basic physical principles and their applications to geophysics and planetary physics. Star formation and nucleosynthesis; planetary accretion and the birth of the solar system; heat flow, plate tectonics, and mantle dynamics; seismology and geodesy; core dynamics, geomagnetism, and planetary magnetism. Prerequisites: PHYS 181 and MATH 120 or equivalents.

**G&G 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.

**G&G 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.

**G&G 555b, Thermodynamics of Mountain Belts** Jay Ague

Examination of the fundamental principles governing the formation of metamorphic and igneous rocks during mountain building. Topics include processes of heat and mass transfer in orogenic belts, generation of igneous rocks in continental and subduction settings, ultra-high-pressure and ultra-high-temperature metamorphism, spatial and temporal patterns of petrologic processes throughout geologic time, and pressure-temperature-time paths of metamorphic and igneous rocks.



**G&G 562b / ARCG 762b / EMD 548b, Observing Earth from Space** Ronald Smith  
A practical introduction to satellite image analysis of Earth's surface. Topics include the spectrum of electromagnetic radiation, satellite-borne radiometers, data transmission and storage, computer image analysis, the merging of satellite imagery with GIS and applications to weather and climate, oceanography, surficial geology, ecology and epidemiology, forestry, agriculture, archaeology, and watershed management.

**G&G 632b, Evolution of Lizards** Jacques Gauthier

**G&G 636a / ANTH 636a / ARCG 636a, 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.

**G&G 650b, Deformation of Earth Materials** Shun-ichiro Karato

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

**G&G 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.

**G&G 659b, Time Series Analysis with Geoscience Applications** Jeffrey Park

Introductory course in geoscience data analysis and time series methods, with emphasis on multiple-taper time series techniques. Examples drawn from seismological, paleoclimate, and historical climate data. Weekly computer assignments. Python proficiency helpful.

**G&G 690a or b, Directed Research in Geology and Geophysics** Staff

By arrangement with faculty.

**G&G 691a or b, Independent Research** Staff

In addition to the seminars noted below, others on special topics like evolution, invertebrate and vertebrate paleontology, statistical mechanics and spectroscopy, structural geology and tectonics, petrology, volcanology, and physics of oceans and atmospheres are offered according to student interest, by arrangement with department faculty. Seminars are often organized around the research interests of visiting faculty as well. Prerequisite: approval of DGS and adviser.

**G&G 701a, The Warming Papers** Trude Storelvmo

Weekly presentation and discussion of papers representing the scientific foundation for the climate change forecast. Open to graduate students and advanced undergraduate students. No formal prerequisites, but basic calculus and university-level physics are helpful.

**G&G 703a or b / E&EB 930a or b, Seminar in Systematics** Jacques Gauthier

A seminar on using molecular evolutionary models in Bayesian phylogenetic analyses. Topics are chosen by the participants but may include "models" in phylogenetics,

understanding and comparison of model selection criteria, effects of model under- and overparameterization on parameter value estimates and phylogenetic inferences, and accommodating model uncertainty and model-averaging.

**G&G 710a, Responsible and Ethical Conduct of Research** Jun Korenaga

A 5-to-6-week lecture course (1 hour) that is required of all graduate students and must be completed within the first year. Course topics include record keeping and data management/retention; plagiarism and fraud; collaboration, coauthorship, and ownership of research materials and intellectual property; laboratory dynamics and sexual harassment. G&G 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

**G&G 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.

**G&G 745b, Seminar in Climate and Energy** Michael Oristaglio

This seminar looks at prospects for decarbonization of the world's energy supply along the lines envisioned in the Paris Agreement adopted at the conclusion of the twenty-first session of the United Nations Conference of the Parties (COP 21). The course studies the details of the Paris Agreement in light of two key reports published by the International Energy Agency (IEA) before the Paris talks: World Energy Outlook 2015 and World Energy Outlook Special Report: Energy and Climate Change. Topics include emissions reductions through Intended Nationally Determined Contributions (INDCs); the role of new technologies such as bio-energy with carbon capture and storage; transitional energy models, including renewable energy finance; and climate trajectories for the twenty-first century.

**G&G 775a or b, Seminar in Lithosphere and Surface Processes** Staff

The seminar focuses on advanced topics in the evolution and structure of the lithosphere. The theme for the seminar changes each term, covering topics such as the restoration of continents in deep time, true polar wander, lithospheric instabilities, orogenesis at convergent plate boundaries, interactions between climate and tectonics. Meetings are for 1.5 hours, once a week, and are organized around readings from the primary research literature.

**G&G 800a or b, Tutorial in Paleobiology** Staff

**G&G 810a or b, Tutorial in Structural Geology and Tectonics or Solid Earth Geophysics** Staff

**G&G 820a or b, Tutorial in Meteorology, Oceanography, or Fluid Dynamics** Staff

**G&G 830a or b, Tutorial in Geochemistry, Petrology, or Mineralogy** Staff

**G&G 840a or b, Tutorial in Sedimentology** Staff

**G&G 860a or b, Tutorial in Remote Sensing** Staff

# Germanic Languages and Literatures

W. L. Harkness Hall, 203.432.0788

<http://german.yale.edu>

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

## Chair

Kirk Wetters

## Director of Graduate Studies

Rüdiger Campe

**Professors** Rüdiger Campe, Carol Jacobs (*Emerita*), Rainer Nägele (*Emeritus*), Paul North, Brigitte Peucker, Henry Sussman (*Visiting [F]*), Kirk Wetters

**Assistant Professor** Katrin Trüstedt

**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.

## SPECIAL ADMISSIONS REQUIREMENT

All students must provide evidence of mastery of German upon application.

## REQUIREMENTS FOR THE PH.D. DEGREE

Students are required to demonstrate, besides proficiency in German, a reading knowledge of one other foreign language in the third term of study. French is recommended, although occasionally, on consultation with the director of graduate studies (DGS), other relevant languages may be substituted. The faculty in German considers teaching to be essential to the professional preparation of graduate students. Four terms of teaching are required beginning in the third year of study. Students normally teach undergraduate language courses under supervision for at least three terms. Other teaching experiences are available thereafter in literature, theory, film, etc.

In the first two years of study, students take four courses per term. Three of these sixteen courses in the first four terms may be audited.

Oral examinations must be passed in the fifth and sixth terms of study, and a dissertation prospectus should be submitted no later than the end of the sixth term. All students will be asked to defend the prospectus in an informal discussion with the faculty. The defense will take place before the prospectus is officially approved, usually in May of the sixth term. Students are admitted to candidacy for the Ph.D. upon completion of all predissertation requirements, including the prospectus.

After the submission of the prospectus, the student's time is devoted mainly to the preparation of the dissertation. A dissertation committee will be set up for each student at work on the dissertation. It is expected that students will periodically pass their work along to members of their committee, so that faculty members in addition to the dissertation adviser can make suggestions well before the dissertation is submitted. Drafts of each chapter must be submitted in a timely fashion to all members of the student's committee: The first chapter should be submitted to the committee by February 1 of the fourth year of study; the second chapter should be submitted by January 1 of the fifth year. There will be a formal review of the first chapter.

Two concentrations are available to graduate students: Germanic Literature and German Studies. There is a special combined degree with Film and Media Studies; see below.

### **SPECIAL REQUIREMENTS FOR THE GERMANIC LITERATURE CONCENTRATION**

During the first two years of study, students are required to take sixteen term courses, four of which may be taken outside the department. Three courses may be audited.

### **SPECIAL REQUIREMENTS FOR THE GERMAN STUDIES CONCENTRATION**

During the first two years of study, students are required to take sixteen term courses, seven of which may be taken outside the department. Three of those courses may be audited. Students are asked to define an area of concentration and will meet with appropriate advisers from both within and outside the department.

### **COMBINED PH.D. PROGRAM WITH FILM AND MEDIA STUDIES**

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

### **MASTER'S DEGREES**

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

**M.A. (en route to the Ph.D.)** Students enrolled in the Ph.D. program may qualify for the M.A. degree upon completion of a minimum of eight graduate term courses and the demonstration of reading knowledge in either French or another 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](mailto:german@yale.edu).

## COURSES

**GMAN 592a / FILM 765a, The Films of Fassbinder, Herzog, and Haneke** Brigitte Peucker

Examination of representative films by three major German-language auteurs. Topics include cinema's investment in painting and theatricality; its relation to gendered, imaginary, and abject bodies and to the specificities of time and place; the fictions of the self that these auteurs construct; and how questions of identity intersect with ideology and the political. Films subtitled; all readings and discussion in English.

**GMAN 602a / CPLT 621a, Books, Displays, and Systems Theory** Henry Sussman  
A status report on the book as a medium in an age of cybernetic technology and virtual reality. The contentious no-man's-land between books and contemporary systems.

**GMAN 603a / CPLT 699a / PHIL 602a, Heidegger's *Being and Time*** Martin Hägglund

A systematic, chapter-by-chapter study of Heidegger's *Being and Time*, arguably the most important work of philosophy of the twentieth century. All the major themes of the book are addressed in detail, with a particular emphasis on care, time, death, and the meaning of being.

**GMAN 620b / CPLT 868b, Speaking for Others: Advocacy and Representation in Law and Literature** Rüdiger Campe

Speaking for others (representing others) before a third party (judge or audience) is a basic constellation in Western literature rooted in legal, political, and religious practices. Speaking for others has been an alternative to and can function as reinterpretation of our usual dual idea of communication (*Me* speaking to *You* about Something in the world, G.H. Mead). Readings address the history and structure of speaking for others in three major sections: (1) ancient rhetoric and the Christian figure of speaking-for (Christ, the "paraclete"): Aristotle and Quintilian on rhetoric; Aeschylus, Eumenides; the Gospel of St. John; (2) political representation and speaking for others in (early) modern times: Hobbes and Rousseau on representation; Schiller, Don Carlos; Hölderlin, Empedocles; and (3) the critique of speaking for others in contemporary theory and literature: the Deleuze-Foucault debate on advocacy in the public space; Kafka, *The Trial* and related texts; Celan, *The Meridian* and related poems; Canetti on literature as art of becoming-the-other.

**GMAN 645a / CPLT 589a, Walter Benjamin and the Modernization of Nineteenth-Century Paris** Henry Sussman

The radical modernization of Paris under the Second Empire (1851–70) as seen through the eyes of Walter Benjamin. Focus on Benjamin's Arcades Project, a compendium that charted developments such as Parisian mass transit and streamlined traffic, the construction of apartment houses, and the dissemination of mass media. Readings from other literary texts on the same events include works by Balzac, Zola, and Aragon.

**GMAN 649a / JDST 651a / PHIL 617a, Critical Theory and the Frankfurt School** Asaf Angermann

This course is an introduction to the thought and writings of the philosophers known as the Frankfurt School, who founded and developed the idea of Critical Theory. Taken in its original meaning as a method or even a practice, rather than a systematic theory, Critical Theory suggests a way of thinking about the interrelations between philosophy and society, culture and politics, and on the complex relation between

philosophical concepts and social reality. By reading key texts of Frankfurt School authors such as Adorno, Horkheimer, Marcuse, Benjamin, Kracauer, and Fromm, the course inquires into the meaning of concepts such as critique, history, freedom, individuality, emancipation, and aesthetic experience.

**GMAN 653b / CPLT 932b / FILM 839b, Scandinavian Cinema and Television** Katie Trumpener

Contemporary Scandinavian film and television examined in relation to earlier cinematic highpoints. Europe's first art cinema, early Scandinavian film was catalyzed and sustained by modernist breakthroughs in theater, literature, and painting. Contemporary cinema and television (Dogma films; Nordic Noir television; experimental music and genre film) continue to develop innovative aesthetic, funding, and exhibition models. The course explores regionally specific ideas about acting, visual culture, and the role of art; feminism and the social contract; historical forces and social change. Films by Bergman, Dreyer, Sjöström, Sjöberg, Vinterberg, von Trier, Östlund, Kaurismäki, Kjartansson; as well as contemporary television series selected by students.

**GMAN 663a / CPLT 561a, Performance and Postdramatic Theater** Katrin Trüstedt

This course explores the "postdramatic theatre" (Hans-Thies Lehmann) of Heiner Müller, Elfriede Jelinek, René Pollesch, and others. In close readings of *Hamletmaschine*, *Die Schutzbefohlenen*, and *Kill Your Darlings* we trace how the appearance of bodies and media on stage is foregrounded instead of the dramatic plot, and how the emphasis on the theatrical apparatus questions the primacy of dramatis personae and the theatrical illusion. Readings of dramatic texts and analyses of performance videos are accompanied by discussions of theoretical texts on performativity, theatricality, and subjectification. Topics include the history of theater, play, and drama; conceptions of performance and theatricality; subjectivity and authority; and the reentry of the text within the theatrical play.

**GMAN 678a / CPLT 907a / FILM 796a, Media Archaeologies: The Visual and the Environmental** Francesco Casetti and Rüdiger Campe

The seminar aims at retracing two divergent cultural processes: how and why, starting from the discovery of artificial perspective, an increasing number of cultural practices were devoted to making the world visible; and correlatively how and why, starting from the first half of the nineteenth century, visibility increasingly met with the resistance of other modes of accessing the world through the human body and the role of the environment? These two trajectories are retraced through a special attention to the media that were on the forefront of these cultural processes: from Brunelleschi's mirror to Alberti's window and grid, from camera obscura to Galileo's telescope, from Panorama to Phantasmagoria, from the optical toys of the nineteenth century to the increasing implication of art into social and political questions. The seminar privileges the cultural practices that underpin both the trust in visibility and the discovery of environmentality, and it gives due attention to the political questions that the changing fortunes of the optical media imply. The seminar is the first part of a two-year project and will be followed next year by an analysis of the prevalence of the environmental dimension in contemporary media.

**GMAN 712b, Graduate Proseminar in German Literature** Kirk Wetters

Field-specific introduction to the history and methods of the field of German in a comparative and interdisciplinary context, with emphasis on project design and professionalization. Specific topic(s) in the form of case studies chosen by proseminar

participants and first- and second-year graduate students in German. Focus on cornerstone works of literature and emerging fields in the context of established critical approaches. Proseminar participants and the faculty proseminar leader collaboratively teach and design individual meetings. Strongly encouraged for first- and second-year graduate students in German. Open to advanced auditors and graduate students from adjacent fields with a concentration in German. Open to undergraduates intending to apply to graduate school in German or related fields, with permission of the instructor. May be taken twice for credit. Prerequisite: reading knowledge of German. Graded Satisfactory/Unsatisfactory.

**GMAN 713a / CPLT 587a, World Literature in German Context** Kirk Wetters

The concept of world literature, from its origins in the eighteenth-century cosmopolitanism of Herder and Goethe up to contemporary critical debates (Apter, Casanova, Cheah, Damrosch, Dharwadker, I. Hesse, Moretti, Mufti, Pollock, Said, Spivak). World literature in relation to national, German-language, and German-Jewish literature. Translation, untranslatability, the effect of markets, diaspora, politics. Literary critical readings are supplemented by exemplary literary texts in multiple genres. Student contributions based on individual linguistic backgrounds.

**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*)

### Director of Graduate Studies

Lloyd Grieger (*Sociology*)

### Director of Student Affairs

Lily Sutton ([lily.sutton@yale.edu](mailto:lily.sutton@yale.edu))

**Professors** Julia Adams (*Sociology*), John Gaddis (*History*), Jeffrey Garten (*School of Management*), Jacob Hacker (*Political Science*), Oona Hathaway (*Law*), Stathis Kalyvas (*Political Science*), Paul Kennedy (*History*), James Levinsohn (*School of Management*), A. Mushfiq Mobarak (*School of Management*), Catherine Panter-Brick (*Anthropology*), W. Michael Reisman (*Law*), Susan Rose-Ackerman (*Political Science; Law*), Peter Schott (*Economics; School of Management*), Ian Shapiro (*Political Science*), Timothy Snyder (*History*), Jing Tsu (*East Asian Languages & Literatures*), Aleh Tsyvinski (*Economics*), Steven Wilkinson (*Political Science*), Elisabeth Wood (*Political Science*), Ernesto Zedillo (*International Economics & Politics*)

**Associate Professors** Konstantinos Arkolakis (*Economics*), Ana De La O Torres (*Political Science*), Alexandre Debs (*Political Science*), Kaveh Khoshnood (*Public Health*), Jason Lyall (*Political Science*), Nuno Monteiro (*Political Science*), Marci Shore (*History*), Jonathan Wyrzten (*Sociology; International Affairs*)

**Assistant Professors** Katharine Baldwin (*Political Science*), Lorenzo Caliendo (*Economics; School of Management*), Zack Cooper (*Public Health*), Lloyd Grieger (*Sociology*), Daniel Keniston (*Economics*), Thania Sanchez (*Political Science*)

**Senior Lecturers** Charles Hill (*International Security Studies*), Justin Thomas

**Lecturers** Michael Boozer (*Economics*), Elaine Dezenski (*Ethics, Politics & Economics*), Christopher Fussell, William Casey King, Nicholas Lotito (*Political Science*), Alice Miller (*Public Health; Law*), Kristina Talbert-Slagle (*Global Health*), Edward Wittenstein

### Visiting Professors\*

**Senior Fellows\*** Sigga Benediktsdottir, Eric Braverman, David Brooks, Howard Dean, Rosemary DiCarlo, Robert Ford, Unni Karunakara, Clare Lockhart, Stanley McChrystal, Stephen Roach, Emma Sky

**Distinguished Fellow for Global Affairs** John Kerry

\* For a complete list of visiting professors and senior fellows, see the Jackson Institute website.



The Jackson Institute for Global Affairs nurtures degree programs and scholarship with a strong interdisciplinary and policy-oriented international focus. The programmatic interests of the institute focus on development and security.

The Jackson Institute for Global Affairs administers the two-year Master of Arts (M.A.) and the one-year Master of Advanced Study (M.A.S.) degrees in Global Affairs. The fifty to sixty students in the M.A. program combine fundamental training in core disciplines in Global Affairs with an individualized concentration that has relevance to current international issues. Students in the M.A.S. program select courses based on their individual academic and professional goals. In addition to courses in the Global Affairs program, students take courses throughout the Yale Graduate School of Arts and Sciences and Yale's professional schools.

## FIELDS OF STUDY

The programs are designed to combine breadth of knowledge of the basic disciplines of global affairs with depth of specialization in a particular academic discipline, geographic area, specialized functional issue, and/or professional field. The M.A. program is designed primarily for students seeking an advanced degree before beginning a career in global affairs; joint degrees are offered with the School of Forestry & Environmental Studies, the Law School, the School of Management, and the School of Public Health. The M.A.S. program is aimed at midcareer professionals with extensive experience in a field of global affairs such as, but not limited to, international security, diplomacy, and development.

## SPECIAL ADMISSIONS REQUIREMENTS

Applicants to either program must take the GRE General Test; students whose native language is not English and who did not earn their undergraduate degree at an English-language university must take the Test of English as a Foreign Language (TOEFL) or the International English Language Testing System (IELTS). The minimum score on the TOEFL is 610 on the paper-based test or 102 on the Internet-based test. Entering M.A. students are strongly encouraged to have taken introductory courses in microeconomics and macroeconomics prior to matriculation.

## SPECIAL REQUIREMENTS FOR THE M.A. DEGREE

The M.A. in Global Affairs requires two years of graduate study at Yale. To complete the degree, students must pass sixteen courses that fulfill the core and concentration requirements, demonstrate proficiency in a modern language, complete a summer internship or project, and maintain the grade average specified below.

**Core** Students take GLBL 801, GLBL 802, and GLBL 803 during the first term of enrollment. Any exceptions are to be made at the discretion of the director of graduate studies (DGS).

**Concentration** Beyond the core courses and courses taken in fulfillment of the language requirement, each student must identify and demonstrate the academic integrity of a coherent set of courses as a proposed concentration for approval by the DGS. Students are able to develop concentrations based on a topical, regional, or disciplinary focus, or a combination of a topical and regional focus. Sample concentrations are available from the Jackson Institute website.

**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 also be fulfilled by completing language study, other relevant course work, or independent research on an approved topic.

Each first-year student must file a form with the director of career services before June 1 stating the nature of the student's summer internship or approved alternative and submit a self-evaluation form by September 1.

**Expectation of academic performance** M.A. candidates are required to achieve at least two grades of Honors, while maintaining a High Pass average. To remain in good academic standing at the end of the first year, M.A. students are expected to complete half of the course work required for the degree, with at least a High Pass average and one grade of Honors. Students who do not have at least a High Pass average or the required number of courses at the end of the first year will not be allowed to continue in the program.

## SPECIAL REQUIREMENTS FOR THE M.A.S. DEGREE

The M.A.S. in Global Affairs requires one year of graduate study at Yale. To complete the degree, students must pass eight courses in one year of full-time study. Courses are chosen in consultation with the DGS at the start of each term. The program of study is customized to a student's individual academic and professional goals.

## SPECIAL REQUIREMENTS FOR THE M.A. JOINT-DEGREE PROGRAMS

Joint-degree candidates must fulfill all of the requirements of both programs in which they are enrolled before receiving either degree. Joint-degree students must take at least twelve graduate-level courses in Arts and Sciences departments or in professional schools other than the one granting the joint degree toward the Global Affairs program requirements. Three of these will be GLBL 801, 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. Under no circumstances will students be allowed a Global Affairs concentration in the functional area in which they will be receiving a joint degree.

Applicants to the joint-degree programs must apply separately, by the appropriate deadline, to the Graduate School for the Global Affairs M.A. program and to the professional school involved. Decisions on admissions and fellowship support are made independently by each school. Students are encouraged to apply to both programs simultaneously. They may also apply during their first year at Yale to the second

program for a joint degree. If accepted into the new program, they must receive approval for credit allocation upon registration from both degree programs.

For more information, visit <http://jackson.yale.edu/study>, e-mail [jackson.institute@yale.edu](mailto:jackson.institute@yale.edu), or call 203.432.3418.

## COURSES

### **GLBL 504b, International Economics** Peter Schott

Introduction to conceptual tools useful for understanding the strategic choices made by countries, firms, and unions in a globalized world. Prerequisite: two terms of introductory economics.

### **GLBL 559a, Evolution of Central Banking** Rakesh Mohan

Changes in the contours of policy making by central banks since the turn of the twentieth century. Theoretical and policy perspectives as well as empirical debates in central banking. The recurrence of financial crises in market economies. Monetary policies that led to economic stability in the period prior to the collapse of 2007–2008. Changes in monetary policies since the great financial crisis.

### **GLBL 574b, International Human Rights** Samuel Moyn

This course surveys a selection of topics in contemporary human rights law, with attention to broader principles and problems in international law, as well as to cognate fields like international criminal and international humanitarian law. A consistent focus is how the United States relates to the international human rights system—and how, conversely, that system impinges on diverse areas of American law and policy. The course also takes up the ways in which both the international system and the rights jurisprudence of other countries might differ from approaches in American law, as for example in socioeconomic rights adjudication or the regulation of religious practice. Self-scheduled examination. Follows Law School calendar.

### **GLBL 579a / PLSC 656a, 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 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 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 595b, The Logic of Randomized Experiments in Political Science** Alexander Coppock

Instruction in the design, execution, and analyzation of randomized experiments for businesses, nonprofits, political organizations, and social scientists. Students learn to evaluate the impact of real-world interventions on well-defined political, economic, and social outcomes. Specific focus on randomized experimentation through field and survey experiments, with design and analysis principles extending to lab and so-called “natural” experiments.

**GLBL 598b, Military Justice** Eugene Fidell

This course explores the character and function of military justice today. Topics include the constitutional rights of military personnel; court-martial jurisdiction and offenses; trial and appellate structure and procedure; collateral review; the roles of commanders, Congress, the Supreme Court, and the President; unlawful command influence; the role of custom; and punishment. Current issues such as the treatment of sexual offenses, military commissions, government contractors and other civilians, command accountability, military justice on the battlefield, judicial independence, and the application of international human rights norms to military justice are addressed. The class considers issues of professional responsibility, how the military justice system can be improved, and what, if anything, can be learned from the experience of other countries. Paper required. *Also LAW 21678.*

**GLBL 633b, Strategies for Economic Development** Rakesh Mohan

How strategies for economic development have changed over time and how dominant strands in development theory and practice have evolved. Students trace the influence of the evolution in thinking on actual changes that have taken place in successful development strategies, as practiced in fast-growing developing countries, and as illustrated in case studies of fast growth periods in Japan, South Korea, Brazil, China, and India. Prerequisites: introductory microeconomics and macroeconomics.

**GLBL 693a / E&RS 511a, United States and Russian Relations since the End of the Cold War** Thomas Graham

This course examines the factors—political, socioeconomic, and ideological—that have shaped U.S.-Russian relations since the end of the Cold War, as well as specific issues in bilateral relations, including arms control, counterterrorism, energy, and regional affairs. The goal is to understand the way each country constructs relations with the

other to advance its own national interests, and the implications of U.S.-Russian relations for global affairs.

**GLBL 799a or b, Independent Project** Staff

By arrangement with Jackson Institute Senior Fellows.

**GLBL 801a, Economics: Principles and Applications** James Levinsohn and Zachary Cooper

This course deals with the application of basic microeconomic analysis to public policy issues. The principal goal is to teach students the process of economic reasoning and how to apply that reasoning to policy issues in the real world. The course covers the basic topics in microeconomic theory: consumer theory, production theory, market models from competition to monopoly, theories of labor and capital markets, and models of externalities and other common market failures. Some calculus will be used without apology along with a great deal of algebra and graphical analysis.

**GLBL 802a, Applied Methods of Analysis** Lloyd Grieger

The course focuses on useful analytical approaches in public policy and the social sciences. The first part of the course focuses on mathematical skills. The second part focuses on methods for analyzing empirical data and builds on the mathematical skills from the first part of the course. Special focus is devoted to developing the skills necessary to synthesize and evaluate empirical evidence from the social sciences. Students leave the class with an applied understanding of how quantitative methods are used as tools for analysis in public affairs.

**GLBL 803a, History of the Present** Timothy Snyder and Sara Silverstein

The first half of the course presents some of the major diplomatic (and sometimes military) confrontations of the twentieth century, beginning with the First Balkan War, including the breakdowns of the late 1930s and progressing through the end of the Cold War. The second half introduces the history of Ukraine and closes with a case study of the Russian invasion of Ukraine's south and east as the end of the post-cold war order. In both parts emphasis is placed upon a close reading of primary documents and upon the reconstruction of possible alternatives.

**GLBL 838a / ANTH 538a, Culture and Politics in the Contemporary Middle East**  
Marcia Inhorn

This interdisciplinary seminar is designed to introduce students to some of the most pressing contemporary cultural and political issues shaping life in the Middle East and North Africa. The course aims for broad regional coverage, with particular focus on several important nation-states (e.g., Egypt, Saudi Arabia, Afghanistan, Iran, Iraq) and Western interventions in them. Students should emerge with a keener sense of Middle Eastern regional histories and contemporary social issues, as described by leading scholars in the field of Middle Eastern studies and particularly Middle Eastern anthropology. Following a historical introduction, the course is organized around three core themes – Islam, politics, modernity – with movement from the macropolitical level of Islamic discourse and state politics to the most intimate domains of gender, family life, and contemporary youth culture. Through reading, thinking, talking, and writing about a series of book-length monographs, students gain broad exposure to a number of exigent issues in the Middle Eastern region, as well as to the ethnographic methodologies and critical theories of Middle East anthropologists. Students are graded on seminar participation, leadership of seminar discussions, two review/analysis

papers, and a comparative written review of three books. Required for Council on Middle East Studies (CMES) graduate certificate students. Recommended for Middle East concentrators in other disciplines.

**GLBL 846b, Firm Strategies and Regulation** Evangelia Chalioti

The objective of this course is to introduce students to the role of government in markets where competitive equilibria “fail.” Emphasis is on the importance of market structure and industrial performance, including the strategic interaction of firms. We examine the behavior of individual markets, focusing on cost analysis, the determinants of market demand, market power, and the implications of government regulatory behavior. Topics include the benefits of monopoly; firms’ productivity, market efficiency, and competition in quantities (Cournot) vs. competition in prices (Bertrand); location models; mergers; vertical integration; entry deterrence; innovation and intellectual property rights (IP); network effects; and current policy issues on antitrust regulation, focusing on environmental, health, and safety regulation. Prerequisite: GLBL 801 or equivalent.

**GLBL 885b, World Order in Liberal Arts** Charles Hill

International peace and security as humanity’s primary moral-philosophical problem, reflected in works beyond the policy realm, from Confucius to Kant, Hegel, Wittgenstein, and Niebuhr. Early writings of Kissinger and his diplomatic papers now at Yale provide case studies. Open to graduate and undergraduate students with permission of the instructor.

**GLBL 999a or b, Directed Reading** Staff

By arrangement with faculty.

# History

240 Hall of Graduate Studies, 203.432.1366

<http://history.yale.edu>

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

## Chair

Naomi Lamoreaux

## Director of Graduate Studies

Daniel Botsman (236 HGS, 203.432.1361)

**Professors** Jean-Christophe Agnew, Abbas Amanat, Ned Blackhawk, David Blight, Daniel Botsman, Paul Bushkovitch, Deborah Coen, Stephen Davis, Carolyn Dean, Fabian Drixler, Carlos Eire, Paul Freedman, Joanne Freeman, John Gaddis, Beverly Gage, Bruce Gordon, Valerie Hansen, Robert Harms, Matthew Jacobson, Gilbert Joseph, Paul Kennedy, Benedict Kiernan, Jennifer Klein, Naomi Lamoreaux, Noel Lenski, Kathryn Lofton, Mary Lui, J.G. Manning, Ivan Marcus, John Merriman, Joanne Meyerowitz, Alan Mikhail, Samuel Moyn, Peter Perdue, Steven Pincus, Stephen Pitti, Naomi Rogers, Paul Sabin, Lamin Sanneh, Stuart Schwartz, Frank Snowden, Timothy Snyder, David Sorkin, Harry Stout, Francesca Trivellato, John Harley Warner, Anders Winroth, John Witt, Keith Wrightson

**Associate Professors** Paola Bertucci, Crystal Feimster, Daniel Magaziner, Edward Rugemer, Marci Shore, Eliyahu Stern

**Assistant Professors** Jennifer Allen, Sergei Antonov, Rosie Bsheer, Henry Cowles, Rohit De, Marcela Echeverri, Anne Eller, Denise Ho, Isaac Nakhimovsky, Joanna Radin, William Rankin, Carolyn Roberts

**Lecturer\*** Chitra Ramalingam

\* For a complete list of lecturers, see the undergraduate bulletin, *Yale College Programs of Study*.

## FIELDS OF STUDY

Fields include ancient, medieval, early modern, and modern Europe (including Britain, Russia, and Eastern Europe), United States, Latin America, East Asia, Southeast Asia, Middle East, Africa, Jewish history; and diplomatic, environmental, ethnic, intellectual, labor, military, political, religious, social, and women's history, as well as the history of science and medicine (see the section in this bulletin on the History of Science and Medicine).

## SPECIAL ADMISSIONS REQUIREMENTS

The deadline for submission of the application for the History graduate program is December 15.

The department requires a short book review (maximum 1,000 words) to accompany the application. It should cover the book that has most shaped the applicant's understanding of the kind of work the applicant would like to do as a historian.

In addition, the department requires submission of an academic writing sample of not more than 25 pages, double spaced. Normally, the writing sample should be based on research in primary source materials.

## SPECIAL REQUIREMENTS FOR THE PH.D. DEGREE

### Language Requirements

All students must pass examinations in at least one foreign language by the end of the first year. Students are urged to do everything in their power to acquire adequate linguistic training before they enter Yale and should at a minimum be prepared to be examined in at least one language upon arrival. Typical language requirements for major subfields are as follows:

**African** Either (1) French and German or Portuguese or Dutch-Afrikaans; or (2) French or German or Portuguese and Arabic; or (3) French or German or Portuguese or Dutch-Afrikaans and an African language approved by the director of graduate studies (DGS) and the faculty adviser.

**American** One language relevant to the student's research interests.

**Ancient** German, French, or Italian and two ancient languages, one of which must be Greek or Latin and the second of which can be either the second classical language or another ancient language (e.g., Hebrew, Aramaic/Syriac, Demotic, Coptic, Classical Armenian, Sanskrit).

**Chinese** Chinese and Japanese; additional languages like French, Russian, or German may be necessary for certain dissertation topics.

**East European** The language of the country of the student's concentration plus two of the following: French, German, Russian, or an approved substitution.

**Global/International** Two languages to be determined by the DGS in consultation with the adviser.

**Japanese** Japanese and French or German; Chinese may be necessary for certain fields of Japanese history.

**Jewish** Modern Hebrew and German, and additional languages such as Latin, Arabic, Yiddish, Russian, or Polish, as required by the student's areas of specialization.

**Latin American** Spanish, Portuguese, and French.

**Medieval** French, German, and Latin.

**Middle East** Arabic, Persian, or Turkish (or modern Hebrew, depending on area of research) and a major European research language (French, German, Russian, or an approved substitute).

**Modern Western European (including British)** French and German; substitutions are permitted with the approval of the DGS.

**Russian** Russian plus French or German with other languages as required.

**Southeast Asian** Choice of Dutch, French, Spanish, Portuguese, Chinese, Sanskrit, or Arabic, plus one or more Southeast Asian language (e.g., Bahasa Indonesian, Burmese,



Khmer, Lao, Malay, Tagalog, Thai, Tetum, or Vietnamese). In certain cases, Ph.D. dissertation research on Southeast Asia may also require knowledge of a regional or local language, e.g., Balinese or Cham.

Foreign students whose native language is not English may receive permission during their first year to hand in some written work in their own language. Since, however, the dissertation must be in English, they are advised to bring their writing skills up to the necessary level at the earliest opportunity.

## Additional Requirements

These new regulations will be observed by students admitted in 2013 and following years. Students admitted earlier may opt to observe either the new or the old regulations.

During the first year of study, students normally take six term courses, including *Approaching History* (HIST 500). During the second year of study, they may opt to take four to six term courses, with the approval of their adviser and the DGS. Students who plan to apply for outside grants at the beginning of their third year are recommended to take the *Prospectus Tutorial* (HIST 995) during their second year, and it is required for students in European history. The tutorial should result in a full draft of the dissertation prospectus. The ten courses taken during the first two years should normally include at least six chosen from those offered by the department. Students must achieve Honors in at least two courses in the first year, and Honors in at least four courses by the end of the second year, with a High Pass average overall. Courses graded in the Satisfactory/Unsatisfactory mode count toward the course work requirement but do not count toward the Honors requirement.

Two of the ten courses must be research seminars in which the student produces an original research paper from primary sources. The *Prospectus Tutorial* does not count as a research seminar. All graduate students, regardless of field, will be required to take two seminar courses in a time period other than their period of specialty.

Students in their second year should choose their courses so that at least one course will prepare them for a comprehensive examination field in their third year. Some fields offer reading seminars specifically designed to help prepare students for examination; others encourage students to sign up for examination tutorials (HIST 994) with one of their examiners.

By the end of their fifth term, at the latest, students are expected to take comprehensive examinations. Students will have a choice of selecting three or four fields of concentration: a major field and either two or three minor fields. The examination must contain one minor field that deals 50 percent or more with the historiography of a region of the world other than the area of the student's major field. The examination will have a written component that will be completed before the oral component. For their major field, students will write a historiographical essay of maximum 8,000 words. For each of the minor fields, the student will prepare a syllabus for an undergraduate lecture class in the field. All of these are to be written over the course of the examination preparation process and will be due on a definite, uniform date toward the end of the students' fifth term, typically on the Friday before Thanksgiving break (or on a corresponding date in the spring term). The oral examination examines

the students on their fields and will, additionally, include discussion of the materials produced for the written component of the examination. If the student selects the four-field option, the major field will be examined for thirty minutes. If the student selects the three-field option, the major field will be examined for sixty minutes and each minor field for thirty minutes.

By the end of their sixth term, at the latest, students are expected to hold a prospectus colloquium, but those who took the Prospectus Tutorial (HIST 995) during their second year are encouraged to hold the colloquium at the beginning of their third year. The prospectus colloquium offers students an opportunity to discuss the dissertation prospectus with their dissertation committee in order to gain the committee's advice on the research and writing of the dissertation and its approval for the project. The dissertation prospectus provides the basis of grant proposals.

Completion of ten term courses (including HIST 500), the language requirements of the relevant field, the comprehensive examinations, and the prospectus colloquium will qualify a student for admission to candidacy for the Ph.D., which must take place by the end of the third year of study.

It is also possible for students who have completed extensive graduate work prior to entering the Yale Ph.D. program to complete course work sooner. Students may petition for course waivers based on previous graduate work (up to three term courses) only after successful completion of the first year.

Students normally serve as teaching fellows during four terms to acquire professional training. Ordinarily, students teach in their third and fourth years. During their first term of teaching, students must attend training sessions run by the 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 the Graduate School for extended registration. The petition, delivered through the History DGS, will explain the academic reasons for the request. Only students who have completed the first chapter conference will be considered for extended registration.

## EVALUATION OF FIRST- AND SECOND-YEAR GRADUATE STUDENTS

At the end of each term, the DGS will ask faculty members whether they have serious concerns about the academic progress of any first- or second-year students in the Ph.D. program. Faculty members who have such concerns will provide written feedback to the DGS at 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 Classics

The Department of History also offers, in conjunction with the Department of Classics, a combined Ph.D. in History and Classics, with a concentration in Ancient History. For further details, see Classics.

### History and African American Studies

The Department of History also offers, in conjunction with the Department of African American Studies, a combined Ph.D. in History and African American Studies. For further details, see African American Studies.

### History and Renaissance Studies

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

## MASTER'S DEGREES

**M.Phil.** Students who have completed all requirements for admission to candidacy for the Ph.D. may receive the M.Phil. degree.

**M.A. (en route to the Ph.D.)** Students enrolled in the Ph.D. program may qualify for the M.A. degree upon completion of a minimum of seven graduate term courses at Yale, of which two must have earned Honors grades and the other five courses must average High Pass overall. Students must also pass an examination in one foreign language. A student in the American Studies program who wishes to obtain an M.A. in History, rather than an M.A. in American Studies, must include in the courses completed at least two research seminars in the History department.

**Terminal Master's Degree Program** For this terminal master's degree, students must pass seven term courses, four of which must be in History; substantial written work must be submitted in conjunction with at least two of these courses, and Honors grades are expected in two courses, with a High Pass average overall. Of the seven required courses, one should be a language or relevant technological language course. An undergraduate language course, statistics course, or other applicable course in a technological "language" counts for credit toward the graduate degree. All students in this program must pass an examination in one foreign language. Financial aid is not available for this program.

More information is available on the department's website, <http://history.yale.edu>.

## COURSES

**HIST 500a, Approaching History: Problems, Methods, and Theory** Daniel Botsman and Jennifer Klein

An introduction to the professional study of history, which offers new doctoral students an opportunity to explore (and learn from each other about) the diversity of the field, while also addressing issues of shared concern and importance for the future of the discipline. By the end of the term participants have been exposed to some of the key methodological and theoretical approaches historians have developed for studying

different time periods, places, and aspects of the human past. Required of all first-year doctoral students.

**HIST 502b / ANTH 531b / ARCG 531b / CLSS 815b / CPLT 547b / JDST 653b / NELC 533b / RLST 803b, Slavery, Dependency, and Genocide in the Ancient and Premodern World** Noel Lenski and Benedict Kiernan

Covers the subject of class and ethnic repression from the third millennium B.C.E. to the mid-second millennium C.E. Analyzes textual, epigraphic, and iconographic sources for slavery, dependency, and genocide in Assyrian, Greek, Roman, Germanic, Angkorian, Vietnamese, Burmese, Chosun, Mayan, and Aztec cultures.

**HIST 511b / CLSS 807b / RLST 514b, Hellenistic Civilization and the Jews** Joseph Manning and John Collins

This seminar examines two incidents in the Hellenistic world that can be construed as persecution of the Jews. The first was in the years 167–164 B.C.E., when the Seleucid Antiochus Epiphanes tried to suppress the traditional Jewish cult in Jerusalem. The second was in Alexandria in 38 C.E., when the Jewish community came under attack from its Gentile neighbors and the Roman authorities. The seminar examines these incidents in the context of Seleucid and Roman policies toward subject peoples.

**HIST 537b / MDVL 612b, The Mediterranean in Late Antiquity and the Middle Ages** Paul Freedman

This course looks at the Mediterranean in late antiquity and the Middle Ages. How unified or diverse was this area in terms of climate, cultures, and populations? Historiography of the Mediterranean includes works by Braudel, Abulafia, McNeil, Horden, and Purcell.

**HIST 542a / MDVL 555a, Law in Medieval Europe** Anders Winroth

This seminar explores the creation in the twelfth and thirteenth centuries of a sophisticated system of law, the European Common Law (*ius commune*). All late medieval and much modern legislation is based on this legal system. The course focuses on its roots in the Roman law of Emperor Justinian and in ecclesiastical legislation. We also study the influence of the *ius commune* on national and local medieval law. The emphasis is on using law in historical research and on learning the technical skills necessary. Prerequisite: facility with Latin or another relevant medieval language.

**HIST 574a / RLST 813a, Apocalypticism** Abbas Amanat and John Collins

This seminar reviews the origins of apocalyptic thought in the three great monotheistic religions (Judaism, Christianity, and Islam) and also considers the modern adaptations of apocalypticism in each tradition.

**HIST 587b / JDST 793b / RLST 799b, Introduction to Modern Jewish Thought** Eliyahu Stern

An overview of Jewish philosophical trends, movements, and thinkers from the seventeenth to the twenty-first century. Topics include enlightenment, historicism, socialism, secularism, religious radicalism, and Zionism.

**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.

**HIST 595b / JDST 844b / RLST 692b, Introduction to Modern European Jewish**

**History** David Sorkin

This course introduces students to European Jewish history since approximately 1648. It teaches the major historiographical traditions as well as the major themes of European Jewish history. Its audience is students specializing in Jewish history but also other historians who wish to add an understanding of Jewish history to their understanding of Europe.

**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.

**HIST 601b / JDST 790b / RLST 776b, Jewish History, Thought, and Narratives in**

**Medieval Societies** Ivan Marcus

Research seminar that focuses on the two medieval Jewish subcultures of Ashkenaz (northern Christian Europe) and Sefarad (mainly Muslim and Christian Spain).

**HIST 614a / CPLT 843a, Methods in Book History: The Early Modern Book in**

**Manuscript and Print** Kathryn James

This course offers a collections-based introduction to the material culture of the early modern book in print and manuscript, while exploring questions of evidence, canonicity, disciplinary formation, and the social construction of knowledge. Focusing primarily on early modern Britain and Yale's British collections, the course offers students a detailed understanding of English paleography and bibliography, early modern manuscript and print culture, and the disciplinary histories that have informed the collection and study of early modern British texts.

**HIST 617a, Britain: Modernity and Empire** Steven Pincus

Why and in what ways did Britain become the paradigmatic modern nation? This research seminar introduces students to a variety of approaches to the study of modernization and to a range of questions about the coming of modernity in Britain. Topics may include the emergence of the novel, the origins of the British Empire, England's economic transformation, the development of representative politics, the emergence of the bourgeois public sphere, and secularization, among others. It emphasizes methodological as well as substantive questions. The course is appropriate for historians of any period or area, as well as for graduate students in related disciplines.

**HIST 619a, Readings in the Social and Economic History of Britain, 1500–1750**

Keith Wrightson

Reading and discussion of central works in the social and cultural history of the period. The class begins with the fundamental issues of social structure and population dynamics. Thereafter the weekly agenda is decided in consultation, selecting from such topics as urbanization; poverty; household and family relationships; gender and sexuality; community structures; crime and the law; protest and rebellion; education,

literacy, and print culture; material culture; popular religion; witchcraft; national identities; agrarian custom and change; history and social memory.

**HIST 623a, Mobility, Identification, and Identity in the Early Modern Period**

Francesca Trivellato

Reading or research seminar. Contrary to older views of the early modern period as one dominated by sedentary populations, in the past half century historians have stressed the high degree of geographical mobility that men and women of all social strata experienced even before railroads and steamships. Focus on the institutions that governed mobility, the processes of identification, the cultural outcomes of voluntary movement and mass expulsions, and the organizations of trading networks.

**HIST 628b, Microhistories** Keith Wrightson

A research seminar. The first weeks are devoted to reading and discussing a number of outstanding microhistorical studies of individuals, families, communities, incidents, and processes, principally (though not exclusively) drawn from the literature on the early modern period. Particular attention is paid to questions of sources and their use. Thereafter members of the class undertake individual microhistorical studies on subjects of their choice and present work-in-progress papers to the seminar.

**HIST 634b, Community, Markets, and Authority in Pre-Industrial Europe** Francesca

Trivellato

Reading or research seminar. Influential studies dating from as far back as the nineteenth century and as recent as 2017 about the relationship between market exchanges and the social, political, and legal institutions that shaped late medieval and early modern European societies. Topics include citizenship and credit, the medieval commercial revolution, the public debt, trade diasporas, craft guilds, early modern global expansion, and questions of trust, information, and credible commitments.

**HIST 654a, Readings in 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 667b / FREN 900b / WGSS 667b, History of Sexuality in Modern Europe**

Carolyn Dean

An introduction to the various lines of inquiry informing the history of sexuality. The course asks how historians and others constitute sexuality as an object of inquiry and addresses different arguments about the evolution of sexuality in Europe, including the relationship between sexuality and the state and sexuality and gender.

**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 686a, Revolutionary Russia** Sergei Antonov

Reading seminar focusing on the fall of tsarism in 1917 and the establishment of the Bolshevik regime. Topics include potential viability of later imperial Russia; impact of the First World War; alternative political movements (such as the liberal Provisional Government of 1917 and “White” anti-Bolshevik regimes); early Soviet social, economic, and cultural experiments; and the rise of Stalin. Readings include classic accounts of the revolution, with special attention to recent archive-based historiography. Readings in English, with Russian options.



**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 727a / AMST 796a, Approaches to the History of Capitalism and Culture** Jean-Christophe Agnew

A reading-intensive seminar that draws on different disciplines (e.g., intellectual, social, and economic history; ethnography; social studies of science and technology; religious studies; cultural studies; political theory; and literature) to explore the historical intersections between capitalism and culture in the United States and elsewhere.

**HIST 731b / AMST 835b, 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 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.

**HIST 741b / AFAM 817b, Slavery and Abolition in the Atlantic World** Edward Rugemer

An introduction to the central themes of the historiography on slavery in the Americas during the eighteenth and nineteenth centuries. Readings include books and articles that have an explicitly comparative focus, as well as single-region studies. Themes include master/slave relations, African American cultures, resistance and rebellion, economic life, and the politics of slavery.

**HIST 742b / HSHM 732b, Readings in the Environmental Humanities** Paul Sabin

An interdisciplinary seminar to explore the emerging field of the environmental humanities. This reading course examines how humanities disciplines can best contribute to a broad scholarly and societal conversation about humanity and the fate of the planet. We consider how environmental problems and questions might reshape humanities teaching and research, and what humanities scholars can learn through greater collaboration with social and nature scientists. This seminar draws on faculty expertise from a range of humanities disciplines and engages students in defining the field, including designing possible future courses in the environmental humanities.

**HIST 746a / AMST 903a, Introduction to Public Humanities** Ryan Brasseaux

What is the relationship between knowledge produced in the university and the circulation of ideas among a broader public, between academic expertise on the one hand and nonprofessionalized ways of knowing and thinking on the other? What is possible? This seminar provides an introduction to various institutional relations and to the modes of inquiry, interpretation, and presentation by which practitioners in the humanities seek to invigorate the flow of information and ideas among a public more broadly conceived than the academy, its classrooms, and its exclusive readership of specialists. Topics include public history, museum studies, oral and community history, public art, documentary film and photography, public writing and educational outreach, the socially conscious performing arts, and fundraising. In addition to core



readings and discussions, the seminar includes presentations by several practitioners who are currently engaged in different aspects of the Public Humanities. With the help of Yale faculty and affiliated institutions, participants collaborate in developing and executing a Public Humanities project of their own definition and design. Possibilities might include, but are not limited to, an exhibit or installation, a documentary, a set of walking tours, a website, a documents collection for use in public schools. Required for the M.A. with a concentration in Public Humanities.

**HIST 751a / AFAM 687a / AMST 701a, “Race” and “Races” in American Studies**

Matthew Jacobson

This reading-intensive seminar examines influential scholarship across disciplines on “the race concept” and racialized relations in American culture and society. Major topics include the cultural construction of race; race as both an instrument of oppression and an idiom of resistance in American politics; the centrality of race in literary, anthropological, and legal discourse; the racialization of U.S. foreign policy; “race mixing” and “passing,” vicissitudes of “whiteness” in American politics; the centrality of race in American political culture; and “race” in the realm of popular cultural representation. Writings under investigation include classic formulations by scholars like Lawrence Levine and Ronald Takaki, as well as more recent work by Saidiya Hartman, Robin Kelley, and Ann Fabian. Seminar papers give students an opportunity to explore in depth the themes, periods, and methods that most interest them.

**HIST 760b, American Legal History, 1861–1968** John Witt

Selected topics in the history of American law, including legal thought, legal institutions, the legal profession, and social movements, from 1787 to the late twentieth century. Self-scheduled examination or paper option. Follows Law School academic calendar. *Also LAW 21063.*

**HIST 769b / AFAM 605b / AMST 686b, Introduction to Documentary Studies**

Matthew Jacobson and Anna Duensing

This mixed graduate/undergraduate seminar surveys documentary work in three media – film, photography, and sound – since the 1930s, focusing on the documentary both as a cultural form with a history of its own and as a parcel of skill sets and storytelling and production practices to be studied and mastered. Readings and discussions cover important scholarly approaches to documentary as a genre, as well as close readings of documentaries themselves and practitioners’ guides to various aspects of documentary work. Topics include major trends in documentary practice across the three media, documentary ethics, aesthetics and truth-claims, documentary’s relationship to the scholarly disciplines and to journalism, and documentary work as political activism. Class meetings include screenings/viewings/soundings of documentary works, and practitioners’ panels and workshops with Yale documentarians (including Charles Musser, Zareena Grewal, Elihu Rubin, Gretchen Berland, and Laura Wexler) and local New Haven documentarians such as Jake Halpern (Yale ’97, *This American Life*). Students’ final projects may take the form of a traditional scholarly paper on some aspect of documentary history or a particular documentary producer, or an actual piece of documentary work—a film treatment, a brief video, a set of photographs, a sound documentary, or script.

**HIST 806a, Early Modern Latin America: Social and Cultural History and Historiography** Stuart Schwartz

This course considers the recent historiography of colonial Latin America and the Caribbean with an Atlantic and cross-imperial frame.

**HIST 807a / AMST 650a, Resistance, Rebellion, and Survival Strategies in Modern Latin America** Gilbert Joseph

An interdisciplinary examination of new conceptual and methodological approaches to such phenomena as peasants in revolution, millenarianism, "banditry," refugee movements, and transnational migration.

**HIST 819b, Citizenship and Belonging in Post-Emancipation Americas** Anne Eller

In considering emancipation hemispherically, this course examines literature that seeks to dismantle the temporal and conceptual binaries between slavery and free labor posed in classic liberal thought, challenges narrow parameters of political power, and analyzes these negotiations outside of a national frame. The readings explore contests in the Caribbean, Latin America, the United States, and Canada over the definition and attainment of belonging and participation, as freed people labored in dynamic and restrictive circumstances. Finally, it looks to alternative conceptions of political allegiance and authority, often outside the auspices of a formal state.

**HIST 820b, Problems in Modern Mexican History: People, State, and Nation in Historical Motion** Gilbert Joseph

Focusing on the relationship between forms of the state and grassroots political culture, the course examines prevailing trends and controversies in historical writing on Mexico, with special attention given to the Mexican Revolution and its legacies.

**HIST 824a, Latin America in the History of Global Capitalism** Marcela Echeverri Munoz

This seminar explores Latin America's role in the rise of global capitalism over the course of the sixteenth to nineteenth century. Readings focus on historical representations of the Iberian empires and Latin America in economic treatises, classical writings in economic history, and recent secondary literature. The course reappraises debates over political economy through the lens of the history of colonialism and revolution in the Iberian Americas, highlighting their links to the Asian and European economies. It also examines the emergence and political implications of economic institutions such as slavery, agrarian production, industrialization, and the labor relations that these have engendered in Latin America and the capitalist world.

**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 853b, Approaches to Studying the Modern Middle East** Rosie Bsheer

This seminar familiarizes students with some of the major themes and debates in the field of modern Middle East history and pays careful attention to competing theoretical frameworks and methodological approaches. It looks at some of the most important literature and debates on Orientalism, area studies, modernity, Ottoman reform, colonialism, popular politics, nationalism, gender, capitalism, and class.

**HIST 858a, Further Readings in Ottoman History** Alan Mikhail

Further 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 on methodology, source usage, questions of periodization, and other interpretive problems. It is recommended but not required that students have taken HIST 854.

**HIST 868a, Documents in Tang, Song, and Yuan Dynasties** Valerie Hansen

A survey of the historical genres of premodern China: the dynastic histories, other chronicles, gazetteers, literati notes, and Buddhist and Daoist canons. How to determine what different information these sources contain for research topics in different fields. Prerequisite: at least one term of classical Chinese.

**HIST 869b, Issues in Tang, Song, and Yuan Dynasties** Valerie Hansen

An introduction to the debates about Chinese history between 600 and 1400 including economics, gender, printing, religion, and social change.

**HIST 874b, Research Seminar in Modern Chinese History** Peter Perdue

This course focuses on developing skills needed for academic writing in East Asian studies, including preparation of thesis prospectuses, research papers, and grant proposals. We begin with discussions of recent trends in the East Asian modern history and literature fields, and of academic writing styles. Students then draft projects for presentation to the class. Prerequisite: knowledge of modern Chinese or Japanese; open to undergraduate majors in East Asian Studies with permission of the instructor.

**HIST 877a, Readings in Modern Chinese History** Peter Perdue

In this course we read and discuss recent English-language monographs on modern Chinese history. The primary focus is topics that span the Qing to twentieth century and contain international, transnational, and comparative implications. No knowledge of Chinese 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 880a, Japanese Reference Works and Documents** Daniel Botsman

Provides training in the use of reference works and an introduction to the specialist skills needed to undertake research in pre-twentieth-century Japanese history. Emphasis is on learning documents written in the epistolary style (*sōrōbun*) and exploring Yale's rich collection of premodern source materials.

**HIST 889b, 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 893b, History of China's Republican Period** Denise Ho

This reading seminar examines recent English-language scholarship on China's Republican period (1912–1949) covering themes from state and economy to society and culture. Weekly topics include state institutions and law, nationalism, politics and

political movements, the development of cities, media and publication, public health, education, labor, and rural reconstruction.

**HIST 895b, Twentieth-Century Vietnam** Benedict Kiernan

French colonial rule, cultural change, Japanese occupation, and the origins, course, and aftermath of the Vietnamese-American conflict. War and society from the formation of a modern national identity to the rise of communism, the resurgence of Buddhism, independence and division, the U.S. intervention, escalation and defeat, the postwar Cambodian conflict and the 1979 Chinese invasion, regional integration, and economic reform. Readings, discussion, and research.

**HIST 917a / HSHM 719a, Natural History in History** Paola Bertucci

The changing meaning of natural history, from antiquity to the nineteenth century. Topics include technologies and epistemologies of representation, the commodification of natural specimens and bioprospecting, politics of collecting and displaying, colonial science and indigenous knowledge, the emergence of ethnography and anthropology. Students work on primary sources in Yale collections.

**HIST 927a / HSHM 711a, Death, Degeneration, and Decay** Joanna Radin

This reading seminar addresses questions of finitude, breakdown, loss, and the limits of life as they have been articulated from the mid-twentieth century to the present. Specific topics encompass biomedical interest in cell death, ecological attention to ecosystem collapse, and racial theories of degeneration. Because theories of cybernetics and computing are a fundamental dimension of postwar life and biomedical science, we also consider how ideas about life and death have been addressed in the engineering and maintenance of digital infrastructures.

**HIST 930a / HSHM 701a, Problems in the History of Medicine and Public Health**

John Warner

An examination of the variety of approaches to the social and cultural history of medicine and public health. Readings are drawn from recent literature in the field, sampling writings on health care, illness experiences, and medical cultures in Europe, Asia, Latin America, and the United States from antiquity through the twentieth century. Topics include the role of gender, class, ethnicity, race, religion, and region in the experience of health care and sickness; the intersection of lay and professional understandings of the body; and the role of the marketplace in shaping professional identities and patient expectations.

**HIST 931b / HSHM 702b, 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 939b / HSHM 750b, Approaches to the History of Technology** Paola Bertucci

An introduction to the history of technology, with a focus on classic and recent works in the field. Students discuss theoretical problems and case studies from the Middle Ages to the present. Topics include technological determinism, technology transfer, the Industrial Revolution, the social construction of technology, thing theory, the human-machine relationship.

**HIST 943b / HSHM 736b / WGSS 730b, Health Politics, Body Politics** Naomi Rogers

A reading seminar on struggles to control, pathologize, and normalize human bodies, with a particular focus on science, medicine, and the state, both in North America and in a broader global health context. Topics include disease, race, and politics; repression and regulation of birth control; the politics of adoption; domestic and global population control; feminist health movements; and the pathologizing and identity politics of disabled people.

**HIST 949a / HSHM 656a, Photography and the Sciences** Chitra Ramalingam

Does photography belong in the history of art, or does its status as an “automatic” or “scientific” recording technique and its many uses in the sciences distinguish its history from that of earlier visual media? How does photography look when we approach it from the cultural history of science? How might its role in the sciences have shaped photographic aesthetics in the arts? This course examines the making of photography’s discursive identity as an experimental and evidentiary medium in the sciences, from its announcement to the public in 1839 to the digital innovations of the present day. We take a historical and archival perspective on uses for (and debates over) photography in different fields of the natural and human sciences, grounded in visits to photographic collections at Yale.

**HIST 965a / ANTH 541a / PLSC 779a, Agrarian Societies: Culture, Society, History, and Development** Peter Perdue, Kalyanakrishnan Sivaramakrishnan, and James Scott

An interdisciplinary examination of agrarian societies, contemporary and historical, Western and non-Western. Major analytical perspectives from anthropology, economics, history, political science, and environmental studies are used to develop a meaning-centered and historically grounded account of the transformations of rural society. Team-taught.

**HIST 967b, Intellectual History as Storytelling** Marci Shore

This seminar explores the discipline of intellectual history from the perspective of the historian’s role as author of that history. Topics include the challenges of working with highly personal and subjective sources; the moral dilemmas of relativism; and the relationship between voyeurism and empathy. How do historians relate to novelists grappling with similar material? How can we narrate the history of ideas? How can we write nonfiction about people whose worldviews involved elaborate fantasies about the past, present, and future? How can we situate abstract ideas in concrete times, places, and lives? How do we integrate narrative and analysis? When is it justified to write about the present? The relationship between lunacy and genius is often very intimate; we discuss how historians can approach morally ambiguous historical protagonists be they communist poets, surrealist novelists, fascist philosophers, or others. We focus on storytelling, on history as both art and *Wissenschaft*. Readings include novels, essays, narrative nonfiction, and the genres in between.

**HIST 994a or b, Oral Exam Tutorial** Staff

Graded Satisfactory/Unsatisfactory.

**HIST 995a or b, Prospectus Tutorial** Staff

Graded Satisfactory/Unsatisfactory.

**HIST 998a or b, Directed Readings** Staff

Offered by permission of the instructor and DGS to meet special requirements not covered by regular courses. Graded Satisfactory/Unsatisfactory.

**HIST 999a or b, Directed Research** Staff

Offered by arrangement with the instructor and permission of DGS to meet special requirements.

# 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](mailto:timothy.barringer@yale.edu))

## Director of Graduate Studies

Tim Barringer [F] (Loria 657, 203.432.8162, [timothy.barringer@yale.edu](mailto:timothy.barringer@yale.edu))  
 Nicola Suthor [Sp] (Loria 653, 203.432.7210, [nicola.suthor@yale.edu](mailto:nicola.suthor@yale.edu))

**Professors** Carol Armstrong, Tim Barringer, Edward Cooke, Jr., Diana Kleiner, Kobena Mercer, Amy Meyers (*Adjunct*), Mary Miller, Robert Nelson, Jock Reynolds (*Adjunct*), Nicola Suthor, Mimi Hall Yiengpruksawan

**Associate Professors** Milette Gaifman, Jacqueline Jung, Kishwar Rizvi

**Assistant Professors** Marisa Bass, Craig Buckley, Jennifer Raab

**Lecturers** Martina Droth, Karen Foster, Ian McClure

## FIELDS OF STUDY

Fields include ancient Greek and Roman; Medieval and Byzantine; Renaissance; Early Modern; eighteenth-, nineteenth-, and twentieth-century European; Modern Architecture; African; African American and African diaspora; American; American Decorative Arts; British; Pre-Columbian; Islamic; 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 Film and Media Studies

The Department of the History of Art offers, in conjunction with the Film and Media Studies Program, a combined Ph.D. in the History of Art and Film and Media Studies. Students are required to meet all departmental requirements, but many courses may count toward completing both degrees at the discretion of the directors of graduate studies in History of Art and Film and Media Studies. For further details, see Film and Media Studies.

### History of Art and Renaissance Studies

The Department of the History of Art offers, in conjunction with the Renaissance Studies Program, a combined Ph.D. in the History of Art and Renaissance Studies. For further details, see Renaissance Studies.

## THE CENTER FOR THE STUDY OF AMERICAN ART AND MATERIAL CULTURE

The Center for the Study of American Art and Material Culture provides a programmatic link among the Yale faculty, museum professionals, and graduate students who maintain a scholarly interest in the study, analysis, and interpretation of American art and material culture. It brings together colleagues from a variety of disciplines—from History of Art and American Studies to Anthropology, Archaeological Studies, and Geology and Geophysics—and from some of Yale's remarkable museum collections, from the Art Gallery and Peabody Museum to Beinecke Library. Center activities will focus upon one particular theme each year and will include hosting one or more visiting American Art and Material Culture Fellows to teach a course each term and interact with Yale colleagues; weekly lunch meetings in which a member makes a short presentation centered on an artifact or group of artifacts followed by lively discussion about methodology, interpretation, and context; and an annual three-day Yale-Smithsonian Seminar on Material Culture.

## MASTER'S DEGREES

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

**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, Methods in Art History** Milette Gaifman

This seminar is designed to introduce students to a range of art historical methods past and present: a variety of formalisms, connoisseurship, different kinds of iconography, the social history of art, psychoanalysis, and a number of other approaches that are sometimes referred to as visual culture. Readings include classic texts by Riegl, Wölfflin, Panofsky, and Warburg, and more recent approaches by Alpers, Clark, and Crary, among others.

### **HSAR 512a or b, Directed Research** Staff

By arrangement with faculty.

### **HSAR 568a / ARCG 701a / CLSS 875a, Cleopatra: A Legend for All Time** Diana Kleiner

The life of a queen who became a celebrity and remains a legend serves as the starting point for an exploration of art and architecture produced in Egypt and Rome during the late Hellenistic period and early Roman Empire. Cleopatra was antiquity's greatest female star and one of the most famous women who ever lived. While the full panorama of her life is forever lost, Cleopatra comes alive in surviving works of ancient art and other remains of what was once an opulent material culture. Every generation has its own Cleopatra, and the mythical Egyptian queen's reinvention in later art, literature, and film is also considered. Qualified undergraduates who have taken Roman Art: Empire, Identity, and Society; Roman Architecture; or eClavdia: Women in Ancient Rome, may be admitted with permission of the instructor.

**HSAR 595a, Byzantium and Italy in the Later Middle Ages** Robert Nelson  
Byzantine and Byzantinizing art in Italy and Italian colonies from the twelfth to the sixteenth century, with an emphasis on the later centuries. For research projects, students may explore particular regions and cities, i.e., Venice, Genoa, Tuscany, Rome, southern Italy; consider monumental and minor arts; study the function of imported art and artists in local contexts; and investigate colonial Italian art in the East. General theoretical issues at play are the power of icons, cultural identity, cultural interaction, the social status of the foreign, and European colonialism before its expansion in the sixteenth century.

### **HSAR 600a, Painting 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 620a, The Early Modern Book** Marisa Bass

This course addresses the material culture of the book from the dawn of the printing press through the seventeenth century. It considers the transition from manuscript to print, the rise of the book industry, and the collaborations between publishers, authors, and artists that were central to the nature of books both as objects and vehicles of knowledge. Topics include frontispieces, dedications, typography, and page design;

major early modern genres of visual and intellectual production (such as emblem books, scientific treatises, polyglot bibles, and cartographic atlases); as well as the cultural histories of reading, translation, and library collections. An art historical approach to book history. All seminars take place in Beinecke Library and center on close firsthand study of the books themselves.

**HSAR 645a, Global Idols** Caroline Fowler

The “age of discovery” was formed by both investigations into the antique past of Western Europe and encounters with unknown civilizations in the Americas, Africa, and Asia. This seminar examines how the scholarship of antiquity, paganism, and early Christianity in Western Europe created a matrix by which travelers, missionaries, traders, and artists contextualized the cultures they encountered in new worlds. In particular, we consider how the role of the “idol” in pagan antiquity and Judaic texts formed the means by which Western Europeans understood the role of images, matter, and religion in foreign cultures. We study how the Humanists’ recovery of the ancient world inflected the encounters with new worlds and the ways in which the production, translation, and collection of images from cultures distinct from Western Europe was informed by the revival of antiquity. Moreover, we consider how ideas of “modernity,” “secularization,” “historicism,” and “orientalism,” which scholars often trace to the nineteenth century, are instigated in the sixteenth and seventeenth centuries. The Reformation and Counter-Reformation in Europe affected the ways by which Europeans were equipped to integrate new cultural and religious systems into a worldview already shaken by the religious wars of the sixteenth and seventeenth centuries. This seminar examines early modern encounters and the role and production of images both within and from these encounters. Shifting notions of *historia sacra*, divinity, matter, and images shaped the discovery of new and foreign “idols,” which refused, negated, and challenged the monotheistic religions of Western Europe, and thereby its economic, political, and civil institutions.

**HSAR 657b, What Is Baroque?** Nicola Suthor

“What is baroque?” is an ongoing question that has changed focus every time it has been raised. Answers differ according to whether “baroque” may simply serve as an umbrella term labeling a certain historical period or characterize specific aesthetic features that can be found even in the arts of the twenty-first century: for example, the “highly emotional character” and the “vivacious mixture of reality and imagination” (Erwin Panofsky) attributed to it. In this seminar, both perspectives are connected. The course examines the most prominent philosophical positions establishing “Baroque” as a category for a specific way of thinking and conceptualizing the world, and shows how an array of “baroque” styles appeared in the seventeenth century. We first consider the concept of the “neo-baroque” (C. Buci-Glucksmann, O. Calabrese) and deal with Walter Benjamin’s explanation of the origin of German tragic drama and with Alois Riegl’s *Origins of Baroque Art in Rome*. We search for clues to the conception of Baroque thinking in Gilles Deleuze’s analysis of Leibniz’s fold and examine critically Heinrich Wölfflin’s formalistic approach and his differentiation of classicism and baroque. We then look at several European cultures that have established a Baroque style in the visual arts and discuss in this respect the category of the Golden Age. We examine the impact of the Roman Counter-Reformation, Spanish Mysticism, and Dutch Protestantism on the regional moldings of Baroque style and their specific attitude toward early modern globalism. We consider the central aesthetic concepts

and their backdrop: “naturalism” versus Mannerism, “representation” versus mimesis, and “theatricality” versus order. We discuss the artistic positions, amongst others, of Bernini, Borromini, Caravaggio, Carracci, Claesz, Pietro da Cortona, Kalf, Murillo, Poussin, Rubens, Rembrandt, Velázquez, Zurbarán.

**HSAR 675b, Physical History of Art** Caroline Fowler

How do we study objects? A painting in an art museum exists not only as an artist’s intellectual construction but also as a meeting of materials and technical knowledge, a union of facture and matter that changes through the care of conservators and curators as paintings are cleaned, cradled, divided, reframed, and exhibited in the context of other objects. This seminar considers how artists constructed works, through a close study of materials and technological processes. It also interrogates the interpretation of these materials and techniques by later curators and conservators. Working across temporal and geographic borders with the collections of the Art Gallery and the Center for British Art, this course examines a variety of materials and techniques, including: tempera painting on panel, bronze casting, striking gold and coins, weaving and textiles, printmaking and matrices, time-based media and light installations. We examine how objects are made and how their care and exhibition after their making shapes our understanding of their existence as things in the world. The course provides a foundation in the history of technical art history and conservation while also considering the theoretical and philosophical problems of ecology and conservation, materiality, media archaeology, and obsolescence.

**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 to include Henry Fielding, Jane Austen, Henry James, Edith Wharton, Oscar Wilde, and Virginia Woolf. Painters to 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 747a, Architecture and the Kinetic Image** Craig Buckley

This seminar examines the relationship between concepts of architectural and cinematic space in the twentieth century. The aim is to provide an introduction to the literature on architecture and cinema and to examine a series of laboratories, buildings, sets, pavilions, and environments marked by the impact of moving images, encounters that have transformed concepts of space and expanded the media through which architects think and work. Examining the collaborations of architects, film directors, set designers, critics, and technicians, the course probes the evolving nature of technologies of the kinetic image, and its complement, the manner in which architects have increasingly sought to conceptualize space in terms of movements and flows, from that of the human body, to the automobile, to information. Topics may include Étienne-Jules Marey’s experimental station; expressionist film sets; film experiments at the Bauhaus; cinema design in Weimar Berlin, Amsterdam, and Paris; the multiscreen films of Charles and Ray Eames; the Philips Pavilion; Intermedia environments of the 1960s; the use of film in urban analysis by Donald Appleyard, Denise Scott Brown, and Robert Venturi; the projection environments and multimedia pavilions of Expo ’70;

early video installations by Dan Graham and Dara Birnbaum; and the introduction of computer animation into architectural design.

**HSAR 749a / ANTH 646a, Three Thousand Years of Mexican Feasting: 1500 B.C.E. to 1519 C.E.** Mary Miller and Oswaldo Chinchilla Mazariegos

This course sits at the cusp of anthropology and art history, considered through the lens of the most central of human activities, the consumption of food. Feasting was integral to the prehispanic peoples of Mesoamerica, who domesticated and cultivated maize, beans, chocolate, vanilla, tomatoes, chilies, and squashes, and served dogs, ducks, and turkeys on the most festive of occasions. They developed special ceramics, from elaborate tamale plates to tall chocolate pots, for ritual service, some of which then became assemblages with which to honor the dead, and sometimes preserving a performance otherwise not visible in the present. In this course, the role of food both as object of ritual and performance and as subject is examined. Seasonal celebrations, as documented in the sixteenth-century Florentine Codex, are examined alongside painted and sculpted representations of food and its rituals. Cross-cultural consideration of the feast as a conceptual category that ranges from the potlatch of the Northwest Coast peoples to modern Day of the Dead practice helps shape class discussion of Mesoamerican feasting before European contact, as does study of gender and the spatial settings of consumption. The problem of sampling and identification is considered through scientific study and practice, and vessels in New Haven and New York are explored for potential residues.

**HSAR 752a, The Body in Pain: Representing the American Civil War** Jennifer Raab

How can art persuasively represent pain and death? What are the limits and possibilities of visually expressing individual and collective suffering? This course considers the images that chronicled the deadliest war in American history, from photographs by Alexander Gardner, Timothy O'Sullivan, and Reed Bontecou of battlefields, burned cities, and bullet wounds, to sketches, oil paintings, and engravings by Winslow Homer made at the front lines for *Harper's Weekly*. Readings include period texts by Frederick Douglass, Harriet Beecher Stowe, and Abraham Lincoln along with theoretical sources on violence, trauma, and memory.

**HSAR 756b, Slavery and Visual Culture in Jamaica** Tim Barringer

This traveling seminar examines the visual culture of Jamaica from the late-seventeenth century to today, with particular focus on the representation of the plantation; on slavery and its legacies; and on the transformation of Jamaican visual culture in the period after emancipation—the early years of photography. Timed to coincide with the publication of *Victorian Jamaica*, edited by Tim Barringer and Wayne Modest, the seminar examines both British colonial and Afro-Jamaican cultural traditions from the advent of British rule until Independence in 1962. A particular focus is the masquerade form Jonkonnu, or John Canoe, whose multiple origins, manifestations, and representations are explored. The development of Jamaican art in the twentieth century, and the work of contemporary Jamaican artists of the diaspora in the U.K. and the United States, are explored. Members of the seminar participate in a major international conference to be held in conjunction with the launch of the book; and the seminar will visit Jamaica, examining key public and private art collections, archives, historical urban and plantation sites, galleries, and artists' studios. Prerequisite: advance permission of the instructor; applications to join the seminar must be received by September 10, 2017 (i.e., at the beginning of the fall term).

**HSAR 785b / AFAM 839b, 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 794a, Chinese Painting under the Mongols, 1260–1368**

David Sensabaugh

The period corresponding to Mongol rule in China has been interpreted as a major turning point in the history of Chinese painting. Painters are seen as having turned from an objective tradition to a subjective one. It has been described as a revolution in painting. In this seminar we explore this understanding of Yuan dynasty painting through an examination of major painters and attributions, raising issues of what constitutes Yuan painting. Was the Yuan period truly a major turning point in the history of painting in China?

**HSAR 811b, Cartographic Japan in the Age of Exploration**

Mimi Yiengpruksawan

and Seth Jacobowitz

It has been well noted that maps and more broadly the cartographic sciences constitute the very core of a voracious desire to know and consume the world that is intimately tied to the European expansion of the 1500s. The existence of *Theatrum orbis terrarum* and *Civitates orbis terrarum* virtually insure that the story is typically told from the European perspective. In this seminar we take up the East Asian perspective with emphasis on the ways in which cultural entanglement “east to west” brought about cultural productions in China, Korea, and Japan whose analysis yields insights into the interplay of local and translocal at the heart of the early modern world system.

**HSAR 821b, Pop Realism**

Staff

This seminar explores an often neglected term in critical and historical writing on postwar art: realism. The course specifically addresses the prevalence of traditional realist subjects and genres (portraiture, still-life) in Pop art and associated movements and styles (photorealism). In addition, a variety of factors contributing to the ambivalence surrounding the realist vocabulary during this period are investigated, including formalist modernism (Greenberg), Socialist Realism, and new epistemological challenges to the traditional realist subject (the “death” of the author).

**HSAR 826a, Circular Logic: Investigation of Ceramic and Wooden Vessels**

Edward Cooke

Taking advantage of the special exhibition “*Things of Beauty Growing*”: *British Studio Pottery* at the Center for British Art and the extensive collection of turned American objects in the Art Gallery’s Furniture Study, this seminar focuses on the impact of circular motion on the creation of clay and wooden objects. Beginning with an introduction to materials and techniques of hewing, modeling, or turning vessels, students develop firsthand experience in and knowledge of the different ways to make a vessel, including the suitability of different processes to different economic systems

or uses. The class then turns to the functions of vessels and their deeper symbolic meanings within different cultures.

**HSAR 827b, Lacquer in a World Context** Edward Cooke and Denise Leidy

Taking advantage of the Art Gallery's recent acquisition of a ca. 1600 lacquered namban writing cabinet and the accessibility of collections from the Art Gallery and the Peabody Museum on West Campus, this seminar offers students a global perspective on lacquer. The use of plant-based materials to provide a durable and decorative surface on wood has a long history, but different cultures drew on different types of materials and different techniques of application, and as a result developed their own aesthetic. This course draws on firsthand examination of and readings on East Asian, South Asian, Anglo-Dutch-American, and New Spain examples to understand the way in which the language of lacquer was shared throughout the world during the age of expansion from the sixteenth to the nineteenth century.

**HSAR 828a, Diderot** Carol Armstrong

Perhaps the most inventive writer, philosopher, and art critic of the French Enlightenment, Denis Diderot wrote at the conjunction of several eighteenth-century media and disciplines, in particular art; craft and technology; literature; philosophy; and science. It is in that light that this interdisciplinary seminar considers his work, not only in its own right, but also in relation to that of other figures of his time, including artists such as Jean-Baptiste-Siméon Chardin, Jean-Baptiste Greuze, and Jean-Honoré Fragonard; writers and playwrights such as Voltaire and Jean-Jacques Rousseau; and the philosopher Jean Le Rond d'Alembert, with whom he codirected the great Enlightenment masterwork, the *Encyclopédie*, along with the illustrator Louis-Jacques Goussier, who undertook most of the illustrations. A central focus is the relations between the project of the twenty-eight-volume *Encyclopédie*, carried out between 1751 and 1772, with its 71,818 articles and 3,129 illustrations, and that of the *Salons* written and privately published as letters to the Baron Grimm in *La Correspondance littéraire, philosophique et critique* between 1759 and 1771, and 1775 and 1781. We stress the visual, art historical, and art critical significance of Diderot's thought; and we also consider his novels, letters, and dialogues; his essays on theater; and his philosophical writings on empirical science. Many of these texts are translated into English, but as much as possible we try to read them together in the original French.

**HSAR 829b, Baudelaire** Carol Armstrong

The work of poet and art critic Charles Baudelaire, a pivotal figure in the history of both romanticism and modernism, has had a significant afterlife in modern art theory and criticism, modern literature, and modern thought about everything from pornography to photography, and from caricature to comedy, as well as cities, industrial forms, the temporality of modern life, modern art, modern music, and modern poetry. This interdisciplinary seminar pairs Baudelaire's writing with the work of a variety of other figures of his and our time, from the artists Goya, Delacroix, Guys, and Manet; the photographers Nadar, Carjat, Disdéri, Marville, Le Gray, and Atget; the art critics Gautier and Zola; the Symbolist poets Mallarmé and Verlaine; the writers and artists of the Surrealist movement; and the composers and performers Wagner, Debussy, and Diamanda Galás; to the work and thought of Walter Benjamin concerning Parisian modernity, and the ideas of Sigmund Freud about dreams and the unconscious. We stress the visual, art historical, and art critical ramifications of Baudelaire's work—in particular his *Salons* and *Le Peintre de la vie moderne*, but also his

poetry and other writings. Many of these texts are translated into English, but as much as possible we try to read and discuss them together in the original French.

**HSAR 831a / ARCG 844a / CLSS 848a, Ancient Greek Festivals** Jessica Lamont and Carolyn Laferriere

One of the most prominent expressions of ancient Greek piety was the festival, in which poetry was sung, athletic and artistic contests were held, animals sacrificed, and group identities negotiated and reaffirmed. In the Archaic and Classical periods, festivals could be minor, local, single-day undertakings, or weeklong, multi-city affairs; yet in each instance, they were an expression of communal identity, competition, and devotion to the gods. Poetry and sculpture served to commemorate these events long after the festival itself had passed, and early literary genres and artistic styles took root within and developed alongside the festivals, gods, and individuals whom they were intended to commemorate. Bringing together literary, archaeological, art historical, and anthropological evidence, this interdisciplinary seminar considers Archaic and Classical Greek festivals within their social, historical, and religious contexts. We pay particular attention to the literary and historical texts (hymns, the “recension” of Homeric epic in festival contexts, Attic tragedy and comedy, epinician, etc.) and the visual representations that commemorate and describe the major festivals in Greece, as well as to the particular ways that festivals exploited visual, olfactory, auditory, tactile, or gustatory reactions in their worshippers to provoke specific interactions with the divine.



# History of Science and Medicine

207 Hall of Graduate Studies, 203.432.1365

<http://hshm.yale.edu>

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

## Chair

John Harley Warner [F]

Deborah Coen [Sp]

## Director of Graduate Studies

Paola Bertucci

**Faculty** Paola Bertucci (*History*), Deborah Coen (*History*), Joanna Radin (*History of Medicine*), Chitra Ramalingam (*History*), William Rankin (*History*), Naomi Rogers (*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*), Melissa Grafe (*Librarian for Medical History*), Dimitri Gutas (*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*), Joanne Meyerowitz (*History*), Amy Meyers (*Center for British Art*), Alan Mikhail (*History*), Ayesha Ramachandran (*Comparative Literature*), Kevin Repp (*Curator, Modern European Books & Manuscripts, Beinecke Library*), Carolyn Roberts (*History*), 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 ADMISSIONS REQUIREMENTS

Applicants should have a strong undergraduate background in history and in a science relevant to the direction of their graduate interests. These requirements will be applied with flexibility, and outstanding performance in any field pertinent to the program will be taken into consideration.

## SPECIAL REQUIREMENTS FOR THE PH.D. DEGREE

All students must show proficiency in two languages in addition to English relevant to the student's research interests and approved by the director of graduate studies



(DGS); in recent years these have included Bulgarian, French, German, Hebrew, Hindi, Italian, Japanese, Korean, Mandarin, Norwegian, Spanish, and Swedish. Students may fulfill the requirement by passing an approved language course for credit, by passing a language test administered by the program faculty, by DGS approval of demonstrated command of a native language other than English, or by graduation from an approved foreign university where teaching was conducted in a language other than English.

Students will ordinarily take twelve term courses during the first two years. All students will normally take the two-term core seminar sequence HSHM 701/HSHM 702 or equivalents, HSHM 710, four additional graduate seminars in history of science or medicine, and at least one graduate course in a field of history outside of science or medicine. The remaining courses can be taken in history of medicine or science, history, science, or any other field of demonstrated special relevance to the student's scholarly objectives. Two of the twelve courses must be graduate research seminars in the History of Science and Medicine.

During the first two years of study, students must achieve Honors in at least two courses in the first year and Honors in at least four courses by the end of the second year, with a High Pass average overall. At the end of each term, the DGS will ask faculty members whether they have serious concerns about the academic progress of any first- or second-year students in the Ph.D. program. Faculty members who have such concerns will provide written feedback to the DGS at 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.

At the end of the academic year, the HSHM faculty will hold a special meeting to review each first- and second-year student in the program. The purpose of the meeting is to assess students' academic progress. In order for second years to proceed to the third year, they must demonstrate through written work, classroom performance, and participation in departmental activities that they have the ability to: (a) speak and write clearly; (b) conduct independent research at a high level; and (c) develop coherent scholarly arguments. A faculty vote will be taken at the conclusion of the review meeting to decide whether each second-year student may continue in the program. If a majority of faculty present and voting determine that a student may not continue, the student will be informed in writing and withdrawn from the program. The review meeting must be a full faculty meeting, but faculty members with no knowledge of the students under review may abstain from the vote, and their abstentions will not count in the total. Those members of the faculty who have worked with or know the students being evaluated are required to attend. In the event that any necessary faculty members absolutely cannot be present, they may send their views in writing to the DGS, who will read them at the meeting.

Students who enter having previously completed graduate work may obtain up to three course credits toward the completion of the total course requirement, the amount being contingent on the extent and nature of the previous work and its fit with their intended course of study at Yale.

All students are expected, prior to entering on their dissertation work, to develop a broad general knowledge of the discipline. This knowledge may be acquired through

a combination of course work taken at Yale or elsewhere, regular participation in the program colloquia and workshops, and preparation for the qualifying oral examination.

Students will normally spend the summer following their second year preparing for the oral qualifying examination, which will be taken in the third year, preferably during the first half.

The qualifying examination will cover four areas of chosen concentration: (1 & 2) two fields in the history of science and/or history of medicine; (3) a field in an area of history outside of medicine and/or science; and (4) a field of special interest, the content and boundaries to be established with the adviser for the field. The student may elect to do a second field in history outside of history of science or medicine; or a field in one of the sciences; or a field in a subject such as bioethics, health policy, public health, medical anthropology, medical sociology, science and law, science and national security, science and religion, science and culture, biotechnology, gender, science and medicine; race, science and medicine, or cultural studies.

During their first term in the program, all students will be advised by the DGS. During the second term and thereafter, each student will be advised by a faculty member of 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 supervisor when the time comes to do so. Students are encouraged to discuss their interests and program of study with other members of the faculty.

Students are encouraged to begin thinking about their dissertation topics during the second year. They are required to prepare a dissertation prospectus as soon as possible following the qualifying examination and to defend the prospectus orally before being admitted to full candidacy for the doctoral degree. Ordinarily the prospectus defense is held in the second term of the third year, with advancement to candidacy before the start of the fourth year.

Teaching is an important part of the professional preparation of graduate students in History of Science and Medicine. Students will teach, usually in the third and fourth years of study. They may, however, teach in the second term of the second year, deferring the completion of their required course work to the first term of the third year. Students are also encouraged to participate in the programs to develop teaching skills offered by the Graduate School. All HSHM students are expected to teach for four terms; two terms of teaching are required in order to receive the Ph.D.

In the fourth or fifth year, and preferably no later than the fall term of the fifth year, students are required to submit a chapter of the dissertation (not necessarily the first chapter) to the dissertation committee. This chapter will then be discussed with the student by members of the committee, preferably in a colloquium, to give the student additional advice and counsel on the progress of the dissertation. This conference is designed to be an extension of the conversation begun in the prospectus defense and is not intended as another defense; its aim is to give students early feedback on the research, argument, and style of the first writing accomplished on the dissertation.

## M.D./PH.D. AND J.D./PH.D. JOINT-DEGREE PROGRAMS

Students may pursue a doctorate in History of Science and Medicine jointly with a degree in Medicine or Law. Standard graduate financial support is provided for the doctoral phase of work toward such a joint degree. Candidates for the joint degree in Law must apply for admission to both the Law School and the Graduate School. Information about the joint-degree program with Medicine can be obtained from the 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 656a / HIST 949a, Photography and the Sciences** Chitra Ramalingam  
Does photography belong in the history of art, or does its status as an "automatic" or "scientific" recording technique and its many uses in the sciences distinguish its history from that of earlier visual media? How does photography look when we approach it from the cultural history of science? How might its role in the sciences have shaped photographic aesthetics in the arts? This course examines the making of photography's discursive identity as an experimental and evidentiary medium in the sciences, from its announcement to the public in 1839 to the digital innovations of the present day. We take a historical and archival perspective on uses for (and debates over) photography in different fields of the natural and human sciences, grounded in visits to photographic collections at Yale.

**HSHM 701a / HIST 930a, Problems in the History of Medicine and Public Health**  
John Warner

An examination of the variety of approaches to the social and cultural history of medicine and public health. Readings are drawn from recent literature in the field, sampling writings on health care, illness experiences, and medical cultures in Europe, Asia, Latin America, and the United States from antiquity through the twentieth century. Topics include the role of gender, class, ethnicity, race, religion, and region in the experience of health care and sickness; the intersection of lay and professional understandings of the body; and the role of the marketplace in shaping professional identities and patient expectations.

**HSHM 702b / HIST 931b, 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 711a / HIST 927a, Death, Degeneration, and Decay** Joanna Radin

This reading seminar addresses questions of finitude, breakdown, loss, and the limits of life as they have been articulated from the mid-twentieth century to the present. Specific topics encompass biomedical interest in cell death, ecological attention to ecosystem collapse, and racial theories of degeneration. Because theories of cybernetics and computing are a fundamental dimension of postwar life and biomedical science, we also consider how ideas about life and death have been addressed in the engineering and maintenance of digital infrastructures.

**HSHM 719a / HIST 917a, Natural History in History** Paola Bertucci

The changing meaning of natural history, from antiquity to the nineteenth century. Topics include technologies and epistemologies of representation, the commodification of natural specimens and bioprospecting, politics of collecting and displaying, colonial science and indigenous knowledge, the emergence of ethnography and anthropology. Students work on primary sources in Yale collections.

**HSHM 732b / HIST 742b, Readings in the Environmental Humanities** Paul Sabin

An interdisciplinary seminar to explore the emerging field of the environmental humanities. This reading course examines how humanities disciplines can best contribute to a broad scholarly and societal conversation about humanity and the fate of the planet. We consider how environmental problems and questions might reshape humanities teaching and research, and what humanities scholars can learn through greater collaboration with social and nature scientists. This seminar draws on faculty expertise from a range of humanities disciplines and engages students in defining the field, including designing possible future courses in the environmental humanities.

**HSHM 736b / HIST 943b / WGSS 730b, Health Politics, Body Politics** Naomi Rogers

A reading seminar on struggles to control, pathologize, and normalize human bodies, with a particular focus on science, medicine, and the state, both in North America and in a broader global health context. Topics include disease, race, and politics; repression and regulation of birth control; the politics of adoption; domestic and global population control; feminist health movements; and the pathologizing and identity politics of disabled people.

**HSHM 750b / HIST 939b, Approaches to the History of Technology** Paola Bertucci

An introduction to the history of technology, with a focus on classic and recent works in the field. Students discuss theoretical problems and case studies from the Middle Ages to the present. Topics include technological determinism, technology transfer, the Industrial Revolution, the social construction of technology, thing theory, the human-machine relationship.

# 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

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**Associate Professors** Tarek Fahmy (*Biomedical Engineering*), Ann Haberman (*Laboratory Medicine*), John MacMicking (*Microbial Pathogenesis*), Eric Meffre, Carla Rothlin, Bing Su

**Assistant Professors** Stephanie Eisenbarth (*Laboratory Medicine*), Nikhil Joshi, Martin Kriegel, Carrie Lucas, Noah Palm, João Pereira, Aaron Ring

## FIELDS OF STUDY

The Immunobiology graduate program is designed to prepare students for independent careers in research and teaching in immunology or related disciplines. The educational program emphasizes interdisciplinary training and collaborative and interactive research, an approach based on the idea that solving difficult problems requires the integration of individuals with common goals but differing expertise. Graduate students are diverse in their interests and ethnic backgrounds, and more than 50 percent are women.

## RESEARCH AREAS

Research focuses on the molecular, cellular, and genetic underpinnings of immune system function and development, on host-pathogen interactions, and on human and translational immunology, with a particular interest in a variety of autoimmune disorders. These research interests break down into six major themes, spanning almost all aspects of the immune system and its role in disease prevention.

**Lymphocyte development** A central focus of research is to understand the molecular events underlying the development of B and T lymphocytes. Areas of major interest include the receptors and signals that control lymphocyte lineage commitment, cell maturation, cell proliferation, and cell death; the establishment of the proper environments for lymphocyte development; mechanisms that regulate the state of

chromatin during lymphocyte development; and the mechanisms by which antibody and T cell receptor genes are assembled and diversified.

**Mounting an immune response** An effective immune response requires the coordinated action of numerous cell types. A critical first step is the activation of cells of the innate immune system, including monocytes, macrophages, dendritic cells, and neutrophils; and the receptors and signaling molecules that control this process are under intensive study. The mechanism by which cells take up, process, and present antigen is a major interest, as is the recognition of this antigen by T cell receptors on T lymphocytes. Cytoplasmic signal transduction molecules, nuclear transcription factors, and mechanisms controlling gene expression are all under study.

**Regulating the immune response** The immune response is tightly regulated through the interaction of cell surface receptors with secreted cytokines and with one another, and the mechanisms by which these interactions exert their regulatory influences are studied in several laboratories. Another major interest is in learning how specialized cells or anatomic locations, such as vascular endothelial cells or the epidermis, regulate and direct the immune response.

**Consequences of an immune response** Apart from the obvious consequence of the elimination of an invading organism, an appropriate immune response results in immunological memory and large numbers of activated lymphocytes, which must be eliminated. The mechanisms controlling immunological memory, tolerance, and apoptosis, as well as those leading to autoimmunity, are a major interest of many faculty. Diabetes, multiple sclerosis, lupus, and rheumatoid arthritis are just some of the autoimmune diseases under study. Much of this work takes place in the context of the Section of Human and Translational Immunology.

**Infectious disease and the host-pathogen interaction** A major interest is the study of infectious organisms – bacterial, viral, and parasitic – and the immune response to them. A great deal of effort is directed toward understanding the strategies used by infectious agents to avoid the immune system. HIV, HBV (hepatitis B virus), herpes simplex virus, parvoviruses, *Candida albicans*, *Borrelia burgdorferi* (the causative agent of Lyme disease), *Leishmania*, *Streptococcus pneumoniae*, and *Legionella pneumophila* are all under study.

**Structural analysis of immune system receptors and effectors** There is a growing interest in using structural approaches to understand the function of key molecules of the immune response. For example, a major effort is devoted toward understanding how the Toll-like receptors, despite their similarity in extracellular-ligand recognition regions, are able to specifically recognize such a wide variety of pathogen-associated molecular patterns (PAMPS). Another effort is aimed at understanding the mechanism of APOBEC enzymes in controlling viruses such as HIV.

## FACILITIES

More than thirty laboratories are actively involved in research in immunology. Many share immediately adjoining or nearby laboratory space on the top three floors of the Anlyan Center (TAC), 10 Amistad Street, and 300 George Street, and three faculty are funded by the Howard Hughes Medical Institute. The Department of Immunobiology provides one of the largest, highest-ranked training programs in immunology in the country, led by a faculty with a reputation for excellence in research. The Department of

Immunobiology maintains a wide variety of major equipment, and Dr. Richard Flavell oversees a very active transgenic mouse/ES cell/knockout facility to which members of the department have access.

## PROGRAM ENTRY

Most students enter the Immunobiology graduate program through the Immunology track of the interdepartmental graduate program in Biological and Biomedical Sciences (BBS), <http://bbs.yale.edu>. Other types of students enter from the M.D./Ph.D. program (see below), the MRSP (see below), or another BBS track, with approval of the Immunobiology director of graduate studies (DGS) and the faculty adviser.

The faculty and students of the BBS program are organized into interest-based tracks. Immunology, being one of 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.

**Admission requirements** In addition to meeting general BBS requirements, applicants are expected to have a firm foundation in the biological and physical sciences. It is preferred that students have taken courses in biology, organic chemistry, biochemistry, genetics, cell biology, physics, and mathematics. Actual course requirements, however, are not fixed, and students with outstanding records in any area of the biological sciences may qualify for admission. There are no specific grade requirements for prior course work, but a strong performance in basic science courses is of great importance for admission. In special cases, the Medical College Admission Test (MCAT) scores may substitute for scores on the general GRE.



## SPECIAL REQUIREMENTS FOR THE PH.D. DEGREE

Students are required to take six courses for a grade in the Yale Graduate School.

Required graded courses for first- and second-year students are:

1. IBIO 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 Faculty 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 Yale McDougal Center one-day seminar entitled “Teaching at Yale” is offered each year. Attending this seminar is recommended prior to teaching.

**Prospectus and qualifying exam** Early in the fourth term (or in certain circumstances, in the third term), students make a thirty-minute presentation to the department of their proposed research and initial results. Thereafter, they meet with their prospectus committee, which assigns four or five broad areas of biology and immunology that are of particular relevance to the proposed research and on which the student will be



examined in the qualifying exam. During the next several weeks, students prepare a formal research proposal (in NIH grant format) concerning the proposed thesis research and study for the exam. The exam is held within three months. It is an oral exam covering all aspects of immunology generally, with a focus on the assigned areas mentioned above. The student is questioned on aspects of the thesis proposal.

**Admission to candidacy** Requirements for admission to candidacy, which usually takes place after six terms of residence, are: completion of course requirements, one of the two teaching requirements, the qualifying exam, and the third-year committee meeting – at the one-year anniversary of the qualifying exam – with a signed certification form from the adviser and committee members verifying that the student has made good progress.

Progress in thesis research in the third and later years is monitored carefully by the student's thesis committee (composed of the adviser and three or four other faculty). See below.

## M.D./PH.D. STUDENTS MAJORING IN IMMUNOBIOLOGY

**Required** Six courses for a grade. Out of the six courses the following are mandatory:

1. IBIO 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 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** Alfred Bothwell  
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 532b, Inflammation** Ruslan Medzhitov  
This course covers fundamentals of inflammation from a broad biological perspective, with a focus on both physiological and pathological aspects of inflammation.

**IBIO 538a, Development of the Immune System** Joao Pedro Pereira  
This limited-enrollment seminar can serve as one of the two required seminar courses for Immunobiology graduate students. The course addresses the principles underlying the evolution of immunity, comparing immune defense strategies across the major divisions of living organisms including bacteria, plants, invertebrates, and vertebrates. Major themes include immunity to viruses and endogenous mobile elements, molecules of immune recognition and mechanisms for their diversification, and the evolution

of immune cells. A central goal of the course is for students to be able to use the knowledge gained to formulate hypotheses and identify important unanswered questions in the field of immune system evolution. The emphasis is on broad concepts and conceptual thinking regarding the origins of and links between the different strategies encountered. Assigned readings include review articles and papers from the primary literature, but students are expected to identify additional readings from the literature as they develop their ideas. Each class features two presentations by students on aspects of the week's topic, as well as substantial input from other students. Student evaluation is based on class participation, oral presentations, and a short written "synthesis" paper. Enrollment limited to twenty-two. Preference is given to students who need the requirement in Immunobiology.

**IBIO 540a, Translational Immunobiology** Kevin O'Connor

This course is designed to introduce immunobiology Ph.D. students to translational research and medicine. The course is arranged in modules, each of which focuses on a specific disease with a conspicuous immunological component. Each module consists of (1) didactic sections: covering disease phenotype, underlying immunobiology and pathology, and mechanisms of treatment approaches including their limitations; (2) patient contact: the view of the disease from the patient's perspective including symptoms and treatment options; and (3) clinical section: taking place in the hospital environment, where students are exposed to disease management approaches. The combination of medical knowledge and personal interaction with patients and their physicians provides a new perspective to immunobiology Ph.D. students that will broaden their basic science training and enable them to work more confidently at the interface of research and medicine and facilitate collaborations with clinical investigators. Enrollment limited to twenty-five. Prerequisites: IBIO 530 and 531.

**IBIO 600a, Introduction to Research: Faculty Research Presentations** Susan Kaech

Introduction to the research interests of the faculty. Required of all first-year Immunology/BBS students. Pass/Fail.

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

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** Susan Kaech

Intensive experience in the design and execution of experiments in immunology or other areas of biology. Students design a focused research project in consultation with a faculty mentor and execute the designed experiments in the mentor's laboratory. Students are expected to read relevant background papers from the literature, design and perform experiments, interpret the resulting data, and propose follow-up experiments. Students are also expected to attend the mentor's weekly lab meeting(s) as well as weekly Immunobiology departmental seminars and Research in Progress seminars. The course concludes with the student giving a brief presentation of the work performed at Rotation Talks, attended by other first-year immunology-track graduate students. Evaluation is by the mentor; students also evaluate the rotation experience. Students must turn in a prioritized list of four possible mentors to Barbara Cotton in the office of the director of graduate studies at least one week prior to the beginning

of the course. Mentors are assigned by the DGS. Graded Pass/Fail. 1 course credit; minimum of 20 hours/week. Required of all first-year Immunology/BBS students.

**IBIO 612b, Research Rotation 2** Susan Kaech

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** Susan Kaech

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.

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## FIELDS OF STUDY

The Interdepartmental Neuroscience Program (INP) offers flexible but structured interdisciplinary training for independent research and teaching in neuroscience. The goal of the program is to ensure that degree candidates obtain a solid understanding of cellular and molecular neurobiology, physiology and biophysics, neural development, systems and behavior, and neural computation. In addition to course work, graduate students participate in an annual research-in-progress talk and a regular journal club, organize the Interdepartmental Neuroscience Program Seminar Series, and attend other seminar programs, named lectureships, symposia, and an annual research retreat.

## SPECIAL ADMISSIONS REQUIREMENTS

Applicants to the Interdepartmental Neuroscience Program should have a B.S. or B.A. Most applicants have had course work in neuroscience, psychobiology, physiological psychology, mathematics through calculus, general physics, general biology, general chemistry, organic chemistry, biochemistry, computer science, or engineering.

Deficiencies in these areas can be corrected through appropriate course work in the first year of residence. Laboratory research experience is desirable but is not a formal requirement. Scores for the GRE (General Test required; Subject Test recommended) or MCAT, three letters of recommendation, transcripts of undergraduate grades, and a statement of interest must accompany the application.

To enter the Interdepartmental Neuroscience Ph.D. program, students apply to the Neuroscience track within the program in Biological and Biomedical Sciences (BBS), <http://bbs.yale.edu>.

## SPECIAL REQUIREMENTS FOR THE PH.D. DEGREE

Each entering student is assigned a faculty advisory committee to provide guidance. This committee is responsible for establishing the student's course of study and for monitoring 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 (INP 701, Principles of Neuroscience; INP 720, Neurobiology; INP 580, Bioethics in Neuroscience; and INP 510, Structural and Functional Organization of the Human Nervous System, all completed in the first year of enrollment; and B&BS 503, RCR Refresher for Senior BBS Students, completed during the fourth year of enrollment). Collectively, these courses are designed to ensure broad competence in modern neuroscience. Students are also required to complete at least three additional elective courses from a broad set of neuroscience-related courses. The Graduate School uses grades of Honors, High Pass, Pass, and Fail and requires two term grades of Honors during the first two years of study. Students are expected to maintain at least a High Pass average. Additional degree requirements are successful completion of both terms of Lab Rotation for First-Year Students (INP 511, INP 512) and both terms of Second-Year Thesis Research (INP 513, INP 514). This will ensure that degree candidates obtain a solid background in systems, cellular, and molecular approaches to neuroscience. Admission to candidacy requires passing a qualifying examination normally given during the second year, and submission of a dissertation prospectus (NIH NRSA grant format) before the end of the third year. In accordance with the expectations of the BBS program, Ph.D. students are expected to participate in two terms (or the equivalent) of teaching. Thesis committee meetings are required annually. Also required is the completion and satisfactory defense of the thesis.

Requirements for M.D./Ph.D. students are the same as for Ph.D. students with the following differences: three courses are required (INP 701, 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 four required courses plus two elective courses, a minimum of two Honors grades, and successful completion of both terms of Lab Rotation for First-Year Students (INP 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 558b / PSYC 558b, Computational Methods in Human Neuroscience** Nicholas 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 562b / AMTH 765b / CB&B 562b / ENAS 561b / MB&B 562b / MCDB 562b / PHYS 562b, Dynamical Systems in Biology** Damon Clark and Thierry Emonet

This course covers advanced topics in computational biology. How do cells compute, how do they count and tell time, how do they oscillate and generate spatial patterns? Topics include time-dependent dynamics in regulatory, signal-transduction, and neuronal networks; fluctuations, growth, and form; mechanics of cell shape and motion; spatially heterogeneous processes; diffusion. This year, the course spends roughly half its time on mechanical systems at the cellular and tissue level, and half on models of neurons and neural systems in computational neuroscience. Prerequisite: MCDB 561 or equivalent, or a 200-level biology course, or permission of the instructor.

**INP 720a / MCDB 720a / NBIO 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**

Dean Karlan

## **Director of Graduate Studies**

Michael Boozer

The Department of Economics offers a one-year program of study in International and Development Economics, leading to the Master of Arts degree. IDE students are diverse in terms of their nationalities and their career paths. Many of our students now come directly from their undergraduate school or a few years of work experience, although we do not exclude any candidate on the basis of work experience or country of origin. After completion of the program, IDE students have gone into various paths, including working in research for academic and nonacademic agencies such as the World Bank, the United Nations, and the Poverty Action Lab. Other students have gone on to further academic work such as law school and to Ph.D. programs in economics, environmental sciences, public health, and similar programs. Many students have returned to their home countries to work for their government or for funding agencies there.

Some students entering the program are required to complete the summer program in English and Mathematics for Economists offered by Yale University. This requirement may be waived for applicants demonstrating exceptional training in economic analysis and a good command of English. The Graduate Record Examination (GRE) and the Test of English as a Foreign Language (TOEFL) examinations are also required. For information on testing requirements and application procedures, please see the Graduate School's Admissions website, <http://gsas.yale.edu/admission-graduate-school>.

Yale fellowship funds are not available for the IDE program, and students are required to produce certification of the necessary funding prior to enrollment.

The course program requires the completion of eight graduate-level courses, six of which make up the core elements of the IDE program and are required; the remaining two are graduate electives. The required courses are ECON 545, Microeconomics; ECON 546, Growth and Macroeconomics; ECON 558, Econometrics; ECON 559, Development Econometrics; ECON 591, Economics of Poverty Alleviation; 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 Forestry & Environmental Studies (F&ES) and the School of Public Health (YSPH) are also available. Application to

F&ES or YSPH must be made simultaneously with the application to the IDE program. Admission to these joint programs is determined by the participating professional school and must be obtained prior to beginning the program. Joint-degree students earn the Master of Arts degree in IDE and the Master of Environmental Studies (F&ES) or Master of Public Health (YSPH) degree.

Prospective applicants are encouraged to visit the IDE program website at <http://ide.yale.edu>. Program materials are available upon request to Louise Danishevsky, Senior Administrative Assistant, International and Development Economics Program, Yale University, PO Box 208269, New Haven CT 06520-8269; e-mail, [ide@yale.edu](mailto: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](mailto:joseph.craft@yale.edu))

## Deputy Director

Eugene Shapiro

**Professors** Karen Anderson (*Pharmacology*), Joseph Craft (*Internal Medicine; Immunobiology*), David Fiellin (*Internal Medicine; Epidemiology*), Thomas Gill (*Internal Medicine; Epidemiology*), Fred Gorelick (*Internal Medicine; Cell Biology*), Jeffrey Gruen (*Pediatrics; Genetics*), Harlan Krumholz (*Internal Medicine; Epidemiology*), Chirag Parikh (*Internal Medicine*), Eugene Shapiro (*Pediatrics; Epidemiology*), George Tellides (*Surgery*), Mary Tinetti (*Internal Medicine; Epidemiology*)

## FIELDS OF STUDY

The Investigative Medicine program offers a training pathway for highly select physicians in clinical departments who are interested in careers in clinical research. The program is designed to develop a broad knowledge base, analytical skills, creative thinking, and the hands-on experience demanded of clinical researchers devoted to disease-oriented and patient-oriented investigation. The program provides the student with individualized experience encompassing formal course work and practical experience, under the supervision and mentorship of a senior faculty member.

Students will enter the program with a broad range of experience and interests. Students can undertake thesis work in a variety of disciplines. These include but are not limited to:

1. Evaluating risk factors and interventions for disease using modern concepts in quantitative methods and clinical study design.
2. Investigating the biochemical, physiologic, and genetic basis of disease in the setting of a Clinical Research Center.
3. Exploring the molecular basis of a disease from the laboratory standpoint.

## SPECIAL ADMISSIONS REQUIREMENTS

The Investigative Medicine program is designed for students with an M.D. or D.O. degree. To be eligible for admission, applicants must have completed two or more years of postgraduate clinical training. Prospective students who are already in a residency or subspecialty clinical fellowship program at Yale may apply to the Investigative Medicine program anytime during the first two years of that training (approximate). Application to the program also may be made concurrently with application for residency or fellowship training in a clinical department at the Yale School of Medicine. Special arrangements will be made for a deferred acceptance by the Graduate School.

The most important criteria for selection into the program are commitment to rigorous training in clinical investigation and evidence of high academic achievement

in undergraduate and medical school courses, and on scores from the USMLE. All applicants must be eligible to practice medicine in the United States.

## SPECIAL REQUIREMENTS FOR THE PH.D. DEGREE

The minimum overall course requirements for the doctorate program are completion of nine (9) courses. Intensive course work will extend for twelve months, starting in July. The majority of the course requirements are to be completed by the end of the first year of study. Prior to registering for a second year of study, students must successfully complete IMED 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, Frontiers

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 24–August 4, 2017. Consent 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 635a, Directed Reading in Investigative Medicine** Staff

An independent study course for first-year students in the Investigative Medicine program. Topics are chosen by the student, and reading lists are provided by faculty for weekly meetings to discuss articles. Four sessions are required; dates/times by arrangement. Consent of instructor required.

### **IMED 645a, Introduction to Biostatistics in Clinical Investigation** Eugene Shapiro

The course provides an introduction to statistical concepts and techniques commonly encountered in medical research. Previous course work in statistics or experience with statistical packages is not a requirement. Topics to be discussed include study design, probability, comparing sample means and proportions, survival analysis, and sample size/power calculations. The computer lab incorporates lecture content into practical application by introducing the statistical software package SPSS to describe and analyze data. Two weeks, July 10–July 21, 2017. Consent of instructor required.

### **IMED 655b, Writing Your Career Development (K-type) Grant** Eugene Shapiro

In this term-long course, students gain intensive, practical experience in evaluating and preparing grant proposals, including introduction to NIH study section format. The course gives new clinical investigators the essential tools to design and initiate their

own proposals for obtaining grants to do research and to develop their own careers. The course is limited to students who plan to submit grant proposals for a K-type mentored career development award. Attendance and active participation are required. There may be spaces to audit the course. Consent of instructor required.

**IMED 660a, Methods in Clinical Research, Part I** Eugene Shapiro

This yearlong course (with IMED 661 and 662), presented by the Robert Wood Johnson Clinical Scholars Program, presents in depth the methodologies used in patient-oriented research, including methods in biostatistics, clinical epidemiology, health services research, community-based participatory research, and health policy. Consent of instructor required.

**IMED 661a, Methods in Clinical Research, Part II** Eugene Shapiro

This yearlong course (with IMED 660 and 662), presented by the Robert Wood Johnson Clinical Scholars Program, presents in depth the methodologies used in patient-oriented research, including methods in biostatistics, clinical epidemiology, health services research, community-based participatory research, and health policy. Consent of instructor required.

**IMED 662b, Methods in Clinical Research, Part III** Eugene Shapiro

This yearlong course (with IMED 660 and 661), presented by the Robert Wood Johnson Clinical Scholars Program, presents in depth the methodologies used in patient-oriented research, including methods in biostatistics, clinical epidemiology, health services research, community-based participatory research, and health policy. Consent of instructor required.

**IMED 670b, Writing Your First Independent Investigator-Initiated (R-type) Grant**  
Eugene Shapiro

In this term-long course, students gain intensive, practical experience in evaluating and preparing grant proposals, including discussion of NIH study section format. The course is particularly designed to help investigators in the “K to R” transition period. The course is limited to students who plan to submit an R-type (e.g., R01 or R21) grant, as well as VA and foundation grant proposals. Attendance and active participation are required. Consent of instructor required.

**IMED 680b, Topics in Human Investigation** Joseph Craft

The course teaches students about the process through which novel therapeutics are designed, clinically tested, and approved for human use. It is divided into two main components, with the first devoted to moving a chemical agent from the bench to the clinic, and the second to outlining the objectives and methods of conducting clinical trials according to the FDA approval process. The first component describes aspects of structure-based drug design and offers insight into how the drug discovery process is conducted in the pharmaceutical industry. The format includes background lectures with discussions, labs, and computer tutorials. The background lectures include a historical perspective on drug discovery, the current paradigm, and important considerations for future success. The second component of the course provides students with knowledge of the basic tools of clinical investigation and how new drugs are tested in humans. A series of lectures and discussions provides an overview of the objectives, research strategies, and methods of conducting patient-oriented research, with a focus on design of trials to test therapeutics. Each student is required

to participate (as an observer) in an HIC review, in addition to active participation in class. Consent of instructor required.

**IMED 900a and IMED 901b, Independent Research** Staff

# Italian Language and Literature

82-90 Wall Street, 203.432.0595

<http://italian.yale.edu>

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

## Chair

Millicent Marcus

## Director of Graduate Studies

Giuseppe Mazzotta (82-90 Wall St., Rm. 404, 203.432.0598)

**Professors** Millicent Marcus, Giuseppe Mazzotta

**Assistant Professor** Christiana Purdy Moudarres

**Affiliated Faculty** Roberto González Echevarría (*Spanish & Portuguese*), Gundula Kreuzer (*Music*), Alastair Minnis (*English*), David Quint (*English*), Frank Snowden (*History*), Gary Tomlinson (*Music*), Francesca Trivellato (*History*)

Visiting faculty from other universities are regularly invited to teach courses in the department.

## FIELDS OF STUDY

The Italian department brings together several disciplines for the study of the Italian language and its literature. Although the primary emphasis is on a knowledge of the subject throughout the major historical periods, the department welcomes applicants who seek to integrate their interests in Italian with wider methodological concerns and discourses, such as history, rhetoric and critical theories, comparison with other literatures, the figurative arts, religious and philosophical studies, medieval, Renaissance, and modern studies, and the contemporary state of Italian writing. Interdepartmental work is therefore encouraged and students are accordingly given considerable freedom in planning their individual curriculum, once they have acquired a broad general knowledge of the field through course work and supplementary independent study.

## SPECIAL ADMISSIONS REQUIREMENTS

The department recognizes that good preparation in Italian literature is unusual at the college level and so suggests that applicants begin as soon as possible to acquire a broad general knowledge of the field through outside reading. At the end of the first and second years, students' progress is analyzed in an evaluative colloquium. Applicants who have had little or no experience in Italy are generally urged to do some work abroad during the course of their graduate program. For all students of Italian, a reading knowledge of Latin is essential. This may be acquired during the course of the first year, but applicants are reminded that it is difficult to schedule beginning language courses in addition to a normal graduate program. Students are advised to acquire proficiency in the languages required for the doctoral program before matriculation.

## SPECIAL REQUIREMENTS FOR THE PH.D. DEGREE

Candidates must demonstrate a reading knowledge of a second Romance language, Latin, and a non-Romance language (German recommended). The Latin examination



must be passed, usually before the beginning of the third term of study, and all language requirements must be fulfilled before the Ph.D. qualifying examination. Students are required to take two years of course work (as a rule sixteen courses), including two graduate-level term courses outside the Italian department. After consultation with the director of graduate studies (DGS), students who join the graduate program with an M.A. in hand may have up to four courses waived. The comprehensive qualifying examination must take place during the third year of residence. It is designed to demonstrate the student's mastery of the language and acquaintance with the literature. The examination, which is both written and oral, will be devised in consultation with members of the department. In the term following the qualifying examination, the student will discuss, in a session with the departmental faculty, a prospectus describing the subject and aims of the dissertation. Students are admitted to candidacy for the Ph.D. upon completion of all predissertation requirements, including the prospectus. Admission to candidacy normally occurs by the end of the sixth term.

Teaching is considered to be an important component of the doctoral program in Italian. Students will be appointed as teaching fellows in the third and fourth years of study. Guidance in teaching is provided by the faculty of the department and specifically by the director of language instruction.

## COMBINED PH.D. PROGRAMS

### Italian and Film and Media Studies

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

### Italian and Renaissance Studies

The Department of Italian also offers, in conjunction with the Renaissance Studies Program, a combined Ph.D. in Italian and Renaissance Studies. 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 Language and Literature, Yale University, PO Box 208311, New Haven CT 06520-8311.

## COURSES

### **ITAL 530a, Dante in Translation** Christiana Purdy Moudarres

A critical reading of Dante's *Divine Comedy* and selections from the minor works, with an attempt to place Dante's work in the intellectual and social context of the late Middle Ages by relating literature to philosophical, theological, and political concerns.

### **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.

### **ITAL 643b / CPLT 810b, Renaissance Literature, Philosophy, and Art** Staff

Self-representations of radical novelty in Renaissance texts of literary, philosophical, and visual culture. Outlines of the path to modernity in works by Petrarch, Alberti, Leonardo, Machiavelli, Castiglione, Ariosto, Michelangelo, Aretino, Veronica Franco, Tasso, Cellini, Artemisia Gentileschi, Moderata Fonte, Bruno, Campanella, Galileo, and Vico.

### **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 668b / CPLT 809b, Translating the Renaissance** Staff

Would there have been a Renaissance without translation? We approach this question by beginning with the first modern treatise on translation, by the Florentine chancellor Leonardo Bruni, and moving on to consider the role of translation in Florence's and Tuscany's growing cultural and political mastery over the peninsula—and in Italy's cultural domination of Europe. We go on to explore the translation of “medieval” into “early modern” Europe, the translation of visual into verbal material, and the role of gender in the practice of translation. Students engage in their own translation projects as we dedicate the last part of the seminar to the diffusion of the Petrarchan sonnet tradition in early modern Europe.

### **ITAL 691a or b, Directed Reading** Giuseppe Mazzotta

### **ITAL 700a / CPLT 706a, The New Map of the World: Vico's Poetic Philosophy**

Giuseppe Mazzotta

This course examines Vico's thought globally and in the historical context of the late Renaissance and the Baroque. Starting with Vico's *Autobiography*, working to his University Inaugural Orations, *On the Study of Methods of Our Time*, the seminar delves into his juridical-political texts and submits the second *New Science* (1744) to a detailed analysis. Some attention is given to Vico's poetic production and the encomia he wrote. The overarching idea of the seminar is the definition of Vico's new discourse for the modern age. To this end, discussion deals prominently with issues such as Baroque encyclopedic representations, the heroic imagination, the senses of “discovery,” the

redefinition of “science,” the reversal of neo-Aristotelian and neo-Platonic poetics, the crisis of the Renaissance, and the role of the myth.

**ITAL 705b / CPLT 639b / WGSS 740b, Gender and Genre in Renaissance Love Poetry**

Ayesha Ramachandran

This course interrogates a persistent theme in the literature of the European Renaissance: the love for a much-desired, frequently unobtainable beloved. How and why does love – erotic yearning, sexual passion, unfulfilled desire, religious devotion – become a key subject and metaphor from the fourteenth to the seventeenth century? Focusing on two main poetic genres of the Renaissance – the lyric and the epic-romance – we investigate how questions of desire, love, and gendered subjectivity become a potent means for articulating psychological, social, political, philosophic, and spiritual concerns. Engaging with normative views of gender, erotic discourse, and romantic love from a long historical perspective, this course investigates the development of modern poetry and sexuality in conjunction with each other.

**ITAL 773b, Work, Labor, Rights, Duties, Revolutionary Conscience: Nineteenth Century to the Present** Luigi Ballerini

An analysis of such documents as Marx and Engel’s *Communist Manifesto*, Gramsci’s essays on Americanism and Fordism, the Italian 1947 Constitution, Ferruccio Rossi-Landi’s *Il linguaggio come lavoro e come mercato*, and Alberto Asor Rosa’s *Scrittori e Popolo* serves as background to the reading of novels, essays, and poetry by Giovanni Verga (*Mastro-don Gesualdo*), Matilde Serao (*Ventre di Napoli*), Massimo Bontempelli (522), Paolo Volponi (*Le mosche del capitale*), Ottiero Ottieri (*Donnarumma all’assalto*), Anna Maria Ortese (*Mare non bagna Napoli*), Pier Paolo Pasolini (*Ceneri di Gramsci*), Elio Pagliarani (*La ragazza Carla* and *Ballata di Rudi*), and Nanni Balestrini (*Vogliamo tutto*). The list may be subject to slight variations.

**ITAL 781a / CPLT 705a, The Decameron** Millicent Marcus

An in-depth study of Boccaccio’s text as a journey in genre in which the writer surveys all the storytelling possibilities available to him in the current repertory of short narrative fiction – ranging from ennobling example to flamboyant *fabliaux*, including hagiography, aphorisms, romances, anecdotes, tragedies, and practical jokes – and self-consciously manipulates those forms to create a new literary space of astonishing variety, vitality, and subversive power. In the relationship between the elaborate frame-story and the embedded tales, theoretical issues of considerable contemporary interest emerge – questions of gendered discourse, narratology, structural pastiche, and reader response among them. *The Decameron* is read in Italian or in English. Close attention is paid to linguistic usage and rhetorical techniques in this foundational text of the vernacular prose tradition.

# Law

Sterling Law Building, 203.432.1696  
<http://law.yale.edu/phd>  
M.A., Ph.D.

## Dean

Heather Gerken

## Director of Graduate Studies

To be announced

## FIELDS OF STUDY

The three-year Ph.D. in Law program prepares students who have earned a J.D. to enter law teaching or other careers that require a scholarly mastery of law. The program is designed to give students a broad foundation in the canonical texts and methods of legal scholarship and to support students in producing their own scholarship in the form of a dissertation. The program strongly encourages, but does not require, interdisciplinary approaches to the study of law.

## ADMISSIONS REQUIREMENTS

All applicants must have a J.D. from an accredited United States law school at the time they matriculate and begin the Ph.D. in Law program. Applicants must have taken the Law School Admission Test (LSAT). For other admissions requirements, please see the Ph.D. in Law program's website, <http://law.yale.edu/phd>.

## SPECIAL REQUIREMENTS FOR THE PH.D. DEGREE

Each student will have a faculty advisory committee, which will help select appropriate courses. In their first year, students will take a mandatory two-term seminar on the foundations of legal scholarship, legal theory, and methods and as many as four additional courses. Students may take other courses in the Law School or in other departments or schools at Yale University. Each student's advisory committee may waive up to four courses. The foundations seminar may not be waived and must be taken for a grade, not audited.

Each Ph.D. student will take two qualifying examinations. The first, administered before the start of the second term in the program, will be a written examination built upon a foundation laid by the materials studied in the 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 will be an oral examination administered by the student's advisory committee at the beginning of the second year and no later than October 15 of that year. The oral examination will test whether the student has a sufficiently deep knowledge of the scholarship, theories, and methodologies relevant to the student's area of study. Both qualifying examinations will be graded on a pass/fail basis. A student who fails a qualifying examination may retake it the following term.

After completion of the second qualifying examination, the student will assemble a faculty dissertation committee and prepare a dissertation prospectus. Upon approval of the prospectus, usually by the end of the fourth term, the student will devote the

remaining time in the program to writing a dissertation, which may take the form of a traditional monograph or three publishable scholarly articles. The final dissertation must be approved by both the student's dissertation committee and the Ph.D. Policy Committee.

Students in the Ph.D. in Law program are also expected to meet additional academic requirements in each year of the program, specified below and outlined in greater detail in the Ph.D. in Law Program Manual available from the Graduate Programs Office at Yale Law School. Students who fail to meet program requirements will not be in good standing and may be withdrawn from the program.

All required written work must be judged satisfactory by the student's advisory committee, in consultation with the assistant dean for graduate programs and the director of graduate studies (DGS). A satisfactory article or chapter is one that the student's advisory committee, the assistant dean, and 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; 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 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.

## **GRADUATE RESEARCH ASSISTANT AND TEACHING FELLOW EXPERIENCE**

As part of their training, Ph.D. students must complete two terms of teaching experience. There are a number of ways in which students can fulfill this requirement, which may vary by year. They include: (1) serving as a teaching assistant for a Law

School course; (2) serving as a teaching fellow for a course in Yale College or another school at Yale; (3) co-teaching a course with a faculty member; and (4) in unusual situations, teaching their own course. In all cases, students engaged in teaching will have faculty supervision and feedback from their advisers.

### **MASTER'S DEGREE**

**M.A.** The M.A. degree will be granted to Ph.D. students who are not continuing in the Ph.D. 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 any 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 and their descriptions, see the Law School bulletin, online at <http://bulletin.yale.edu>. For courses in other schools at Yale University, please see their respective bulletins. Specific course selections will be approved by the student's advisory committee and by the DGS.

# Linguistics

370 Temple Street, Rm. 204, 203.432.2450

<http://ling.yale.edu>

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

## Chair

Robert Frank

## Director of Graduate Studies

Claire Bowerman

**Professors** Stephen Anderson (*Emeritus*), Robert Frank, Roberta Frank,\* Laurence Horn (*Emeritus*), Frank Keil,\* Zoltán Szabó,\* Petronella Van Deusen-Scholl (*Adjunct; Center for Language Study*), Raffaella Zanuttini

**Associate Professors** Ryan Bennett, Claire Bowerman, Maria Piñango, Kenneth Pugh (*Adjunct; Haskins Laboratories*)

**Assistant Professors** Jason Shaw, Jim Wood

**Lecturers** Matthew Barros, Hadas Kotek, Kevin Tang

**Supporting faculty in other departments** J. Joseph Errington (*Anthropology*)

\* A joint appointment with primary affiliation in another department.

## FIELDS OF STUDY

Fields include phonetics, phonology, morphology, syntax, semantics, pragmatics, neuro- and psycholinguistics, computational linguistics, historical linguistics, and descriptive study of a variety of languages.

## SPECIAL REQUIREMENTS FOR THE PH.D. DEGREE

### Program Vision

Linguistics at Yale has a long and storied history in traditional approaches to the study of language. Today the department takes a distinctively integrative and interdisciplinary approach in investigating the systems of knowledge that comprise our linguistic competence. We are convinced that an understanding of the human language faculty will arise only through the mutually informing relationship between formally explicit theories and insights from wide-ranging descriptive and experimental work. Thus at Yale, theoretical inquiry grounded in introspection proceeds in partnership with historical and comparative studies, fieldwork, experimental investigations of normal and impaired language processing, cognitive neuroscience, laboratory phonetic analysis, and computational and mathematical modeling. Students in the Ph.D. program are exposed to these methodological approaches, while receiving firm grounding in the traditional domains of linguistics. Ph.D. students participate in research in phonetics, phonology, morphology, syntax, semantics, pragmatics, and historical linguistics, and explore data from a wide variety of languages, both well studied and less well documented, with particular faculty expertise in the Romance, Australian, and Mayan languages.

## Course Work

The conception of linguistics embraced by the Yale Ph.D. program requires that students receive training that is both deep in its coverage of areas of linguistic inquiry and broad in the range of methodological approaches. The course work requirements are designed to accomplish these complementary goals. This course work must include a set of core courses, designed to expose students to core theoretical ideas, together with courses exposing students to a range of methodologies in linguistic research.

During their first six terms, students must complete a minimum of fourteen term courses at the graduate level, of which seven must be completed during the first two terms, and twelve during the first four terms. During the initial two years of course work, students must receive at least three grades of H (= Honors). Two grades of F, or three of P or F, during the initial two-year period constitute grounds for dismissal from the Ph.D. program.

**Core courses** The core requirement ensures that students achieve expertise at the level of the following courses: LING 612, Linguistic Change; LING 620, General Phonetics; LING 635, Phonological Theory; LING 654, Syntax II; LING 663, Semantics I; LING 680, Morphology.

The usual way to demonstrate this expertise will be to take all of these courses. Because several of these courses have prerequisites, students will typically need to take more basic courses in order to prepare themselves for the courses listed here. For example, LING 632, Introduction to Phonological Analysis, serves as a prerequisite for LING 635; and LING 653, Syntax I, is a prerequisite for LING 654; entering students usually take both of these prerequisite courses in the first term. However, students entering the Ph.D. program with sufficient background will be able to place out of antecedent courses. To facilitate placement, reading lists covering the material in the following basic courses will be provided, and students may request to take placement exams in areas in which their previous preparation is such that they could proceed directly to more advanced course work: LING 512, Historical Linguistics; LING 620, General Phonetics; LING 632, Introduction to Phonological Analysis; LING 653, Syntax I; LING 663, Semantics I.

By August 1, entering students may send a request to the DGS for a placement exam in any of these five areas. The exams will be given during the week prior to the fall term. Passing an exam allows the student to place out of the corresponding course. Students placing out of courses are nonetheless expected to complete the same requirement of a minimum of fourteen term courses in the first three years.

**Methodology courses** For the methodology requirement, students must take three relevant courses. The following courses, which are offered regularly by the department, qualify, but other courses may as well, to be determined in consultation with the adviser and DGS: LING 600, Experimentation in Linguistics; LING 624, Formal Foundations of Linguistic Theories; LING 627, Language and Computation I; LING 630, Techniques in Neurolinguistics; LING 631, Neurolinguistics; LING 641, Field Methods.

One of the methodology courses must be taken during the first year of the program, and two must be completed by the end of the second year.



**Seminar courses** Starting in year three and continuing until the prospectus is approved, students are expected to enroll in one seminar course for credit each term. Students should use such seminars as opportunities both for exploring new research areas and, especially, for pushing current research interests in novel directions.

## Research

The primary focus of a Ph.D. program is independent research. In the course of our Ph.D. program, students will learn to carry out cutting-edge linguistic research, culminating in the completion of a dissertation. To help students in the transition from “consuming” to also “producing” linguistic research, there are a number of structures and requirements in place.

1. *Research adviser and first-year directed readings.* By the end of the first term of the program, students will need to find a department faculty member who is willing to serve as their research adviser. This choice should be made on the basis of compatibility of research interests and discussions between the student and faculty member. Starting from the spring term of the first year, 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 are required to keep a research journal, describing their readings and how they fit in with work in the area, and chronicling the development of their thinking about the research topic. It is the faculty's expectation that this exploration will form the foundation for the research reported in the student's first qualifying paper (on which see below). Note however that the initial choice of research adviser is not set in stone: students who want to change their choice of topic or adviser for whatever reason may do so, so long as they are able to find a faculty member who is willing to serve as their adviser on a new topic. It is the student's responsibility to find a suitable adviser, and students are expected to have a faculty adviser at all times during their enrollment in the program.
2. *Portfolio.* At the conclusion of the first year of the program, students must submit to the faculty a portfolio of two research papers, in two distinct subfields. These papers should demonstrate a student's mastery of the material in these fields to the level covered in the core courses in the area, as well as the ability to identify a significant research question and argue for a possible solution. In short, such papers should be at the level of an excellent term paper, representative of a student's best work during the first year of course work. The faculty do not expect students to write papers expressly for the portfolio. Rather, the portfolio will typically consist of versions of term papers from classes taken during the first year in the program, which are then lightly revised on the basis of comments received from the course instructors. The deadline for the submission of these papers is June 15.
3. *Annotated bibliography/research plan.* On the basis of the research journal begun during the first year in the program, students will prepare an annotated bibliography and research plan (ABRP) for their first qualifying paper. The ABRP, which should be approximately twenty pages in length, should lay out the question that the student wants to explore, motivating its importance through a presentation and synthesis of relevant past literature on the topic. The deadline for submission of the ABRP is the beginning of the third week of the fall term.

4. *Qualifying papers.* Once the ABRP has been completed, the student will proceed to work on 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. Because the transition from student to scholar can be a difficult one, we have broken the process of writing the first QP into a number of smaller steps with specific deadlines for each (all during the second year of the program): (a) Students are required to make a presentation of their preliminary results in an appropriate venue (lab meeting, reading group, seminar, etc.) by no later than the end of the fall term. (b) Also by the end of the fall term, the student will send a request for a QP reader to the DGS. This request must include a title and abstract of the project, and may also request specific faculty members to be involved. On the basis of research area and faculty availability, the DGS will identify a faculty member other than the adviser to serve as a QP reader. This reader will be involved in the ultimate evaluation of the QP once it is completed. Because it is useful to get a range of feedback on one's work, we encourage students to make the best use of their QP reader by meeting with them and keeping them up to date on the progress of the project. (c) Students must submit a first draft of their QP to their adviser and reader no later than February 1. (d) Students must make an oral presentation of their work. This oral presentation may take place in the department (typically at a Friday Lunch Talk). Alternatively, the oral presentation requirement may be satisfied via a presentation at a professional conference, provided at least one member of the department faculty is in attendance. (e) Once the QP has been orally presented, students must submit the final version of the paper to their adviser and reader no later than three weeks from the date of presentation.

Toward the end of the spring term of the second year, the student should begin to explore possible areas and advisers for the second QP, and must have identified an area and adviser by the beginning of the fall term of the third year. Students must follow the same steps and deadlines listed above for the second QP, this time during the third year.

5. *Prospectus.* No later than the beginning of the seventh term, students must choose a dissertation topic and find a faculty member who is willing to serve as dissertation adviser. By the end of the seventh term, students will present a dissertation prospectus to the entire faculty. The prospectus should lay out clearly the student's proposed dissertation topic. It should motivate the importance of the topic, present the core idea of the proposed work together with its promise and viability, and demonstrate how this work fits into past research in the area. The prospectus should also identify a dissertation committee. The committee must include at least three faculty members (including the adviser), two of whom must be members of the Linguistics department. The prospectus document should be fifteen to twenty pages in length. After the document is submitted, the prospectus must be defended orally in front of the faculty. Upon successful completion of the prospectus defense, students advance to Ph.D. candidacy.
6. *Dissertation.* By the end of the eighth term, students must complete a chapter of the dissertation, together with a detailed outline of the dissertation and

comprehensive bibliography. At this point (and at one-term intervals thereafter until the completion of the dissertation), the student will meet with the entire dissertation committee, to evaluate progress toward the dissertation. When this committee approves the chapter and dissertation outline, students are eligible for a University Dissertation Fellowship, which will support them in their fifth year of graduate study.

Students are expected to complete their dissertations by the end of the fifth year. At least one month prior to the dissertation filing date, the completed dissertation must be orally defended. This defense will typically involve a public presentation of the main results of the dissertation and oral examination by the members of the dissertation committee. Committee members must be given the completed dissertation no less than two weeks prior to the date of the defense.

## Feedback and Evaluation

At the conclusion of each academic year, all Ph.D. students will receive a written evaluation of their performance in the program, highlighting their strengths and accomplishments, as well as mentioning areas for improvement. Because of the fundamental role played by research in the Ph.D. program, we expect the completion of the research requirements to take highest priority. It is particularly important that students make satisfactory progress toward the first QP and complete all work by the deadlines given above. Failure to do so may result in being asked to leave the program.

## Language Requirement

Students are expected to exhibit some breadth in their knowledge of the languages of the world beyond those most commonly studied (including but not confined to Romance, Germanic, and Slavic languages) and those most similar in structure to the student's first language. LING 641, *Field Methods*, fulfills this requirement; alternatively, with the permission of the DGS, the student may instead take an appropriate language structure class, or one or more classes characterized as L3 or higher at Yale or the equivalent elsewhere. This requirement must be completed before the prospectus defense, when the student advances to Ph.D. candidacy.

## Teaching Fellow/Research Assistant Requirements

The faculty regard teaching experience as an integral part of the graduate training program in Linguistics. All students are required to serve as Teaching Fellows for a minimum of two terms, usually beginning in the first term of the third year. In addition, students must complete two additional terms of assistantship. These may be either as a Teaching Fellow, or through participation in externally supported, supervised research as a Research Fellow. Research assistantships may be provided by the Linguistics faculty and by various Yale and Yale-affiliated units. Before accepting a research assistantship in fulfillment of this requirement, students must receive approval from the DGS. To be approved, a research assistantship must meet the following criteria:

1. It must be supervised by a Linguistics department faculty member or a faculty member from an affiliated unit, such as Haskins Laboratories or the Yale School of Medicine.

2. It must provide research experience that complements the student's academic plan of study.
3. It must provide at least ten hours of experience per week.

If an approved research assistantship is accepted that does not provide a stipend equal to the standard departmental stipend, a University Fellowship will be provided to augment the stipend so as to bring it up to the departmental standard.

## MASTER'S DEGREES

**M.Phil.** Students in the doctoral program who complete all requirements for the Ph.D. apart from the submission of a completed dissertation (but including the presentation and successful defense of a dissertation prospectus) may petition for the M.Phil. degree.

**M.A. (en route to the Ph.D.)** Students in the doctoral program who successfully complete the course work, examinations, and work samples required by the end of the second year of graduate study (see above) may petition for the M.A. degree.

Program materials are available online at <http://ling.yale.edu>.

## COURSES

### **LING 510a, Introduction to Linguistics** Jim Wood

The goals and methods of linguistics. Basic concepts in phonology, morphology, syntax, and semantics. Techniques of linguistic analysis and construction of linguistic models. Trends in modern linguistics. The relations of linguistics to psychology, logic, and other disciplines.

### **LING 512a, Historical Linguistics** Staff

Introduction to language change and language history. Types of change that a language undergoes over time: sound change, analogy, syntactic and semantic change, borrowing. Techniques for recovering earlier linguistic stages: philology, internal reconstruction, the comparative method. The role of language contact in language change. Evidence from language in prehistory.

**LING 513a / CLSS 607a / NELC 562a, Indo-European Linguistics** Kevin Van Bladel  
An introduction to the inner workings and prehistory of the Indo-European languages both as a language family and in individual branches. It is a course in historical linguistics devoted to the best understood of language families, Indo-European. The emphasis is on using the theoretical framework obtained by this knowledge, especially through practical applications for readers of ancient languages such as Greek, Latin, Hittite, Sanskrit, Avestan, and Middle Persian.

### **LING 515a / SKRT 510a, Introductory Sanskrit I** David Brick

An introduction to Sanskrit language and grammar. Focus on learning to read and translate basic Sanskrit sentences in the Indian Devanagari script. No prior background in Sanskrit assumed. Credit only on completion of LING 525/SKRT 520.

### **LING 517a, Language and Mind** Maria Piñango

Knowledge of language as a component of the mind: mental grammars, the nature and subdivisions of linguistic knowledge in connection with the brain. The logical problem of language acquisition. The "universal grammar hypothesis" according to which all humans have an innate ability to acquire language. The connection between language acquisition and general cognitive abilities.

**LING 518a, The Mohegan Language** Staff

Introduction to the Mohegan language, one of the Algonquian (Native American) languages of Connecticut. Emphasis on acquiring speaking competence. How to put words together, sound system, sentences. Regular speaking, writing, and reading practice, interspersed with cultural and historical information.

**LING 525b / SKRT 520b, Introductory Sanskrit II** David Brick

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 / SKRT 530a, Intermediate Sanskrit I** David Brick

The first half of a two-term sequence aimed at helping students develop the skills necessary to read texts written in Sanskrit. Readings include selections from the *Hitopadesa*, *Kathasaritsagara*, *Mahabharata*, and *Bhagavadgita*. Prerequisite: LING 525 or equivalent.

**LING 548b / SKRT 540b, Intermediate Sanskrit II** David Brick

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 602b, The Linguistics of the Voynich Manuscript** Claire Bowers

Introduction to basic ideas of linguistics and cryptography through study of the Voynich Manuscript (MS 408), a mysterious medieval manuscript held in the Beinecke Library. Review of major hypotheses about the manuscript, ranging from the fake, to code, to undeciphered language.

**LING 611b, Grammatical Diversity in U.S. English** Raffaella Zanuttini

Language as a system of mental rules, governing the sound, form, and meaning system. The (impossible) distinction between language and dialect. The scientific study of standard and nonstandard varieties. Social attitudes toward prestige and other varieties; linguistic prejudice. Focus on morpho-syntactic variation in North American English: alternative passives ("The car needs washed"), personal datives ("I need me a new printer"), negative inversion ("Don't nobody want to ride the bus"), "drama SO" ("I am SO not going to study tonight").

**LING 612b, Linguistic Change** Claire Bowers

Principles governing linguistic change in phonology and morphology. Status and independence of proposed mechanisms of change. Relations between the principles of historical change and universals of language. Systematic change as the basis of linguistic comparison; assessment of other attempts at establishing linguistic relatedness. Prerequisites: LING 512, 632, and 653.

**LING 620b, General Phonetics** Staff

Investigation of possible ways of describing the speech sounds of human languages. Tools to be developed: acoustics and physiology of speech; computer synthesis of speech; practical exercises in producing and transcribing sounds.

**LING 627a, Language and Computation I** Robert Frank

Design and analysis of computational models of language. Topics include finite state tools, computational morphology and phonology, grammar and parsing, lexical

semantics, and the use of linguistic models in applied problems. Prerequisite: prior programming experience or permission of the instructor.

**LING 632a, Introduction to Phonological Analysis** Staff

The structure of sound systems in particular languages. Phonemic and morphophonemic analysis, distinctive-feature theory, formulation of rules, and problems of rule interpretation. Emphasis on problem solving. Prerequisite: LING 510 or 620.

**LING 634a, Quantitative Linguistics using Corpora** Staff

Introduction to the basics of corpus linguistics. Students learn to compile and process corpora and conduct statistical tests to better understand linguistic patterns and are provided with the background and tools necessary to pursue further research in this area. Digital humanities students from other departments are welcome. Prerequisite: one entry-level linguistics course (e.g., phonetics, phonology, syntax, and psycholinguistics) or permission of the instructor.

**LING 635b, Phonological Theory** Staff

Topics in the architecture of a theory of sound structure. Motivations for replacing a system of ordered rules with a system of ranked constraints. Optimality theory: universals, violability, constraint types, and their interactions. Interaction of phonology and morphology, as well as relationship of phonological theory to language acquisition and learnability. Opacity, lexical phonology, and serial versions of optimality theory. Prerequisite: LING 632 or permission of the instructor.

**LING 636a, Articulatory Phonology** Staff

Introduction to phonology as a system for combining units of speech (constriction gestures of the vocal organs) into larger structures. Analysis of articulatory movement data; modeling using techniques of dynamical systems. Emphasis on universal vs. language-particular aspects of gestural combination and coordination. Prerequisite: LING 520 or permission of the instructor.

**LING 641a, Field Methods** Staff

Principles of phonetics, phonology, morphology, syntax, and semantics applied to the collection and interpretation of novel linguistic data. Data are collected and analyzed by the class as a group, working directly with a speaker of a relatively undocumented language.

**LING 645b, Topics in Language Comparison: Mohegan and Delaware** Staff

Advanced practical use of techniques in historical linguistics and language documentation to further the available language revitalization materials for Mohegan, an Algonquian language of Connecticut.

**LING 653a, 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 654b, Syntax II** Jim Wood

Recent developments in syntactic theory: government and binding, principles and parameters, and minimalist frameworks. In-depth examination of the basic modules of grammar (lexicon, X-bar theory, theta-theory, case theory, movement theory).

Comparison and critical evaluation of specific syntactic analyses. Prerequisite: LING 653.

**LING 663a, Semantics I** Matthew Barros

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 672b, Formal Pragmatics** Matthew Barros

The function of definite and indefinite noun phrases in discourse, the notions of topic and focus, discourse representation theory, presupposition, and implicature. Formal tools necessary to do original research in pragmatics, the subfield of linguistics concerned with language use in context.

**LING 675a, Pragmatics** Laurence Horn

Context-dependent aspects of meaning and inference. Speech act theory, presupposition, implicature. Role of pragmatics in the lexicon and in meaning change. The semantics-pragmatics distinction from different perspectives; the position of pragmatics in linguistic theory.

**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 735a, Information Structure and Linguistic Communication** Maria Piñango

Language use is serial and local (occurs in real time), yet it is able to convey information which by definition is multidimensional and atemporal. What is the structure of the human cognitive system, including the reasoning system, such that it can support this multilayered parsing task? The seminar investigates models of how information is structured in real time and how such structure serves communication building on two hypotheses: (1) that the constrained nature of linguistic meaning composition (including information structural constraints) is intimately connected to the organizational properties of the human cognitive system, and (2) that such a connection is rooted in the dynamics of contextual relevance and perspective. Readings are drawn from a variety of perspectives including functional and formal pragmatics, cognitive psychology, and model-theoretic and lexico-conceptual semantics.

**LING 760a, Copular Clauses: Meaning, Structure, and Use** Matthew Barros

The proper analysis of copular clause structure, interpretation, and usage in discourse. Comparison between English and other languages. Focus on current open questions in the field surrounding different types of copular clauses: existentials (There's a dog in the garden), locatives (A dog is in the garden), presentatives (Here's Jack), and different kinds of clauses in Higgins' taxonomy.

**LING 779b, Morphology and Syntax Interface** Jim Wood

A research seminar in which original research is surveyed and discussed critically. The course is appropriate for advanced undergraduates with some training in linguistics (and/or who are conducting research for senior theses), and graduate students who are conducting original research.

**LING 790a, Research Methods** Raffaella Zanuttini

An introduction to research methods in linguistics. Observational and experimental approaches to research in the field. Topics include collection and organization of linguistic data, basic field methods, and use of language corpora and databases.

Introduction to research in language acquisition and language change. Prerequisites: one course in syntax and one course in phonology.



# Management

Edward P. Evans Hall, Rm. 5125A, 203.432.6002  
<http://phd.som.yale.edu>  
 M.A., M.Phil., Ph.D.

## Dean

Edward Snyder

## Director of Graduate Studies

Matthew Spiegel (Evans Hall, Rm. 4526, 203.432.6017, [matthew.spiegel@yale.edu](mailto:matthew.spiegel@yale.edu))

**Professors** Rick Antle, Nicholas Barberis, James Baron, Paul Bracken, Zhiwu Chen, Judith Chevalier, James Choi, Ravi Dhar, Jonathan Feinstein, Shane Frederick, William Goetzmann, Gary Gorton, Jonathan Ingersoll, Edward Kaplan, James Levinsohn, Andrew Metrick, A. Mushfiq Mobarak, Barry Nalebuff, Nathan Novemsky, Sharon Oster, Edieal Pinker, Benjamin Polak, Douglas Rae, K. Geert Rouwenhorst, Peter Schott, Fiona Scott-Morton, Subrata Sen, Robert Shiller, Jiwoong Shin, Edward Snyder, Olav Sorenson, Matthew Spiegel, K. Sudhir, Shyam Sunder, Arthur Swersey, Jacob Thomas, Heather Tookes, Amy Wrzesniewski, Gal Zauberman, X. Frank Zhang

**Associate Professors** Victoria Brescoll, Daylian Cain, Arthur Campbell, Rodrigo Canales, Lisa Kahn, Sang-Hyun Kim, Marissa King, Donald Lee, Justin Murfin

**Participating Faculty from the School of Management** Jason Abaluck, Saed Alizamir, Lorenzo Caliendo, Zoë Chance, Jason Dana, Joyee Deb, Florian Ederer, Constanca Esteves-Sorenson, Stanley Garstka, Jeffrey Garten, Roger Ibbotson, Ivana Katic, Ahmed Khwaja, Thomas Kolditz, Kalin Kolev, Balázs Kovács, Michael Kraus, Vineet Kumar, Alina Lerman, Vahideh Manshadi, Alan Moreira, Tyler Muir, George Newman, Marina Niessner, Amandine Ody-Brasier, Taly Reich, Jeffrey Sonnenfeld, Thomas Steffen, Kosuke Uetake, Victor Vroom, Kevin Williams

## FIELDS OF STUDY

Current fields include accounting, financial economics, marketing (behavioral), marketing (quantitative), operations, and organizations and management.

## SPECIAL ADMISSIONS REQUIREMENTS

The GRE General Test or the GMAT Test is required by the Graduate School. Applicants whose native language is not English must take the Test of English as a Foreign Language (TOEFL).

## CORE REQUIREMENTS FOR THE PH.D. DEGREE

All students are required to take the Ph.D. Student Research Workshop (MGMT 780) and each individual program's seminar and workshop series in every term throughout their years in residence. These are not counted as part of the required number of courses specified below for each of the individual programs. All of the programs are full-time, requiring that all students be in residence at Yale during the academic year as well as the summer months. Teaching is considered to be an important part of the doctoral program in Management. Students are expected to serve as teaching fellows in

one term of their residence. Additional requirements in each program of study are listed below.

### SPECIAL REQUIREMENTS IN ACCOUNTING

The specialization in Accounting prepares students to become accounting scholars engaged in research and teaching at the highest levels in the general areas of financial information and contracting within and across organizations. It is designed to develop strong theoretical and empirical skills. There is heavy emphasis on students' original research, which is supported through courses, presentations, feedback, joint work, and informal interactions with the faculty and fellow students in accounting and other disciplines.

The general structure of the program is as follows. During the first four terms of study, students take a minimum of twelve courses in addition to attending conference and seminar presentations and other academic activities. Courses are selected in consultation with the faculty advisers and the director of graduate studies (DGS). The summer months at the end of years one and two are devoted to completing original research papers (due by September 1 and October 1, respectively). After four terms in the program (typically by mid-June), students take a faculty-written three-day qualifying exam aimed at assessing their intellectual readiness to start dissertation research. They remain in residence for five years while they receive a stipend. During this period each student is assigned to a member of the faculty as a research assistant. Students also have the option of accepting teaching assistantships. To register for their seventh term of study, students submit an approved dissertation prospectus. Students are expected to complete their dissertations by the end of the sixth year but may petition for a seventh year of study if academically necessary.

### SPECIAL REQUIREMENTS IN FINANCIAL ECONOMICS

The specialization in Financial Economics prepares students to launch a career in academic finance. Students should seek out faculty with whom they may wish to work early in the process to ensure a smooth transition from one stage of the program to the next.

Students are required to take twelve courses. In the first year of study, students are expected to take Financial Economics I (MGMT 740), Financial Economics II (MGMT 741), General Economic Theory: Microeconomics (ECON 500 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.

**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 fourteen Ph.D.-level courses in their first two years of study: one microeconomics course (ECON 545); two empirical methods courses (e.g., PSYC 518, S&DS 563); five depth courses (MGMT 750, MGMT 753, MGMT 754, MGMT 758; PSYC 543 or PSYC 601, or INP 597); and six electives (from MGMT 703; PSYC 509, PSYC 607, PSYC 610, PSYC 621, PSYC 749; S&DS 530). Students may take other courses as electives if the faculty adviser permits. Students are expected to obtain at least two Honors grades and a High Pass average in the remaining twelve courses.

**Research papers** Students are expected to write original research papers during the summers after their first and second years of study. Either paper may be coauthored with others students or faculty. Students select a faculty adviser for each paper and work with him or her during the summer to develop the paper. The first paper must be presented in the Ph.D. Student Research Workshop during the fall term of the student's second year of study. The second paper must be presented in the Ph.D. Student Research Workshop in the student's third year of study.

**Qualifying exam** Students must successfully complete the qualifying exam in Marketing at the end of their second year of study. The exam is administered no later than June 15. A student who fails to successfully complete the exam may retake it once;

retakes are generally scheduled during August of the year in which the student first took the exam. A second failure results in dismissal from the program.

**Dissertation** The dissertation typically consists of three essays which are completed in the student's third through fifth years of study. Prior to starting work on the dissertation, the student must write a dissertation prospectus and finalize 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 fourteen 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); four depth courses (MGMT 750, MGMT 755; MGMT 753, MGMT 754, or MGMT 758); and six 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); five depth courses (MGMT 731, MGMT 733, MGMT 734, MGMT 736; PSYC 629); two 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 at least two additional electives chosen in consultation with the adviser. Beginning in their third year, students are also expected to present in the Organizations and Management Workshop once per year.

**Research papers and qualifying exam** During the summer after the first year of study, each student collaborates on a research paper with a faculty member. An initial draft of the paper should be completed by September 30, and the completed paper should be approved by two faculty members and submitted by 5 p.m. of the last day of classes of the fall term. Students will present these coauthored papers in the Ph.D. Student Research Workshop in the fall of the second year.

During the summer after the second year of study, each student works on a research paper under the guidance of a faculty member. An initial draft of the paper should be submitted by 5 p.m. of the last business day in October of the student's third year of study. Students will present these papers in the Ph.D. Student Research Workshop in their third year of study. The second summer paper is considered the qualifying exam and will be vetted by both the Organizations and Management faculty and the DGS.

**Dissertation** Once students have completed their course work, first-year paper, and qualifying exam, they may apply for admission to candidacy. As part of this application, students must submit a proposal for their planned dissertation and form a four-person dissertation committee to advise this research. Admission to candidacy depends on approval of the proposed plan of study and a comprehensive review of the student's performance by the faculty; completion of the requirements listed above does not guarantee admission. Students must be admitted to candidacy prior to their fourth year of study.

## 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** Shyam Sunder

Study of analytical modeling techniques in accounting research that covers topics such as performance measurement for incentives, the consequences of asymmetric information in economic relationships and the role of accounting therein, information sharing within and across firms, and the pricing of related-party transactions.

### **MGMT 702b, Seminar in Accounting Research III** Jacob Thomas and Frank Zhang

Study of empirical accounting research that covers topics such as valuation, pricing of accounting information, earnings management, reporting issues, accounting regulation, analyst forecasts, and auditing.

### **MGMT 720a, Models of Operations Research and Management** Vahideh Manshadi

### **MGMT 735a, Research Methods** Balazs Kovacs

This course is an introduction to the methods of the social sciences, focusing on issues raised by management research. The term "research methods" embraces all stages of the research process from how to identify and formulate interesting research problems to the design of appropriate research methods to investigate the chosen problem. This course is not intended to make students experts in research design or in any particular research method. Rather, it is a "sample platter" designed to acquaint them with the various approaches available. The course presumes that students will move on to more specialized and advanced methods courses as they develop clarity on the research questions that interest them and the methodologies appropriate to those questions and their field of study.

### **MGMT 736b, Organizations and Management I: Inside Organizations** Amy

Wrzesniewski and Michael Kraus

This course, taught every other year, reviews economic, psychological, and sociological perspectives on the internal behavior of organizations. Sessions are generally organized around phenomena and jointly taught by two instructors from different perspectives.

### **MGMT 737a, Applied Empirical Methods** Olav Sorenson

### **MGMT 740a / ECON 670a, Financial Economics I** Jonathan Ingersoll

Current issues in theoretical financial economics are addressed through the study of current papers. Focuses on the development of the problem-solving skills essential for research in this area.



**MGMT 744b, Household Finance** James Choi**MGMT 745b / ECON 672b, Behavioral Finance** Nicholas Barberis

Much of modern financial economics works with models in which agents are rational, in that they maximize expected utility and use Bayes's law to update their beliefs. Behavioral finance is a large and active field that studies models in which some agents are less than fully rational. Such models have two building blocks: limits to arbitrage, which make it difficult for rational traders to undo the dislocations caused by less rational traders; and psychology, which catalogues the kinds of deviations from full rationality we might expect to see. We discuss these two topics and then consider a number of applications: asset pricing (the aggregate stock market and the cross-section of average returns); individual trading behavior; and corporate finance (security issuance, corporate investment, and mergers).

**MGMT 746b / ECON 674b, Financial Crises** Gary Gorton 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 and permission of the instructor.

**MGMT 748a, Empirical Corporate Finance** Marina Niessner**MGMT 751b, Seminar in Marketing I** Jiwoong Shin

Current issues in marketing related to product planning, pricing, advertising, promotion, sales force management, channels of distribution, and marketing strategy are addressed through the study of state-of-the-art papers.

**MGMT 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 757a, Designing and Conducting Experimental Research** Gal Zauberman

This course discusses how to effectively generate, design, evaluate, report, and present behavioral research. Topics include theory development, idea generation, increasing statistical power, internal vs. external validity, between vs. within-subjects designs, psychological measurement, survey research methods, the publication process, writing high-quality abstracts and journal articles, and presenting research findings. This course offers a very practical, learning-by-doing approach. In addition to discussing the weekly readings, class sessions offer students ample opportunity to practice (1) generating appropriate and effective experimental designs, (2) generating high-quality survey questions, (3) critiquing and reviewing existing research, and (4)



presenting research findings. This course is primarily for Ph.D. students intent on pursuing an academic career conducting behavioral research in psychology, marketing, organizational behavior, or a related field.

**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 780a or b, Ph.D. Student Research Workshop** Matthew Spiegel

**MGMT 781a or b, Workshop** Staff

781-01, Accounting/Finance Workshop; 781-03, Marketing Workshop; 781-04, Organizations and Management Workshop; 781-05, Operations Workshop.

**MGMT 782a or b, Doctoral Student Pre-Workshop Seminar** Staff

782-01, Accounting Doctoral Student Pre-Workshop Seminar; 782-02, Financial Economics Doctoral Student Pre-Workshop Seminar; 782-03, Marketing Doctoral Student Pre-Workshop Seminar; 782-04, Organizations and Management Doctoral Student Pre-Workshop Seminar; 782-05, Operations Doctoral Student Pre-Workshop Seminar.

**MGMT 792a or b, Predissertation Research** Staff

By arrangement with individual faculty.

# Mathematics

10 Hillhouse Avenue, 203.432.4172

<http://math.yale.edu>

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

## Chair

Igor Frenkel

## Director of Graduate Studies

Zhiwei Yun

**Professors** Andrew Casson, Ronald Coifman, Igor Frenkel, Alexander Goncharov, Peter Jones, Gil Kalai (*Adjunct*), Alexander Lubotzky (*Adjunct*), Gregory Margulis, Yair Minsky, Vincent Moncrief (*Physics*), Hee Oh, Sam Payne, Nicholas Read (*Physics; Applied Physics*), Vladimir Rokhlin (*Computer Science*), Daniel Spielman (*Computer Science*), Van Vu, John Wettlaufer (*Geology & Geophysics; Physics*), Zhiwei Yun, Gregg Zuckerman

**Assistant Professors** Matthew Durham, Stefan Steinerberger

## FIELDS OF STUDY

Fields include real analysis, complex analysis, functional analysis, classical and modern harmonic analysis; linear and nonlinear partial differential equations; dynamical systems and ergodic theory; geometric analysis; kleinian groups, low dimensional topology and geometry; differential geometry; finite and infinite groups; geometric group theory; finite and infinite dimensional Lie algebras, Lie groups, and discrete subgroups; higher Teichmüller theory and cluster varieties; representation theory; automorphic forms, L-functions; algebraic number theory and algebraic geometry; derived algebraic geometry, and periods and motives; tropical algebraic geometry; tomography and integral geometry; mathematical physics, quantum field theory, relativity, numerical analysis; combinatorics and discrete mathematics.

## SPECIAL REQUIREMENTS FOR THE PH.D. DEGREE

All students are required to: (1) complete eight term courses at the graduate level, at least two with Honors grades; (2) pass qualifying examinations on their general mathematical knowledge; (3) submit a dissertation prospectus; (4) participate in the instruction of undergraduates; (5) be in residence for at least three years; and (6) complete a dissertation that clearly advances understanding of the subject it considers. The normal time for completion of the Ph.D. program is five years. Requirement (1) should be completed by the end of the second year. A sequence of three qualifying examinations (algebra and number theory, real and complex analysis, topology) is offered each term, at intervals of about one month. All qualifying examinations must be taken by the end of the third term. The thesis is expected to be independent work, done under the guidance of an adviser. This adviser should be contacted not long after the student passes the qualifying examinations. A student is admitted to candidacy after completing requirements (1)–(5) and obtaining an adviser.

In addition to all other requirements, students must successfully complete MATH 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, most Mathematics students are required to assist in teaching during five terms. Students in years one and two serve as tutors and graders in undergraduate mathematics courses during one term per year. The department also offers a required teaching practicum in year two. In years three through five, students normally teach one section of calculus or its equivalent during one term per year. Students receiving external fellowships may petition for a waiver of teaching while receiving external funding in place of University funding, but they are still required to teach one section of calculus or its equivalent for a minimum of two terms over the course of their program.

## MASTER'S DEGREES

**M.Phil.** In addition to the Graduate School's Degree Requirements (see under Policies and Regulations), a student must undertake a reading program of at least two terms' duration in a specific significant area of mathematics under the supervision of a faculty adviser and demonstrate a command of the material studied during the reading period at a level sufficient for teaching and research.

**M.S. (en route to the Ph.D.)** A student must complete six term courses with at least one Honors grade, perform adequately on the general qualifying examination, and be in residence at least one year. The M.S. degree is conferred only en route to the Ph.D.; there is no separate master's program in Mathematics.

Program materials are available upon request to the Director of Graduate Studies, Mathematics Department, Yale University, PO Box 208283, New Haven CT 06520-8283.

## COURSES

### **MATH 500a, Modern Algebra I** Staff

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 501b, Modern Algebra II** Staff

Topics in commutative algebra: general extension of fields; Noetherian, local, and Dedekind rings. Introduction to valuation theory. Rudiments of algebraic geometry. After MATH 500.

### **MATH 515b, Intermediate Complex Analysis** Staff

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** Staff

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** Staff

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** Staff

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** Staff

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 573b, Algebraic Number Theory** Staff

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; adeles and ideles; zeta functions.

**MATH 991a / CPSC 991a, Ethical Conduct of Research** Vladimir Rokhlin

o Course cr

# Mechanical Engineering & Materials Science

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

## Chair

Udo Schwarz

## Director of Graduate Studies

Jan Schroers (jan.schroers@yale.edu)

**Professors** Charles Ahn, Ira Bernstein (*Emeritus*), Juan Fernández de la Mora, Alessandro Gomez, Sohrab Ismail-Beigi, Shun-Ichiro Karato, Marshall Long, Brian Scassellati, Jan Schroers, Udo Schwarz, Mitchell Smooke

**Associate Professors** Aaron Dollar, Corey O'Hern

**Assistant Professors** Eric Brown, Judy Cha, Rebecca Kramer-Bottiglio, Madhusudhan Venkadesan

**Lecturers** Beth Anne Bennett, Kailasnath Purushothaman, Joseph Zinter

## FIELDS OF STUDY

**Fluids and thermal sciences** Suspensions; electrospray theory and characterization; electrical propulsion applications; electrified and magnetized interfaces of electrically conducting liquids and ferrofluids; combustion and flames; computational methods for fluid dynamics and reacting flows; turbulence; laser diagnostics of reacting and nonreacting flows; and magnetohydrodynamics.

**Soft matter/complex fluids** Jamming and slow dynamics in gels, glasses, and granular materials; mechanical properties of soft and biological materials; and structure and dynamics of 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 properties of two-dimensional layered materials; amorphous metals and nanomaterials including nanocomposites, characterization of crystallization and other phase transformations; nanoimprinting; atomic-scale investigations of surface interactions and properties; classical and quantum nanomechanics; nanotribology; nanostructured energy applications; nanoparticle synthesis for energy applications; combinatorial materials science; and in situ transmission electron and scanning probe microscopy.

**Robotics/mechatronics** Machine and mechanism design; dynamics and control; robotic grasping and manipulation; human-machine interface; rehabilitation robotics; haptics; 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 admissions and degree requirements, see Engineering & Applied Science.

For course listings, see Engineering & Applied Science.

## Medieval Studies

53 Wall Street, Rm. 310, 203.432.0672

<http://medieval.yale.edu>

Ph.D.

### Chair and Director of Graduate Studies

To be announced

**Executive Committee** R. Howard Bloch, Jessica Brantley, Ardis Butterfield, Stephen Davis, Roberta Frank, Paul Freedman, Dimitri Gutas, Ivan Marcus, Giuseppe Mazzotta, Alastair Minnis, Robert Nelson, Anders Winroth

**Faculty associated with the program** R. Howard Bloch, Gerhard Böwering, Jessica Brantley, Ardis Butterfield, Walter Cahn (*Emeritus*), Marcia Colish (*Emerita*), Stephen Davis, Roberta Frank, Paul Freedman, Creighton Gilbert (*Emeritus*), Walter Goffart (*Emeritus*), Harvey Goldblatt, Frank Griffel, Dimitri Gutas, Valerie Hansen, Peter Hawkins, Jacqueline Jung, Traugott Lawler (*Emeritus*), Ivan Marcus, Vasileios Marinis, Giuseppe Mazzotta, Mary Miller, Alastair Minnis, Robert Nelson, Henry Parkes, Fred Robinson (*Emeritus*), Barbara Shailor, Denys Turner (*Emeritus*), Anders Winroth, Mimi Hall Yiengpruksawan, Anna Zayarnaya

**Lecturer** Raymond Clemens

### FIELDS OF STUDY

Fields in this interdisciplinary program include history, history of art, history of music, religious studies, languages and literatures, linguistics, and philosophy.

### SPECIAL ADMISSIONS REQUIREMENTS

The General Test of the GRE is required. A writing sample of ten to twenty pages should be included with the application.

### SPECIAL REQUIREMENTS FOR THE PH.D. DEGREE

Languages required are Latin, French, and German. Latin may be replaced with Arabic, Greek, or Hebrew when appropriate. Proficiency in Latin, Arabic, Greek, and Hebrew is tested with an examination administered and evaluated by the program during the first term. Proficiency in French and German is demonstrated by passing the departmental examinations and should be achieved by the third term. Students will design their programs in close contact with the director of graduate studies (DGS). During the first two years students take fourteen term courses, and must receive an Honors grade in at least four term courses the first year. Students take an oral examination, usually in the fifth term, on a set of three topics worked out in consultation with the DGS. Then, having nurtured a topic of particular interest, the student submits a dissertation prospectus that must be approved by the end of the third year. Upon completion of all predissertation requirements, including the prospectus, students are admitted to candidacy for the Ph.D. degree. What remains, then, is the writing, submission, and approval of the dissertation during the final two years.

Students in Medieval Studies participate in the Teaching Fellows Program in the third and fourth years.

## COURSES

### **MDVL 550a or b, Directed Reading** Staff

By arrangement with faculty.

### **MDVL 555a / HIST 542a, Law in Medieval Europe** Anders Winroth

This seminar explores the creation in the twelfth and thirteenth centuries of a sophisticated system of law, the European Common Law (*ius commune*). All late medieval and much modern legislation is based on this legal system. The course focuses on its roots in the Roman law of Emperor Justinian and in ecclesiastical legislation. We also study the influence of the *ius commune* on national and local medieval law. The emphasis is on using law in historical research and in learning the technical skills necessary. Prerequisite: facility with Latin or another relevant medieval language.

### **MDVL 563b / CLSS 602b, Advanced Latin Paleography** Barbara Shailor

The challenges of using hand-produced Latin manuscripts in research, with an emphasis on texts from the late Middle Ages. Gothic cursive scripts and book hands ca. 1200–ca. 1500; fragments of unidentified codices; complex or composite codices with heavy interlinear and marginal annotations. Manuscripts and fragments selected largely from collections in the Beinecke Library. Prerequisite: CLSS 601 or permission of the instructor.

### **MDVL 580a / NELC 548a, Ancient and Medieval Astronomy: From Babylonian to Greek to Arabic to Latin** Kevin Van Bladel

Astronomy was one of the seven classical liberal arts. This course introduces the history and methods of classical astronomy as practiced by ancient and medieval astronomers of Assyria and Babylonia, Greece, Rome, and Persia; and by medieval scholars in Latin, Arabic, and Sanskrit, down to the time of Copernicus and Kepler.

### **MDVL 581b / NELC 549b, Reading Classical Arabic Scholarship** Kevin Van Bladel

This course studies a tenth-century overview of the sciences in classical Arabic and meaningful excerpts of additional texts representing each science covered. Students acquire a large vocabulary of scholarly and technical terms of art as used in classical Arabic, facilitating further research in traditional Arabic scholarship.

### **MDVL 611a, Medieval Latin for Sinners and Saints** John Dillon

An introductory reading course in Late Antique and Medieval Latin that is intended to help students interested in Christian Latin sources improve their reading ability. The primary objective is to familiarize students with Medieval Latin and improve their proficiency in reading and translating Medieval Latin texts. Students learn to recognize the features (grammatical and syntactical) that make Medieval Latin distinct, improve their overall command of Latin by reviewing grammar and syntax, and gain an appreciation of the immense variety of texts written in Medieval Latin.

### **MDVL 612b / HIST 537b, The Mediterranean in Late Antiquity and the Middle Ages** Paul Freedman

This course looks at the Mediterranean in late antiquity and the Middle Ages. How unified or diverse was this area in terms of climate, cultures, and populations? Historiography of the Mediterranean includes works by Braudel, Abulafia, McNeil, Horden, and Purcell.

# 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

## Registrar

Corey Brushett

**Professors** Serap Aksoy (*Epidemiology*), Susan Baserga (*Molecular Biophysics & Biochemistry; Genetics; Therapeutic Radiology*), Ronald Breaker (*Molecular, Cellular & Developmental Biology; Molecular Biophysics & Biochemistry*), Richard Bucala (*Internal Medicine; Epidemiology; Pathology*), Michael Cappello (*Pediatrics; Epidemiology; Microbial Pathogenesis*), Yung-Chi Cheng (*Pharmacology*), Peter Cresswell (*Immunobiology; Cell Biology*), Daniel DiMaio (*Genetics; Molecular Biophysics & Biochemistry; Therapeutic Radiology*), Erol Fikrig (*Internal Medicine; Epidemiology; Microbial Pathogenesis*), Durland Fish (*Emeritus, Microbial Diseases*), Richard Flavell (*Immunobiology*), Jorge Galán (*Microbial Pathogenesis; Cell Biology*), Eduardo Groisman (*Microbial Pathogenesis*), Akiko Iwasaki (*Immunobiology; Molecular, Cellular & Developmental Biology*), Christine Jacobs-Wagner (*Molecular, Cellular & Developmental Biology; Microbial Pathogenesis*), Susan Kaech (*Immunobiology*), Albert Ko (*Epidemiology; Internal Medicine*), Diane McMahon-Pratt (*Epidemiology*), Ruslan Medzhitov (*Immunobiology*), I. George Miller (*Pediatrics; Epidemiology; Molecular Biophysics & Biochemistry*), Walther Mothes (*Microbial Pathogenesis*), Melinda Pettigrew (*Epidemiology*), John Rose (*Pathology*), Craig Roy (*Microbial Pathogenesis; Immunobiology*), Nancy Ruddle (*Emerita, Epidemiology*), Clifford Slayman (*Cellular & Molecular Physiology*), Dieter Söll (*Molecular Biophysics & Biochemistry; Chemistry*), William Summers (*Emeritus, Molecular Biophysics & Biochemistry*), Joann Sweasy (*Therapeutic Radiology; Genetics*), Peter Tattersall (*Laboratory Medicine; Genetics*), Christian Tschudi (*Epidemiology*), Paul Turner (*Ecology & Evolutionary Biology*)

**Associate Professors** Choukri Ben Mamoun (*Internal Medicine; Microbial Pathogenesis*), Andrew Goodman (*Microbial Pathogenesis*), Farren Isaacs (*Molecular, Cellular & Developmental Biology*), Barbara Kazmierczak (*Internal Medicine; Microbial Pathogenesis*), Priti Kumar (*Internal Medicine/Infectious Diseases*), Brett Lindenbach (*Microbial Pathogenesis*), John MacMicking (*Microbial Pathogenesis; Immunobiology*), Carla Rothlin (*Immunobiology*), Christian Schlieker (*Molecular Biophysics & Biochemistry; Cell Biology*), Richard Sutton (*Internal Medicine; Microbial Pathogenesis*), Jeffrey Townsend (*Biostatistics; Ecology & Evolutionary Biology*), Yong Xiong (*Molecular Biophysics & Biochemistry*)

**Assistant Professors** Murat Acar (*Molecular, Cellular & Developmental Biology; Physics*), Jason Crawford (*Chemistry; Microbial Pathogenesis*), Stavroula Hatzios (*Molecular, Cellular & Developmental Biology*), Martin Kriegel (*Immunobiology; Internal Medicine*), Noah Palm (*Immunobiology*), E. Hesper Rego (*Microbial Pathogenesis*), Aaron Ring (*Immunobiology*)



## FIELDS OF STUDY

The Graduate Program in Microbiology is a multidepartmental, interdisciplinary Ph.D. program in training and research in the study of microorganisms and their effects on their hosts. The faculty of the program share the view that understanding the biology of microorganisms requires a multidisciplinary approach; therefore, the Microbiology graduate program emphasizes the need for strong multidisciplinary training. The program is designed to provide individualized education in modern microbiology and to prepare students for independent careers in research and teaching. Students can specialize in various areas, including bacteriology, virology, microbe-host interactions, microbial pathogenesis, cell biology and immunobiology of microbial infections, microbial genetics and physiology, parasitology, microbiome, and microbial ecology and evolution.

## SPECIAL ADMISSIONS REQUIREMENTS

To enter the Ph.D. program, students apply to the Microbiology track within the interdepartmental graduate program in the Biological and Biomedical Sciences (BBS), <http://bbs.yale.edu>. An undergraduate major in biology, biophysics, biochemistry, microbiology, or molecular biology is recommended; the GRE General Test or MCAT is required.

## SPECIAL REQUIREMENTS FOR THE PH.D. DEGREE

Course work generally occupies the first two years of study. Each student, together with a faculty committee, outlines a course of study tailored to the individual's background and career goals. A program of course work may include general microbiology, virology, parasitology, and/or microbial genetics, as well as complementary courses in such areas as epidemiology, cell biology, immunology, biochemistry, and genetics. Students must take a minimum of four courses, three of which have to be in microbiology. Students must receive a grade of Honors in two full-term courses. All students participate in three laboratory rotations (MBIO 670, 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. An individualized qualifying exam on topics selected by each student, in consultation with the faculty, is given before the end of the second year. Students then undertake an original research project under the direct supervision of a faculty member. In the third year, students organize their thesis committee and prepare a dissertation prospectus, which is submitted to the Graduate School after approval by their committee. The student is then admitted to candidacy. Upon completion of the student's research project, the Ph.D. requirements conclude with the writing of a dissertation and its oral defense.

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

In addition to all other requirements, students must successfully complete IBIO 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 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

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 670a and MBIO 671b and MBIO 672b, Laboratory Rotations** Walther Mothes  
Rotation in three laboratories. Required of all first-year graduate students.

**MBIO 680a / EMD 680a, Advanced Topics in Tropical Parasitic Diseases** Staff

An introductory topic-based course in modern parasitology. For each topic there is an introductory lecture followed by a journal club-like discussion session of relevant papers selected from the literature. The course provides an introduction to basic biological concepts of parasitic eukaryotes causing diseases in humans. Topics include strategies used by parasitic eukaryotes to establish infections in the host and approaches to disease control, through either chemotherapy, vaccines, or genomics. In addition, emphasis is placed on evaluating the quality and limitation of scientific publications and developing skills in scientific communication. Prerequisite: permission of the instructor.

**MBIO 685b, Molecular Mechanisms of Microbial Pathogenesis** Staff

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, Bacterial Determinants of Pathogenesis** Staff

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 his or her 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** Staff

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

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

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

## Chair

Mark Hochstrasser

## Director of Graduate Studies

Yong Xiong (336 Bass, 203.432.5662, [nessie.stewart@yale.edu](mailto:nessie.stewart@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*), Mark Hochstrasser, Jonathon Howard, Anthony Koleske, William Konigsberg, Peter Lengyel (*Emeritus*), J. Patrick Loria (*Chemistry*), I. George Miller (*Pediatric Infectious Diseases; Public Health*), Andrew Miranker, Peter Moore (*Emeritus, Chemistry*), Karla Neugebauer, Thomas Pollard (*Molecular, Cellular & Developmental Biology*), Lynne Regan, Karin Reinisch (*Cell Biology*), David Schatz (*Immunobiology*), Robert Shulman (*Emeritus*), Fred Sigworth (*Cellular & Molecular Physiology; Biomedical Engineering*), Dieter Söll, Mark Solomon, Joan Steitz, Thomas Steitz, Scott Strobel, William Summers (*Emeritus*), Patrick Sung, Kenneth Williams (*Adjunct; Research*)

**Associate Professors** Titus Boggon (*Pharmacology*), Michael Koelle, Christian Schlieker, Charles Sindelar, Yong Xiong

**Assistant Professors** Julien Berro, Wendy Gilbert, Erdem Karatekin (*Cellular & Molecular Physiology*), Nikhil Malvankar, Matthew Simon, Sarah Slavoff (*Chemistry*), Seyedtaghi Takyar (*Internal Medicine/Pulmonary*)

## FIELDS OF STUDY

The principal objective of members of the department is to understand living systems at the molecular level. Laboratories in MB&B focus on a diverse collection of problems in biology. Some specialize in the study of DNA dynamics, including replication, recombination, transposition, and/or functional genomics. Others focus on transcriptional regulation, from individual transcription factors to the control of lymphocyte activation, the interferon response, and organismal development. Other groups study RNA catalysis, RNA-protein interactions, and ribonucleoproteins including spliceosomes and the ribosome. Additionally there are those that emphasize protein folding and design, transmembrane signaling, and control of the cell cycle. Structural and computational biology is a strong component of many of these research efforts.

## SPECIAL ADMISSIONS REQUIREMENTS

Courses in introductory biology, general chemistry, organic chemistry, physical chemistry, mathematics through differential equations, and one year of physics with calculus are required for admission. Biochemistry is strongly recommended. Applicants must take the GRE General Test, which is preferred, or the MCAT.

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

## INTEGRATED GRADUATE PROGRAM IN PHYSICAL AND ENGINEERING BIOLOGY (PEB)

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

## SPECIAL REQUIREMENTS FOR THE PH.D. DEGREE

All first-year students (except M.D./Ph.D.) perform three laboratory rotations (MB&B 650, Lab Rotation for First-Year Students). All students are required to take, for credit, seven one-term science courses. To obtain the desired breadth and depth of education, students are required to take two courses in molecular biophysics (one of which must be MB&B 720), one course in critical thinking (MB&B 730), 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. The student selects a research adviser by the end of the second term of residence. At that time two additional faculty members are chosen to form a research committee, with the total committee including at least two members of MB&B. Students are required to meet with this committee in the spring of years two and three, and in both the fall and spring of subsequent years. The qualifying examination, usually taken in the fall of the second year, is an oral defense of a research proposal consisting of (1) thesis aims and (2) extended goals on the same topic. The extended goals should include approaches beyond those in the thesis aims, typically beyond those generally employed by the host lab. Thus, a predominantly molecular biological set of thesis aims should be accompanied by biophysical approaches in the extended goals section, and vice versa. The three-member oral examination committee usually includes at least one of the two members of the research committee excluding the thesis adviser. Requirements for admission to candidacy, which usually takes place after four terms of residence, include (1) completion of course requirements; (2) completion of the qualifying examination; (3) certification of the student's research abilities by vote of the faculty upon recommendation from the student's research committee; and (4) submission of a brief prospectus of the proposed thesis research. Completion of the

teaching requirement is not required for admission to candidacy. Once final drafts of the thesis chapters have been approved by the research committee, the student presents a dissertation seminar to the entire department, and only afterward may the thesis be submitted. Students must have written at least one first-author paper that is submitted, in press, or published by the time of the thesis seminar.

## HONORS REQUIREMENT

Students must meet the Graduate School's Honors requirement by the end of the fourth term of full-time study; see Degree Requirements under Policies and Regulations. Students must also maintain an overall High Pass average. Student progress toward these goals is reviewed at the ends of the first and second terms.

## M.D./PH.D. STUDENTS

M.D./Ph.D. students must satisfy the requirements listed above for the Ph.D. with the following modifications: Laboratory rotations are not required but are available. Assisting in teaching of one lecture course is required. Students are required to take MB&B 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 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 / MCDB 500a, Biochemistry**

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 517b / ENAS 517b / MCDB 517b / PHYS 517b, Methods and Logic in Interdisciplinary Research** Staff

This half-term PEB class is intended to introduce students to integrated approaches to research. Each week, the first of two sessions is student-led, while the second session is led by faculty with complementary expertise and discusses papers that use different approaches to the same topic (for example, physical and biological or experiment and theory). Counts as 0.5 credit toward MB&B graduate course requirements.

½ Course cr

**MB&B 520a, Boot Camp Biology** Lynne Regan

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** Simon Mochrie

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 545b, Methods and Logic in Molecular Biology** Wendy Gilbert, Donald Engelman, 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 561a / CB&B 561a / MCDB 561a / PHYS 561a, Introduction to Dynamical Systems in Biology** Thierry Emonet, Damon Clark, and Jonathon Howard

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.

**MB&B 562b / AMTH 765b / CB&B 562b / ENAS 561b / INP 562b / MCDB 562b / PHYS 562b, Dynamical Systems in Biology** Damon Clark and Thierry Emonet

This course covers advanced topics in computational biology. How do cells compute, how do they count and tell time, how do they oscillate and generate spatial patterns? Topics include time-dependent dynamics in regulatory, signal-transduction, and neuronal networks; fluctuations, growth, and form; mechanics of cell shape and

motion; spatially heterogeneous processes; diffusion. This year, the course spends roughly half its time on mechanical systems at the cellular and tissue level, and half on models of neurons and neural systems in computational neuroscience. Prerequisite: MCDB 561 or equivalent, or a 200-level biology course, or permission of the instructor.

**MB&B 591a / ENAS 991a / MCDB 591a / PHYS 991a, Integrated Workshop** Corey O'Hern

This required course for students in PEB involves hands-on laboratory modules with students working in pairs. A biology student is paired with a physics or engineering student; a computation/theory student is paired with an experimental student. The modules are devised so that a range of skills is acquired, and students learn from each other. Modules are hosted in faculty laboratories. Receives no course credit toward MB&B graduate course requirements. With permission of the DGS, can be used by PEB students to replace the third rotation of MB&B 650 but will receive no separate course credit toward MB&B course requirements.

**MB&B 600a, Principles of Biochemistry I** Matthew Simon and Michael Koelle  
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 and Joan Steitz  
A continuation of MB&B 600a that considers the chemistry and metabolism of nucleic acids, the mechanism and regulation of protein and nucleic acid synthesis, and selected topics in macromolecular biochemistry.

**MB&B 602a / CBIO 602a / MCDB 602a, Molecular Cell Biology** Charles Lusk, Michael Caplan, Pietro De Camilli, Thomas Pollard, Peter Takizawa, David Calderwood, James Rothman, Valerie Horsley, Thomas Melia, Megan King, and Josephina Van Wolfswinkel

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.

**MB&B 625a / GENE 625a / MCDB 625a, 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.

**MB&B 630b / MCDB 630b, Biochemical and Biophysical Approaches in Molecular and Cellular Biology** Thomas Pollard and Karin Reinisch

This course introduces the theory and application of biochemical and biophysical methods to study the structure and function of biological macromolecules. The course considers the basic physical chemistry required in cellular and molecular biology but does not require a previous course in physical chemistry. One class per week is a lecture introducing a topic. The second class is a discussion of one or two research papers utilizing those methods. Does not count for graduate course credit for BBSB graduate students.



**MB&B 635a / ENAS 518a, Quantitative Approaches in Biophysics and Biochemistry**

Nikhil Malvankar and Yong Xiong

The course offers an introduction to quantitative methods relevant to analysis and interpretation of biophysical and biochemical data. Topics covered include statistical testing, data presentation, and error analysis; introduction to dynamical systems; analysis of large datasets; and Fourier analysis in signal/image processing and macromolecular structural studies. The course also includes an introduction to basic programming skills and data analysis using MATLAB. Real data from research groups in MB&B are used for practice. Prerequisites: MATH 120 and MB&B 600 or equivalents, or permission of the instructors.

**MB&B 650a and MB&B 651b, Lab Rotation for First-Year Students** Yong Xiong

Required of all first-year BBSB graduate students. Credit for full year only.

**MB&B 710b / C&MP 710b, Electron Cryo-Microscopy for Protein Structure**

Determination Frederick Sigworth

Understanding cellular function requires structural and biochemical studies at an ever-increasing level of complexity. The course is an introduction to the concepts and applications of high-resolution electron cryo-microscopy. This rapidly emerging new technique is the only method that allows biological macromolecules to be studied at all levels of resolution from cellular organization to near atomic detail. Counts as 0.5 credit toward MB&B graduate course requirements. ½ Course cr

**MB&B 720a, Macromolecular Structure and Biophysical Analysis** Andrew Miranker,

Yong Xiong, Jonathon Howard, Nikhil Malvankar, and Wendy Gilbert

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, Anthony

Koleske, Enrique De La Cruz, Christian Schlieker, and Julien Berro

The course examines fundamental concepts in molecular biology through intense critical analysis of the primary literature. The objective is to develop primary literature reading and critical thinking skills. Required of and open only to first-year graduate students in BBSB.

**MB&B 734b / GENE 734b / MBIO 734b, Molecular Biology of Animal Viruses** Staff

Lecture course with emphasis on mechanisms of viral replication, oncogenic transformation, and virus-host cell interactions.

**MB&B 743b / GENE 743b / MCDB 743b, Advanced Eukaryotic Molecular Biology**

Mark Hochstrasser, Matthew Simon, Patrick Sung, Seyedtaghi Takyar, 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, Medical Impact of Basic Science** Joan Steitz, Thomas Steitz, I. George Miller, Andrew Miranker, David Schatz, 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 750b, Biological Membranes** Donald Engelman  
 Biological membranes and their resident proteins are essential for cellular function; yet comparatively little is known about their structure and dynamics. This class provides an introduction to the biochemistry and biophysics of lipids, lipid bilayers, and lipid-derived second messengers. In addition, structural as well as functional aspects of the different classes of membrane proteins are discussed along with an outline of experimental approaches used to achieve an understanding of membrane protein structure and function at a molecular level. Counts as 0.5 credit toward MB&B graduate course requirements. Prerequisite: biochemistry.

**MB&B 752b / CB&B 752b / CPSC 752b / MCDB 752b, Biomedical Data Science:**

**Mining and Modeling** Mark Gerstein

Biomedical data science encompasses the analysis of gene sequences, macromolecular structures, and functional genomics data on a large scale. It represents a major practical application for modern techniques in data mining and simulation. 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 753b, Biomedical Data Science: Mining** Mark Gerstein

Biomedical data science encompasses the analysis of gene sequences, macromolecular structures, and functional genomics data on a large scale. It represents a major practical application for modern techniques in data mining and simulation. This module of the full-term course MB&B 752 focuses on the first of these techniques, data mining. Specific topics include sequence alignment, comparative genomics and phylogenetics, biological databases, microarray normalization, and machine-learning approaches to data integration. Counts as 0.5 credit toward MB&B graduate course requirements. Prerequisites: biochemistry and calculus, or permission of the instructor.

**MB&B 754b, Biomedical Data Science: Modeling** Mark Gerstein

Biomedical data science encompasses the analysis of gene sequences, macromolecular structures, and functional genomics data on a large scale. It represents a major practical application for modern techniques in data mining and simulation. This module of the full-term course MB&B 752 focuses on the second of these techniques, simulation. Specific topics to be covered include geometric analysis of protein structure, molecular-dynamics simulation, and biological networks. Counts as 0.5 credit toward MB&B

graduate course requirements. Prerequisites: biochemistry and calculus, or permission of the instructor.

**MB&B 760b, Principles of Macromolecular Crystallography** Thomas Steitz and Yong Xiong

Rigorous introduction to the principles of macromolecular crystallography, aimed at students who are planning to carry out structural studies involving X-ray crystallography or who want to obtain in-depth knowledge for critical analysis of published crystal structures. Counts as 0.5 credit toward MB&B graduate course requirements. Prerequisites: physical chemistry and biochemistry. ½ Course cr

**MB&B 900a and MB&B 901b, Reading Course in Biophysics** Yong Xiong

Directed reading course in biophysics. Term paper required. By arrangement with faculty. Open only to graduate students in MB&B. Please see syllabus for additional requirements.

**MB&B 902a and MB&B 903b, Reading Course in Molecular Genetics** Yong Xiong

Directed reading course in molecular genetics. Term paper required. By arrangement with faculty. Open only to graduate students in MB&B. Please see syllabus for additional requirements.

**MB&B 904a and MB&B 905b, Reading Course in Biochemistry** Yong Xiong

Directed reading course in biochemistry. Term paper required. By arrangement with faculty. Open only to graduate students in MB&B. Please see syllabus for additional requirements.

# Molecular, Cellular, and Developmental Biology

Kline Biology Tower, 203.432.3538

<http://mcd.b.yale.edu>

M.S., Ph.D.

## Chair

Vivian Irish

## Director of Graduate Studies

Farren Isaacs

**Professors** Ronald Breaker, John Carlson, Lynn Cooley (*Genetics*), Craig Crews, Stephen Dellaporta, Paul Forscher, Mark Hochstrasser (*Molecular Biophysics & Biochemistry*), Scott Holley, Vivian Irish, Akiko Iwasaki (*Immunobiology*), Christine Jacobs-Wagner, Douglas Kankel, Paula Kavathas (*Immunobiology*), Haig Keshishian, Mark Mooseker, Thomas Pollard, Anna Pyle, Joel Rosenbaum, Alanna Schepartz (*Chemistry*), Hugh Taylor (*Obstetrics, Gynecology & Reproductive Sciences*), Robert Wyman

**Associate Professors** Sreenganga Chandra (*Neurology*), Thierry Emonet, Valerie Horsley, Farren Isaacs, Kathryn Miller-Jensen (*Biomedical Engineering*), Matthew Rodeheffer (*Comparative Medicine*), Weimin Zhong

**Assistant Professors** Murat Acar, Shirin Bahmanyar, David Breslow, Damon Clark, Nicole Clay, Nadya Dimitrova, Joshua Gendron, Stavroula Hatzios, Yannick Jacob, Josien van Wolfswinkel

## FIELDS OF STUDY

Research in genetics and molecular biology encompasses studies of non-coding RNAs, genome engineering, genome organization and regulation, gene dosage, aging, bacterial chemotaxis, and oncogenes. Research topics in cellular and developmental biology include structure and dynamics of the cell cytoskeleton, molecular motors, chemical biology, the nuclear envelope, lncRNAs, regeneration, developmental biomechanics, vertebral column development, neural and epidermal stem cells, and systems developmental biology. Research in neurobiology focuses on growth cone motility, neural differentiation, synaptogenesis, visual perception, olfaction, and the formation of topographic maps. A Special Program in Plant Sciences provides research and training in the molecular genetics of flowering, epigenetics, the physiology of hormone action, pathogen defense systems, sex determination, and the circadian clock. Because of the breadth of the department, students are provided with unique opportunities for interdisciplinary studies.

To enter the Ph.D. program, students apply to the Molecular Cell Biology, Genetics, and Development (MCGD) track, the Biochemistry, Biophysics, and Structural Biology (BBSB) track, or the Plant Molecular Biology (PMB) track within the interdepartmental graduate program in Biological and Biomedical Sciences (BBS), <http://bbs.yale.edu>.

## SPECIAL ADMISSIONS REQUIREMENTS

Applicants should have obtained training in the structure, development, and physiology of organisms; the structure, biochemistry, and physiology of cells; genetics; elementary calculus; elementary physics; inorganic and organic chemistry; statistics or advanced mathematics. Lack of some prerequisites can be made up in the first year of graduate study. Students having different science training, such as degrees in chemistry, physics, or engineering, are encouraged to apply. In addition to the GRE General test, a Subject Test is recommended, preferably in Biology, or in Biochemistry, Cell and Molecular Biology.

## INTEGRATED GRADUATE PROGRAM IN PHYSICAL AND ENGINEERING BIOLOGY (PEB)

Students applying to the MCGD or BBSB 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, First-Year Introduction to Research. With the help of a faculty committee, each student will plan a specific program that includes appropriate courses, seminars, laboratory rotations, and independent reading fitted to individual needs and career goals. There is no foreign language requirement. Late in the third term of study, the student meets with a faculty committee to decide on a preliminary topic for dissertation work and to define the research areas in which 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 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 Center for Science and Social Science Information (CSSSI). All students are required to teach in two one-term (TF level 10) courses during their Ph.D. study, but not during the first year of graduate study. Requirements for M.D./Ph.D. students are the same as for Ph.D. students, except that a single term of teaching is required. During their first year of study, students must successfully complete MCDB 901, First-Year Introduction to Research—Ethics: Scientific Integrity in Biomedical Research, to fulfill the responsible conduct and ethics in research requirement. This requirement must be met prior to registering for a second year of study. Further, in the fourth year of study, all students must successfully complete B&BS 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 Course and Honors Requirements under Policies and Regulations).

## MASTER'S DEGREE

**M.S. (en route to the Ph.D.)** The minimum requirements for award of the Master of Science degree are (1) two academic years registered and in residence full-time in the graduate program; (2) satisfactory completion of the first two years of study and research leading to the Ph.D.; this requirement may be met either (a) by completing a minimum of five courses with an average grade of High Pass and at least one Honors grade, in addition to satisfactory performance in MCDB 900/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 (<http://bbs.yale.edu>), MCGD, BBSB, and PMB tracks.

## COURSES

**MCDB 500a / MB&B 500a, Biochemistry** Ronald Breaker, Nicole Clay, and Donald Engelman

An introduction to the biochemistry of animals, plants, and microorganisms, emphasizing the relations of chemical principles and structure to the evolution and regulation of living systems.

**MCDB 517b / ENAS 517b / MB&B 517b / PHYS 517b, Methods and Logic in Interdisciplinary Research** Staff

This half-term PEB class is intended to introduce students to integrated approaches to research. Each week, the first of two sessions is student-led, while the second session is led by faculty with complementary expertise and discusses papers that use different approaches to the same topic (for example, physical and biological or experiment and theory). Counts as 0.5 credit toward graduate course requirements. ½ Course cr

**MCDB 530a / IBIO 530a / MBIO 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.

**MCDB 550a / C&MP 550a / ENAS 550a / PHAR 550a, Physiological Systems** 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** Frederick Sigworth

The course focuses on understanding the processes that transfer molecules across membranes at the cellular, molecular, biophysical, and physiological levels. Students learn about the different classes of molecular machines that mediate membrane transport, generate electrical currents, or perform mechanical displacement. Emphasis is placed on the relationship between the molecular structures of membrane proteins and their individual functions. The interactions among transport proteins in determining the physiological behaviors of cells and tissues are also stressed. Molecular motors are introduced and their mechanical relationship to cell function is explored. Students read papers from the scientific literature that establish the connections between mutations in genes encoding membrane proteins and a wide variety of human genetic diseases.

**MCDB 561a / CB&B 561a / MB&B 561a / PHYS 561a, Introduction to Dynamical**

**Systems in Biology** Thierry Emonet, Damon Clark, and Jonathon Howard

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.

**MCDB 562b / AMTH 765b / CB&B 562b / ENAS 561b / INP 562b / MB&B 562b /**

**PHYS 562b, Dynamical Systems in Biology** Damon Clark and Thierry Emonet

This course covers advanced topics in computational biology. How do cells compute, how do they count and tell time, how do they oscillate and generate spatial patterns? Topics include time-dependent dynamics in regulatory, signal-transduction, and neuronal networks; fluctuations, growth, and form; mechanics of cell shape and motion; spatially heterogeneous processes; diffusion. This year, the course spends roughly half its time on mechanical systems at the cellular and tissue level, and half on models of neurons and neural systems in computational neuroscience. Prerequisite: MCDB 561 or equivalent, or a 200-level biology course, or permission of the instructor.

**MCDB 570b, Biotechnology** Craig Crews, Nicole Clay, Joseph Wolenski, and Kenneth Nelson

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 585b, Research in MCDB for B.S./M.S. Candidates** Douglas Kankel

A two-credit course taken in the third-to-last term (typically the second term of the junior year). At the start of this course, each student forms a committee composed of the student's adviser and two faculty members that meets to discuss the research project. At the end of this course, students complete a detailed prospectus describing their thesis project and the work completed thus far. The committee evaluates an oral and written presentation of this prospectus; the evaluation determines whether the student may continue in the combined program. Required of students in the joint B.S./M.S. program with Yale College. 2 Course cr

**MCDB 591a / ENAS 991a / MB&B 591a / PHYS 991a, Integrated Workshop** Corey O'Hern

This required course for students in PEB involves hands-on laboratory modules with students working in pairs. A biology student is paired with a physics or engineering student; a computation/theory student is paired with an experimental student. The modules are devised so that a range of skills is acquired, and students learn from each other. Modules are hosted in faculty laboratories.

**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** Charles Lusk, Michael Caplan, Pietro De Camilli, Thomas Pollard, Peter Takizawa, David Calderwood, James Rothman, Valerie Horsley, Thomas Melia, Megan King, and Josephina Van Wolfswinkel

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.



**MCDB 603a / CBIO 603a, Seminar in Molecular Cell Biology** Megan King, Michael Caplan, Pietro De Camilli, Thomas Pollard, Peter Takizawa, David Calderwood, James Rothman, Valerie Horsley, Thomas Melia, Charles Lusk, and Josephina Van Wolfswinkel

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

**MCDB 625a / GENE 625a / MB&B 625a, 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 630b / MB&B 630b, Biochemical and Biophysical Approaches in Molecular and Cellular Biology** Thomas Pollard and Karin Reinisch

This course introduces the theory and application of biochemical and biophysical methods to study the structure and function of biological macromolecules. The course considers the basic physical chemistry required in cellular and molecular biology but does not require a previous course in physical chemistry. One class per week is a lecture introducing a topic. The second class is a discussion of one or two research papers utilizing those methods. Does not count for graduate course credit for BBSB graduate students.

**MCDB 650a, Epigenetics** Nadya Dimitrova, Josephina Van Wolfswinkel, and Yannick Jacob

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 777b, Mechanisms of Development** Valerie Reinke

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 680a, Advances in Plant Molecular Biology** Yannick Jacob

The study of basic processes in plant growth and development to provide a foundation for addressing critical agricultural needs in response to a changing climate. Topics include the latest breakthroughs in plant sciences with emphasis on molecular, cellular, and developmental biology; biotic and abiotic plant interactions; development, genomics, proteomics, epigenetics, and chemical biology in the context of plant biology; and the current societal debates about agrobiotechnology.

**MCDB 720a / INP 720a / NBIO 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 intercellular mechanisms underlying the generation and control of behavior.

**MCDB 743b / GENE 743b / MB&B 743b, Advanced Eukaryotic Molecular Biology**

Mark Hochstrasser, Matthew Simon, Patrick Sung, Seyedtaghi Takyar, 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, Biomedical Data Science: Mining and Modeling** Mark Gerstein

Biomedical data science encompasses the analysis of gene sequences, macromolecular structures, and functional genomics data on a large scale. It represents a major practical application for modern techniques in data mining and simulation. 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, First-Year Introduction to Research – Grant Writing and Scientific Communication** Valerie Horsley

Grant writing, scientific communication, and laboratory rotation talks for Molecular Cell Biology, Genetics, and Development track students.

**MCDB 901b / CBIO 901b / GENE 901b, First-Year Introduction to Research – Ethics: Scientific Integrity in Biomedical Research** Joerg Bewersdorf

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

**MCDB 902a and MCDB 903b, Advanced Graduate Seminar** Josephina Van Wolfswinkel

The course allows students to hone their presentation skills through yearly presentation of their dissertation work. Two students each give thirty-minute presentations in each class session. Students are required to present every year beginning in their third year in the MCDB program. Each MCDB graduate student is expected to attend at least 80 percent of the class sessions. Two faculty members co-direct the course, attend the seminars, and provide feedback to the students.

**MCDB 911a / CBIO 911a / GENE 911a, First Laboratory Rotation** Valerie Horsley

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

**MCDB 912a / CBIO 912a / GENE 912a, Second Laboratory Rotation** Valerie Horsley

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

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

# Music

Stoeckel Hall, 203.432.2986

<http://yalemusic.yale.edu>

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

## Chair

James Hepokoski

## Director of Graduate Studies

Richard Cohn (Stoeckel, 203.432.2986, [dgs.music@yale.edu](mailto:dgs.music@yale.edu))

**Professors** Kathryn Alexander (*Adjunct*), Ardis Butterfield, Richard Cohn, Michael Friedmann (*Adjunct*), Daniel Harrison, Paul Hawkshaw (*Adjunct*), James Hepokoski, Richard Lalli (*Adjunct*), Patrick McCreless, Ian Quinn, Gary Tomlinson, Michael Veal

**Associate Professors** Robert Holzer (*Adjunct*), Brian Kane, Gundula Kreuzer, Markus Rathey (*Adjunct*)

**Assistant Professors** Henry Parkes, Anna Zayaruznaya

## FIELDS OF STUDY

Fields include music history, music theory, and ethnomusicology. (Students interested in degrees in performance, conducting, or composition should apply to the Yale School of Music.)

## SPECIAL ADMISSIONS REQUIREMENTS

Previous training in music theory or music history is required. Samples of the applicant's previous work such as extended papers, advanced exercises, and analyses must be submitted. The GRE General Test is required by the Graduate School. Applicants whose native language is not English must take the Test of English as a Foreign Language (TOEFL).

## SPECIAL REQUIREMENTS FOR THE PH.D. DEGREE

Two years of course work, comprising a minimum of fourteen courses. All students must take the proseminars in ethnomusicology, music history, and music theory. In addition, students in the theory program must take both of the history of theory seminars; students in the music history program must take one history of theory seminar; and students in the ethnomusicology program must take at least two but no more than five graduate seminars or non-introductory undergraduate courses in other departments or schools within the University. In consultation with the DGS, history and theory students may elect to take up to two graduate seminars or non-introductory undergraduate courses outside the department. Consult the Music Graduate Student Handbook for further details specific to each program.

A student must receive at least four Honors grades in departmental seminars in order to proceed to the qualifying examination, administered in August following the second year. Reading proficiency in two languages—for historians and theorists, German and usually either French or Italian; for ethnomusicologists, two languages relevant to their research, one of which must be a European language—is demonstrated by examinations (with dictionary access) offered once per term. A style and repertory examination must

be taken upon entering in August, and retaken every term until passed before the end of the third year. Third-year students attend a weekly prospectus/dissertation colloquium. Approval of the dissertation prospectus admits a student to candidacy, provided that all other requirements are met. Only students admitted to candidacy can continue into the fourth year of study. Fourth- and fifth-year students attend the dissertation colloquium in the spring terms.

The faculty considers teaching to be essential to the professional preparation of graduate students in Music. Students in Music participate in the Teaching Fellows Program in their third and fourth years.

## COMBINED PH.D. PROGRAM: MUSIC AND RENAISSANCE STUDIES

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

## MASTER'S DEGREES

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

**M.A. (en route to the Ph.D.)** Students enrolled in the Ph.D. program qualify for the M.A. degree upon the successful completion of seven courses, at least six of which are seminars given in the department, along with the passing of the style and repertory examination and an examination in one foreign language. Of the six departmental seminars, at least two grades must be Honors; the remaining five grades must average High Pass.

**Terminal Master's Degree Program** The department offers admission to a small number of students in a terminal M.A. program. Candidates must pass seven term courses achieving an average of High Pass and at least one Honors, complete a special project, and pass an examination in one foreign language.

## COURSES

**MUSI 515b, Schenkerian Analysis** Daniel Harrison

Advanced work in harmony, counterpoint, thoroughbass, structure, and form; Schenkerian analysis of selected compositions from the tonal repertory.

**MUSI 699a, Proseminar: Musicology** Gary Tomlinson

A historiographical survey of major topics, issues, and techniques of musicological research. We consider the position of musicology in the broader context of historical thought and provide a conceptual foundation for further work in the field.

**MUSI 721b, History of Theory II** Ian Quinn

This seminar surveys the history of music theory in the eighteenth, nineteenth, and early twentieth centuries. Readings are drawn from the writings of Rameau, Heinichen, Kirnberger, C.P.E. Bach, Koch, Reicha, A.B. Marx, Fétis, Choron, Förster, Weber, Richter, Sechter, Hauptmann, von Oettingen, Helmholtz, Riemann, Hanslick, Louis and Thuille, Schoenberg, Hindemith, and Schenker. Overarching themes include the relationship between speculative and practical traditions; the institutional sites of music theory; interactions among theory, analysis, and composition pedagogy; the role of oral

teaching traditions; the position of music theory in the academy; the scientific status of music theory; and the historiography of music theory.

**MUSI 801b, Early Modernism: Strauss, Mahler, Nietzsche, 1890s** James Hepokoski  
Exploration of the concept of early modernism in Austro-Germanic symphonic music. Issues and conditions confronting the musical “generation of the 1860s,” those composers coming of age in the late 1880s and 1890s. The initial sessions are devoted to considerations of musical, literary, and aesthetic early modernism, including readings from Germanic manifestos of the period along with overviews by Dahlhaus, Calinescu, Gumbrecht, Jameson, Eysteinnsson, and others. The second portion of the term is given to close readings/analyses and discussions of two works representing contrasting responses to Nietzsche’s *Thus Spoke Zarathustra*: Richard Strauss’s *Also sprach Zarathustra* (1896) and Gustav Mahler’s Symphony No. 3 (1893–96).

**MUSI 811b / AFAM 813b / AMST 875b, Critical Approaches to Popular Music**  
Michael Veal

This seminar applies the different themes and discourses relevant to the study of popular music, including cultural studies, ethnomusicology, media, technology, music theory, gender studies, art history, and music history. The seminar is organized in workshop fashion, with student discussants drawing on the various discourses to contextualize specific album-length recordings assigned each week. The seminar is designed to help students master the variety of theoretical approaches that render popular music comprehensible.

**MUSI 812a or b, Directed Studies: Ethnomusicology** Staff

**MUSI 814a or b, Directed Studies: History of Music** Staff  
By arrangement with faculty.

**MUSI 817a / FILM 788a, Music, Radio, and Mediation** Brian Kane

This seminar focuses on the heyday of radio—its so-called Golden Age—and considers the medium from a variety of perspectives: media theory, auditory culture, musicology, and sociology, among others. The goal is to understand how radio functioned not only as a mass medium but also as a form of mediation. Special attention is given to the role of music on the radio and to the ways that radio altered the nature of musical works. Readings include classic texts on radio (Arnheim, Adorno, Merton, Lazarsfeld, Fanon, McLuhan) as well as more recent writing in cultural history (Douglas, Hilmes), sound studies (Mowitt, Bijsterveld), and media archaeology (Ernst). Special attention is given to the nature of the radio archive and its problems, with sessions devoted to working with source materials.

**MUSI 826b, Perspectives on the *Cantus Firmus* Mass** Anna Zayaruznaya

This seminar surveys the rich repertory of fifteenth-century settings of the Mass Ordinary whose movements are united by a shared *cantus firmus*—a melody borrowed from plainchant or popular song and placed in one voice, usually the tenor. In addition to developing an understanding of the musical transformations to which preexisting material is subject in its new polyphonic context and of how the newly written voices are affected by the resulting compositional process, we address a series of cultural themes raised in recent musicological work, including emulative acts between the composers writing masses (Gallagher, Rodin), the eschatological and liturgical significance of the repertory (Kirkman), and the notational innovations involved in tenor transformations (Schiltz, Zazulia).

**MUSI 857a, Music in Nazi Germany** Gundula Kreuzer

An exploration of musical life under a totalitarian regime. The quest for “Germanness” in music and the Nazis’ ill-fated attempts at policing musical aesthetics and compositional styles. Ideological, political, and administrative dimensions of these attempts; their influences on such composers as Egk, Hartmann, Hindemith, and Orff, as well as on jazz and “entertainment music”; the reception of canonic masters; and consequences for performance and scholarship at large, during the Third Reich and after.

**MUSI 904a, The Beach Boys in American Culture and Counterculture** Daniel Harrison

A research seminar using the fifty-year career of the Beach Boys as an armature to study a variety of topics of interest to music theorists and analysts, historical musicologists, American cultural historians, and students of media. The group’s musical production is notably large and stylistically varied, its complex history (and mythology) is well documented in print and on film, and recent scholarship about the group is sophisticated and suggestive. Starting with close listening of a large set of songs, readings from both academic and popular sources, and discussions with expert guests in cultural studies, rock journalism, biography, and music analysis, students identify and work on an original research project related to the group, broadly conceived.

**MUSI 914a or b, Directed Studies: Theory of Music** Staff

By arrangement with faculty.

**MUSI 925a, Parsifal** Richard Cohn

A study of Wagner’s final opera, applying recent approaches to late-nineteenth-century harmony, with particular attention to the relationship between diatonic and chromatic systems of pitch organization.

**MUSI 950a, Shostakovich** Patrick McCreless

The course aims to develop a rich understanding of Shostakovich’s musical oeuvre, focusing on a number of central works. We try to achieve a balance between critical and analytical approaches, between consideration of the composer’s whole output and detailed consideration of individual pieces, and between a study of the music’s Russian and Soviet context and a study of the music itself.

**MUSI 998a, Prospectus Workshop** Gundula Kreuzer**MUSI 999b, Dissertation Colloquium** Gundula Kreuzer

# Near Eastern Languages and Civilizations

314 Hall of Graduate Studies, 203.432.2944

<http://nelc.yale.edu>

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

## Chair

Shawkat Toorawa

## Director of Graduate Studies

Eckart Frahm

**Professors** John Darnell, Benjamin Foster, Eckart Frahm, Dimitri Gutas, Salima Ikram (*Visiting*), Shawkat Toorawa, Kevin van Bladel, Harvey Weiss

**Lecturers** Karen Foster, Christina Geisen, Agnete Lassen, Miriam Müller, Kathryn Slanski

**Senior Lector II** Shiri Goren

**Senior Lectors I** Sarab al-Ani, Muhammad Aziz, Jonas Elbousty, Dina Roginsky, Farkhondeh Shayesteh

**Lectors** Ozgen Felek, Orit Yeret

## FIELDS OF STUDY

Fields include Arabic and Islamic studies (also with interdisciplinary minor), Graeco-Arabic studies, Assyriology, and Egyptology.

## SPECIAL ADMISSIONS REQUIREMENTS

Applicants should state their specific field of study and intended specialization. Evidence of a reading knowledge of both French and German is required of all Ph.D. students. Proficiency in one of these languages is normally prerequisite for admission, and deficiency in the second language must be rectified before admission to a second year of study. Proficiency will be certified by passing a departmental examination upon registration at Yale. Ph.D. students admitted with only one of the two required languages or who fail the departmental examination are expected to enroll in an appropriate full-year course given by the French or German department at Yale. Completion of such a course with a grade of A or B will be accepted as fulfilling the proficiency requirement in either language; exceptions, for instance, for native speakers of French or German, may be made by the department upon recommendation of the director of graduate studies (DGS). For students in the M.A. program, evidence of a reading knowledge of either French or German is sufficient.

## SPECIAL REQUIREMENTS FOR THE PH.D. DEGREE

### Course Work

The department normally requires three full years of course work, four year courses or eight term courses per year being considered a full load. This may be reduced to two years in cases of exceptional background in Near Eastern languages. Normal progress



in course work is considered to be consistent achievement of grades of High Pass or better, and at least four term courses or two year courses with Honors per year.

Of the twenty-four required courses for graduate study, at least eighteen should be taken within the department, usually within the student's primary field of study. Courses taken outside of the department should be clearly related to the student's primary field or constitute a coherent second field. For students who take no courses outside of the department, minimum competence in a second field within NELC is required, defined as follows: at least two terms of a Near Eastern language to be evaluated either by examination or a course grade of High Pass or better, or at least two terms of nonlanguage courses outside the area of specialization.

**Advanced standing** In rare cases, upon presenting evidence of successful completion of graduate courses at other universities or at Yale prior to their matriculation in the Ph.D. program, students with significant prior knowledge in their primary fields of study may apply for a waiver of up to eight courses toward the twenty-four required for candidacy. The faculty adviser and the DGS will normally present such applications to the faculty of the department, with a recommendation, no later than the end of the second year.

**Interdisciplinary minor** In Arabic-Islamic Studies, up to eight courses taken in one outside department and inclusion of that department's subject in the comprehensive exams constitute an interdisciplinary track.

## Committees

While doing course work, students are mentored by a faculty adviser from their field and by the DGS. Students writing dissertations may, if they so wish, be mentored by a committee headed by a primary adviser from NELC (not necessarily the faculty adviser from the course work years) and staffed with one, two, or more additional members, from either inside or outside the department, depending on the student's specific needs. Committees are to be approved by the DGS. Interested students are encouraged to seek out suitable and willing faculty to serve on their advisory committees.

## Special Language and Course Requirements

Course work should be planned to meet two departmental general standards: core languages for the primary fields of study, and minimum competence in a secondary field. The core languages in each of the major fields of study are as follows: *Arabic and Islamic Studies*: Arabic, Persian (Farsi) or Syriac or Greek; *Assyriology*: Sumerian and Akkadian; *Egyptology*: Egyptian and at least four terms of Demotic or Coptic. Minimum competence in a secondary field of study is defined as follows: at least two terms of a Near Eastern language to be evaluated either by examination or with a course grade of High Pass or better, or at least two terms of nonlanguage courses outside the area of specialization. A minimum grade of High Pass in these courses will be considered successful fulfillment of this requirement.

In Arabic and Islamic Studies, the minimum competence can be extended to an interdisciplinary course of study in a minor field. Minors may include six to eight term courses in the following departments and programs: Anthropology, Classics, Comparative Literature, French, German, History, History of Science and Medicine, Italian, Judaic Studies, Linguistics, Medieval Studies, Philosophy, Political Science, Religious Studies, Sociology, Spanish and Portuguese, or others, by permission of

the DGS. Students in all programs of the department will be expected to declare their choice of a secondary language or area, or a minor field, by their third term of study.

## Training in Teaching

NELC students normally acquire four terms of teaching experience, between their second and fourth years in residence. Once faculty have determined the courses that they plan to teach in the upcoming academic year, they will inform the DGS of courses that may require Teaching Fellows. The DGS will compile a list of these courses and circulate it among NELC graduate students who have completed the first year of study. Students may then inform the DGS of those courses for which they would prefer to serve as Teaching Fellows. The faculty members in charge, in consultation with the DGS, will subsequently choose the Teaching Fellows for their courses.

## Examinations and the Dissertation

The comprehensive examination is normally taken at the end of the third year of study or no later than the beginning of the fourth year of study. When advanced standing has been granted, the comprehensive examination could be taken at the end of the second year. Comprehensive examinations normally include three written and one oral examination including language, literature, history, and other topics to be determined by the DGS in consultation with the student and the relevant faculty. Comprehensive examinations may be based in part on reading lists of primary core texts and secondary literature compiled well in advance by the student and the relevant faculty. Primary texts and secondary literature studied by the students during their years of course work may also become topics of the examination. For language examinations, texts that the student has not seen may also be included. In the case of the program in Arabic and Islamic Studies with an interdisciplinary minor, the written portion will consist of two language examinations and one subject in the minor field, and the oral of two subjects in Arabic studies and one in the minor field. The written examinations will be set by the individual faculty members responsible for particular areas of study, but the oral portion will be conducted by the full staff of the department. The dissertation proposal is normally submitted one month following the completion of the qualifying examination.

In their final term of course work, students may, with the permission of the DGS and the instructor, enroll in a Directed Readings course related to the general field of the prospective dissertation topic. Course work should include preparation of a comprehensive, annotated bibliography for the prospective topic and exploration of some aspects of the topic in a research paper. Students availing themselves of this option should also present some of their work at the NELC Roundtable.

The dissertation prospectus may comprise up to thirty pages, excluding the bibliography. A two-page summary of the prospectus will normally be circulated among and voted upon by the faculty, though the full prospectus will be available for consideration.

Successful completion of the comprehensive examination and submission of an acceptable prospectus will qualify the student for admission to candidacy for the Ph.D. degree. After completion of the dissertation, the candidate may receive a final examination concerned primarily with the defense of the thesis.

## 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** Applicants who do not enroll in the Ph.D. program may pursue a Master of Arts degree. Students enrolled in the M.A. program should complete a minimum of twelve term courses with at least two term grades of Honors and an average of High Pass in the remaining courses, and will be required to submit a master's thesis no later than April 1 of the fourth term of study. No financial aid is available. Students enrolled in the Ph.D. program are also eligible for this degree by meeting the same requirements. Because of the thesis requirement, the Graduate School procedure of automatic petitions for the M.A. degree is not available to students in Near Eastern Languages and Civilizations.

## COURSES

### **AKKD 500a, Elementary Akkadian I** Eckart Frahm

Introduction to the language of ancient Babylonia and its cuneiform writing system, with exercises in reading, translation, and composition.

### **AKKD 501b, Elementary Akkadian II** Eckart Frahm

Introduction to the language of ancient Babylonia and its cuneiform writing system, with exercises in reading, translation, and composition.

### **AKKD 545a, Neo-Babylonian and Late Babylonian Historical and Archival Texts**

Eckart Frahm

Study and interpretation of royal inscriptions, chronicles, letters, and contracts from seventh- to second-century B.C.E. Babylonia.

### **AKKD 546b, Mythological and Ritual Texts from Ancient Mesopotamia** Eckart

Frahm

A survey of mythological and ritual texts from ancient Mesopotamia.

### **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** Muhammad Aziz

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** Muhammad Aziz

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** Jonas Elbousty

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** Jonas Elbousty

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** Iraj Sheidaee

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** Iraj Sheidaee

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 511a, Advanced Classical Arabic I** Shawkat Toorawa

An advanced course on Arabic grammar and morphology through a close reading of the grammar manual of Ibn Malik (*The Alfyyah*), in addition to advanced training in sentence structure through *i'rab*.

**ARBC 512b, Advanced Classical Arabic II** Shawkat Toorawa

An advanced course on Arabic grammar and morphology through a close reading of the grammar manual of Ibn Malik (*The Alfyyah*), in addition to advanced training in sentence structure through *i'rab*.

**ARBC 530a or b, Arabic Seminar** Staff

Study and interpretation of classical Arabic texts for advanced students. Prerequisite: ARBC 510 or permission of the instructor.

**ARBC 567a, Modern Arab Writers** Muhammad Aziz

Study of novels and poetry written by modern Arab writers, including Taha Hussein, Zaid Damraj, Hoda Barakat, Nizar Qabbani, al-Maqalih, and Mostaghanimi.

Prerequisite: ARBC 504 or permission of the instructor.

**EGYP 500a, Introduction to Classical Hieroglyphic Egyptian I** Christina Geisen

A two-term introduction to the language of ancient pharaonic Egypt (Middle Egyptian) and its hieroglyphic writing system, with short historical, literary, and religious texts. Grammatical analysis with exercises in reading, translation, and composition.

**EGYP 501b, Introduction to Classical Hieroglyphic Egyptian II** Christina Geisen

A two-term introduction to the language of ancient pharaonic Egypt (Middle Egyptian) and its hieroglyphic writing system, with short historical, literary, and religious texts. Grammatical analysis with exercises in reading, translation, and composition.

**EGYP 510a, Elementary Biblical Coptic I** Thomas Schmidt

The native Egyptian language in the Roman and Byzantine periods. Thorough grounding in grammar and vocabulary of the Sahidic dialect as a basis for reading biblical, monastic, and Gnostic texts. Credit only on completion of EGYP 520.

**EGYP 520b, Elementary Biblical Coptic II** Thomas Schmidt

Continuation of EGYP 510. Prerequisite: EGYP 510.

**EGYP 521a, The Wisdom of Ancient Egypt: Pharaonic Cultural Texts in Translation**  
Christina Geisen

Overview of the different text genres in ancient Egypt. Critical analysis of primary sources and their important role in the reconstruction of the history and cultural aspects of ancient Egyptian civilization.

**EGYP 522b, Ancient Egyptian Hieratic Texts** Christina Geisen

An introduction to the hieratic script mainly used for everyday documents. The course also considers Old and Late Egyptian texts.

**EGYP 577a, Egyptian Rock Inscriptions** John Darnell**HEBR 500a, Elementary Modern Hebrew I** Staff

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** Staff

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** Dina Roginsky

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 506b, Dynamics of Israeli Culture** Shiri Goren

The course explores contemporary controversies of Israeli society by examining recent cultural production such as novelistic writing, films, poetry, newspaper articles, new media, advertisement, and television shows. Discussions include migration and the construction of the Sabra character; ethnicity and race: the emergence of Mizrahi voice; women in Israeli society; private and collective memory; minority discourse: Druze, Russian Jews; Israeli masculinity and queer culture. Conducted in Hebrew. Prerequisite: HEBR 502 or permission of the instructor.

**HEBR 510a, Conversational Hebrew: Israeli Media** Shiri Goren

An advanced Hebrew course for students interested in practicing and enhancing conversational skills. The course aims to improve the four language skills while stressing listening comprehension and various forms of discussions including practical situations, online interactions, and content analysis. Prerequisite: HEBR 502 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 516a, Israeli Popular Music** Dina Roginsky

Changes in the development of popular music in Israel explored as representations of changing Israeli society and culture. The interaction of music and cultural identity; the role of modern popular music in representing, shaping, challenging, and criticizing social conventions; songs of commemoration and heroism; popular representation of the Holocaust; Mizrahi and Arab music; feminism, sexuality, and gender; class and musical consumption; criticism, protest, and globalization. Prerequisite: HEBR 502 or equivalent.

**HEBR 563b / JDST 695b, From Biblical to Modern Hebrew** Dina Roginsky

This course aims to support students who have reading knowledge of Biblical Hebrew but cannot read or converse in Modern Hebrew. The course concentrates on reading and aims at enabling students to use Modern Hebrew for research purposes. The texts chosen are tailored to students' particular areas of interest. Prerequisite: two years of Biblical or Modern Hebrew studies, or permission of the instructor. Conducted in English.

**MESO 506b, Selected Mesopotamian Texts: Bilingual Texts** Eckart Frahm**MESO 577a, Sumerian School Dialogues: The Eduba through the Eyes of the Old Babylonian Literati** Klaus Wagonsonner

An investigation of scribal apprenticeship as vividly reflected in Sumerian literary texts, in particular the so-called school dialogues. Dialogues and diatribes are fairly but unjustifiably underrepresented in modern scholarship. The course takes examples from primary sources in the Yale Babylonian Collection and other collections.

**NELC 504b, Art of the Ancient Near East and Aegean** Karen Foster

Introduction to the art and architecture of Mesopotamia, Egypt, and the Aegean, with attention to cultural and historical contexts.

**NELC 518a, 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 533b / ANTH 531b / ARCG 531b / CLSS 815b / CPLT 547b / HIST 502b / JDST 653b / RLST 803b, Slavery, Dependency, and Genocide in the Ancient and Premodern World** Noel Lenski and Benedict Kiernan

Covers the subject of class and ethnic repression from the third millennium B.C.E. to the mid-second millennium C.E. Analyzes textual, epigraphic, and iconographic sources for slavery, dependency, and genocide in Assyrian, Greek, Roman, Germanic, Angkorian, Vietnamese, Burmese, Chosun, Mayan, and Aztec cultures.

**NELC 537a / ANTH 692a / ARCG 692a, Imaging Ancient Worlds** Roderick McIntosh and John Darnell

The interpretation of epigraphic and archaeological material within the broader context of landscape, by means of creating a virtual model to reconstruct the sensory experiences of the ancient peoples who created the sites. Use of new technologies in computer graphics, including 3-D imaging, to support current research in archaeology and anthropology.

**NELC 547a, Survey of Mesopotamian and Akkadian Literature** Benjamin Foster

Introduction to Sumerian and Akkadian literature, in translation, from their beginnings through the Hellenistic period.

**NELC 548a / MDVL 580a, Ancient and Medieval Astronomy: From Babylonian to Greek to Arabic to Latin** Kevin Van Bladel

Astronomy was one of the seven classical liberal arts. This course introduces the history and methods of classical astronomy as practiced by ancient and medieval astronomers of Assyria and Babylonia, Greece, Rome, and Persia; and by medieval scholars in Latin, Arabic, and Sanskrit, down to the time of Copernicus and Kepler.

**NELC 549b / MDVL 581b, Reading Classical Arabic Scholarship** Kevin Van Bladel

This course studies a tenth-century overview of the sciences in classical Arabic and meaningful excerpts of additional texts representing each science covered. Students acquire a large vocabulary of scholarly and technical terms of art as used in classical Arabic, facilitating further research in traditional Arabic scholarship.

**NELC 550b, Classical Near East Seminar** Kevin Van Bladel

The Classical Near East Seminar covers a different topic in each iteration, introducing graduate students to the state of a field of historical or philological study. The Classical Near East includes ancient Iran, the early Islamic caliphates, the late Roman and Byzantine Near East, and adjacent areas. The basis for research is the vast manuscript and other textual corpora in late ancient and medieval Near Eastern languages such as Arabic, Greek, Middle Persian, and Syriac. Typical CNE Seminar topics include Introduction to Sasanian Studies, the Religions of Ancient Iran, or intense philological



investigations of classical Near Eastern languages such as Bactrian, Sogdian, or Middle Persian.

**NELC 556a / CPLT 654a, Classics: The Arabic-Islamic World** Shawkat Toorawa  
Survey of the literary tradition of the Arabic-Islamic world (West Asia, North Africa, and Muslim Spain). Prose and poetry from the Qur'an to the Arabian Nights; attention to the interdependence of the works and their cultural setting, the agendas authors pursued, and the characters they portrayed.

**NELC 562a / CLSS 607a / LING 513a, Indo-European Linguistics** Kevin Van Bladel  
An introduction to the inner workings and prehistory of the Indo-European languages both as a language family and in individual branches. It is a course in historical linguistics devoted to the best understood of language families, Indo-European. The emphasis is on using the theoretical framework obtained by this knowledge, especially through practical applications for readers of ancient languages such as Greek, Latin, Hittite, Sanskrit, Avestan, and Middle Persian.

**NELC 588b / ANTH 773b / ARCG 773b, Abrupt Climate Change and Societal Collapse**  
Harvey Weiss

Collapse documented in the archaeological and early historical records of the Old and New Worlds, including Mesopotamia, Mesoamerica, the Andes, and Europe. Analysis of politicoeconomic vulnerabilities, resiliencies, and adaptations in the face of abrupt climate change, anthropogenic environmental degradation, resource depletion, "barbarian" incursions, or class conflict.

**NELC 605a, Global Environmental History** Harvey Weiss

**NELC 606a, Agriculture: Origins, Evolution, Crises** Harvey Weiss  
Analysis of the societal and environmental drivers and effects of plant and animal domestication, the intensification of agroproduction, and the crises of agroproduction: land degradation, societal collapses, sociopolitical transformation, sustainability, and biodiversity.

**NELC 607a, Mesopotamian History: First Millennium** Benjamin Foster  
A survey of Mesopotamian history in the first millennium.

**NELC 703b / JDST 721b / 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.

**NELC 706b / RLST 719b, Problems in Early Islamic History** Travis Zadeh  
An examination of questions and problems in the origins and development of Islamic history as explored by modern scholarship. Particular focus is placed on early source material.

**NELC 850a, Introduction to Arabic and Islamic Studies** Dimitri Gutas  
Comprehensive survey of the various subjects treated in Arabic and Islamic studies, with representative readings from each. Detailed investigation into the methods and techniques of scholarship in the field, with emphasis on acquiring familiarity with the bibliographical and other research tools.



**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 561a or b, Cinema of Iran, Past and Present** Farkhondeh Shayesteh

A thematic survey of Iranian cinema, past and present. Prominent Iranian directors such as Kiarostami, Beyzai, Panahi, Banietemad, and Farhadi are explored through discussion and in-class viewing of clips from assigned films. Students enhance their awareness of Persian culture through Iranian films while advancing their language skills.

**SMTC 520b / RLST 840b, Intermediate Ugaritic: Mythological Texts** Jimmy Daccache

This course completes the introduction to the Ugaritic language. Students read and analyze texts in the major genres of Ugaritic literature, with special emphasis on mythological texts.

**SMTC 523a / RLST 826a, Intermediate Syriac I** Jimmy Daccache

This two-term course is a continuation of SMTC 521. Reading and analysis of Syriac texts from various genres and time periods. Prerequisite: SMTC 521 or knowledge of Syriac.

**SMTC 524b / RLST 827b, Intermediate Syriac II** Jimmy Daccache

This two-term course is a continuation of SMTC 521. Reading and analysis of Syriac texts from various genres and time periods. Prerequisite: SMTC 521 or knowledge of Syriac.

**SMTC 534a, Introduction to Babylonian Aramaic** Elitzur Bar-Asher

An introduction to the language of the Jewish Babylonian Aramaic. This course covers the grammar of this dialect followed by reading of texts of different genres. In addition this class introduces some of the major philological aspects for approaching Talmudic texts.

**SMTC 535b / JDST 672b, Readings in Babylonian Aramaic Texts** Elitzur Bar-Asher

This course builds on SMTC 534. We read different texts from all sources of Jewish Babylonian Aramaic, with concentration on a variety of linguistic topics.

**SMTC 545a / RLST 835a, Northwest Semitic Inscriptions: Aramaic** Jimmy Daccache

This course is designed to familiarize students with Aramaic epigraphy from the first millennium B.C.E. The Aramaic grammar is illustrated through early monumental inscriptions on stone from Anatolia and the abundant papyri of the Persian period from Egypt.

**SMTC 836b / RLST 836b, Northwest Semitic Inscriptions: Hebrew and Moabite**

Jimmy Daccache

The aim of this course is to provide students with an overview of the Hebrew epigraphy from the first millennium B.C.E., including inscriptions on stone, jars, and ostraca. The second part of the term is devoted to the study of Moabite monumental inscriptions and seal inscriptions.

# Neuroscience

Sterling Hall of Medicine C303, 203.785.4323

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

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

## Chair

Pietro De Camilli

## Director of Graduate Studies

Michael Crair (SHM B301, 203.785.5768, [michael.crair@yale.edu](mailto:michael.crair@yale.edu))

## Director of Medical Studies

Michael Schwartz (ESH 302, 203.737.7100, [michael.schwartz@yale.edu](mailto:michael.schwartz@yale.edu))

**Professors** Amy Arnsten, Hal Blumenfeld (*Neurology*), Marvin Chun (*Psychology*), Michael Crair, Pietro De Camilli, Nihal de Lanerolle (*Neurosurgery*), Sabrina Diano (*Obstetrics, Gynecology & Reproductive Sciences*), Ralph DiLeone (*Psychiatry*), Ronald Duman (*Psychiatry*), Joel Gelernter (*Psychiatry*), Charles Greer (*Neurosurgery*), Murat Gunel (*Neurosurgery*), Joy Hirsch (*Psychiatry*), Tamas Horvath (*Comparative Medicine*), Elizabeth Jonas (*Internal Medicine/Endocrinology*), Jeffery Kocsis (*Neurology*), Anthony Koleske (*Molecular Biophysics & Biochemistry*), John Krystal (*Psychiatry*), Robert LaMotte (*Anesthesiology*), Daeyeol Lee, Csaba Leranth (*Obstetrics, Gynecology & Reproductive Sciences*), Paul Lombroso (*Child Study Center*), David McCormick, Godfrey Pearlson (*Psychiatry*), Marina Picciotto (*Psychiatry*), Vincent Pieribone (*Cellular & Molecular Physiology*), Marc Potenza (*Psychiatry*), Pasko Rakic, Joseph Santos-Sacchi (*Surgery*), Nenad Sestan, Gordon Shepherd, Rajita Sinha (*Psychiatry*), Stephen Strittmatter, Susumu Tomita, Flora Vaccarino (*Child Study Center*), Christopher van Dyck (*Psychiatry*), Stephen Waxman (*Neurology*), Z. Jimmy Zhou (*Ophthalmology & Visual Science*)

**Associate Professors** Meenakshi Alreja (*Psychiatry*), Charles Bruce, Sreeganga Chandra, Bo Chen (*Ophthalmology & Visual Science*), Daniel Colón-Ramos, Kelly Cosgrove (*Psychiatry*), Jaime Grutzendler (*Neurology*), Marc Hammarlund, Michael Higley, In-Jung Kim (*Ophthalmology & Visual Science*), Ifat Levy (*Comparative Medicine*), Chiang-Shan Ray Li (*Psychiatry*), Janghoo Lim (*Genetics*), Angeliki Louvi (*Neurosurgery*), Dhasakumar Navaratnam (*Neurology*), Michael Schwartz, Justus Verhagen

**Assistant Professors** Jessica Cardin, Steve Chang (*Psychology*), Marcelo de Oliveira Dietrich (*Comparative Medicine*), George Dragoi (*Psychiatry*), Jason Gerrard (*Neurosurgery*), Elena Gracheva, Michael Higley, Alex Kwan (*Psychiatry*), John Murray (*Psychiatry*)

Starting in the 2018–2019 academic year, graduate degrees will no longer be offered through the Department of Neuroscience graduate program. Instead, all students interested in pursuing a graduate degree in neuroscience should enter through the Interdepartmental Neuroscience Program (INP), which will continue to offer graduate degrees in neuroscience for all interested Yale graduate students. See INP for information on admissions requirements and process.

## **FIELDS OF STUDY**

Fields include the development, neuronal organization, and function of the mammalian central nervous system. The range of methods includes molecular-genetic and cellular neuroscience, neuroanatomy, biochemistry, neuropharmacology, computational modeling, neurophysiology, neuroimaging and behavior. An integrative, multidisciplinary approach is encouraged.

## **SPECIAL REQUIREMENTS FOR THE PH.D. DEGREE**

### **Course Requirements**

Six courses are required, and students must obtain a grade of Honors in two of these courses and maintain an HP average or better. Students not achieving this will be put on academic probation and may be dismissed from the graduate program. Without exception, students are required to earn two Honors by the end of the second year of enrollment. All students will be reviewed academically at the end of the year. For purposes of calculating an overall High Pass or above average, Honors=3, High Pass=2, Pass=1, and Fail=0.

Required courses are Principles of Neuroscience (NBIO 701), Neurobiology (NBIO 720), and Structural and Functional Organization of the Human Nervous System (NBIO 500). In addition, three more elective graduate-level courses are required. Additional degree requirements are successful completion of both terms of Lab Rotation for First-Year Students (NBIO 511, NBIO 512) and both terms of Second-Year Thesis Research (NBIO 513, NBIO 514). This will ensure that degree candidates obtain a solid background in systems, cellular, and molecular approaches to neuroscience. In addition to all other requirements, students must successfully complete NBIO 580, Bioethics in Neuroscience, prior to the end of their first year of study. This requirement must be met prior to registering for a second year of study. In their fourth year of study, all students must successfully complete B&BS 503, RCR Refresher for Senior BBS Students.

### **Laboratory Rotations**

Two rotations are required; they are typically completed in the first year. Rotations outside the Neuroscience track will count toward this requirement upon approval of the Neuroscience track directors.

### **Teaching Requirements**

An important aspect of graduate training in Neuroscience is the acquisition of teaching skills through participation in courses appropriate for the student's scientific interests. These opportunities can be drawn from a diverse menu of lecture, laboratory, and seminar courses at the undergraduate, graduate, and medical school levels. Ph.D. students are required to serve as Teaching Fellows (TF) for two terms. First-year students may not serve as a TF without written permission from the Neuroscience track directors. It is recommended that one term of teaching should be completed by the end of the third year, and both requirements be completed by the end of the fourth year.

Specifically, it is recommended that the first requirement be met by teaching in either Principles of Neuroscience (NBIO 701), Neurobiology (NBIO 720), Brain and Thought (CGSC 201), or Structural and Functional Organization of the Human Nervous

System (NBIO 500). The second course may be chosen from the list of neuroscience-related courses in the Graduate School of Arts and Sciences bulletin, or from the Interdepartmental Neuroscience Program's Bioethics course. A course not directly related to neuroscience must have the approval of the director of graduate studies (DGS).

## Qualifying Exam

Ph.D. students must complete their qualifying exam by June 1 of their second year as a graduate student. The student must choose four faculty members to read with in consultation with the DGS and the student's Ph.D. mentor; it is strongly encouraged that these faculty represent interests spanning from molecular to systems/cognitive neuroscience and not include the Ph.D. mentor. The student and faculty should devise a reading list of about fifteen papers on a defined topic. They should meet regularly (at least three or four meetings) to discuss the papers in depth. For the written exam, the student is given two questions from each faculty member. The student has three hours to write an answer to one of the two questions for each faculty member, i.e., a twelve-hour written exam spread over two days. The exam is performed on a laptop observing the honor system and is proctored by the DGS. The student may refer to the papers and the student's notes but not to the Internet. The answers are distributed to the faculty, and several days later an oral exam is held to further evaluate the student's knowledge. A fifth faculty member (a reader) chosen by the student may also be present at the oral exam, along with the DGS. If the student fails the qualifying exam, the student may have one more attempt at passage; this must be completed within one term of taking the original exam. A unanimous Pass vote from the Qualifying Examination committee is required. Students who do not pass the Qualifying Examination will be put on academic probation and will be required to either retake parts of the qualifier and/or complete additional course work. They will receive a letter from the DGS explaining why their performance was marginal, and they may be dismissed from the graduate program if they do not show improvement within one term. Areas of weakness will be outlined, as well as specific guidelines as to how they can demonstrate improvement. Proof of timely continual academic progress will be required.

## Prospectus

Ph.D. students must complete and submit their dissertation prospectus (also called thesis proposal) by June 1 of the third year as a graduate student. The guidelines are as follows:

1. The student should discuss with the mentor an appropriate topic and research plan for the thesis proposal, as well as discuss likely names of faculty to serve on the thesis committee. The thesis committee is required to have four members: the mentor and three other faculty, with at least one of those three faculty with a primary appointment in the Department of Neuroscience and one member with a primary appointment outside the Department of Neuroscience. Faculty outside of Yale can be included if they can attend on a regular basis. Non-Yale faculty are often best included as a fifth member, so that a meeting can officially be held in their absence if needed. One member of the thesis committee (not the mentor) is appointed chair.

2. The student should write a proposal of approximately seven (7) pages (following the format of an NIH/NRSA application). This should include (a) the hypothesis to be addressed (specific aims), (b) a few pages of background and significance, (c) preliminary data to demonstrate feasibility, and (d) a research plan including strategies in case proposed experiments fail. It is highly recommended that the thesis include a core of conservative experiments, i.e., very feasible, well-controlled studies. High-risk/high-payoff studies should only be included as “halo” research; i.e., if these fail, the student should still be able to graduate.
3. The mentor should approve the thesis proposal.
4. The student should distribute the proposal to the thesis committee members at least one week before the thesis committee meeting, and optimally discuss the proposal with each member individually prior to the meeting to ensure that there are no major problems.
5. The student meets with the thesis committee to approve the thesis proposal. It is at this time that the proposal is often modified, for instance by the suggestion of an additional control experiment. Goals should be realistic and in the interest of the student completing the degree in a timely manner. The finalized approved protocol is then provided to the Neuroscience business office, where the registrar will complete the paperwork for advancement to candidacy, obtain the DGS’s signature, and then send it to the Graduate School. As this must be completed before June 1, students should convene the thesis committee meetings prior to mid-May.

The student is required to meet with the thesis committee on at least a yearly basis to update progress and problems. A one-page summary of this meeting is written and signed by the chair of the thesis committee. The student is provided with written feedback. The registrar receives a copy of the report and files it in the student’s file.

## Admission to Candidacy

Ph.D. students are required to have been admitted to candidacy by June 1 of the third year as a graduate student. Generally, the submission of the thesis prospectus is the final requirement for admission to candidacy. The paperwork for both is submitted to the Graduate School at the same time. Students who do not meet this standard may be required to petition the Graduate School for permission to register for the following term and can be placed on academic probation until these requirements have been met.

## Other Requirements

All graduate students who are admitted to candidacy are required to have an annual thesis committee meeting; more frequent meetings are encouraged. All graduate students are required to give a student research presentation annually (a brief INP rotation talk early in the graduate career, followed by a longer Neuroscience Student Research Talk as the student’s research advances). All students are expected to attend rotation/student research talks.

## Thesis Defense

There are several parts to the thesis defense: (1) The student gives the full thesis document to the thesis committee with sufficient time (approximately two weeks) for

the committee to read and comment on this large document before the thesis defense.

- (2) The student defends the thesis in front of the thesis committee in a private setting. It is expected that small changes to the thesis document will be made before submission to the Graduate School. Major changes to the thesis may require additional meetings between the student and the thesis committee before a public defense can be scheduled.
- (3) The student gives the public defense no less than one month following the private (thesis committee) defense, following approval of the DGS. The public defense is a one-hour seminar summarizing the research and open to the community.

## Vacation Policy

Students making satisfactory progress toward the completion of their Ph.D. degree will have two weeks of vacation in addition to the stated Yale University holidays and the break from Christmas Eve through New Year's Day. Additional vacation time will require permission from the thesis adviser. Although classes are not held, Fall and Spring recesses are not considered Yale University holidays. Proposed exceptions must be discussed with the DGS.

## SPECIAL REQUIREMENTS FOR THE M.D./PH.D.

Requirements for M.D./Ph.D. students are the same as for Ph.D. students with the following differences: three courses are required (Principles of Neuroscience [NBIO 701], Structural and Functional Organization of the Human Nervous System [NBIO 500], and one elective graduate-level course). M.D./Ph.D. students are required to serve for one term as teaching assistants; however, two terms of teaching are preferred.

## MASTER'S DEGREES

**M.Phil.** See Degree Requirements under Policies and Regulations. Awarded only to students who are continuing for the Ph.D. degree. Students are not admitted for this degree.

**M.S.** Awarded only to students who are not continuing for the Ph.D. Students must have successfully completed our equivalent of 30 credit hours in the doctoral program. This includes a passing grade in the four required courses plus two elective courses, a minimum of two Honors grades, and successful completion of both terms of Lab Rotation for First-Year Students (NBIO 511, NBIO 512) and both terms of Second-Year Thesis Research (NBIO 513, NBIO 514). Students are not admitted for this degree.

Program materials are available upon request to the Director of Graduate Studies, Department of Neuroscience, Yale University, PO Box 208001, New Haven CT 06520-8001.

## COURSES

### **NBIO 570b / C&MP 570b, Sensory Physiology** David Zenisek

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

**NBIO 720a / 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.



# Nursing

400 West Campus Drive, 203.785.2389

<http://nursing.yale.edu/academics/doctor-philosophy-phd>

M.Phil., Ph.D.

## Dean

Ann Kurth

## Director of Graduate Studies

Robin Whittemore (203.737.2351, [robin.whittemore@yale.edu](mailto:robin.whittemore@yale.edu))

**Professors** Jane Dixon, Marjorie Funk, Margaret Grey, Holly Kennedy, M. Tish Knobf, Ann Kurth, Ruth McCorkle, Nancy Redeker, Nancy Reynolds, Lois Sadler, Robin Whittemore

**Associate Professors** Wei-Ti Chen, Joanne Iennaco, Mark Lazenby, Linda Pellico, Jacquelyn Taylor, Julie Womack

**Assistant Professor** Soohyun Nam

## FIELDS OF STUDY

Fields include chronic illness (diabetes, cardiovascular disease, cancer, HIV/AIDS); self- and family management; maternal and child health; sleep and sleep disorders; global health; health equity and care of vulnerable populations; acute and critical care; end-of-life and palliative care; genetic and environmental influences on health; gerontology and long-term care; and school- and community-based interventions.

## SPECIAL ADMISSIONS REQUIREMENTS

Applicants should have a master's degree in nursing, or the equivalent, including previous course work in statistics and graduate-level course work in research methods. The Graduate Record Examination (GRE) General Test is required. The Test of English as a Foreign Language (TOEFL) is required of all applicants for whom English is a second language. Samples of written work (e.g., published article, thesis, literature review) and a curriculum vitae are required. Qualified applicants will be invited for an interview with a member of the doctoral faculty.

## SPECIAL REQUIREMENTS FOR THE PH.D. DEGREE

### Course Work

Completion of 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: Theoretical Basis for Nursing Science; NURS 913, Foundations of Scientific Inquiry II: Biopsychosocial Theories of Health; Symptom Management; 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 five-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.

### **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. For a complete list of Nursing courses, see the School of Nursing bulletin, online at <http://bulletin.yale.edu>; and Online Course Information (OCI) at <https://students.yale.edu/oci>.

### **NURS 901a, Research Methods I: Quantitative Methods for Health Research** Staff

This course in research methods provides an opportunity to evaluate various scientific designs for investigating problems of importance to nursing and health, with a focus on quantitative research methods. Emphasis is placed on the interrelationships of the research question and study aims with study design and method—with the goal of understanding methods decisions that are made by researchers, and how these decisions influence study validity. The Yale Model for Generation of Knowledge for Evidence-Based Practice is introduced. The course prepares the student for designing a quantitative study. Required of all Ph.D. students in nursing. Open to master's students with permission of the instructor. Three hours per week.

### **NURS 902b, Research Methods II: Qualitative Methods for Health Research** Staff

This course introduces the student to major approaches to qualitative research, including newer and innovative methods. Selected topics are presented linking qualitative approaches with stage of knowledge development and steps in the research process, including use of theory, design, conduct, analyses, rigor, reporting, and evaluation of qualitative research. Emphasis is placed on the appropriate use of qualitative methods and differences across qualitative approaches depending on the nature of the research question. The course includes practice with key elements of data collection, analysis, reporting, and critiquing. Required of all Ph.D. students in nursing. Three hours per week.

### **NURS 903a, Research Methods III: Measurement of Health Variables** Staff

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** Staff

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 905b, Research Methods V: Intervention Development** Staff

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** Staff

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** Staff

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 908a, Science, Scholarship, and Communication of Knowledge I** Staff

This is the first course in a four-course sequence designed to socialize the student into the roles and responsibilities of a Ph.D.-prepared nurse scientist. Students develop specific beginning competencies necessary to engage in a career as an independent nurse scientist, including basic principles and processes of scientific writing and communication, and research priorities and strategies for building a program of research. The NURS 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 909b, Science, Scholarship, and Communication of Knowledge II** Staff

This is the second course in a four-course sequence designed to socialize the student into the roles and responsibilities of a Ph.D.-prepared nurse scientist. Students develop specific beginning competencies necessary to engage in a career as an independent nurse scientist, including basic principles and processes of grant writing and communicating research results. The NURS 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 910a, Science, Scholarship, and Communication of Knowledge III** Staff

This is the third course in a four-course sequence designed to socialize the student into the roles and responsibilities of a Ph.D.-prepared nurse scientist. Students develop specific beginning competencies necessary to engage in a career as an independent nurse scientist, including basic principles and processes of peer review, responding to research critiques, and publishing research results. The NURS 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** Staff

This is the fourth course in a four-course sequence designed to socialize the student into the roles and responsibilities of a Ph.D.-prepared nurse scientist. Students develop specific beginning competencies necessary to engage in a career as an independent nurse scientist, including basic principles and processes of grant management, mentorship, career planning, and roles and responsibilities of the nurse scientist

and leader. The NURS 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 912a, Foundations of Scientific Inquiry I: Philosophical and Theoretical Basis for Nursing Science** Staff

In this course students examine the nature of the philosophical and theoretical basis for nursing science. The nature of science is explored through a dialogue of competing philosophical perspectives, such as logical positivism, post-positivism, historicism, critical theory, and post-structuralism. The philosophies that have informed the scientific process and the conceptual and theoretical underpinnings of nursing science are discussed. Specific approaches to concept/theory development and analysis, with linkages to philosophical perspectives, are examined. Required of all Ph.D. students in nursing. Three hours per week.

**NURS 913b, Foundations of Scientific Inquiry II: Theories of Health, Symptom Management, and Self-Management** Staff

This course examines major conceptualizations of health and illness, self- and family management, and research supporting these conceptualizations. Emphasis is placed on the link between health and illness self-management, with particular emphasis on vulnerable populations, and related concepts such as symptom distress, self-efficacy and coping, and the contributions of risk and protective factors to self-management. Self-management is considered from both an individual and family perspective, and sociocultural influences on self-management are explored. Required of all Ph.D. students in nursing. Three hours per week.

**NURS 917b, Advanced Statistics for Clinical Nursing Research** Staff

This term-long course starts with linear regression and advances to additional multivariate analyses most commonly used in nursing studies. The emphasis is on attaining a conceptual understanding of these statistical techniques, selecting appropriate techniques for a given clinical research problem, conducting computer-assisted data analyses, and correctly expressing the results of such analyses. The laboratory part of the course covers fundamentals of data management and statistical analysis, and proceeds to the conduct of advanced analyses. The course emphasizes using programming language in SAS®. Required of all Ph.D. students in nursing; open to master's students with permission of the instructor. Four hours per week (two hours seminar, two hours lab).

**NURS 929b, Ethical Conduct of Clinical Research** Staff

The course introduces major concepts in the ethical conduct of clinical research from the perspective of the advanced practice nurse and the nurse-researcher. National and international ethical codes for research and regulatory requirements are reviewed. Emphasis is placed on the protection of vulnerable populations and community-based research, including international research. Required of all Ph.D. students in nursing. Open to others with permission of the instructor. One hour per week.

**NURS 941b, Health Policy, Leadership, and Systems** Staff

The course addresses salient issues in health policy and the challenges to linking research and clinical care with public and private policy agendas. The course covers the following topics: health care delivery systems; policy and political factors that affect access to care and its financing, delivery, and quality; challenges to evidence-based policy and the dissemination of research findings to policy and community-

based leaders. It also includes theories of leadership and policy change relevant to students' research topics. Critical thinking, problem-solving skills, and research-based analysis are integrated throughout the course. A major written assignment suitable for submission to a peer-reviewed journal (or that can be easily modified for same) is a course requirement. Prerequisite: students must pass a test based on the online Yale University School of Nursing Health Policy Module. Required of all Ph.D. students in nursing. Three hours per week.

## ELECTIVES

### **NURS 920a and NURS 921b, Doctoral Independent Study** Staff

This elective is initiated by the student and negotiated with faculty. The purpose is to allow in-depth pursuit of individual areas of interest and/or practice. A written proposal must be submitted and signed by the student, the faculty member(s), and the program chairperson.

### **NURS 927b, Research in Care of People with Cancer or at Risk for Cancer and Their Families** Staff

This course focuses on the current state of the science in care of people with cancer, or at risk for cancer, and their families. Specific attention is paid to factors associated with quality-of-life outcomes, such as symptoms, functional status, and affect; and factors that place people at high risk, such as family history, ethnicity, and socioeconomic class. Research from nursing, medicine, and the social sciences is discussed. Two hours per week. 2 Course cr

### **NURS 931b, Creating Methods: Innovation and Synthesis** Staff

This elective doctoral seminar explores methodological development in nursing and health research, through illustration of how methodological perspectives are conceptualized and systematically analyzed, in order to prepare the learner to contribute to the methods literature. During the first part of the course, we examine methods papers of various types. Each student prepares a methods paper of publishable quality. Ideally, this may become a methods paper for the dissertation. There is a focus on advanced quantitative design, including large datasets and secondary analysis.  
o Course cr

# 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](mailto:elias.lolis@yale.edu))

## Director of Medical Studies

Benjamin Turk (SHM B395, 203.737.2494, [ben.turk@yale.edu](mailto:ben.turk@yale.edu))

**Professors** Karen Anderson, Anton Bennett, Yung-Chi Cheng, Jack Cooper (*Emeritus*), Priscilla Dannies (*Emerita*), Barbara Ehrlich, Jonathan Ellman, James Howe (*Emeritus*), Leonard Kaczmarek, Mark Lemmon, Elias Lolis, Gary Rudnick, Joseph Schlessinger, William Sessa, Diangling (Dan) Wu

**Associate Professors** Titus Boggon, David Calderwood, Kathryn Ferguson, Ya Ha, Irit Lax, Benjamin Turk

**Assistant Professors** Daryl Klein, Bryce Nelson

## FIELDS OF STUDY

Major emphases in the department are in the areas of molecular pharmacology, mechanisms of drug action, signal transduction, structural biology, neuropharmacology, and chemotherapy.

## SPECIAL ADMISSIONS REQUIREMENTS

A bachelor's degree in biology, chemistry, or another science is required.

Undergraduate courses should include biology, organic chemistry, physics, and calculus. GRE scores are required; a GRE Subject Test, preferably in Biology or Chemistry, is recommended.

To enter the Ph.D. program, students should apply to an interest-based track within the interdepartmental graduate program in Biological and Biomedical Sciences (BBS), <http://bbs.yale.edu>. Most students interested in a Ph.D. in Pharmacology apply through the Molecular Medicine, Pharmacology, and Physiology track or the Biochemistry, Quantitative Biology, Biophysics, and Structural Biology track.

## SPECIAL REQUIREMENTS FOR THE PH.D. DEGREE

Because the field of pharmacology encompasses many disciplines, the department's flexible program of study toward the Ph.D. degree permits students to concentrate in areas of their particular interest. Students must take the core graduate pharmacology course (PHAR 504) and the two terms of the graduate seminar course (PHAR 502) or equivalent from another department. The other courses will be selected based on each student's interest but must include at least two of three other courses: PHAR 528, PHAR 529, and PHAR 550; PHAR 560 may be substituted for PHAR 550. Students are required to do three laboratory rotations. The Graduate School requires a grade of Honors for a minimum of two courses. Honors for seminar courses or rotations



cannot be used toward this requirement. Students must meet the Honors requirement prior to being admitted to candidacy. Students must also maintain an overall High Pass average. A grade of Honors or High Pass is required for PHAR 504. 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, two lectures from PHAR 580 and one lecture from B&BS 503, RCR Refresher for Senior BBS Students, must be completed by the end of the fourth year.

Students are also required to pass the qualifying examination by the end of their fourth term. Before the end of the third year, a thesis prospectus must be submitted and accepted for admission to candidacy. A doctoral dissertation based upon original research includes an oral presentation given only to the pharmacology faculty (pre-defense). Within six months of passing the pre-defense, the student must submit a preliminary written thesis to the thesis committee and an outside reader. A public Ph.D. dissertation seminar will be scheduled, followed by a closed examination by the thesis committee and the outside examiner. Once the draft of the written thesis is approved by the thesis committee, it is submitted to the Graduate School. Two first-author manuscripts are required from the thesis research.

An important aspect of graduate training in pharmacology is the acquisition of teaching skills through the participation in courses related to the student's scientific interests. These opportunities can be drawn from a diverse menu of lecture, laboratory, and seminar courses given at the undergraduate, graduate, and medical school levels. Ph.D. students are required to participate in two terms (or the equivalent) of teaching. Fulfillment of this requirement occurs by the end of the third year. Students are not expected to teach during their first year.

## **M.D./PH.D. STUDENTS**

M.D./Ph.D. students must satisfy all of the above requirements for the Ph.D. with the following modifications: (1) only two of three laboratory rotations are required; (2) some medical school courses (except Pharmacology) can qualify as Graduate School courses as long as the M.D./Ph.D. student registers for them in OCS (Online Course Selection); and (3) only one term of teaching is required. Current Graduate School courses cannot be used to fulfill any medical school course requirements.

## **MASTER'S DEGREES**

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

**M.S. (en route to the Ph.D.)** Students are eligible for the M.S. degree upon successful completion of the first three terms of the Ph.D. program. This includes one year of lab rotations and course requirements.

Program materials are available upon request to the Director of Graduate Studies, Department of Pharmacology, Yale University, PO Box 208066, New Haven CT 06520-8066.

## COURSES

### **PHAR 502a or b / C&MP 630a or b / PATH 680a or b, Seminar in Molecular**

**Medicine, Pharmacology, and Physiology** Susumu Tomita

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

### **PHAR 504a, Principles of Pharmacology** Elias Lolis

This course covers the molecular mechanisms of therapeutics, which are presented in a conceptual framework to increase understanding but decrease memorization. Topics include (but are not limited to) receptor affinity, efficacy, multiple equilibria, pharmacokinetics, and toxicity; enzyme kinetics and inhibition, drug discovery and design; molecular basis of antimicrobial therapy, cardiology drugs, anticancer and antiviral therapies; and therapeutics for inflammatory disorders, asthma, and allergy.

### **PHAR 528a, Principles of Signal Transduction** Anton Bennett

The regulation of intracellular signaling is of fundamental importance to the understanding of cell function and regulation. This course introduces the broad principles of intracellular signal transduction. More detailed lectures on specific intracellular signaling pathways are given in which students learn both the basic and most recent and cutting-edge concepts of intracellular signaling. Topics include regulation of signaling by protein phosphorylation, small G proteins, G-protein-coupled receptors, hormones, phospholipids, adhesion, and gasses.

### **PHAR 529b, Structural Biology and Drug Discovery** Titus Boggon and Ya Ha

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.

### **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 550a / C&MP 550a / ENAS 550a / MCDB 550a, Physiological Systems** 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** Frederick Sigworth

The course focuses on understanding the processes that transfer molecules across membranes at the cellular, molecular, biophysical, and physiological levels. Students learn about the different classes of molecular machines that mediate membrane transport, generate electrical currents, or perform mechanical displacement. Emphasis is placed on the relationship between the molecular structures of membrane proteins and their individual functions. The interactions among transport proteins in determining the physiological behaviors of cells and tissues are also stressed. Molecular motors are introduced and their mechanical relationship to cell function is explored. Students read papers from the scientific literature that establish the connections between mutations in genes encoding membrane proteins and a wide variety of human genetic diseases.

**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](mailto: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, Thomas Pogge, Scott Shapiro, Sun-Joo Shin, Steven Smith, Jason Stanley, Zoltán Szabó, Kenneth Winkler, Gideon Yaffe

**Assistant Professors** Robin Dembroff, Daniel Greco, Elizabeth Miller, John Pittard

## 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 towards 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 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 [http://www.yale.edu/classics/research\\_philosophy\\_program.html](http://www.yale.edu/classics/research_philosophy_program.html).

Applicants for the Philosophy track of the combined program must satisfy the general requirements for admission to the Philosophy graduate program, in addition to the requirements of the Philosophy track of the combined program. Details of the Philosophy track of the program are available online at <http://philosophy.yale.edu/graduate-program/classics-and-philosophy-program>.

The combined program is overseen by an interdepartmental committee currently consisting of Verity Harte, David Charles, and Brad Inwood together with the director of graduate studies (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 602a / CPLT 699a / GMAN 603a, Heidegger's *Being and Time*** Martin Hägglund

A systematic, chapter-by-chapter study of Heidegger's *Being and Time*, arguably the most important work of philosophy of the twentieth century. All the major themes of the book are addressed in detail, with a particular emphasis on care, time, death, and the meaning of being.

**PHIL 615b, Hume and Reid** Kenneth Winkler

A study of Hume's epistemology and metaphysics and his science of human nature. Topics include space and time; inductive reasoning; causation; belief in an external world; personal identity; liberty and necessity; moral judgment; religious belief; and skepticism. Readings in Book I of *A Treatise of Human Nature*, *An Enquiry concerning Human Understanding*, and *Dialogues concerning Natural Religion*.

**PHIL 617a / GMAN 649a / JDST 651a, Critical Theory and the Frankfurt School** Asaf Angermann

This course is an introduction to the thought and writings of the philosophers known as the Frankfurt School, who founded and developed the idea of Critical Theory. Taken in its original meaning as a method or even a practice, rather than a systematic theory, Critical Theory suggests a way of thinking about the interrelations between philosophy and society, culture and politics, and on the complex relation between philosophical concepts and social reality. By reading key texts of Frankfurt School authors such as Adorno, Horkheimer, Marcuse, Benjamin, Kracauer, and Fromm, the course inquires into the meaning of concepts such as critique, history, freedom, individuality, emancipation, and aesthetic experience.

**PHIL 619a, Descartes** Michael Della Rocca

An examination of Descartes as a founder of the modern world picture. Consideration of all his major works.

**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 630a, Social Epistemology** Daniel Greco

Survey of recent work in social epistemology, the branch of philosophy that concerns the social dimensions of knowledge. Topics to be addressed include the epistemic significance of disagreement, judgment aggregation, and how various social institutions look when viewed through an epistemological lens (e.g., epistemic arguments for democracy, error-minimization arguments for trial-by-jury).

**PHIL 634b, 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 638a, Philosophy of Logic** Sun-Joo Shin

Exploration of valid reasoning, mainly in the context of propositional and predicate logic. Topics include the well-known debate on the justification of *modus ponens*; Tarski's analysis of logic consequence; and the relatively recent and provocative claim (made by Etchemendy) that Tarski's analysis of logical consequence fails in capturing ordinary and intuitive concept of logical consequence.

**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 644b, 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 650a, The Problem of Evil** Keith DeRose

The evils of our world can seem to present strong reasons for disbelieving in the existence of God. This course examines the main forms that this problem for theism takes, and some of the proposed ways of solving, or at least mitigating, the problem.

**PHIL 654a, The Moral Theories of Moore and Ross** Shelly Kagan

An examination of two of the most important works of moral philosophy of the twentieth century, *Principia Ethica* by G.E. Moore and *The Right and the Good* by W.D. Ross.

**PHIL 655b, 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 657b / PLSC 611b, 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 663a / PLSC 605a, Rethinking Sovereignty: Human Rights and Globalization**

Seyla Benhabib

The crises of sovereignty and the end of sovereignty have been discussed in law, political science, and philosophy. Post-nationalist, cosmopolitan, as well as neoliberal critics of sovereignty abound. This course discusses alternative models of sovereignty, ranging from democratic iterations to popular constitutionalism, and considers the implications of these models for the definition and enforcement of rights. Recent developments in the U.S. and the European Union law regarding immigration and refugee issues are a special focus. Readings include Hobbes, Kant, Schmitt, Arendt, Kelsen, Habermas, Waldron, Walker, and Benveniste. *Also LAW 20662.*

**PHIL 664a, 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 668a, Metaethics** Stephen Darwall

A study of moral theorizing and moral discourse. The linguistic role of words like good, bad, right, and wrong; whether propositions that use these terms can be true or false. What ethical claims mean, if anything, and what kinds of reasoning or evidence might justify such claims.

**PHIL 683b, Plato's Metaphysics** Verity Harte

A broad look at central topics in Plato's metaphysics followed by in-depth study of the conception of reality underlying the classificatory method at work in his *Sophist*, *Statesman*, and *Philebus*.

**PHIL 684a or b, Teleology and Mechanism** Staff

Examination of teleology, with special emphasis on Aristotle, Kant, Schelling, and Hegel, as well as recent discussions of invisible hand explanations, which explain the appearance of purposiveness. Additional exploration of conceptions of mechanism, both in the history of modern philosophy and science, and in recent debates about so-called new mechanical philosophy.

**PHIL 703b, Philosophy of Law: Analytical Jurisprudence** Scott Shapiro

This course examines a variety of historically influential responses to basic questions concerning the nature of law and the difference (if any) between law and morality. Readings include works by legal positivists, natural lawyers, legal realists, and critical legal scholars. PHIL 715 is a companion to this course. The two together comprise a literacy course in the philosophy of law. They can be taken in either order or separately. Neither is a prerequisite for the other, but students seeking a strong background in philosophy of law are encouraged, but not required, to take both. Self-scheduled examination or paper option.

**PHIL 705a, First-Year Seminar** Michael Della Rocca and Robin Dembroff

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 706a, Work in Progress I** Paul Franks

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 715a, Philosophy of Law: Normative Jurisprudence** Gideon Yaffe

This course concerns philosophical topics that arise in connection with particular areas of law. Such topics include the justification of criminal punishment; discrepancy in punishment of attempted and completed crimes; the relevance of ignorance of the law to criminal responsibility; self-defense and other forms of preventive violence; the rationale for double-jeopardy restrictions; the conception of justice of import to tort law; the concepts of causation and intention in tort law; the relationship between promises and contracts; the fundamental rationale for property rights; the grounds for and nature of the individualization of the reasonable person standard; the rationale for variations in standards of proof across areas of law. A selection of such topics are examined through consideration of both philosophical essays written about them and legal materials that bear on them. PHIL 703 is a companion to this course. The two together comprise a literacy course in the philosophy of law. They can be taken in either order or separately. Neither is a prerequisite for the other, but students seeking a strong background in philosophy of law are encouraged, but not required, to take both. Enrollment limited to twenty-five. Self-scheduled examination.

**PHIL 717b, Recent Work and Research in Epistemology** Keith DeRose

A study of some prominent issues in current epistemology, focusing on literature relevant to research interests of students and the instructor. Topics may include skepticism, internalist vs. externalist accounts of knowledge and of justification, the structure of knowledge and of justification (foundationalism, coherentism), contextualism in epistemology, relevant alternative accounts of knowledge, and the epistemology of lotteries. Students not in the Philosophy graduate program are welcome, but should contact the instructor for permission and further information before enrolling.

**PHIL 718a / PLSC 553a, Social Justice** Bruce Ackerman

An examination of contemporary theories, together with an effort to assess their practical implications. Authors this year include Peter Singer, Richard Posner, John Rawls, Robert Nozick, Michael Walzer, Marion Young, Avishai Margalit, and Cass Sunstein. Topics: animal rights, the status of children and the principles of educational policy, the relation of market justice to distributive justice, the status of affirmative action, and the rise of technocracy. Self-scheduled examination or paper option. Follows Law School academic calendar. Also *LAW 20104*.

**PHIL 721b, Context** Zoltán Szabó

The problem of context-dependence in natural language. Topics include objective and subjective conceptions of context, types of context-sensitivity, vagueness and imprecision, compositionality and rule-following.

**PHIL 736a / CLSS 879a, Stoicism** Brad Inwood

Stoicism was one of the most important philosophical movements in the ancient Graeco-Roman world and has exercised great influence on European philosophy (and culture more generally) since the Renaissance. This course is a high-level introduction to ancient Stoicism, open equally to those who have a reading knowledge of Greek and/or Latin (as relevant) and those who don't.

**PHIL 738a, Aristotle: *Metaphysics* Book 9 [Theta]** David Charles

The class reads and discusses the Greek text of Aristotle's *Metaphysics* 9 [Theta], which discusses substances, processes, activities, and capacities: central features of Aristotle's metaphysics. This book is important for its discussion of a series of arguments concerning necessity, possibility, metaphysical priority, and truth. This is a core course for the combined Ph.D. program in Classics and Philosophy. It is open to all graduate students in Philosophy or Classics who have suitable preparation in Attic Greek and some prior knowledge of ancient philosophy. Others interested in taking or attending the class must have prior permission of the instructors.

**PHIL 743b, Law and Psychology** Gideon Yaffe

This seminar explores recent research in psychology and philosophy concerned with free will, agency, and moral and criminal responsibility, and the bearing of this research on the law. Topics include the nature of agency and free will; the distinction between compulsion and weakness; causality and responsibility; conceptions of just deserts; excusing, mitigating, and aggravating conditions; neural and genetic sources of conduct, and situational and unconscious factors shaping conduct.

**PHIL 750a or b, Tutorial** Zoltán Szabó

By arrangement with faculty.

# Physics

35 Sloane Physics Laboratory, 203.432.3607  
<http://physics.yale.edu>  
 M.S., M.Phil., Ph.D.

## Chair

Paul Tipton

## Director of Graduate Studies

Sean Barrett (SPL 24, 203.432.6928, [graduatephysics@yale.edu](mailto: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*), Paolo Coppi (*Astronomy*), David DeMille, Michel Devoret (*Applied Physics*), Frank Firk (*Emeritus*), Bonnie Fleming, Marla Geha (*Astronomy*), Steven Girvin, Leonid Glazman, Jack Harris, John Harris, Karsten Heeger, Victor Henrich (*Applied Physics*), Jay Hirshfield (*Adjunct*), Jonathon Howard (*Molecular Biophysics & Biochemistry*), Francesco Iachello, Sohrab Ismaill-Beigi (*Applied Physics*), Steve Lamoreaux, Samuel MacDowell (*Emeritus*), Simon Mochrie, Vincent Moncrief, Priyamvada Natarajan (*Astronomy*), Peter Parker (*Emeritus*), Daniel Prober (*Applied Physics*), Nicholas Read, Jack Sandweiss (*Emeritus*), Robert Schoelkopf (*Applied Physics*), Ramamurti Shankar, Witold Skiba, Charles Sommerfield (*Emeritus*), A. Douglas Stone (*Applied Physics*), Paul Tipton, Thomas Ullrich (*Adjunct*), C. Megan Urry, Pieter van Dokkum (*Astronomy*), John Wettlaufer (*Geology & Geophysics*), Robert Wheeler (*Emeritus*), Werner Wolf (*Emeritus*), Michael Zeller (*Emeritus*)

**Associate Professors** Helen Caines, Sarah Demers, Thierry Emonet (*Molecular, Cellular & Developmental Biology*), Walter Goldberger, Reina Maruyama, Daisuke Nagai, Corey O'Hern (*Mechanical Engineering & Materials Science*), Nikhil Padmanabhan, David Poland

**Assistant Professors** Murat Acar (*Molecular, Cellular & Developmental Biology*), Meng Cheng, Damon Clark (*Molecular, Cellular & Developmental Biology*), Liang Jiang (*Applied Physics*), David Moore, John Murray (*Psychiatry*), Nir Navon, Laura Newburgh, Peter Rakich (*Applied Physics*)

## FIELDS OF STUDY

Fields include atomic physics and quantum optics; nuclear physics; particle physics; astrophysics and cosmology; condensed matter; biological physics; quantum information physics; applied physics; and other areas in collaboration with the School of Engineering & Applied Science, and the departments of Applied Physics; Mathematics; Chemistry; Molecular Biophysics and Biochemistry; Molecular, Cellular, and Developmental Biology; Geology and Geophysics; and Astronomy.

## SPECIAL ADMISSIONS REQUIREMENTS

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

## **INTEGRATED GRADUATE PROGRAM IN PHYSICAL AND ENGINEERING BIOLOGY (PEB)**

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

### **SPECIAL REQUIREMENTS FOR THE PH.D. DEGREE**

To complete the course requirements students are expected to take a set of nine term courses: six core courses, an advanced course, and two electives. The six core courses (PHYS 500, Advanced Classical Mechanics; PHYS 502, Electromagnetic Theory I; PHYS 506, Mathematical Methods of Physics; PHYS 508 and PHYS 608, Quantum Mechanics I and II; and PHYS 512, Statistical Physics I) serve to complete the student's undergraduate training in classical and quantum physics. Students select an advanced course from a set of five (PHYS 538, Introduction to Relativistic Astrophysics and General Relativity; PHYS 609, Relativistic Field Theory I; PHYS 610, Quantum Many-Body Theory; PHYS 628, Statistical Physics II; and PHYS 630, Relativistic Field Theory II) that provide an introduction to modern physics and research. Certain equivalent course work and successful completion of a pass-out examination may reduce the course requirement or allow substitution of elective courses for individual students. In addition, all students are required to be proficient and familiar with advanced laboratory techniques. This requirement can be met either by taking PHYS 504, Modern Physics Measurements, or PHYS 990, Special Investigations. In addition to all other requirements, students must successfully complete PHYS 590, Responsible Conduct in Research for Physical Scientists, prior to the end of their first year of study. This requirement must be met prior to registering for a second year of study.

Students who have completed their course requirements with satisfactory grades (a grade of Honors in PHYS 990, Special Investigations, may be counted toward the Graduate School requirement of two grades of Honors), passed the qualifying examination, and submitted an acceptable thesis prospectus are recommended for admission to candidacy. The qualifying examination, normally taken at the beginning of the third term (and no later than the beginning of the fifth term), is a six-hour written examination covering the six core courses as described above. Students normally submit the dissertation prospectus before the end of the third year of study.

There is no foreign language requirement. Teaching experience is regarded as an integral part of the graduate training program. During their study students are expected to serve four terms as teaching fellows at the TF-10 level, usually in the first two years. Formal association with a dissertation adviser normally begins in the fourth term after the qualifying examination has been passed and required course work has been completed. An adviser from a department other than Physics can be chosen in consultation with the director of graduate studies (DGS), provided the dissertation topic is deemed suitable for a physics Ph.D.

## MASTER'S DEGREES

**M.Phil.** Students who have successfully advanced to candidacy qualify for the M.Phil. degree.

**M.S. (en route to the Ph.D.)** Students who complete the first-year graduate courses with a satisfactory record (including two Honors or four High Passes) qualify for the M.S. degree.

Program materials are available upon request to the Director of Graduate Studies, Department of Physics, Yale University, PO Box 208120, New Haven CT 06520-8120; e-mail, [graduatephysics@yale.edu](mailto: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** Robert Schoelkopf

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** Reina Maruyama

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** Thomas Appelquist

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 517b / ENAS 517b / MB&B 517b / MCDB 517b, Methods and Logic in Interdisciplinary Research** Staff

This half-term PEB class is intended to introduce students to integrated approaches to research. Each week, the first of two sessions is student-led, while the second session is led by faculty with complementary expertise and discusses papers that use different approaches to the same topic (for example, physical and biological or experiment and theory). Counts as 0.5 credit toward graduate course requirements. ½ Course cr

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

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 528b / ENAS 848b, Soft Condensed Matter Physics** Eric Brown

An introduction to the physics and phenomenology of soft condensed matter: classical systems with mesoscale structure where thermal fluctuations and interfacial forces play essential roles. Discussion of applications to materials science/engineering, nanotechnology, and molecular/cellular biology. Essential concepts from statistical thermodynamics, classical mechanics, and electricity and magnetism are reviewed/developed as needed.

**PHYS 538b, Introduction to Relativistic Astrophysics and General Relativity** Vincent Moncrief

Basic concepts of differential geometry (manifolds, metrics, connections, geodesics, curvature); Einstein's equations and their application to such areas as cosmology, gravitational waves, black holes.

**PHYS 548a / APHY 548a / ENAS 850a, Solid State Physics I** Victor Henrich

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 / APHY 549b / ENAS 851b, 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 561a / CB&B 561a / MB&B 561a / MCDB 561a, Introduction to Dynamical Systems in Biology** Thierry Emonet, Damon Clark, and Jonathon Howard

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.

**PHYS 562b / AMTH 765b / CB&B 562b / ENAS 561b / INP 562b / MB&B 562b /****MCDB 562b, Dynamical Systems in Biology** Damon Clark and Thierry Emonet

This course covers advanced topics in computational biology. How do cells compute, how do they count and tell time, how do they oscillate and generate spatial patterns? Topics include time-dependent dynamics in regulatory, signal-transduction, and neuronal networks; fluctuations, growth, and form; mechanics of cell shape and motion; spatially heterogeneous processes; diffusion. This year, the course spends roughly half its time on mechanical systems at the cellular and tissue level, and half on models of neurons and neural systems in computational neuroscience. Prerequisite: MCDB 561 or equivalent, or a 200-level biology course, or permission of the instructor.

**PHYS 570a / ASTR 570a, High-Energy Astrophysics** Priyamvada Natarajan

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 590b / APHY 590b, Responsible Conduct in Research for Physical Scientists**  
Staff

Required seminar for all first-year students.

**PHYS 600a, Cosmology** Daisuke Nagai

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

**PHYS 608b, Quantum Mechanics II** Jack Harris

Approximation methods, scattering theory, and the role of symmetries. Relativistic wave equations. Second quantized treatment of identical particles. Elementary introduction to quantized fields.

**PHYS 609a, Relativistic Field Theory I** Walter Goldberger

The fundamental principles of quantum field theory. Interacting theories and the Feynman graph expansion. Quantum electrodynamics including lowest order processes, one-loop corrections, and the elements of renormalization theory.

**PHYS 610b / APHY 610b, Quantum Many-Body Theory** Yoram Alhassid

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 624b, Group Theory** Francesco Iachello

Lie algebras, Lie groups, and some of their applications. Representation theory. Explicit construction of finite-dimensional irreducible representations. Invariant operators

and their eigenvalues. Tensor operators and enveloping algebras. Boson and fermion realizations. Differential realizations. Quantum dynamical applications.

**PHYS 628a / APHY 628a, Statistical Physics II** Meng Cheng

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** Walter Goldberger

An introduction to non-Abelian gauge field theories, spontaneous symmetry breakdown, and unified theories of weak and electromagnetic interactions. Renormalization group methods, quantum chromodynamics, and nonperturbative approaches to quantum field theory.

**PHYS 633a / APHY 633a, Introduction to Superconductivity** Daniel Prober

The fundamentals of superconductivity, including both theoretical understandings of basic mechanism and description of major applications. Topics include historical overview, Ginzburg-Landau (mean field) theory, critical currents and fields of type II superconductors, BCS theory, Josephson junctions and microelectronic and quantum-bit devices, and high-T<sub>c</sub> oxide superconductors.

**PHYS 634a / APHY 634a, Mesoscopic Physics I** Michel Devoret

Introduction to the physics of nanoscale solid state systems, which are large and disordered enough to be described in terms of simple macroscopic parameters like resistance, capacitance, and inductance, but small and cold enough that effects usually associated with microscopic particles, like quantum-mechanical coherence and/or charge quantization, dominate. Emphasis is placed on transport and noise phenomena in the normal and superconducting regimes.

**PHYS 675a / APHY 675a, Principles of Optics with Applications** Hui Cao

Introduction to the principles of optics and electromagnetic wave phenomena with applications to microscopy, optical fibers, laser spectroscopy, nanophotonics, plasmonics, and metamaterials. Topics include propagation of light, reflection and refraction, guiding light, polarization, interference, diffraction, scattering, Fourier optics, and optical coherence.

**PHYS 762a or b / CHEM 562La or b, Laboratory in Instrument Design and the Mechanical Arts** Kurt Zilm and David Johnson

Familiarization with modern machine shop practices and techniques. Use of basic metalworking machinery and instruction in techniques of precision measurement and properties of commonly used metals, alloys, and plastics.

**PHYS 816a or b / APHY 816a or b, Techniques Microwave Measurement** Staff

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 991a / ENAS 991a / MB&B 591a / MCDB 591a, Integrated Workshop** Corey O'Hern

This required course for students in PEB involves hands-on laboratory modules with students working in pairs. A biology student is paired with a physics or engineering student; a computation/theory student is paired with an experimental student. The modules are devised so that a range of skills is acquired, and students learn from each other. Modules are hosted in faculty laboratories.

## Political Science

Rosenkranz Hall, 203.432.5241  
<http://politicalscience.yale.edu>  
M.A., M.Phil., Ph.D.

### Chair

Steven Wilkinson

### Director of Graduate Studies

Milan Svolik

**Professors** Bruce Ackerman, Akhil Amar (*Law*), Seyla Benhabib, Paul Bracken (*Management*), David Cameron, Bryan Garsten, Alan Gerber, Jacob Hacker, Gregory Huber, Stathis Kalyvas, David Mayhew, Barry Nalebuff (*Management*), Douglas Rae, John Roemer, Susan Rose-Ackerman, Frances Rosenbluth, James Scott, Ian Shapiro, Stephen Skowronek, Steven Smith, Susan Stokes, Peter Swenson, Ivan Szelenyi (*Sociology*), John Wargo (*Forestry & Environmental Studies*), Steven Wilkinson, Elisabeth Wood

**Associate Professors** Ana De La O Torres, Alexandre Debs, H       Landemore, Jason Lyall, Karuna Mantena, Nuno Monteiro, Milan Svolik

**Assistant Professors** Peter Aronow, Katharine Baldwin, Deborah Beim, Daniela Cammack, Alexander Coppock, Allan Dafoe, John Henderson, Eitan Hersh, Daniel Mattingly, Didac Queralt, Kelly Rader, Thania Sanchez, Fredrik S      

### FIELDS OF STUDY

Fields include political theory, international relations, comparative politics, American politics, political economy, quantitative empirical methods, qualitative and archival methods, and formal theory.

### SPECIAL ADMISSIONS REQUIREMENT

The department requires that scores from the GRE General Test and a writing sample accompany an application. Additional details about the application process are available on the department website. The department only accepts applications for the Ph.D. program.

### SPECIAL REQUIREMENTS FOR THE PH.D. DEGREE

**Overall program requirements** Students are required to pass sixteen term courses by the end of their fourth term in the program, to receive a grade of Honors in at least two Political Science courses, and to maintain an overall High Pass or above average (for purposes of calculating this average, Honors=3, High Pass=2, Pass=1, and Fail=0). The High Pass average must also be met for graduate courses listed in the Political Science department. To remain in good standing throughout their time in the Ph.D. program, students are expected to actively participate in classes and workshops, produce high quality written work, and demonstrate regular progress toward completion of the dissertation. The department regularly offers about sixty term courses for graduate students each year. Courses are conducted as seminars and typically have small enrollments. Four of the courses required for the degree may be in departments other

than Political Science (two of these can be advanced language courses with the approval of the director of graduate studies [DGS]).

Each student must demonstrate elementary reading competence in one foreign language. Such competence is usually demonstrated by taking, or having completed, two years of undergraduate course work or by examination. Alternatively, the language requirement can be satisfied by successfully completing two terms of formal theory or two terms of statistical methods at the graduate level (beyond the introductory course in statistical methods offered in the department).

Courses are offered in five substantive fields—political theory, international relations, comparative politics, American politics, and political economy—and three methods fields: quantitative empirical methods, qualitative and archival methods, and formal theory. Courses taken must include one each in at least three of the department's substantive fields. Courses cannot be counted in more than one field. Each student must demonstrate competence in three fields (two of which must be substantive fields) before the start of the fifth term. Competence can be demonstrated either by passing the comprehensive examination in the field or by course work, provided that each student takes at least two comprehensive exams. The fields of formal theory and quantitative empirical methods offer certification only through examination. For fields to be certified by course work, students are required to satisfactorily complete three courses in the field, where courses in the field are determined by the faculty and the DGS, including one in which a research paper is written and presented. The paper must be submitted to review by the instructor of the course for which the paper was written. The department offers exams twice a year, in late August and in early January. Students are expected to pass their comprehensive examinations by August of their second year. Each examination is based on a reading list compiled by the faculty within the field and updated each year. Each list offers an introduction and framework for study in the field and preparation for the examination. A committee of faculty within the field grades the exams as Distinguished, Satisfactory, or Unsatisfactory.

Students who successfully complete the Ph.D. in Political Science will often join the faculties of colleges and universities. For that reason, learning what is involved in teaching and gaining teaching experience are also essential components of graduate education. The department normally expects students to devote themselves exclusively to course work and comprehensive examinations in their first two years in the Ph.D. program. Students in Political Science typically teach in their third and fourth years.

During each year in residence, graduate students are expected to participate actively and regularly in one or more of the many research workshops run by the department. Students beyond their fourth term are required to enroll in at least one of the workshops for credit, and all workshops are graded on a Satisfactory/Unsatisfactory basis. All students are expected to present a research paper of their own at one of these workshops before the end of their fourth year. Workshop participation does not count toward the requirement of sixteen term courses.

**Prior to registration for the second year** (1) Students must have taken and passed at least seven courses, including the required Introduction to the Study of Politics (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) 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.

## COURSES

### Empirical Analysis and Research Methodology

**PLSC 500a, Quantitative Methods I: Research Design and Data Analysis** Alexander Coppock

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 504a, Advanced Quantitative Methods** Fredrik Sävje

The aim of this course is to provide students with the understanding and tools to critically consume and conduct statistical research. The theme is the challenge of drawing reliable causal inference. We will learn: how to use graphical methods to transparently analyze and present data; how to discipline our analyses against multiple-comparisons bias; how to use nonparametric methods to avoid implausible assumptions; how strong research design is essential to causal inference; how Bayesian inference provides the mathematical vocabulary for thinking about scientific inference; how causal graphs allow us to express and analyze causal assumptions, choose control variables, and think about selection bias; how placebo tests allow us to test assumptions; how to build and understand Likelihood and Bayesian models including Logistic and Probit models; how to think about and analyze time-series cross-sectional data. We will review instrumental variables methods and regression-discontinuity designs, though it is assumed that you have already covered these in PLSC 503. The course assumes students have command of the material covered in PLSC 500 and PLSC 503, including basic probability theory, matrix algebra, and the linear regression model.

**PLSC 505a / SOCY 508a, Qualitative Field Research** Elisabeth Wood

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 508b, Causal Inference and Research Design** Peter Aronow

This seminar exposes students to cutting-edge empirical and statistical research across the social and health sciences, with a focus on topics relevant to causal questions in the domain of political science. The class features five or six presentations by visiting

speakers (primarily faculty at other universities) who discuss their work. When visiting speakers are not present (roughly every other week), lectures and discussions focus on selected methodological topics, including experimental design, partial identification, design-based inference, network analysis, semiparametric efficiency theory, and qualitative/mixed-methods research. Statistical training at the level of PLSC 503 is expected, though training in probability theory at the level of S&DS 541 or ECON 550 is suggested.

**PLSC 510a, Introduction to the Study of Politics** Elisabeth Wood

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, Introduction to Experimental Methods in Political Science** Alexander Coppock

An introduction to experimental methods as they can be used to study politics. Exploration of strengths and weaknesses of experimental and nonexperimental studies. Applications include the effects of television advertising, formation of political attitudes, and causes of voter turnout. Students participate in the design and implementation of an experiment. Knowledge of introductory statistics helpful but not required.

**PLSC 517a, Fundamentals of Modeling** John Roemer

The course is an introduction to techniques of microeconomic modeling, as applied to problems in political economy and political science. The level is that of a sophisticated course in intermediate microeconomics. Topics include preferences, utility functions, Pareto efficiency, competitive economic equilibrium, the first theorem of welfare economics, Hotelling-Downs political equilibrium, Nash equilibrium, Wittman-Nash political equilibrium, Nash bargaining, Arrow's theorem and social welfare functions, and distributive justice. Prerequisites: differential calculus and/or the Political Science Math Camp. Microeconomics at the intermediate level is helpful but not mandatory.

**PLSC 518b, Introduction to Game Theory** Alexandre Debs

Building upon Fundamentals of Modeling I, the course offers a rigorous introduction to noncooperative game theory. The goal of the course is to help students understand the key concepts and ideas in game theory and to provide students with a road map for applying game theoretic tools to their own research. Topics include strategic form games, extensive form games, and Bayesian games, among others. Students are assumed to have mathematical knowledge at the level of the Political Science Math Camp and to have taken Fundamentals of Modeling I or its equivalent.

**PLSC 522b / SOCY 503b, 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 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** Greg Huber and Ian Shapiro

This is a required course for all second-year students. It meets for the first six weeks of the fall term and the first six weeks of the spring term. The fall meetings are devoted to discussion of research design as well as individual student projects. The spring meetings are devoted to discussion of drafts of student papers. The work of the spring-term seminar includes criticism of the organization, arguments, data evaluation, and writing in each student's paper by the instructors and the other students. Using this criticism, and under the supervision of the instructors, each student conducts additional research, if necessary, rewrites the paper as required, and prepares a final paper representing the best work of which the student is capable. Students must submit a one-page outline of the proposed project for the first fall-term meeting and a complete draft of the paper at the first meeting in the spring.

## Political Theory

**PLSC 553a / PHIL 718a, Social Justice** Bruce Ackerman

An examination of contemporary theories, together with an effort to assess their practical implications. Authors this year include Peter Singer, Richard Posner, John Rawls, Robert Nozick, Michael Walzer, Marion Young, Avishai Margalit, and Cass Sunstein. Topics: animal rights, the status of children and the principles of educational policy, the relation of market justice to distributive justice, the status of affirmative action, and the rise of technocracy. Self-scheduled examination or paper option. Follows Law School academic calendar. Also *LAW 20104*.

**PLSC 565a, Democracy and Distribution** Ian Shapiro

The attention showered in 2015 on Thomas Piketty's book *Capital in the Twenty-First Century* brought issues of inequality in the distribution of income and wealth to the forefront of public and scholarly attention. An enormous body of research has been produced over the past two decades to understand the nature of the dramatic rise in inequality, especially in the United States, and its causes. A long list of proposals for legal change has emerged in response to the outpouring of data and analysis. This course explores the facts and the causes of and political barriers to potential responses to these recent developments, principally but not exclusively in the United States. Ultimately, the question requires an examination of the relations between democracy and the distribution of income and wealth. Particular attention is paid to the ways in which different groups, classes, and coalitions affect, and are affected by, democratic distributive politics. Attention is paid to theories of distribution, politics of distribution, distributive instruments, and the implementation of policies affecting distribution. Substantive topics covered include regulation, protectionism, taxes, social insurance, welfare, public opinion, education, and unions. Follows Law School academic calendar.

**PLSC 595a / ECON 791a, Theories of Distributive Justice** John Roemer

This year, we spend the first half of the course (or so) reading and discussing Thomas Piketty's *Capital in the Twenty-First Century* (2014). We then survey the main egalitarian theories of distributive justice proposed by economists and political philosophers since J. Rawls, including A. Sen, R. Dworkin, G.A. Cohen, R. Arneson, and S. Scheffler.

We subject these theories to economic and philosophical analysis. Prerequisite: intermediate microeconomics or PLSC 517.

**PLSC 605a / PHIL 663a, Rethinking Sovereignty: Human Rights and Globalization**

Seyla Benhabib

The crises of sovereignty and the end of sovereignty have been discussed in law, political science, and philosophy. Post-nationalist, cosmopolitan, as well as neoliberal critics of sovereignty abound. This course discusses alternative models of sovereignty, ranging from democratic iterations to popular constitutionalism, and considers the implications of these models for the definition and enforcement of rights. Recent developments in the U.S. and the European Union law regarding immigration and refugee issues are a special focus. Readings include Hobbes, Kant, Schmitt, Arendt, Kelsen, Habermas, Waldron, Walker, and Benveniste. *Also LAW 20662.*

**PLSC 611b / PHIL 657b, 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 642b, Tocqueville** Bryan Garsten

A close reading of Alexis de Tocqueville's *Democracy in America*, along with major influences, such as Rousseau, Pascal, and Montesquieu, and near contemporaries, including Constant, Guizot, and Marx.

**PLSC 649b, The Political Philosophy of Rousseau** Steven Smith

Close reading of some of the major works of Rousseau, concentrating on his political theory, his writings on education and the family, and his conception of the philosophic life. Consideration of interpretations of Rousseau from the past century.

## International Relations

**PLSC 656a / GBL 579a, Global Governance** Yuriy Sergeyev

Examination of global policy problems, the acceleration of interdependence, and the role, potential, and limits of the institutions of global governance to articulate collective interests and to work out cooperative problem-solving arrangements. Consideration of gaps in global governance and controversies between globalization and state sovereignty, universality, and tradition.

**PLSC 662a, Strategy, Technology, and War** Paul Bracken

An integrated, comprehensive examination of technology and strategy in the field of national security. Key concepts—technology strategy, macro-organizational behavior, strategic posture—describe the international strategic environment. Analysis of the changing structure of defense in light of new dynamics: a second nuclear age; the spread of advanced technologies to China, India, militia groups, etc.; network-centric and information warfare; private equity investment in defense and intelligence; and a shifting locus of innovation to lower-tier firms. This interdisciplinary course crosses boundaries of management, politics, and economics.

**PLSC 695a, International Relations: Concepts and Theories** Nuno Monteiro

The course examines theories of international relations and evaluates empirical evidence in favor of or against those theories. It surveys the main theoretical traditions in international relations and considers how empirical methods can be used to identify causation in the international relations field. Students acquire broad familiarity with



the diverse literature in this field, learn to identify opportunities for new research, and apply rigorous methodology to evaluate theoretical claims. The course is designed for students who plan to pursue doctoral-level research in international relations and want to pass the Ph.D. qualifying exam in the field.

**PLSC 696b, International Relations: Research Design** Jason Lyall

This course introduces students to the various methodological challenges that arise while conducting empirical research in international relations as well as possible research designs for overcoming them. This course, which builds directly on PLSC 695, draws heavily, though not exclusively, on research issues that arise in the subfield of international security. Each week we tackle a key debate: proposed topics include (1) explaining the origins, conduct, and outcomes of inter- and intrastate wars; (2) the sources of military effectiveness; (3) the uses and limits of coercive diplomacy; and (4) the effects of transnational forces and actors. We use these debates as springboards for broader discussions of the strengths and weaknesses of different research approaches, including experimental, quasi-experimental, observational, and interview and archival-based work. PLSC 695 is strongly recommended.

**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).

## Comparative Politics

**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 712a, Comparative Political Economy** Frances Rosenbluth

Introduction to issues in political economy across time and place. The field's diverse theoretical underpinnings and its place in the context of political science and of the social sciences more generally; theoretical perspectives such as materialism, institutionalism, and cognition/culture/beliefs; interactions between government and the economy in democratic and nondemocratic regimes and in developed and developing countries.

**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 717a, Business and Government after Communism** Ian Shapiro

Reassessment of business's place in society—and its relations with government—in an era when alternatives to capitalism are moribund. Topics include the role of business

in regime change, corruption and attempts to combat it, business and the provision of low-income housing and social services, and privatization of such core functions of government as prisons, the military, and local public services.

**PLSC 734a or b / SOCY 560a or b, 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.

**PLSC 738a, Turkish Politics** Staff

Issues in Turkish politics. Continuity and change in historical institutional legacies with specific focus on the internal contradictions between these legacies, such as Ottomanism, Kemalism, secular vs. religious nationalism, and Islamism. Elaboration of major issues of Turkey's "divided society" concerning the ends of state, secularism vs. Islamism, top-down reformism vs. majoritarianism, and minority rights.

**PLSC 740a, Political Violence** Stathis Kalyvas

A survey of both fundamental and cutting-edge research on all forms of political violence, from street protest to genocide, including riots, political assassinations, military coups, terrorism, civil wars, and certain types of organized crime. What connects them and how are the rise and decline of each form shaping the presence or absence of the other ones?

**PLSC 755b, European Politics** David Cameron

Comparison of the political systems of the major European countries. Topics include political institutions, electoral politics and political parties, public policies, and contemporary problems.

**PLSC 756a, 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 766b, Politics and Markets** Peter Swenson

Examination of the interplay between market and political processes in different substantive realms, time periods, and countries. Inquiry into the developmental relationship between capitalism and democracy, including the developmental and functional relationships between the two. Investigation of the politics of regulation in areas such as property rights; social security; international finance; and product, labor, and service markets. Topics include the economic motives of interest groups and coalitions in the political process.

**PLSC 777a, Comparative Politics I: Research Design** Katharine Baldwin

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** Stathis Kalyvas

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 / HIST 965a, Agrarian Societies: Culture, Society, History, and Development** Peter Perdue, Kalyanakrishnan Sivaramakrishnan, and James Scott

An interdisciplinary examination of agrarian societies, contemporary and historical, Western and non-Western. Major analytical perspectives from anthropology, economics, history, political science, and environmental studies are used to develop a meaning-centered and historically grounded account of the transformations of rural society. Team-taught.

## Political Economy

**PLSC 712a, Comparative Political Economy** Frances Rosenbluth

Introduction to issues in political economy across time and place. The field's diverse theoretical underpinnings and its place in the context of political science and of the social sciences more generally; theoretical perspectives such as materialism, institutionalism, and cognition/culture/beliefs; interactions between government and the economy in democratic and nondemocratic regimes and in developed and developing countries.

**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 717a, Business and Government after Communism** Ian Shapiro

Reassessment of business's place in society—and its relations with government—in an era when alternatives to capitalism are moribund. Topics include the role of business in regime change, corruption and attempts to combat it, business and the provision of low-income housing and social services, and privatization of such core functions of government as prisons, the military, and local public services.

## American Politics

**PLSC 800a, Introduction to American Politics** Jacob Hacker

An introduction to the analysis of U.S. politics. Approaches given consideration include institutional design and innovation, social capital and civil society, the state, attitudes, ideology, econometrics of elections, rational actors, formal theories of institutions, and transatlantic comparisons. Assigned authors include R. Putnam, T. Skocpol, J. Gerring, J. Zaller, D.R. Kiewiet, L. Bartels, D. Mayhew, K. Poole & H. Rosenthal, G. Cox & M. McCubbins, K. Krehbiel, E. Schickler, and A. Alesina. Students are expected to read and discuss each week's assignment and, for each of five weeks, to write a three- to five-page analytic paper that deals with a subject addressed or suggested by the reading.

**PLSC 801a, Political Preferences and American Political Behavior** John Henderson  
Introduction to research methods and topics in American politics. Focus on ideas about choice that are useful for the study of politics. Topics include utility theory, heuristics and biases, proximity vs. directional voting, Bayesian updating, retrospective voting, priming and framing, the role of emotion, and the consequences of political ignorance.

**PLSC 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 828b / AMST 828b, American Political Development** Stephen Skowronek  
An examination of patterns of political change and institutional development in the United States. The course considers patterns of reform, the political construction of interests and movements, problems of political culture, party building, and state building.

**PLSC 853a, U.S. National Elections** David Mayhew  
An investigation of electoral realignments, voting for president and Congress, voter turnout, incumbency advantage, nominations, and campaign finance. Paper.

**PLSC 860b, Advanced Topics in Quantitative American Politics** Greg Huber  
This course reviews significant substantive findings and the most important recent developments in research design in quantitative American politics. The course provides a forum for students to initiate and complete a collaborative research project with the instructors. Prerequisite: although attention is not exclusively restricted to experimental research, enrollment requires permission of the instructor and is limited to students with an adequate statistics background and demonstrated research interest in work that focuses on empirical examination of causal relationships.

## Research Workshops

**PLSC 930a and PLSC 931b, American Politics Workshop** Greg Huber  
The course meets throughout the year in conjunction with the ISPS American Politics Workshop. It serves as a forum for graduate students in American politics to discuss current research in the field as presented by outside speakers and current graduate students. Can be taken as Satisfactory/Unsatisfactory only.

**PLSC 932a and PLSC 933b, Comparative Politics Workshop** Katharine Baldwin and Daniel Mattingly  
A forum for the presentation of ongoing research by Yale graduate students, Yale faculty, and invited external speakers in a rigorous and critical environment. The workshop's methodological and substantive range is broad, covering the entire range of comparative politics. There are no formal presentations. Papers are read in advance by participants; a graduate student critically discusses the week's paper, the presenter responds, and discussion ensues. Detailed information can be found at <https://campuspress.yale.edu/cpworkshop>. Can be taken as Satisfactory/Unsatisfactory only.

**PLSC 934a and PLSC 935b, Political Theory Workshop** Seyla Benhabib, Karuna Mantena, and Hélène Landemore

An interdisciplinary forum that focuses on theoretical and philosophical approaches to the study of politics. The workshop seeks to engage with (and expose students to) a broad range of current scholarship in political theory and political philosophy, including work in the history of political thought; theoretical investigations of contemporary political phenomena; philosophical analyses of key political concepts; conceptual issues in ethics, law, and public policy; and contributions to normative political theory. The workshop features ongoing research by Yale faculty members, visiting scholars, invited guests, and advanced graduate students. Papers are distributed and read in advance, and discussions are opened by a graduate student commentator. Detailed information can be found at <http://politicaltheory.yale.edu>. Can be taken as Satisfactory/Unsatisfactory only.

**PLSC 936a and PLSC 937b, Order, Conflict, and Violence** Stathis Kalyvas

The OCV seminar series focuses on processes related to the emergence and breakdown of order. The key assumption is that understanding and studying these processes requires better theoretical and empirical foundations and calls for challenging existing disciplinary and methodological divides. The seminar series is, therefore, dedicated to the presentation of cutting-edge work from all social science disciplines and includes the presentation of ongoing research by Yale graduate students. Detailed information can be found at <http://ocvprogram.macmillan.yale.edu>. Can be taken as Satisfactory/Unsatisfactory only.

**PLSC 938a and PLSC 939b, Leitner Political Economy Seminar Series** Milan Svolik

This seminar series engages research on the interaction between economics and politics as well as research that employs the methods of political economists to study a wide range of social phenomena. The workshop serves as a forum for graduate students and faculty to present their own work and to discuss current research in the field as presented by outside speakers, faculty, and students. Detailed information can be found at <http://leitner.yale.edu/seminars>. Can be taken as Satisfactory/Unsatisfactory only.

**PLSC 940a and PLSC 941b, International Relations Workshop** Staff

This workshop engages work in the fields of international security, international political economy, and international institutions. The forum attracts outside speakers, Yale faculty, and graduate students. It provides a venue to develop ideas, polish work in progress, or showcase completed projects. Typically, the speaker would prepare a 35- to 40-minute presentation, followed by a question-and-answer session. More information can be found at <http://irworkshop.yale.edu>. Can be taken as Satisfactory/Unsatisfactory only.

**PLSC 990a or b, Directed Reading** Staff

By arrangement with individual faculty.

# Psychology

Kirtland Hall, 203.432.4500  
<http://psychology.yale.edu>  
 M.S., M.Phil., Ph.D.

## Chair

Frank Keil (203.432.4545, [frank.keil@yale.edu](mailto:frank.keil@yale.edu))

## Director of Graduate Studies

Gregory McCarthy (203.432.9261, [gregory.mccarthy@yale.edu](mailto:gregory.mccarthy@yale.edu))

**Professors** Woo-kyoung Ahn, Stephen Anderson (*Linguistics*), Amy Arnsten (*Neuroscience*), John Bargh, Paul Bloom, Thomas Brown, Tyrone Cannon, B.J. Casey, Marvin Chun, Margaret Clark, Ravi Dhar (*School of Management*), John Dovidio, Carol Fowler (*Haskins Laboratories*), Robert Frank (*Linguistics*), Tamar Gendler (*Philosophy*), Jeannette Ickovics (*Public Health*), Jutta Joormann, Dan Kahan (*Law School*), Alan Kazdin, Frank Keil, Robert Kerns (*Veterans Administration Medical Center*), Joshua Knobe (*Philosophy*), Marianne LaFrance (*Women's, Gender & Sexuality Studies*), Becca Levy (*Public Health*), Lawrence Marks (*Public Health*), Linda Mayes (*Child Study Center*), Gregory McCarthy, Nathan Novemsky (*School of Management*), Donald Quinlan (*Psychiatry*), Jennifer Richeson, Peter Salovey, Laurie Santos, Brian Scholl, Jane Taylor (*Psychiatry*), Nicholas Turk-Browne, Tom Tyler (*Law School*), Victor Vroom (*School of Management*), Karen Wynn

**Associate Professors** Walter Gilliam (*Child Study Center*), Elena Grigorenko (*Child Study Center*), Joan Kaufman (*Psychiatry*), Kevin Pelphrey (*Psychiatry*), Maria Piñango (*Linguistics*), David Rand, Mary Schwab-Stone (*Child Study Center*)

**Assistant Professors** Arielle Baskin-Sommers, Steve Chang, Molly Crockett, Yarrow Dunham, Dylan Gee, Avram Holmes, Julian Jara-Ettinger, Hedy Kober (*Psychiatry*)

**Lecturers** Nancy Close, Nelson Donegan, Carla Horwitz, Kristi Lockhart, Mary O'Brien, Matthias Siemer

## FIELDS OF STUDY

Fields include clinical psychology; cognitive psychology; developmental psychology; neuroscience; and social/personality psychology.

## SPECIAL ADMISSIONS REQUIREMENT

The department requires that scores from the GRE General Test accompany an application.

## SPECIAL REQUIREMENTS FOR THE PH.D. DEGREE

In order to allow 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.

## 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. However, 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 advisor in Psychology can be identified prior to an admissions decision.

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.

Program materials are available online at <http://psychology.yale.edu>.



## COURSES

### **PSYC 509a, Social Cognition** John Bargh

A course in contemporary social cognition theory and research, in which students fully participate in each week's class discussion of the assigned readings. The goal of the course is to bring students up to speed, not only on the major themes and programs of research today, but also on the historical roots and context of that research—in other words, why that research is being done in the first place.

### **PSYC 518a, Multivariate Statistics** Julian Jara-Ettinger

Analysis of tabular data arrays arising usually from experiments. Sums of squares, F-tests, and variance components. The method of contrasts. Data transformations. "Nesting," "crossings," and Latin square designs. The analysis of covariance. Aspects of Tukey's *Exploratory Data Analysis* such as box plots and median polish. Introduction to computer program packages. How to think about statistics.

### **PSYC 530a, Foundations of Neuroscience: Biological Bases of Human Behavior**

Tyrone Cannon

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. For the neuroscience area students, this is a required course.

### **PSYC 531b, Psychopharmacology** Thomas Brown

The purpose of this course is to provide an overview of pharmacological principles and the properties of psychoactive drugs. Background is furnished on neuroanatomy and neurophysiology. Topics include therapies for neurological and psychiatric disorders as well as drugs of abuse. Special attention is paid to the molecular, cellular, and physiological mechanisms of drug effects.

### **PSYC 534a, 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 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** Nicholas 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 604a, Cognition and Emotion** Matthias Siemer

The course presents an overview of current research questions and results in the area of cognition and emotion. We explore basic research questions as well as implications of cognitive approaches toward emotions for domains such as emotional disorders and psychological resilience and well-being.

**PSYC 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 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 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 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 689a, Psychopathology and Diagnostic Assessment** Mary O'Brien

Didactic practicum for first-year clinical students. Main emphasis is initial assessment. Treatment planning and evaluation of progress also covered. Students first observe and then perform initial interviews. Applicable ethics and local laws reviewed.

**PSYC 690b, Ethics and Clinical Practice: Legislation and Diversity Issues** Mary O'Brien

Introduction to ethical and legal guidelines for clinical practice. In addition, supervision on diagnostic interview using the Structured Clinical Interview for DSM-IV is provided.

**PSYC 702a, Current Work in Cognition** Staff

A weekly seminar in which students, staff, and guests report on their research in cognition and information processing.

**PSYC 710a, Current Work in Social Psychology and Personality** Staff

Faculty and students in personality/social psychology meet during lunchtime to hear about and discuss the work of a local or visiting speaker.

**PSYC 718a, Diversity in Clinical Science and Practice** Staff

Basic and applied current research in diversity in clinical science and practice is presented by faculty, visiting scientists, and graduate students and examined in terms of theory, methodology, and ethical and professional implications. Students cannot simultaneously enroll in PSYC 720.

**PSYC 721a, Research Topics in Infant Cognition** Staff

Investigation of various topics in infant cognition: early mechanisms for representing and reasoning about number; infants' ability to represent time; early object knowledge; foundations of intentional understanding. Prerequisite: permission of the instructor.

**PSYC 724a, Research Topics in Cognition, Emotion, and Psychopathology** Staff

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, Research Topics in Human Neuroscience** Staff

Discussion of current and advanced topics in the analysis and interpretation of human neuroimaging and neurophysiology.

**PSYC 727a, Research Topics in Clinical Neuroscience** Staff

Current research into the biological bases of schizophrenia and bipolar disorder, including topics related to etiology, treatment, and prevention.

**PSYC 728a, Research Topics in Human Cooperation** Staff

Our lab asks why and when people are willing to help others at a cost to themselves, and how we can encourage this cooperative behavior. We combine experiments (mostly using economic games) with computer models, and run studies both in the lab and online.

**PSYC 729a, Research Topics in Language and Cognition** Staff

Seminar focusing on ongoing research projects in language, cognition, and development. Prerequisite: permission of the instructor.

**PSYC 731a, Research Topics in Cognition and Development** Staff

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 732a, Research Topics in Visual Cognitive Neuroscience** Staff

Examines current research in visual cognitive neuroscience, including discussion of proposed and ongoing research projects. Topics include visual attention, perception, memory, and contextual learning.

**PSYC 733a, Research Methods in Social Cognitive Development** Staff

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, Research Topics in Thinking and Reasoning** Staff

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 736a, Research Topics in Stereotyping and Prejudice** Staff

Explores the nature of prejudice in its traditional and contemporary forms. Although the emphasis is on the causes and consequences of racial bias in the United States, the dynamics of intergroup relations are considered more broadly as well. Emphasis is on developing critical thinking, reading, and research skills to test ideas relevant to understanding and combating stereotyping, prejudice, and discrimination.

**PSYC 737a, Research Topics in Clinical and Affective Neuroscience** Staff

Seminar focusing on ongoing research projects in clinical, cognitive, and translation neuroscience. Prerequisite: permission of the instructor.

**PSYC 741a, Research Topics in Emotion and Relationships** Staff

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 744a, Research Topics in Philosophical Psychology** Staff

The lab group focuses on topics in the philosophical aspects of psychology.

**PSYC 745a, Research Topics in Disinhibitory Psychopathology** Staff

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, Research Topics in Social Neurosciences** Staff

A weekly seminar discussing recent advances in social neurosciences. We discuss recent progress in research projects by the lab members as well as go over recently published papers in depth. Our primary topics include neural basis of social decision-making, social preference formation, and social information processing. Our lab studies these topics by combining neurophysiological and neuroendocrinological techniques in nonhuman animals.

**PSYC 753a, Research Topics in Law and Psychology** Staff

Lab focusing on ongoing research projects in law and psychology.

**PSYC 754a, Research Topics in Clinical Affective Neuroscience and Development**  
Staff

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, Research Topics in Intergroup Relations** Staff

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, Research Topics in the Fundamentals of Adolescent Brain and Behavior** Staff

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 766a, Research Topics in Perception and Cognition** Staff

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, Research Topics in Nonconscious Processes** Staff

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 772a or b, Experimental Jurisprudence** Joshua Knobe

Investigation of legally relevant concepts using systematic experimental methods. Topics include the concepts of causation, consent, similarity, intention. Emphasis is on helping students develop and implement their own experimental studies.

**PSYC 775a, Research Topics in Animal Cognition** Staff

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 / WGSS 767a, Research Topics in Gender and Psychology** Staff

The “Gender Lab” meets weekly to consider research being done in the Psychology department that bears on some gender-related issue.

**PSYC 778a, Research Topics in Clinical and Affective Neuropsychology** Staff

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 779a, Research Topics in Depression and Treatment Response** Staff

This weekly lab seminar focuses on the molecular and cellular mechanisms that underlie the neuronal and behavioral deficits caused by stress and depression, and conversely the signaling mechanisms underlying the therapeutic actions of antidepressants, including synaptic and behavioral responses.

**PSYC 801a, Clinical Internship (Child)** Staff

Advanced training in clinical psychology with children. Adapted to meet individual needs with location at a suitable APA-approved internship setting.

**PSYC 802a, Clinical Internship (Adult) Staff**

Advanced training in clinical psychology with adults. Adapted to meet individual needs with location at a suitable APA-approved internship setting.

**PSYC 806a, Practicum in Childhood Intervention Staff**

Advanced supervised work in settings where child and family policies are developed and/or implemented. Adapted to meet individual needs with location at suitable sites.

**PSYC 808a, Practicum in Child Psychology Staff**

The Yale Child Study Center offers a yearlong practicum, which includes assessment of children, psychotherapy, team meetings, supervision, and didactic experiences.

**PSYC 809a, Practicum in Assessment of School-Aged Children Staff**

Students gain practical experience in testing with children.

**PSYC 810a, Practicum in Developmental Assessment Staff**

Practicum in early childhood screening and assessment of infants and toddlers at high risk for social adaptive and emotional developmental problems.

**PSYC 811a, Mood and Anxiety Disorders Practicum Staff**

Discussion of current topics in psychopathology and treatment of anxiety disorders. Group supervision of therapy cases involving OCD, panic, social phobia.

**PSYC 816a, Practicum in Developmental Disabilities and Developmental Assessment Staff**

An introduction to approaches in developmental assessment in infants and young children (under age five years) with a range of developmental difficulties. Students observe and/or participate in developmental assessments. Students are exposed to a range of assessment instruments including developmental tests, speech-communication assessments, and psychiatric diagnostic instruments appropriate to this age group. Prerequisite: permission of the instructor.

**PSYC 817a, Other Clinical Practica Staff**

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 883a, Practicum in Clinical Assessment Staff**

Supervised psychological assessment using measures of intellectual functioning, projective testing, and neuropsychological testing with patients.

**PSYC 920a, First-Year Research Staff**

By arrangement with faculty.

**PSYC 923a, Individual Study: Theme Essay Staff**

By arrangement with faculty.

**PSYC 925a, Individual Tutorial Staff**

By arrangement with faculty and approval of DGS.

# Public Health

60 College Street, 203.785.6383  
<http://publichealth.yale.edu>  
 M.S., M.Phil., Ph.D.

## Dean

Sten Vermund

## Senior Associate Dean of Academic Affairs

Melinda Pettigrew

## Director of Graduate Studies

Christian Tschudi (203.785.6383)

## Director of Medical Studies

Mayur Desai

## Director of Medical Research

Elizabeth Claus

**Professors** Serap Aksoy, Michelle Bell (*Forestry & Environmental Studies*), Richard Bucala (*Internal Medicine*), Susan Busch, Michael Cappello (*Pediatrics*), Elizabeth Claus, Paul Cleary, John Dovidio (*Psychology*), Robert Dubrow, David Fiellin (*Internal Medicine*), Erol Fikrig (*Internal Medicine*), Alison Galvani, Robert Heimer, Theodore Holford, Jeannette Ickovics, Melinda Irwin, Amy Justice (*Internal Medicine*), Edward Kaplan (*School of Management*), Trace Kershaw, Albert Ko, Harlan Krumholz (*Internal Medicine*), Brian Leaderer, Becca Levy, Elan Louis (*Neurology*), Shuangge Ma, Robert Makuch, I. George Miller (*Pediatrics*), Linda Niccolai, A. David Paltiel, Catherine Panter-Brick (*Anthropology*), Andrew Papachristos (*Sociology*), Peter Peduzzi, Rafael Pérez-Escamilla, Melinda Pettigrew, Jeffrey Powell (*Ecology & Evolutionary Biology*), Harvey Risch, Robert Rosenheck (*Psychiatry*), Peter Salovey (*Psychology*), Mark Schlesinger, Jody Sindelar, Mary Tinetti (*Internal Medicine*), Christian Tschudi, Vasilis Vasilou, Sten Vermund, Daniel Zelterman, Heping Zhang, Hongyu Zhao

**Associate Professors** Rene Almeling, Ted Cohen, Forrest Crawford, J. Lucian Davis, Mayur Desai, Andrew Dewan, Josephine Hoh, Judith Lichtman, Haiqun Lin, Xiaomei Ma, Joan Monin, Ingrid Nembhard, John Pachankis, Sunil Parikh, Virginia Pitzer, Jeffrey Townsend, Zuoheng (Anita) Wang, Marney White, Yawei Zhang (*Surgery*), Yong Zhu

**Assistant Professors** Xi Chen, Maria Ciarleglio, Zack Cooper, Nicole Deziel, Abigail Friedman, Gregg Gonsalves, Nicola Hawley, Caroline Johnson, Anne Marie Jukic, Michael Kane, Danya Keene, Chima Ndumele, Yusuf Ransome, Jason Schwartz, Fatma Shebl, Megan Smith (*Psychiatry*), Jacob Wallace, Shiyi Wang, Joshua Warren, Daniel Weinberger, Reza Yaesoubi

## FIELDS OF STUDY

Programs of study are offered in the areas of Biostatistics, Chronic Disease Epidemiology, Social and Behavioral Sciences, Environmental Health Sciences, Health Policy and Management, and Epidemiology of Microbial Diseases.

## SPECIAL ADMISSIONS REQUIREMENTS

Applicants should have a strong background in the biological and/or social sciences. Students pursuing a Biostatistics specialty should have a strong background in mathematics. The GRE General Test is required. The TOEFL is required of all applicants whose native language is not English. IELTS scores are also accepted in addition to or in lieu of TOEFL scores. This requirement is waived only for applicants who, prior to matriculation at Yale, will have received a baccalaureate degree or its foreign equivalent from a college or university where English is the primary language of instruction. Applicants must have studied in residence at the baccalaureate institution for at least three (3) years to receive the waiver. Applicants who do not qualify for a waiver but have taken the TOEFL within the past two years will need to have their TOEFL scores released to the Yale Graduate School of Arts and Sciences (code 3987).

## ACADEMIC REQUIREMENTS

Generally the first two years are devoted primarily to course work and rotations for students in some areas. All doctoral students are required to successfully complete a minimum of ten graduate-level courses and must satisfy the individual departmental requirements, detailed below. Courses such as Dissertation Research, Preparing for Qualifying Exams, Research Ethics and Responsibility, or Seminar do not count toward the course requirements. However, students must register for these “courses” in order for them to appear on the transcript.

All first-year students must enroll in and complete training in Research Ethics and Responsibility (EPH 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 are expected to achieve a High Pass average. (This applies to courses taken after matriculation in the Graduate School and during the nine-month academic year.)

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, typically during years two and three. With the permission of the director of graduate studies (DGS), the total teaching requirement beyond two terms may be reduced for students who are awarded fellowships supported by outside funding or who are graduate research assistants in year three. 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 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.

## Required Course Work

### BIOSTATISTICS

Ph.D. students in the Department of Biostatistics (BIS) must complete a minimum of fifteen courses (not including BIS 525, BIS 610, BIS 695, and EPH 600). Course



waivers must be recommended by the academic adviser and approved by the department chair and DGS.

Required courses are: both terms of BIS 525, Seminar in Biostatistics and Journal Club; BIS 557, Computational Statistics; BIS 567, Bayesian Statistics; BIS 610, Applied Area Readings for Qualifying Exams; BIS 628, Longitudinal and Multilevel Data Analysis; BIS 643, Theory of Survival Analysis; BIS 646, Nonparametric Statistical Methods and Their Applications; BIS 678, Statistical Consulting; BIS 681, Statistical Consulting Lab; BIS 691, Theory of Generalized Linear Models; BIS 695, Summer Internship in Biostatistical Research; CDE 508, Principles of Epidemiology I; S&DS 610, Statistical Inference; S&DS 612, Linear Models; EPH 600, Research Ethics and Responsibility; and EPH 608, Frontiers of Public Health. 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 CDE 508.

In consultation with their academic adviser, students choose a minimum of four additional electives that will best prepare them for dissertation work.

Students funded by specific fellowships may be subject to additional requirements and should discuss this with their adviser.

#### CHRONIC DISEASE EPIDEMIOLOGY

Ph.D. students in the Department of Chronic Disease Epidemiology (CDE) must complete a minimum of fifteen courses (not including CDE 610 and EPH 600). Course waivers must be recommended by the academic adviser and approved by the department chair and DGS. Students must complete course work that introduces them to the breadth of public health (EPH 608, Frontiers of Public Health). Students entering the doctoral program with an M.P.H. are exempt from EPH 608. Required courses (or their equivalents) are: CDE 502, Physiology for Public Health; CDE 508, Principles of Epidemiology I; CDE 516, Principles of Epidemiology II; CDE 523, Measurement Issues in Chronic Disease Epidemiology; 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 634, Advanced Applied Analytic Methods in Epidemiology and Public Health; and CDE 650, Introduction to Evidence-Based Medicine and Health Care. In addition, in consultation with their dissertation adviser, students choose three 600-level course units in Biostatistics as well as three additional electives that will best prepare them for their dissertation research.

#### SOCIAL AND BEHAVIORAL SCIENCES

Ph.D. students in the 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 department chair and DGS. 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. Required courses (or their equivalents) are: CDE 508, Principles of Epidemiology I; CDE 516, Principles of Epidemiology II; CDE 534, Applied Analytic Methods in Epidemiology; CDE 617, Developing a Research Proposal\*; SBS 580, Qualitative Methods; SBS 610, Applied Area Readings for Qualifying Exams; SBS 676,

Questionnaire Development; and SBS 699, Advanced Topics in Social and Behavioral Sciences. In addition, in consultation with their dissertation adviser, students choose three advanced-level (600 or above) statistics courses (from Biostatistics, Psychology, Political Science, Sociology, 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 whether there are training-specific requirements with the principal investigator of the grant.

\* CDE 617 is not required of students funded by the Interdisciplinary HIV Prevention Training Grant. Those students must take a fourth elective in order to meet the fifteen-course requirement.

## ENVIRONMENTAL HEALTH SCIENCES

Ph.D. students in Environmental Health Sciences have a choice of two concentrations: Environmental Epidemiology and Exposure Science, and Environmental and Molecular Toxicology. For both concentrations, courses required in the first year are: BIS 505, Statistical Thinking I; BIS 505, Statistical Thinking II; EMD 508, Principles of Epidemiology I; EHS 503, Public Health Toxicology; EHS 525, Seminar in Environmental 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. are exempt from EPH 608. Ph.D. students enrolled in EHS 503 and EHS 525 may be assigned additional readings. Students who select specialization in *Environmental Epidemiology and Exposure Science* are required to take EHS 507, Environmental Epidemiology; and EHS 508, Assessing Exposures to Environmental Stressors. Students who select specialization in *Environmental and Molecular Toxicology* are required to take EHS 545, Molecular Epidemiology. In addition, all students are required to complete two research rotations during the first year: EHS 620 (total of two units). At the end of the lab rotation students give a presentation and are graded based on their rotation work and presentation.

In the second year, students specializing in *Environmental Epidemiology and Exposure Science* must choose a minimum of three electives from the following: BIS 511, GIS Applications in Epidemiology and Public Health; BIS 623, Applied Regression Analysis; BIS 625, Categorical Data Analysis; BIS 628, Longitudinal and Multilevel Data Analysis; CDE 617, Developing a Research Proposal; EHS 502, Physiology for Public Health; EHS 511, Principles of Risk Assessment; EHS 520, Case-Based Learning for Genetic and Environmental Diseases; EHS 545, Molecular Epidemiology; EHS 562, Systems Technologies, Big Data, and Biomarkers; and EHS 580, Environmental Hormones and Human Health. Students specializing in *Environmental and Molecular Toxicology* must choose a minimum of three electives from the following: EHS 502, Physiology for Public Health; CDE 617, Developing a Research Proposal; EHS 508, Assessing Exposures to Environmental Stressors; EHS 537, Water, Sanitation, and Global Health; EHS 520, Case-Based Learning for Genetic and Environmental Diseases; EHS 562, Systems Technologies, Big Data, and Biomarkers; and EHS 511, Principles of Risk Assessment.

## EPIDEMIOLOGY OF MICROBIAL DISEASES

Ph.D. students in the Department of Epidemiology of Microbial Diseases (EMD) must complete a minimum of ten courses (not including EPH 600). Course waivers must be recommended by the academic adviser and approved by the department chair and DGS.

Courses in biostatistics, epidemiology, and microbiology are strongly recommended. The specific courses recommended depend on the background of individual students and their stated research interests. An individual program that includes courses, seminars, and research rotations is developed by the student and 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) are graded and account for three of the required ten courses. Student progress is reviewed at the end of each academic year.

Students are required to complete course work in epidemiology (EMD 508, Principles of Epidemiology I; 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. are 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 departments may also be appropriate: CBIO 602, Molecular Cell Biology; CDE 516, Principles of Epidemiology II; EMD 508, Principles of Epidemiology I; EMD 538, Quantitative Methods for Infectious Disease Epidemiology; EMD 539, Introduction to Public Health Surveillance; EMD 543, Global Aspects of Food and Nutrition; 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 680, Advanced Topics in Tropical Parasitic Diseases; F&ES 500, Landscape Ecology; HPM 570, Cost-Effectiveness Analysis and Decision Making; and PATH 650, Cellular and Molecular Biology of Cancer.

## HEALTH POLICY AND MANAGEMENT

Ph.D. students in the Department of Health Policy and Management (HPM) are required to develop expertise in one of three disciplinary concentrations—Economics; Organizational Theory and Management; or Political and Policy Analysis—and then to apply this discipline to a more specialized area; the latter becomes their area of distinction.

Students are required to complete the course work detailed below, or the equivalent of the topic areas covered in these courses. The course listing represents a suggested program of study. The standard number of courses taken is eighteen, with the option of obtaining credits for previous courses. With the approval of the academic adviser and DGS, alternative courses that better suit the needs of the student may satisfy the course work requirement. The departmental representative to the Graduate Student Executive Committee (GSEC), in conjunction with the student's adviser, is responsible for determining if core course requirements have been satisfied by previous course work.

or alternative courses. If so, the student should apply for a course waiver through the Graduate School. HPM students can only waive up to two of the eighteen courses.

Courses required of all students are: EPH 600, Research Ethics and Responsibility (does not count toward the total number of required courses); both terms of HPM 617, Colloquium in Health Services Research (does not count toward the total number of required courses); CDE 508, Principles of Epidemiology I; and EPH 608, Frontiers of Public Health. Students entering the program with an M.P.H. degree may be exempt from CDE 508 and EPH 608.

HPM 610, Applied Area Readings, is required of all second-year students. Students are also expected to attend the departmental research seminar for faculty and the doctoral research seminar.

In Methods and Statistics, a minimum of four courses are required from the following: BIS 623, Applied Regression Analysis; BIS 625, Categorical Data Analysis; BIS 628, Longitudinal and Multilevel Data Analysis; CDE 580, Qualitative Research Methods in Public Health; ECON 556, Topics in Empirical Economics and Public Policy; ECON 558, Econometrics; HPM 583, Methods in Health Services Research; PLSC 500, Statistics; PLSC 503, Quantitative Methods; PLSC 504, Advanced Quantitative Methods; 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 Statistics for Social Sciences; S&DS 565, Applied Data Mining and Machine Learning.

In Health Policy and Management, a minimum of four courses, all with Ph.D. readings, are required from the following: HPM 510, Introduction to Health Policy and Health Systems; HPM 514, Health Politics, Governance, and Policy; HPM 560, Health Economics and U.S. Health Policy; HPM 561, Managing Health Care Organizations; HPM 570, Cost-Effectiveness Analysis and Decision Making; HPM 573, Advanced Topics in Modeling Health Care Decisions; HPM 587, Advanced Health Economics; HPM 590, Addiction, Economics, and Public Policy; and HPM 597, Capstone Course in Health Policy.

### **Disciplinary Concentrations**

Students in HPM must complete a minimum of four courses, all with Ph.D. readings, in their chosen disciplinary concentration.

In *Economics*, required courses are: ECON 545, Microeconomics; and ECON 558, Econometrics (which may count as a Methods and Statistics class or as a disciplinary concentration class, but not both). In addition, students are required to take two field courses in a concentration area in which they plan to develop expertise. In *Behavioral Economics*, two courses from: MGMT 758, Foundations of Behavioral Economics; and PSYC 553 and PSYC 554, Behavioral Decision Making. 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 *Organizational Theory and Management*, required courses are: MGMT 731, Organizations/Management II: Organizations and the Environment; MGMT 733,

Theory Construction; MGMT 736, Organizations/Management I: Inside Organizations; and HPM 600, Directed Readings: Organizational Behavior and Theory in Health Care.

In *Political and Policy Analysis*, four courses are required, selected in consultation with the student's adviser. Suggested courses are: PLSC 617, Deliberative Democracy and Beyond; PLSC 766, Politics and Markets; PLSC 800, Introduction to American Politics; PLSC 801, Political Preferences and American Political Behavior; PLSC 802, Collective Action and Choice; PLSC 803, American Politics Institutions III; PSYC 647, Social Science and Institutional Design; and SOCY 557, Political Sociology.

HPM students take qualifying exams in each of three areas: (1) health policy and management; (2) empirical analysis and/or statistics; and (3) the student's disciplinary concentration. Typically these are taken in the summer after two years of course work.

### SPECIAL REQUIREMENTS FOR THE PH.D. DEGREE

At the end of years one and two, advisers will be asked to complete a progress report for each student evaluating 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 for approval. The dissertation prospectus must be approved by the end of the third year.

To be admitted to candidacy, students must: (1) satisfactorily complete the course requirements for their department as outlined above, achieve grades of Honors in at least two full-term courses, and achieve an overall High Pass average; (2) obtain an average grade of High Pass on the qualifying exam; and (3) have the dissertation prospectus approved by the Graduate Studies Executive Committee. 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 to the DAC and other invited faculty. Upon completion of the closed defense, the chair/adviser of the DAC submits the recommendation to the Graduate Studies Executive Committee along with the names of three appropriate readers.

Doctoral dissertations originating in Public Health must also be presented in a public seminar. This presentation is scheduled after the submission of the dissertation to the

readers and preferably prior to the receipt and consideration of the readers' reports. At least one member of the DAC supervising the dissertation and at least one member of the Graduate Studies Executive Committee are required to attend the presentation.

## MASTER'S DEGREES

**M.Phil. (en route to the Ph.D.)** The M.Phil. is awarded to students who have advanced to candidacy. When students advance to candidacy, the registrar's office automatically submits a petition for the awarding of the M.Phil. degree.

**Terminal Master's Degree Program** The School offers a terminal master's degree program leading to an M.S. in Public Health in two specialty areas: Biostatistics (a two-year program) and Chronic Disease Epidemiology (a one-year program). All students must fulfill both the departmental and Graduate School requirements for a terminal M.S. degree.

Students must have an overall grade average of High Pass, including a grade of Honors in at least one full-term graduate course (for students enrolled in the one-year program in Chronic Disease Epidemiology) or in at least two full-term graduate courses (for students enrolled in the two-year program in Biostatistics). In order to maintain the minimum average of High Pass, each grade of Pass must be balanced by one grade of Honors. For more details, please see Course and Honors Requirements under Policies and Regulations.

A Biostatistics or Chronic Disease Epidemiology student who is withdrawing from the Ph.D. program, and has successfully completed all required course work for the terminal M.S. degree (described below), may apply and be recommended for the M.S. in Public Health. In 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. IN BIOSTATISTICS

Faculty in the Biostatistics department of the School of Public Health offer a two-year terminal Master of Science degree. Fields include clinical trials, epidemiologic methodology, statistical genetics, and mathematical models for infectious diseases.

### Special Admissions Requirements

Applicants should have a strong background in quantitative sciences such as mathematics. In addition, it is recommended that applicants have undergraduate course work in the biological and social sciences. At a minimum, applicants would have taken one year of calculus and a course in linear algebra prior to enrolling in this program. The GRE General Test is required. The TOEFL is required of all applicants whose native language is not English. This requirement is waived only for applicants who, prior to matriculation at Yale, will have received a baccalaureate degree or its foreign equivalent from a college or university where English is the primary language of instruction. If you do not qualify for a waiver but have taken the TOEFL within the past two years, you will need to have your TOEFL scores released to us (code 3987).

## Course Requirements

The Biostatistics track requires the completion of fifteen required courses (not including EPH 600, BIS 695, and BIS 525). Required courses are: BIS 525, Seminar in Biostatistics and Journal Club; BIS 540, Fundamentals of Clinical Trials; BIS 623, Applied Regression Analysis; BIS 625, Categorical Data Analysis; BIS 628, Longitudinal and Multilevel Data Analysis; BIS 630, Applied Survival Analysis; BIS 678, Statistical Consulting; BIS 679, Advanced Statistical Programming in SAS and R; BIS 681, Statistical Consulting Lab; BIS 695, Summer Internship in Biostatistical Research; CDE 508, Principles of Epidemiology I; EPH 600, Research Ethics and Responsibility; S&DS 541, Probability Theory; and S&DS 542, Theory of Statistics. Students entering the program with an M.P.H. may be exempt from CDE 508.

Students must complete two Statistics electives at the 600 level. Students will also be required to attend a Professional Skills Seminar (details provided in the first term).

Additionally students must choose two Biostatistics electives from these courses: BIS 557, Computational Statistics; BIS 567, Bayesian Statistics; BIS 643, Theory of Survival Analysis; BIS 646, Nonparametric Statistical Methods and Their Applications; BIS 651, Spatial Statistics in Public Health; and BIS 691, Theory of Generalized Linear Models. Students demonstrating a mastery of topics covered by the required courses may replace them with more advanced courses but must receive written permission from their advisor and the DGS prior to enrolling in the substitute courses.

Students wishing to complete a thesis may enroll in BIS 650 (1 course unit). This would be an additional requirement and cannot replace any of the required courses noted above.

## TERMINAL M.S. IN CHRONIC DISEASE EPIDEMIOLOGY

Faculty in the Chronic Disease Epidemiology department of the School of Public Health offer a one-year terminal Master of Science degree. This one-year program is designed for medical and health care professionals (e.g., M.D., Ph.D., D.V.M., D.D.S., D.M.D.) who seek the skills necessary to conduct epidemiological research in their professional practice.

## Special Admissions Requirements

Applicants should have a basic understanding of quantitative science and statistics. It is recommended that candidates have strong science backgrounds and demonstrated competency in statistical analysis and logical thinking. Applicants from rigorous programs in the biological or social sciences will be given preference. At a minimum, applicants should have one year of course work in statistics or equivalent prior to enrolling in this program. Applicants must submit scores from either the MCAT or the GRE General Test. Students whose native language is not English must take the TOEFL or IELTS examination.

## Course Requirements

The M.S. track in Chronic Disease Epidemiology requires the completion of ten courses (excluding the Ethics course, EPH 600; and Seminar, CDE 525), including a capstone course.\* Required courses are: BIS 623, Applied Regression Analysis; BIS 625, Categorical Data Analysis; BIS 630, Applied Survival Analysis; CDE 508, Principles of Epidemiology I; CDE 516, Principles of Epidemiology II; CDE 523, Measurement Issues



in Chronic Disease Epidemiology; CDE 525, Seminar in Chronic Disease Epidemiology and Social and Behavioral Sciences; CDE 617, Developing a Research Proposal; and EPH 600, Research Ethics and Responsibility.

In addition, students must complete three electives. Suggested electives are: BIS 540, Fundamentals of Clinical Trials; BIS 561, Advanced Topics and Case Studies in Multicenter Clinical Trials; BIS 643, Theory of Survival Analysis; BIS 645, Statistical Methods in Human Genetics; CDE 520, Case-Based Learning for Genetic and Environmental Diseases; CDE 531, Health and Aging; CDE 532, Epidemiology of Cancer; CDE 533, Topics in Perinatal Epidemiology; CDE 535, Epidemiology of Heart Disease and Stroke; CDE 562, Nutrition and Chronic Disease; CDE 597, Genetic Concepts in Public Health; CDE 600, Directed Readings (one term); CDE 634, Advanced Applied Analytical Methods in Epidemiology and 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.

## **M.D./PH.D. PROGRAM REQUIREMENTS FOR PUBLIC HEALTH**

All M.D./Ph.D. students must meet with the Director of Graduate Studies (DGS) in Public Health if they are considering affiliating with Public Health. Students in this program are expected to meet the guidelines listed below in the timeframe outlined. The DGS must approve any variations to these requirements.

### **Teaching**

One term of teaching is required. If students teach beyond this requirement, they can be compensated. If a student has served as a teaching fellow elsewhere on campus, this experience may be counted toward the requirement. DGS approval is required to waive the teaching requirement on the basis of previous Yale teaching experience.

### **Rotations/Internships**

Students should do two rotations/internships with potential advisers in Public Health. The purpose of these rotations/internships is to learn lab technique and/or to allow the student time to determine if the PI's research interests are compatible with the student's research interests. These rotations/internships are usually done during the summer between the first and second years of medical school course work. In some cases, students may need to defer this requirement until the summer after the second year after taking certain courses and/or completing readings 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 may vary; therefore students should confer with the DGS and their Ph.D. adviser.



## Timeline for Qualifying Exam

Students generally will take medical school courses in years one and two. Students can take Public Health doctoral courses in years one and two before they affiliate if scheduling allows. Once affiliated with the Public Health program, students will complete all course requirements for the department. This generally takes a minimum of two terms but can take up to four terms after affiliating with Public Health. The qualifying exam is commonly completed after the fourth term of affiliation with the Ph.D. program in Public Health but can sometimes be done earlier with approval of the Ph.D. adviser and DGS.

## Prospectus Timeline

Following completion of the qualifying exam, students should focus on the prospectus, which has to be approved by the Public Health Graduate Studies Executive Committee (GSEC) before the end of their sixth term as an affiliated Ph.D. student in Public Health.

## Admission to Candidacy

To be admitted to candidacy, students must: (1) satisfactorily complete the course requirements for their department as outlined above, achieve grades of Honors in at least two full-term courses, and achieve an overall High Pass average; (2) obtain an average grade of High Pass on the qualifying exam; and (3) have the dissertation prospectus approved by the Graduate Studies Executive Committee. All Ph.D. students must be admitted to candidacy before the start of their fourth year in the Ph.D. program (i.e., before the start of the seventh term).

Ph.D. or terminal M.S. degree program materials are available upon request to the Office of the Director of Graduate Studies (c/o M. Elliot), School of Public Health, Yale University, PO Box 208034, New Haven CT 06520-8034; 203.785.6383; e-mail, [melanie.elliott@yale.edu](mailto:melanie.elliott@yale.edu).

## REQUIRED COURSES

For a complete list of Public Health courses, see the School of Public Health bulletin, available online at <http://bulletin.yale.edu>; and Online Course Information (OCI) at <https://students.yale.edu/oci>.

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 or b, Research Ethics and Responsibility** Staff

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 608b, Frontiers of Public Health** Staff

This course is designed for Ph.D. and Advanced Professional M.P.H. students. 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. Discussions examine the advances across disciplines

of biomedical research, 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

Kathryn Lofton

## Director of Graduate Studies

Christine Hayes [F]  
 Travis Zadeh [Sp]

**Professors** Harold Attridge (*Divinity*), Joel Baden (*Divinity*), Christopher Beeley (*Divinity*), Gerhard Böwering, John J. Collins (*Divinity*), Stephen Davis, Carlos Eire, Steven Fraade, Paul Franks (*Philosophy*), Bruce Gordon (*Divinity*), Philip Gorski (*Sociology*), Phyllis Granoff, Frank Griffel, John Hare (*Divinity*), Christine Hayes, Jennifer Herdt (*Divinity*), Kathryn Lofton, Ivan Marcus, Andrew McGowan (*Divinity*), Sally Promey (*American Studies*), Carolyn Sharp (*Divinity*), Gregory Sterling (*Divinity*), Harry Stout, Kathryn Tanner (*Divinity*), Miroslav Volf (*Divinity*), Robert Wilson

**Associate Professors** Zareena Grewal (*American Studies*), Willie Jennings (*Divinity*), Noreen Khawaja, Nancy Levene, Andrew Quintman, Eliyahu Stern

**Assistant Professors** Maria Doerfler, Eric Greene, Travis Zadeh

**Senior Lecturers** John Grim (*Forestry & Environmental Studies*), Margaret Olin, Mary Evelyn Tucker (*Forestry & Environmental Studies*)

**Lecturers** Jimmy Daccache, Supriya Gandhi, Felicity Harley-McGowan (*Divinity*), Daniel Jennings

## FIELDS OF STUDY

Students must enroll in one of the following fields of study: American Religious History, Asian Religions, Hebrew Bible/Old Testament, History of Ancient Christianity, Islamic Studies, Judaic Studies, New Testament, Religious Ethics, Theology, Religion and Modernity, and Philosophy of Religion.

## SPECIAL ADMISSIONS REQUIREMENTS

The department requires the scores of the GRE General Test; previous study in areas relevant to the chosen field of study, including ancient languages where applicable; and a writing sample of 20–30 pages, which will be evaluated for both content and style. Prospective students must apply in one of the ten fields of study, and when requesting information they should specify their particular field of interest.

## SPECIAL REQUIREMENTS FOR THE PH.D. DEGREE

Students are required to take 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. 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 at least two years during their graduate programs. Such teaching normally takes place during their third and fourth years, unless other arrangements are approved by the director of graduate studies.

A combined Ph.D. degree is available with African American Studies. Consult department for details.

## MASTER'S DEGREES

**M.Phil. and M.A. (both en route to the Ph.D.)** See Degree Requirements under Policies and Regulations. Students in Religious Studies must take seven courses to be eligible for the M.A. degree.

Program materials are available online at <http://religiousstudies.yale.edu>.

## COURSES

### **RLST 510a, Method and Theory** Kathryn Lofton

Required seminar for doctoral students in Religious Studies. Others admitted with instructor's permission.

### **RLST 514b / CLSS 807b / HIST 511b, Hellenistic Civilization and the Jews** Joseph Manning and John Collins

This seminar examines two incidents in the Hellenistic world that can be construed as persecution of the Jews. The first was in the years 167–164 B.C.E., when the Seleucid Antiochus Epiphanes tried to suppress the traditional Jewish cult in Jerusalem. The second was in Alexandria in 38 C.E., when the Jewish community came under attack from its Gentile neighbors and the Roman authorities. The seminar examines these incidents in the context of Seleucid and Roman policies toward subject peoples.

### **RLST 539b, Sensing the Sacred in India: Sensory Culture in South Asian Religions** Finnian Moore Gerety

This seminar explores South Asian religions through the body, the senses, and aesthetics. Drawing on Hindu, Buddhist, and Jain traditions, and concentrating on embodied practices such as meditation, chanting, eating, sex, asceticism, ritual, possession, and performance, we examine experiences of the sacred in India, past and

present. How has sensory culture—the sound of mantras, the smell of incense, the touch of a guru’s embrace—shaped lives, practices, and doctrines? What place does the gratification (or denial) of the senses have in South Asian traditions? The course draws on premodern texts as various as law codes, erotic handbooks, and medical treatises, and integrates a range of new media from ethnographic films to graphic novels.

**RLST 542a, Early Chan/Zen Buddhism** Eric Greene

Exploration of the literature of early Chan/Zen Buddhism (seventh–eighth century). Selected readings in genres such as hagiographies, lineage texts, ritual manuals, and doctrinal treatises. Introduction of tools and methods for studying Buddhist texts in Chinese.

**RLST 544b, Animals in Indian Religions** Phyllis Granoff

Students read Buddhist, Hindu, and Jain texts dealing with animals. We examine divergent beliefs about the place of animals in the hierarchy of living beings. Readings include stories of the Buddha’s births as an animal, the *Ramayana* on the monkey god Hanuman, and Jain rebirth narratives. Philosophical readings on animal sacrifice culminate in a consideration of recent debates against sacrifice in the Indian supreme court.

**RLST 546a, Tibetan Historical Texts** Andrew Quintman

This seminar focuses on a variety of Tibetan sources on Buddhist religious history. Prerequisite: reading knowledge of Classical Tibetan. Graded Satisfactory/Unsatisfactory.

**RLST 547b, Classical Tibetan Literature** Andrew Quintman

This seminar focuses on a variety of Tibetan sources on Buddhist religious history. Prerequisite: reading knowledge of Classical Tibetan.

**RLST 551b, Readings in Indian Texts** Phyllis Granoff

This is a course for students who read Sanskrit/Prakrit/Pali and would like to study a particular text in depth. The choice of text is determined after discussion with interested students.

**RLST 557a, Medieval Indian Texts** Phyllis Granoff

An advanced reading course in Sanskrit texts. Depending on student interest we read literature or philosophy. Prerequisite: two years of Sanskrit.

**RLST 565b / SAST 559b, Buddhist Traditions of Mind and Meditation** Andrew Quintman

Buddhist meditation practices examined in the context of traditional theories of mind, perception, and cognition. Readings both from Buddhist canonical works and from secondary scholarship on cognitive science and ritual practice. Recommended preparation: a course in Asian religions.

**RLST 583a / SAST 567a, Visual Worlds of Himalayan Buddhism** Andrew Quintman

The role of images and imagining in the religious traditions of Tibetan Buddhism. How Tibetan Buddhist cultures produce religious images; ways of visualizing those images to invest them with meaning. Topics include specific modes of visual representation, relationships between text and image, social lives of images, and processes of reading and interpretation.

**RLST 589a, Readings in Urdu Texts** Supriya Gandhi

Readings from a range of Urdu texts, with a focus on works produced in the nineteenth century. Topics include Hindu reform, Islamic revival, colonialism, and interreligious polemic. The selection of texts takes into account the research interests of enrolled students.

**RLST 602b, New Testament and Ancient Christianity: Early Christian Literature in Theoretical Perspective** Harold Attridge and Michal Beth Dinkler

Required of doctoral students in New Testament studies and ancient Christianity. The topic and instructor change yearly. The topic for spring 2018 is the ways in which current literary theory can illuminate a range of ancient Christian literary genres.

**RLST 608b, Christianity in Late Antiquity** Maria Doerfler

Required of doctoral students in ancient Christianity. Topics include the relation of church and state after Constantine; theological controversies and church councils; interfaith relations; pieties and practices; and material culture.

**RLST 632b, Introduction to Contemporary Political Theology** Staff

Most political theology courses begin with Spinoza's *Tractatus Theologico-Politicus* and focus primarily on Carl Schmitt's famous 1922 book, *Political Theology*. This course generally concentrates on the turn to political theology since the fall of the Soviet Union. It deals specifically with recent political circumstances in the United States and Europe that have led to a renewed interest in the subject of political theology: French secularism, Islam, executive power, states of exception, the politics of religious freedom, neoliberalism, nationalism, race, international law, etc. Readings include works by Giorgio Agamben, Talal Asad, Saba Mahmood, Olivier Roy, Samuel Moyn, Willie James Jennings, and many others.

**RLST 654a, Biblical Interpretation in Early Christianity** Maria Doerfler

Scripture was both the primary focus of early Christians' literary attentions and the most significant resource for resolving questions of theological, ethical, or practical concern in their communities. Yet Scripture frequently did not speak with sufficient clarity and univocality; it required mediation—in homily, hymn, commentary, and treatise—and, in the process, interpretation and exposition. This course introduces students to a survey of ancient Christian writers' exegetical efforts from the very beginnings of Christian interpretive activity through the flowering of exegesis across the Roman and Sassanid Empires in the fourth through sixth century.

**RLST 655a, Proseminar: Christianity in the Second Century** Stephen Davis

Philological problems in the study of the second century and its aftermath. Required of all doctoral students in New Testament Studies and Ancient Christianity. Open to other doctoral students by permission of the instructor.

**RLST 686b, Religion in the American West** Tisa Wenger

This course investigates the histories of religious encounter and the formation of diverse religious identities in the American West, placing them in broader contexts of Atlantic world, Pacific world, hemispheric, and national histories. The West has played multiple roles in the nation's imagination: a place to be conquered and controlled, a place for new beginnings (religious or otherwise), a place of perils and of opportunities. Over the course of the term we ponder the religious dimensions of each of these constructed meanings and examine their very real impact on the people and landscapes of the West.

**RLST 692b / HIST 595b / JDST 844b, Introduction to Modern European Jewish History** David Sorkin

This course introduces students to European Jewish history since approximately 1648. It teaches the major historiographical traditions as well as the major themes of European Jewish history. Its audience is students specializing in Jewish history but also other historians who wish to add an understanding of Jewish history to their understanding of Europe.

**RLST 711b, Al-Ghazali and Maimonides** Frank Griffel

Close study of the lives and the thought of two of the most influential theologians and philosophers in Islam and Judaism. Comparison of their lives and writings, focusing on their integration of Aristotelian philosophy into the theology of Islam and Judaism.

**RLST 719b / NELC 706b, Problems in Early Islamic History** Travis Zadeh

An examination of questions and problems in the origins and development of Islamic history as explored by modern scholarship. Particular focus is placed on early source material.

**RLST 720a, The Qur'an and Its Interpretation** Gerhard Böwering

Intensive study of the Qur'an with special emphasis on its biblical roots. Readings in Arabic commentaries on the Qur'an. Prerequisites: advanced knowledge of Arabic and permission of the instructor.

**RLST 722a, Al-Ghazali's Impact on Islamic Thought** Frank Griffel

**RLST 729b, Islamic Theology Seminar** Frank Griffel

An advanced course designed for Ph.D. students. Prerequisites: reading command of Arabic, preferably Classical Arabic, and permission of the instructor.

**RLST 731a, Islam, Conquest, and Conversion** Travis Zadeh

Through examination of conquest and religious conversion in the formative periods of Islamic history, this course interrogates the idea that Islam was spread by violent domination. Case studies are drawn from the Middle East, South and Southeast Asia, the Indian Ocean, Iberia, and West Africa.

**RLST 739b, Life and Thought of Jonathan Edwards** Harry Stout

This course offers students a comprehensive view into the life and thought of Jonathan Edwards.

**RLST 751b / JDST 721b / NELC 703b, 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 762b / CPLT 690b / JDST 838b, Politics of Modern Hebrew Literature**

Hannan Hever

An overview of the poetics, culture, history, and political dynamics of modern Hebrew literature over the past 250 years. No background in Jewish literature and Jewish culture is required. All readings in English.

**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, 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 776b / HIST 601b / JDST 790b, Jewish History, Thought, and Narratives in Medieval Societies** Ivan Marcus

Research seminar that focuses on the two medieval Jewish subcultures of Ashkenaz (northern Christian Europe) and Sefarad (mainly Muslim and Christian Spain).

**RLST 777b / HIST 590b / JDST 764b, 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 799b / HIST 587b / JDST 793b, Introduction to Modern Jewish Thought** Eliyahu Stern

An overview of Jewish philosophical trends, movements, and thinkers from the seventeenth to the twenty-first century. Topics include enlightenment, historicism, socialism, secularism, religious radicalism, and Zionism.

**RLST 800a, Hebrew Bible Seminar: Problems in the History of Israelite Religion** Robert Wilson

An intensive study of important features of ancient Israelite religion, including the origins of monotheism, the priesthood, worship, prophecy, and apocalyptic.

**RLST 801b, Hebrew Bible Seminar: Problems in the Book of Isaiah** Robert Wilson

A close reading of selected chapters of the Hebrew text of Isaiah in order to test recent theories of the book's compositional history.

**RLST 803b / ANTH 531b / ARCG 531b / CLSS 815b / CPLT 547b / HIST 502b / JDST 653b / NELC 533b, Slavery, Dependency, and Genocide in the Ancient and Premodern World** Noel Lenski and Benedict Kiernan

Covers the subject of class and ethnic repression from the third millennium B.C.E. to the mid-second millennium C.E. Analyzes textual, epigraphic, and iconographic sources for slavery, dependency, and genocide in Assyrian, Greek, Roman, Germanic, Angkorian, Vietnamese, Burmese, Chosun, Mayan, and Aztec cultures.

**RLST 813a / HIST 574a, Apocalypticism** Abbas Amanat and John Collins

This seminar reviews the origins of apocalyptic thought in the three great monotheistic religions (Judaism, Christianity, and Islam) and also considers the modern adaptations of apocalypticism in each tradition.



**RLST 826a / SMTC 523a, Intermediate Syriac I** Jimmy Daccache

This two-term course is a continuation of SMTC 521. Reading and analysis of Syriac texts from various genres and time periods. Prerequisite: SMTC 521 or knowledge of Syriac.

**RLST 827b / SMTC 524b, Intermediate Syriac II** Jimmy Daccache

This two-term course is a continuation of SMTC 521. Reading and analysis of Syriac texts from various genres and time periods. Prerequisite: SMTC 521 or knowledge of Syriac.

**RLST 835a / SMTC 545a, Northwest Semitic Inscriptions: Aramaic** Jimmy Daccache

This course is designed to familiarize students with Aramaic epigraphy from the first millennium B.C.E. The Aramaic grammar is illustrated through early monumental inscriptions on stone from Anatolia and the abundant papyri of the Persian period from Egypt.

**RLST 836b / SMTC 836b, Northwest Semitic Inscriptions: Hebrew and Moabite**

Jimmy Daccache

The aim of this course is to provide students with an overview of the Hebrew epigraphy from the first millennium B.C.E., including inscriptions on stone, jars, and ostraca. The second part of the term is devoted to the study of Moabite monumental inscriptions and seal inscriptions.

**RLST 840b / SMTC 520b, Intermediate Ugaritic: Mythological Texts** Jimmy

Daccache

The Ugaritic alphabet was used in Ras Shamra-Ugarit in the thirteenth century B.C.E. on the Syrian coast. This course is an initiation into the linguistic system of the Ugaritic language, written in a cuneiform script, and into the Ugaritic civilization.

**RLST 865a, Moral, Religious, and Social Issues in Bioethics** Stephen Latham

A selective survey of issues in biomedical ethics. Comparison of different points of view about biomedical issues, including religious vs. secular and liberal vs. conservative. Special attention to issues in research and at the beginning and end of life.

**RLST 905a, Theology Doctoral Seminar** Chloe Starr and Kathryn Tanner

Spurred by contemporary criticisms of systematic theology, this course considers the various literary forms that theological writing takes, their theological presuppositions and theological effects, with attention to the influence of differences in historical and cultural contexts. Required of Ph.D. students in Theology.

**RLST 961a or b, Directed Readings: American Religious History** Staff

**RLST 962a or b, Directed Readings: Ancient Christianity** Staff

**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 967a or b, Directed Readings: New Testament** 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, Edwin Duval, Carlos Eire, Roberto González Echevarría, Bruce Gordon, David Scott Kastan, Christina Kraus, Lawrence Manley, Giuseppe Mazzotta, Robert Nelson, David Quint, John Rogers, Francesca Trivellato, Keith Wrightson

**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*), Edwin Duval, Carlos Eire, Roberta Frank, Paul Freedman, Roberto González Echevarría, Bruce Gordon, Emily Greenwood, K. David Jackson, Maija Jansson, Jacqueline Jung, David Scott Kastan, Christina Kraus, Noel Lenski, Lawrence Manley, John Matthews, Giuseppe Mazzotta, Mary Miller, Alastair Minnis, Isaac Nakhimovsky, Robert Nelson, Catherine Nicholson, Steven Pincus, David Quint, Ayesha Ramachandran, John Rogers, Ellen Rosand, Christopher Semk, Nicola Suthor, Francesca Trivellato, Anders Winroth, Keith Wrightson

## FIELDS OF STUDY

Renaissance Studies offers a combined Ph.D. degree that integrates concentration in a departmental field with interdisciplinary study of the broader range of culture in the Renaissance and early modern periods. The program is designed to train Renaissance specialists who are firmly based in a traditional discipline but who can also work across disciplinary boundaries. Departmental areas of concentration available are Classics, Comparative Literature, English, French, History, History of Art, History of Music, Italian, and Spanish and Portuguese.

## SPECIAL ADMISSIONS REQUIREMENTS

Only candidates wishing to proceed to a doctorate should apply. Application should be made to the department of concentration, with an indication that the candidate seeks nomination to the combined degree in Renaissance Studies. Applications should be accompanied by scores from the GREs and one research or critical paper.

## SPECIAL REQUIREMENTS FOR THE PH.D. DEGREE

Students are subject to the combined Ph.D. supervision of the Renaissance Studies program and the relevant participating department. The student's program will be decided in consultation with an adviser, the director of graduate studies (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, designed to present a wide range of topics concerned with Renaissance and early modern culture, is required of all combined degree candidates. This course, offered every other year, is open to students from other departments.

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

The scheduling of the oral examination and the dissertation prospectus follows the practice of the primary department, but in every case the two requirements must be completed not later than September of the fourth year. The oral examination, varying in length from two hours to two hours and fifteen minutes, will include questions on Renaissance topics outside the primary discipline. The remainder of the examination will be devoted to the primary discipline, including (except in the case of Classics) some further coverage of the Renaissance period. Students take additional written examinations as required by the primary departments.

Upon completion of all predissertation requirements, including the prospectus, students are admitted to candidacy for the combined Ph.D. degree. Admission to candidacy must be completed by the beginning of the fourth year.

The dissertation will be advised and completed according to departmental guidelines, but one of the readers will normally be a member of the Renaissance Studies Executive Committee.

## Classics

**Course work** Students are required to complete sixteen term courses. Eight of these will be courses in Classics and will include at least four courses in Greek and Latin literature, a course in historical or comparative grammar, and at least three seminars. The eight remaining courses making up the Renaissance Studies portion of the degree will be distributed as follows: two terms of the Renaissance Studies Core Course, six additional term courses to be taken in at least two disciplines (such as literature, history, history of art, music, religious studies, etc.). One of these courses should respect the spirit of the ordinary Classics requirement of a course in classical art or archaeology (a course on the classical origins of Renaissance architecture, for example, will satisfy this requirement).

**Languages** Students are expected to pass the normal Greek and Latin competency exams upon entrance to the program. Italian, as set by Renaissance Studies—one hour on sixteenth-century Italian prose, and another one-hour exam on modern Italian scholarship—and a second language, normally German or French.

**Examinations** Students are expected to pass the Greek and Latin translation exams, based on the Classics and Renaissance Studies Ph.D. reading lists, by the beginning of the fifth term in residence; the oral exams in Greek and Latin literature, based on the Classics and Renaissance Studies Ph.D. reading lists, by the end of the fifth term

in residence; and the oral exams on special fields appropriate to both disciplines, as described below, by the end of the sixth term in residence.

**Orals** Classics portion: seventy-five minutes on three or four topics in classical Greek and Latin literature. Renaissance Studies portion: forty-five minutes, three fifteen-minute questions on Renaissance topics to be divided between at least two disciplines, i.e., literature, history, history of art, etc.

**Prospectus and dissertation** The prospectus must be completed by the end of the seventh term in residence. Procedures regarding the dissertation will follow departmental practice, although the board of readers will normally include at least one member of the Renaissance Studies Executive Committee.

## Comparative Literature

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

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

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

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

## English

**Course work** Students are required to complete sixteen term courses. Eleven of these will be courses in English, of which five (including those normally cross-listed, such as Comparative Literature courses and the Renaissance Studies Core Course) will be in Renaissance literature. An additional five courses in Renaissance topics will be non-cross-listed courses from other departments. Course work must be completed by the end of the fifth term.

**Languages** Latin, Italian, and a second modern language, to be tested by the Renaissance Studies program.

**Orals** Five twenty-minute questions, including two Renaissance topics. An additional thirty-minute portion, consisting of two fifteen-minute questions in Renaissance Studies, on nonliterary disciplines.

**Prospectus and dissertation** The prospectus must be completed by the beginning (i.e., September) of the seventh term. Procedures regarding the dissertation will follow departmental practice, with at least one reader from the Renaissance Studies Executive Committee.

## French

**Course work** Sixteen term courses at the graduate level are required. Nine correspond to the requirements of the French department, seven to the requirements of the Renaissance Studies program. Of the nine courses taken in French, one must be FREN 610 (Introduction to Old French), two others must fall within the medieval and early modern periods (eleventh through seventeenth century). The six remaining courses in French must cover as broad a spectrum as possible of the various periods and subfields of French and francophone literature. Of the seven courses taken in Renaissance Studies, two must be the Renaissance Studies Core Course, two must be in a literature or literatures other than French, and three must be taken in other departments (e.g., History, History of Art, Music, Religious Studies, Philosophy, etc.).

**Languages** Latin and Italian, as required and examined by Renaissance Studies, and a third language relevant to the student's specialization (Greek, Hebrew, Spanish, Portuguese, German), in addition to French. A written examination in Latin will consist of a passage of humanist Latin prose (one hour). A written examination in Italian will consist of a literary passage from the Italian Renaissance (one hour) and a passage of modern Italian scholarship (one hour). Written examinations in the third language will consist of passages appropriate to the language and the discipline, or may be satisfied by a graduate seminar taken in the language or literature in question.

**Orals** An oral qualifying examination must take place as early as possible in the third year of study, before spring recess at the latest. The examination will consist of seven topics: four in French and three in Renaissance Studies. Of the four topics in French, one must center on Renaissance literature, two on other areas of French and francophone literature; the fourth will consist of the textual analysis of a poem or prose passage in French, provided to the candidate twenty-four hours before the examination. Of the three topics in Renaissance Studies, one or two must center on a Renaissance literature other than French, the remainder on an area or areas of Renaissance Studies other than literature. The French part of the examination will be conducted in French; the Renaissance Studies part will be conducted in English.

**Prospectus and dissertation** A formal prospectus defense must take place no later than two weeks before the end of the sixth term (third year) of study. The prospectus committee will consist of three faculty members, including the dissertation director(s) and at least one member of the Renaissance Studies Executive Committee. Once approved by the committee, the prospectus will be submitted to the graduate faculty of the Department of French for a vote on final approval and advancement to candidacy.

More than one dissertation adviser is permitted and indeed encouraged, but the principal adviser will normally be in the Department of French. The official readers of the finished dissertation need not be members of the original prospectus committee, but will include at least one member of the Department of French and at least one member of the Renaissance Studies Executive Committee.

## History

**Course work** Students are required to complete sixteen term courses. Ten of these will be courses in History; of these, a minimum of four will be in Renaissance/early modern topics from the fourteenth through the seventeenth century. The six remaining courses making up the Renaissance Studies portion of the degree will be distributed as follows: two terms of the Renaissance Studies Core Course, four additional term courses to be taken in at least two disciplines outside of history (such as Classics, modern literatures, history of art, music, etc.). The normal History department requirements of three research seminars and a prospectus tutorial apply to combined-degree students.

**Languages** Latin and Italian, as set by Renaissance Studies – one hour of Renaissance Latin prose; two hours of Italian, one of sixteenth-century Italian prose, one of modern Italian scholarship – and a third language chosen by the student.

**Orals** History portion: seventy-five minutes in all, including forty-five minutes on the student's major Renaissance/Reformation/early modern field, which may, but need not be, shared with more than one examiner, and thirty minutes on a minor field outside the specialization (and preferably outside of European history). Renaissance Studies portion: forty-five minutes, three fifteen-minute questions to be divided between at least two disciplines outside of history narrowly conceived (i.e., in literature, history of art, etc.). Students are expected to complete the oral examination no later than September of the fourth year.

**Prospectus and dissertation** Students are expected to complete the prospectus by March of the third year. Procedures regarding the dissertation will follow departmental practice, although the board of readers will normally include at least one member of the Renaissance Studies Executive Committee.

## History of Art

**Course work** Students are required to complete fifteen term courses. Ten of these will be courses in History of Art; of these, a minimum of four will be in Renaissance art from fourteenth-century Italy through the baroque. The five remaining courses making up the Renaissance Studies portion of the degree will be distributed as follows: two terms of the Renaissance Studies Core Course, three additional term courses taken in at least two disciplines outside of history of art (such as literature, history, music, religious studies, etc.). Students will normally take seven courses in the first year, six in the second year (the credit for first-time teaching will be included in this number), and a final course in the fall of the third year.

**Qualifying paper** Normally during January of the second year, students submit a qualifying paper that should demonstrate the candidate's ability to complete a Ph.D. dissertation successfully.

**Languages** Latin and Italian, as set by Renaissance Studies – one hour of Renaissance Latin prose; two hours of Italian, one of sixteenth-century Italian prose, one of modern Italian scholarship. A third language (in most cases German) at the discretion of the History of Art department.

**Orals** The comprehensive oral examination will normally take place toward the end of the first term of the third year and must be completed no later than September of the fourth year. It will consist of a three-hour written examination based on the candidate's major field and an oral examination as follows: History of Art: seventy-five minutes, including examination on at least one field noncontiguous with the Renaissance; Renaissance Studies: forty-five minutes, three fifteen-minute questions to be divided between at least two disciplines outside the history of art.

**Prospectus and dissertation** Students are expected to complete the prospectus and colloquium by March of the third year. Procedures for the submission and evaluation of dissertations will be those followed in History of Art, although the board of readers will normally include a member of the Renaissance Studies Executive Committee.

## Italian

**Course work** Of the combined degree program's total of sixteen term courses, seven are in Renaissance Studies and nine are in the Department of Italian. Of the nine courses in Italian, at least three must be devoted to the period from Dante to the earlier seventeenth century. The seven courses making up the Renaissance Studies portion of the degree will be distributed as follows: two terms of the Renaissance Studies Core Course; two courses in Renaissance literatures other than Italian, and three courses divided between at least two nonliterary disciplines (e.g., history, history of art, religious studies, etc.).

**Languages** Latin, as set by Renaissance Studies (one hour of Renaissance Latin prose), a second romance language, and a non-romance language, tested in a two-hour examination (one hour of Renaissance prose, one hour of modern scholarship). Latin to be passed by the end of the first year (and preferably upon entrance); all languages to be passed before the oral examination.

**Orals** The qualifying examination, which must be completed by the end of the third year, will include an oral examination in which sixty minutes will be devoted to Italian literature, including the Renaissance, and forty-five minutes will be devoted to three fifteen-minute questions on a topic in Renaissance literature outside of Italy and two topics in nonliterary areas of the Renaissance (such as history or history of art). The portion of the examination devoted to Italian literature will also include a written component following departmental guidelines.

**Prospectus and dissertation** The dissertation (a prospectus of which must be completed by the beginning of the fourth year) will normally be directed within the Department of Italian, but at least one of the readers will normally be a member of the Renaissance Studies Executive Committee.

## Music

**Course work** Students are required to complete sixteen term courses. Ten of these will be courses in Music, including four in early music, i.e., from the later Middle Ages



through the baroque. The six remaining courses making up the Renaissance Studies portion of the degree will be distributed as follows: two terms of the Renaissance Studies Core Course, four additional term courses taken in at least two disciplines outside of music (such as literature, history, history of art, religious studies, etc.).

**Languages** Latin and Italian, as set by Renaissance Studies—one hour of Renaissance Latin prose; two hours of Italian, one of sixteenth-century Italian prose, one of modern Italian scholarship. A third language (normally French or German) at the discretion of the Department of Music.

**Comprehensive examinations** Music: three ninety-minute essays (including one on early music), followed by an oral examination of ninety minutes. Renaissance Studies: one ninety-minute essay on an interdisciplinary Renaissance topic (e.g., art and literature of a particular country, or comparison of the culture of two or three princely courts, or the history of the Reformation or Counter-Reformation), followed by a thirty-minute oral examination on the essay topic. Students take the comprehensive exam in Music at the beginning of the third year and the Renaissance Studies comprehensive exam in the spring of the third year.

**Prospectus and dissertation** Students enroll in the third-year prospectus/dissertation seminar in Music and must complete the prospectus no later than September of the fourth year. Dissertations will be approved in the Department of Music, with at least one reader to come from the Renaissance Studies Executive Committee.

## Spanish and Portuguese

**Course work** A total of sixteen term courses at the graduate level is required. Nine correspond to the requirements of the Spanish and Portuguese department, seven to the requirements of the Renaissance Studies program. Of the nine courses taken in Spanish and Portuguese, two are required: 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 Course, two must be in a literature or literatures other than Spanish and/or Portuguese, and three must be taken in other departments (e.g., History, History of Art, Religious Studies, Philosophy, etc.).

**Languages** Students are expected to have a strong command of Spanish and/or Portuguese as well as English. In addition, the following requirements must be met: (1) Latin, as set by the Renaissance Studies program (passing a one-hour translation examination in Renaissance Latin prose); (2) Italian, as set by the Renaissance Studies program (successful completion of a one-hour translation exam in sixteenth-century Italian prose and a one-hour translation exam in modern Italian scholarship); (3) demonstration of reading/translation proficiency in one of the following languages: French, German, Greek, Portuguese (available to students doing departmental course work exclusively in Spanish), Spanish (available to students doing departmental

course work exclusively in Portuguese), or another language relevant to the student's specialization. Students doing their departmental course work in a combination of Spanish-language and Portuguese-language courses will be understood to have satisfied this third reading knowledge requirement so long as the courses are taught and the readings done in the relevant Romance language. If the course work in either Hispanic or Luso-Brazilian literatures is done in English, then the student will be expected to demonstrate proficiency by taking a one-hour translation exam in the sixteenth-century prose of the relevant language. One language requirement must be satisfied by the end of the first year of study, if not upon entrance into the program (preferably Latin or Italian); the remaining requirement (for students doing both Spanish- and Portuguese-language literatures) or requirements (for the student working exclusively in either Spanish or Portuguese) must be satisfied by the end of the second year.

**Qualifying examination** Written component: (1) a two-hour examination in peninsular Spanish and/or Portuguese literatures, and (2) a two-hour exam in the ultramarine literatures of Spain and/or Portugal. Oral component: eight fifteen-minute questions, distributed as follows: four in Spanish/Portuguese peninsular/ultramarine literatures (medieval period through the seventeenth century), and three in Renaissance Studies (one question on a non-Spanish/Portuguese literature, and two questions from extra-literary fields such as history, history of art, religious studies, etc.).

**Prospectus** The dissertation project should be carefully planned with faculty members from the relevant departments specializing in the respective areas. The prospectus should meet the approval of the student's adviser in the Department of Spanish and Portuguese and the Renaissance Studies program member advising the student. The prospectus must include a presentation of the topic to be investigated, an explanation of the reasons for its significance, and a description of the theoretical and methodological framework to be employed. The prospectus must be submitted to the 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**

**RNST 500a, The Italian Renaissance** David Quint

An introduction to the Renaissance in Italy, focused on readings and analyzing key texts.

**RNST 501b, The Renaissance beyond Italy** Lawrence Manley and Bruce Gordon

An introduction to the Renaissance beyond Italy, focused on reading and analyzing key texts.

**RNST 900a or b, Directed Reading** Staff

By arrangement with faculty.

# Slavic Languages and Literatures

2704 Hall of Graduate Studies, 203.432.1300, [slavic.department@yale.edu](mailto:slavic.department@yale.edu)

<http://slavic.yale.edu>

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

## Chair

John MacKay

## Director of Graduate Studies

Molly Brunson

**Professors** Vladimir Alexandrov, Katerina Clark, Harvey Goldblatt, John MacKay

**Associate Professor** Molly Brunson

**Assistant Professor** Marijeta Bozovic

**Senior Lectors II** Irina Dolgova, Constantine Muravnik

**Senior Lectors I** Krystyna Illakowicz, Julia Titus, Karen von Kunes

## FIELDS OF STUDY

The department offers the Ph.D. in Russian literature and culture and, by special arrangement, in medieval Slavic literature and philology.

## SPECIAL ADMISSIONS REQUIREMENTS

An advanced-level command of the Russian language is required. A ten- to twenty-page writing sample, written in English, should be submitted with the application.

## SPECIAL REQUIREMENTS FOR THE PH.D. DEGREE

All graduate students are required to take four courses. RUSS 607, Topics in Russian Literature from Its Origins to the Eighteenth Century, is coordinated with the department's graduate reading list of required works in Russian literature of the period. All students will take an examination in RUSS 607 that will also double as the medieval Russian literature examination for the doctorate (for more on examinations, see below). RUSS 608, Eighteenth-Century Russian Literature, follows the same pattern as RUSS 607. Its readings are also coordinated with the department's graduate reading list of required works in Russian literature. All students will take an examination in RUSS 608 that will also double as the eighteenth-century Russian literature examination for the doctorate. The other required courses are SLAV 754, Old Church Slavonic, and RUSS 834, Aspects of Russian Grammar and Teaching Methodologies, which combines pedagogy with the structure of Russian. If possible, SLAV 754 should be taken before RUSS 607. RUSS 834 should be taken concurrently with or before a graduate student's first term of teaching Russian language, typically during the seventh term of study.

The minimum number of graduate courses for the Ph.D. is sixteen, counting the above four required courses. Of the remaining twelve, at least two must be taken in nineteenth-century Russian literature and at least two in twentieth-century Russian literature, including poetry and prose or dramatic works.

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.

## **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 663a, Introduction to Russian Poetry** Marijeta Bozovic

This seminar presents an introduction and historical overview of the classics of Russian poetry in the nineteenth and twentieth centuries, including works by Pushkin, Lermontov, Tiutchev, Nekrasov, Gippius, Bely, Blok, Akhmatova, Mandelstam, Khlebnikov, Mayakovsky, Tsvetaeva, and Brodsky, as well as by several contemporary Russian poets.

### **RUSS 680a, Space and Place in Modern Theory and Fiction** Edyta Bojanowska

While the study of literature has been dominated by questions of time and chronology, recent scholarship has seen a surge of interest in the spatial discourses of literary texts. This course considers the geometric, geographic, social, and epistemic spaces of literary texts. How do humans organize space, and how are they organized by space? How do literary texts conceptualize and sometimes transgress their own spatial order? Is space a "container" or a relation? How does it situate knowledge, culture, and society? Borders, thresholds, and in-between spaces occupy us along with transformations and animations of space. We are guided in this conceptual terrain by key theoretical contributions on space and place from a variety of disciplines, including philosophy, literary and cultural theory, anthropology, sociology, phenomenology, and geography. We test their insights by analyzing key texts of Russian literature from the nineteenth to the twenty-first century. Theoretical readings include Plato, Heidegger, Goffman, Lefebvre, Foucault, Anderson, Bakhtin, Lotman, Tuan, Bachelard, de Certeau, Moretti, Massey, Grosz, Said, Bhabha, Deleuze, and Guattari. Primary texts include Russian texts by Pushkin, Gogol, Turgenev, Tolstoy, Dostoevsky, Chekhov, Bely, Zamyatin, Platonov, Nabokov, Ulitskaya, and Pelevin.

### **RUSS 695a / FILM 778a, Russian Literature and Film in the 1920s and 1930s**

Katerina Clark

This course presents a historical overview, incorporating some of the main landmarks of the 1920s and 1930s including works by Pilnyak, Bakhtin, the Formalists, Platonov, Mayakovsky, Bulgakov, Zoshchenko, Eisenstein, Protazanov, Pudovkin, the Vasilyev "brothers," and G. Aleksandrov.

### **RUSS 753b, The Russian Short Story and Beyond** John MacKay

Despite its importance, ubiquity, and popularity, the short story form remains one of the most woefully understudied of all literary genres, having attracted far less scholarly attention than the novel, the lyric, the epic, or drama. This class is intended to make a start on filling that gap by paying close historical, critical, and aesthetic attention to Russian short stories from the early nineteenth century onward.

### **RUSS 834a, Aspects of Russian Grammar and Teaching Methodology** Irina Dolgova

The course examines various aspects of Russian grammar and the use of different teaching methodologies. Special emphasis is placed on the connection between linguistic knowledge and its application for teaching Russian in an English-speaking classroom. Different types of language learners, diverse teaching strategies, and existing resources for teaching Russian are discussed.

**RUSS 851b, Proseminar in Slavic Literature** Molly Brunson and Marijeta Bozovic  
Introduction to the graduate study of Russian literature. Topics include literary theory, methodology, introduction to the profession.

**RUSS 882a / CPLT 882a / ENGL 709a, What Happened to Race, Class, and Gender? Keywords of Recent Critical Theory** Ayesha Ramachandran and Marta Figlerowicz

What *did* happen to race, class, and gender? This course examines the persistence of older theoretical frameworks such as Marxism or feminism in current critical discourse. It also explores new critical keywords—biopolitics, affect, the Anthropocene, and others—that now help structure theoretical debates in the humanities. Intended as a fast-paced, reading-heavy introduction to recent critical theory, the course will help graduate students in literature acquire a better sense of their field of study and reflect upon the methodologies they will use in their dissertation projects. Readings include the work of older theorists such as Jacques Derrida, Theodor Adorno, Michel Foucault, Judith Butler, and Donna Haraway, as well as recent ones such as Jasbir Puar, Sianne Ngai, Tiqqun, Paolo Virno, and Dipesh Chakrabarty.

**SLAV 752a, The Slavic Peoples and Their Languages: From Unity to Diversity**  
Harvey Goldblatt

Examination of the linguistic and cultural history of the Slavs from their prehistoric period up to the formation of the diverse Slavic languages, the individual Slavic states, and their national literatures.

**SLAV 756a, Princely Valor: *The Lay of Igor's Campaign*** Harvey Goldblatt  
This course offers a close reading of *The Lay of Igor's Campaign*, which tells of the adventurous but ultimately unsuccessful military campaign waged by Prince Igor, the son of Svjatoslav, against the Polovcians in 1185. It compares the *Lay* with the chronicle accounts that also describe the rash military deeds of Prince Igor and the implications of his defeat for Old Rus'. The course seeks to highlight important coincidences between the *Lay* and the heroic epics that played a central role in the medieval European literary patrimony.



# Sociology

493 College Street, 203.432.3323

<http://sociology.yale.edu>

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

## Chair

Philip Smith

## Director of Graduate Studies

Ron Eyerman

**Professors** Julia Adams, Jeffrey Alexander, Elijah Anderson, Scott Boorman, Nicholas Christakis, Deborah Davis, Ron Eyerman, Philip Gorski, Grace Kao, Andrew Papachristos, Philip Smith, Frederick Wherry

**Associate Professors** Rene Almeling, Emily Erikson, Jonathan Wrytzen

**Assistant Professors** Lloyd Grieger, Joscha Legewie

## FIELDS OF STUDY

Fields include comparative sociology/macrosociology; cultural and historical sociology; economic sociology; life course/social stratification; mathematical sociology; medical sociology; methodology (qualitative and quantitative approaches); networks; political sociology; race/gender/ethnic/minority relations; social change; social demography; social movements; theory (general, critical, hermeneutic); urban sociology.

## SPECIAL REQUIREMENTS FOR THE PH.D. DEGREE

Qualification for admission to candidacy for the Ph.D. will take place during the student's first three years of study at Yale. A student who has not been admitted to candidacy will not be permitted to register for the seventh term of study. To qualify for candidacy the student must take twelve seminars to be completed in years one and two, four required courses (SOCY 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 503b / PLSC 522b, 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.

**SOCY 508a / PLSC 505a, Qualitative Field Research** Elisabeth Wood

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 534a, Cultural Sociology** Jeffrey Alexander

Cultural sociology studies “irrational” meanings in supposedly rational, modern societies. Social meanings are symbolic, but also sensual, emotional, and moral. They can deeply divide nations but also powerfully unite them. They affect every dimension of social life, from politics and markets to race and gender relations, class, conflict, and war. We look at how this cultural approach developed, from counterintuitive writings of Durkheim and Weber a century ago, to the breakthroughs of semiotics and anthropology in midcentury, the creation of modern cultural sociology in the 1980s, and new thinking about social performance and material icons today. As we trace this historical arc, we examine ancient and modern religion, contemporary capitalism, the coronation of Elizabeth II, professional wrestling, Americans not eating horses, the Iraq War, the impeachment of Bill Clinton, Barack Obama’s first presidential campaign, and the new cult of vinyl records.

**SOCY 542a, Sociological Theory** Emily Erikson

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 548b / AFST 548b, Islamic Social Movements** Jonathan Wyrzten

Social movement theory used to analyze the emergence and evolution of Islamic movements from the early twentieth century to the present. Organization, mobilization, political process, and framing of political, nonpolitical, militant, and nonmilitant movements; transnational dimensions of Islamic activism. Case studies

include the Muslim Brotherhood, Hamas, Hizbollah, Al-Qaeda, Gulen, Al-Adl wa-Ihsann, Islamic State, and others.

**SOCY 551a, Comparative and Historical Methods** Philip Gorski

The course provides a hands-on introduction to the craft of comparative and historical analysis. Through a series of small-scale, individual, and group projects, students learn how to frame researchable problems, how to use comparisons to address them, how to work with different types of primary sources, how to transform them into “data,” and how to manage this data. In order to create a substantive focus for the course, and to exploit the strengths of Yale’s libraries and archives, the readings and assignments are centered on English history and historiography. The course is designed for graduate students in history and the social sciences but is also open to undergraduates with a strong interest in research.

**SOCY 554a, 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 734a or b, 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 563b / AFST 573b, Imperialism, Insurgency, and State Building in the Middle East and North Africa** Jonathan Wirtzen

The historical evolution of political order from Morocco to Central Asia in the past two centuries. Focus on relationships between imperialism, insurgency, and state building. Ottoman, European, and nationalist strategies for state building; modes of local resistance; recent transnational developments; American counterinsurgency and nation-building initiatives in the region.

**SOCY 580a, Introduction to Methods in Quantitative Sociology** Lloyd Grieger

Introduction to methods in quantitative sociological research. Covers data description; graphical approaches; elementary probability theory; bivariate and multivariate linear regression; regression diagnostics. Includes hands-on data analysis using Stata.

**SOCY 581b, Intermediate Methods in Quantitative Sociology** Staff

Second part of a two-term introduction to statistical analysis for quantitative social science research. Covers review of linear regression; introduction to models for categorical and count data, the analysis of time data, and longitudinal data; overview of missing data and weighting; and discussion of data that are complicated by issues of nonrandom design. Prerequisite: SOCY 580.

**SOCY 584b / AFAM 584b, 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, Inequality and Life Course Workshop** Lloyd Grieger

In this workshop we present and discuss ongoing research work, primarily but not exclusively quantitative analyses. In addition, we address theoretical and methodological issues in the areas of the life course (education, training, labor markets, aging, as well as family demography), social inequality (class structures, stratification, and social mobility), and related topics.

**SOCY 596a / EAST 596a, Wealth and Poverty in Modern China** Deborah Davis

The underlying causes and consequences of the changing distribution of income, material assets, and political power in contemporary China. Substantive focus on inequality and stratification. Instruction in the use of online Chinese resources relevant to research. Optional weekly Chinese language discussions. Prerequisite: permission of the instructor.

**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** Jeffrey Alexander

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 630a / AFAM 773a, 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 632b, Social Network Analysis** Emily Erikson

Social Network Analysis (SNA) refers to both a theoretical perspective and a set of methodological techniques. As a theoretical perspective, SNA stresses the interdependence among social actors. This approach views the social world as patterns or regularities in relationships among interacting units and focuses on how such

patterns affect the behavior of network units or actors. A “structure” emerges as a persistent pattern of interaction that can influence a multitude of behaviors, such as getting a job, income attainment, political decision-making, social revolutions, organizational merges, global finance and trade markets, delinquent youth behaviors, the spread of infectious diseases, and so on. As a methodological approach, SNA refers to a catalog of techniques steeped in mathematical graph theory and now extending to statistical simulation and algebraic models. This course surveys the growing field of SNA, emphasizing the merger of theory and method, while gaining hands-on experience with network data and software.

**SOCY 633a, Sociology of Education** Staff

This seminar introduces students to studies in the sociology of education. The class emphasizes studies in the United States and also focuses on studies of stratification by race, ethnicity, immigrant status, class, and gender. We also examine empirical studies of youth from early childhood to post-college, and we think more broadly about how longitudinal studies affect our understandings of how schools may help to provide more equal opportunities to students or whether they exacerbate inequality.

**SOCY 656a, Professional Seminar** Ron Eyerman

This required seminar aims at introducing incoming sociology graduate students to the department and the profession. Yale Sociology faculty members are invited to discuss their research. There are minimum requirements, such as writing a book review. No grades are given; students should take for Audit. Held biweekly.

**SOCY 663a, Sociology of Education** Staff

This seminar introduces students to studies in the sociology of education, emphasizing studies in the United States and studies of stratification by race, ethnicity, immigrant status, class, and gender. We also examine empirical studies of youth from early childhood to post-college, and we think more broadly about how longitudinal studies affect our understandings of how schools may help to provide more equal opportunities to students or whether they exacerbate inequality. We also spend some time on professionalization activities.

# 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

R. Howard Bloch

## Director of Graduate Studies

Rüdiger Campe

**Professors** Rolena Adorno, Roberto González Echevarría, Aníbal González-Pérez, K. David Jackson, Noël Valis

**Assistant Professor** Leslie Harkema

**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. In addition, the department participates in (1) a combined Ph.D. program in Spanish and Portuguese and African American Studies offered in conjunction with the Department of African American Studies and (2) a combined Ph.D. program in Spanish and Portuguese and Renaissance Studies offered in conjunction with the Renaissance Studies Program.

## SPECIAL ADMISSIONS REQUIREMENTS

Thorough command of the language in which the student plans to specialize and a background in its literature, as well as command of at least one of the three additional languages in which the student will need to fulfill requirements, are required.

Application must include GRE scores, a personal statement, and an academic writing sample in the language of the proposed specialization, not to exceed twenty-five pages in length. Students whose native language is not English must submit scores of the Test of English as a Foreign Language (TOEFL).

## SPECIAL REQUIREMENTS FOR THE PH.D. DEGREE

The department requires two years of course work, sixteen term courses, a grade of Honors in at least two of these courses each year, and a minimum grade average of High Pass. Course work includes two required courses, SPAN 500, History of the Spanish Language, and SPAN 790, Methodologies of Modern Language Teaching, and two courses taken outside the department. Also required are a reading knowledge of Latin and a second language, as well as a third language-literature minor, which may be Portuguese or another language-literature. (Students specializing in Spanish literature and opting to fulfill the language-literature minor with two courses in Portuguese

may waive the requirement to take two courses outside the department.) In the third year, the student is expected to pass the qualifying examination (written and oral components) and submit and receive approval of the dissertation prospectus. Upon completion of all predissertation requirements, including the dissertation prospectus, students are admitted to candidacy for the Ph.D.

Participation in the department's teaching and pedagogy program is a degree requirement. It consists of taking the required course SPAN 790 in the second year and teaching one section per term of a course in the beginning language sequence during the third and fourth years of study. Viewed as an integral part of the course of study for the doctorate, this program includes supervision by the director of the language program and course directors.

## COMBINED PH.D. PROGRAMS

### Spanish and Portuguese and African American Studies

The Department of Spanish and Portuguese also offers, in conjunction with the Department of African American Studies, a combined Ph.D. in Spanish and Portuguese and African American Studies. For further details, see African American Studies.

### Spanish and Portuguese and Renaissance Studies

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

## MASTER'S DEGREES

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

**M.A. (en route to the Ph.D.)** The M.A. en route is awarded upon the satisfactory completion of eight term courses and two of the three language requirements (Latin and one other language).

## COURSES

### **PORT 964a, Machado de Assis: The Literary World** Staff

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.

### **PORT 970a, Fernando Pessoa, Inc.** K. David Jackson

This course surveys the main facets of Pessoa's works and considers the principal theories and interpretations of his complex literary universe. A reading knowledge of Portuguese is essential; however, students may supplement his texts with translations into English, Spanish, French, or Italian.

### **SPAN 629a / CPLT 673a, Golden Age Theater** Roberto González Echevarría

The development and apogee of the Spanish *comedia*, as well as contemporary minor subgenres such as the *auto sacramental* and the *entremés*. Exploration of how the theater

synthesizes post-Garcilaso lyric, the *commedia dell'arte*, renaissance epic, the *romancero*, Spanish history, and the European renaissance literary tradition. Works by Cervantes, Lope de Vega, Tirso de Molina, Guillén de Castro, Mira de Amescua, Juan Ruiz de Alarcón, Luis Quiñones de Benavente, Pedro Calderón de la Barca, and Sor Juana Inés de la Cruz. Comparison with English and French theater is encouraged.

**SPAN 660a / CPLT 675a, El Quijote en español** Roberto González Echevarría

A detailed and contextualized reading of Cervantes's masterpiece conducted entirely in Spanish. The study of this iconic text familiarizes students with its literary and cultural values and Cervantes's language.

**SPAN 700a, Contemporary Issues in Iberian and Latin American Studies** Leslie Harkema

The seminar introduces new Ph.D. students in the department to contemporary scholarship in the fields of Iberian and Latin American studies, with a focus on influential and acclaimed recent work in literary studies. Selections from several monographs and edited collections published within the last decade and a half are accompanied by discussion of the literary texts that these publications study and the theoretical frameworks that their authors employ. Students are encouraged to engage critically with both primary and secondary material in order to develop their own positions on the former and dialogue effectively with the latter. While much of the course material reflects the area of expertise of the professor (modern peninsular literary studies), students have the opportunity to explore their individual areas of interest, most especially in the preparation of the final project, a review essay on a topic of their choosing.

**SPAN 747b, Generation of '27: Poetry** Noël Valis

The course examines the theory and art of vanguard writing. Readings include selected poetry of Pedro Salinas, Federico García Lorca, Rafael Alberti, and Luis Cernuda, along with Ortega y Gasset's influential *Deshumanización del arte* and other texts. In Spanish.

**SPAN 850a, The Literary Worlds of El Inca Garcilaso de la Vega** Rolena Adorno

The works of El Inca Garcilaso de la Vega, especially *Comentarios reales de los Incas* and *La Florida del Inca*, are juxtaposed with those he translated, such as León Hebreo's *Diálogos de amor*, and read and cited, such as Alonso de Ercilla's *La Araucana* and José de Acosta's *Historia natural y moral de las Indias*. Counterpoints and contrasts from Spain, New Spain, New Granada, and viceregal Peru, including Pedro Calderón de la Barca's *La aurora en Copacabana*, Carlos de Sigüenza y Góngora's *Teatro de virtudes políticas*, and Guaman Poma de Ayala's *Nueva crónica*, round out this seminar, which postulates that El Inca Garcilaso's writings stand at the center of the literary worlds that he and the others created, and transcend the New World and the Old, the Renaissance and the Baroque. Twentieth-century accusations against him for literary theft add a footnote that reveals his ongoing interest to today's postcolonialist readers. In Spanish.

**SPAN 913b / CPLT 940b, Magical Realism and Its Sequels in Modern Latin American Fiction** Roberto González Echevarría

The course concentrates on the major writers who practiced what is called "magical realism" – Alejo Carpentier, Gabriel García Márquez, Carlos Fuentes, and others – after studying the trend's antecedents in the colonial, post-independence, and early twentieth century. The role of Jorge Luis Borges in the beginnings of magical realism, the works of writers such as Miguel ngel Asturias and Juan Rulfo, and those of more



recent writers who rejected the trend, such as Roberto Bolaño and Fernando Vallejo. The considerable critical corpus on the topic is studied. In Spanish.

**SPAN 937b, The Short Novel in Twenty-First-Century Spanish American Narrative**

Aníbal González Pérez

Exploring possible motives for the rising interest in the short novel genre displayed by major authors of early-twenty-first-century Spanish American narrative, we discuss the various definitions and theoretical debates about the short novel genre, as well as the common artistic traits and concerns shared by today's Spanish American fiction writers. Authors include César Aira, Mario Bellatin, Roberto Bolaño, Carmen Boullosa, Diamela Eltit, Santiago Gamboa, Rita Indiana Hernández, Yuri Herrera, and Valeria Luiselli.

**SPAN 991a, Tutorial** Staff

By arrangement with faculty.

**SPAN 999b, Tutorial** Staff

# Statistics and Data Science

24 Hillhouse Avenue, 203.432.0666

<http://statistics.yale.edu>

M.A., Ph.D.

## Chair

Harrison Zhou

## Directors of Graduate Studies

John Emerson (24 Hlh, [john.emerson@yale.edu](mailto:john.emerson@yale.edu))

Andrew Barron (24 Hlh, [andrew.barron@yale.edu](mailto:andrew.barron@yale.edu))

**Professors** Donald Andrews (*Economics*), Andrew Barron, Joseph Chang, Xiaohong Chen (*Economics*), John Emerson (*Adjunct*), John Hartigan (*Emeritus*), Theodore Holford (*Public Health; Biostatistics*), John Lafferty, Peter Phillips (*Economics*), David Pollard, Van Vu (*Mathematics*), Heping Zhang (*Public Health; Biostatistics*), Hongyu Zhao (*Public Health; Biostatistics*), Harrison Zhou

**Associate Professor** Sekhar Tatikonda (*Electrical Engineering*)

**Assistant Professors** Jessi Cisewski, Sahand Negahban, Yihong Wu

**Senior Lecturer** Jonathan Reuning-Scherer

**Lecturer** Susan Wang

## 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 ADMISSIONS REQUIREMENTS

GRE scores for the General Test are required. A GRE Subject Test in the area closest to the undergraduate major is recommended for the Ph.D. program and encouraged for the M.A. program. All applicants should have a strong mathematical background, including advanced calculus, linear algebra, elementary probability theory, and at least one course providing an introduction to mathematical statistics. An undergraduate major may be in statistics, mathematics, computer science, or in a subject in which significant statistical problems may arise. For those whose native language is not English, the Test of English as a Foreign Language (TOEFL) scores are required. This requirement is waived only for applicants who, prior to matriculation at Yale, will have received a baccalaureate degree or its international equivalent with three years of residency from a college or university where English is the primary language of instruction.

## SPECIAL REQUIREMENTS FOR THE PH.D. DEGREE 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, a written examination, and an oral examination. The examinations are taken as scheduled by the department, with provision for one subsequent reexamination of one or more parts in the event that a student does not pass the first time. All parts of the qualifying examination must be completed before the beginning of the third year. A prospectus for the dissertation should be submitted no later than the first week of March in the third year. The prospectus must be accepted by the department before the end of the third year if the student is to register for a fourth year. Upon successful completion of the qualifying examination and the prospectus (and meeting of Graduate School requirements), the student is admitted to candidacy. Students are expected to attend weekly departmental seminars.

Students normally serve as teaching fellows (at level 20 or the equivalent) during four terms to acquire professional training. Although this may be completed during the third and fourth years, some students elect to satisfy part of this requirement in the earlier years of study, with approval of the DGS and their adviser, in areas contributing to their professional development.

## MASTER'S 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.

**Terminal Master's Degree Program in Statistics** Students are also admitted directly to a terminal master's degree program in Statistics. To qualify for the M.A., the student must successfully complete an approved program of eight term courses in Statistics with an average grade of HP or higher, chosen in consultation with the DGS. Full-time students must take a minimum of four courses per term. Part-time students are also accepted into the master's degree program. See Terminal M.A./M.S. Degrees, under Policies and Regulations.

Program information is available online at <http://statistics.yale.edu>.

## COURSES

**S&DS 500b, Introductory Statistics** John Emerson

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** 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. *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 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** 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** 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 510a, An Introduction to R for Statistical Computing and Data Science** John 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 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: differential calculus of several variables; some acquaintance with matrix algebra and computing is assumed.

**S&DS 541a, Probability Theory** Staff

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** 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, Stochastic Processes** Sahand Negahban

Introduction to the study of random processes, including Markov chains, Markov random fields, martingales, random walks, Brownian motion, and diffusions.

Techniques in probability such as coupling and large deviations. Applications chosen from image reconstruction, Bayesian statistics, finance, probabilistic analysis of algorithms, genetics, and evolution.

**S&DS 562a, Computational Tools for Data Science** Sahand Negahban

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** Staff

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 600b, Advanced Probability** David Pollard

Measure theoretic probability, conditioning, laws of large numbers, convergence in distribution, characteristic functions, central limit theorems, martingales. Some knowledge of real analysis is assumed.

**S&DS 610a, Statistical Inference** Harrison Zhou

A systematic development of the mathematical theory of statistical inference covering methods of estimation, hypothesis testing, and confidence intervals. An introduction to statistical decision theory. Knowledge of probability theory at the level of 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** Joseph Chang

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** Xiaofei Wang

Statistical analysis of a variety of statistical problems using real data. Emphasis on methods of choosing data, acquiring data, assessing data quality, and the issues posed by extremely large data sets. Extensive computations using R.

**S&DS 626b, Practical Work** John 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** John Emerson

Statistical consulting and collaborative research projects often require statisticians to explore new topics outside their area of expertise. This course exposes students to real problems, requiring them to draw on their expertise in probability, statistics, and data analysis. Students complete the course with individual projects supervised jointly by faculty outside the department and by one of the instructors. Students enroll for both terms (S&DS 627 and 628) and receive one credit at the end of the year. ½ Course cr per term

**S&DS 630a, Optimization Techniques** Sekhar Tatikonda

Fundamental theory and algorithms of optimization, emphasizing convex optimization. The geometry of convex sets, basic convex analysis, the principle of optimality, duality. Numerical algorithms: steepest descent, Newton's method, interior point methods, dynamic programming, unimodal search. Applications from engineering and the sciences.

**S&DS 661b, Data Analysis** Staff

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 669b, Statistical Learning Theory** Sahand Negahban

Introduction to theoretical analysis of machine-learning algorithms, focusing on the statistical and computational aspects, and covering such subjects as decision theory, empirical process theory, and convex optimization. Prerequisites: linear algebra,

multivariable calculus, stochastic processes, and introduction to machine learning such as S&DS 565 or a similar course.

**S&DS 690a or b, Independent Study** Staff

By arrangement with faculty. Approval of DGS required.



## 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 Coordinators

Edward Kamens (310 HGS; *East Asian Languages & Literatures*)

J.G. Manning (311 Phelps Hall; *Classics; History*)

**Steering Committee (2015–18)** Joel Baden (*Divinity*), Ruth Barnes (*Art Gallery*), Oswald Chinchilla (*Anthropology*), John J. Collins (*Divinity*), Stephen Davis (*Religious Studies*), Steven Fraade (*Religious Studies; Judaic Studies*), Eckart Frahm (*Near Eastern Languages & Civilizations*), Milette Gaifman (*Classics; History of Art*), Michael Hunter (*East Asian Languages & Literatures*), Edward Kamens (*East Asian Languages & Literatures*), Noel Lenski (*Classics; History*), J.G. Manning (*Classics; History*), Susan Matheson (*Art Gallery*), Irene Peirano Garrison (*Classics*)

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 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 Archaia's graduate coordinator and by the director of graduate studies (DGS) of the student's home

department, who together with the student will lay out a blueprint for completing the requirements, articulating a field of concentration and a direction for the capstone project, and identifying potential mentors.

## REQUIREMENTS FOR THE QUALIFICATION

1. A team-taught Core Seminar—or, in special cases, an approved alternative seminar—introducing students to issues in the study of antiquity and the premodern world, from a cross- and multidisciplinary perspective. Initiative students normally take the Core Seminar in the first year of study. Offered each year in the spring, the seminar is normally a team-taught class sponsored by two or more of the cooperating departments. There will be supplementary sessions in the Yale collections (e.g., the Yale Art Gallery or the Beinecke) and a required monthly colloquium component. Specific topics vary, but each seminar has significant interdisciplinary and comparative dimensions emphasizing the methodologies and techniques of the fields involved.
2. A minimum of three pre-approved courses, of which at least two must be seminar or seminar-type courses, chosen in consultation with Archaia's graduate coordinator and the DGS of the student's home department from courses offered across the University. These will in most cases be courses that also fill requirements for the student's home department, and must be at a level that would normally be accepted for graduate study in that department.
3. A capstone project that demonstrates the student's capacity to pursue independent, interdisciplinary research (the equivalent of 1 or 2 course units, depending on the scope), to be approved in consultation with Archaia's graduate coordinator and the DGS of the student's home department (e.g., an exhibition, documentary, research paper, conservation project).
4. Regular participation in events hosted by 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 DGS of the Classics department, indicating that they have completed the work for the qualification.

## CORE SEMINAR

**ANTH 531b / ARCG 531b / CLSS 815b / CPLT 547b / HIST 502b / JDST 653b / NELC 533b / RLST 803b, *Slavery, Dependency, and Genocide in the Ancient and Premodern World*** Noel Lenski and Benedict Kiernan

Covers the subject of class and ethnic repression from the third millennium B.C.E. to the mid-second millennium C.E. Analyzes textual, epigraphic, and iconographic sources for slavery, dependency, and genocide in Assyrian, Greek, Roman, Germanic, Angkorian, Vietnamese, Burmese, Chosun, Mayan, and Aztec cultures.

## Atmospheric Science

**Advisory Committee** Sarbani Basu (*Astronomy*), Michelle Bell (*Forestry & Environmental Studies*), Alexey Fedorov (*Geology & Geophysics*), Debra Fischer (*Astronomy*), Gary Haller (*Emeritus, Chemical & Environmental Engineering*), Xuhui Lee (*Forestry & Environmental Studies*), Ronald Smith (*Geology & Geophysics*), Mitchell Smooke (*Mechanical Engineering & Materials Science; Applied Physics*), Trude Storelvmo (*Geology & Geophysics*), Mary-Louise Timmermans (*Geology & Geophysics*), John Wettlaufer (*Geology & Geophysics; 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. The Department of Geology and Geophysics is the focus for studies of physical and dynamical meteorology, oceanography, and atmospheric chemistry, with allied methods and approaches in the Program on Applied Mathematics. The departments of Applied Physics, Public Health, and Engineering & Applied Science (which includes the programs of Biomedical Engineering, Chemical & Environmental Engineering, Electrical Engineering, and Mechanical Engineering & Materials Science) provide additional courses in environmental health and atmospherically related processes. The Ph.D. and M.Phil. requirements are those of the admitting departments (see entries in this bulletin).

# Combined Program in the Biological and Biomedical Sciences (BBS)

Sterling Hall of Medicine L-203A, 203.785.5663  
<http://bbs.yale.edu>

## Director

Anthony Koleske

## FIELDS OF STUDY

The Yale Combined Program in the Biological and Biomedical Sciences (BBS) offers unprecedented access to Yale's extensive array of bioscience resources, encompassing everything the University has to offer in one comprehensive, interdisciplinary graduate program. BBS has no boundaries, either departmental or geographical. Students therefore have access to courses, seminars, and faculty labs in every department. Moreover, students can participate in research activities anywhere—on the main University campus, West Campus, or the School of Medicine.

Within BBS there are approximately 350 participating faculty, several dozen courses, and a great many seminars from which to choose. BBS is currently divided into eight interest-based “tracks”:

Biochemistry, 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 university fellowships, National Institutes of Health (NIH) training grants, and grants from foundations and companies.

## SPECIAL ADMISSIONS REQUIREMENTS

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

### Biochemistry, Quantitative Biology, Biophysics, and Structural Biology

All applicants are expected to meet general BBS requirements for entrance. Successful applicants will have a firm foundation in the sciences. Desirable courses include biology; biochemistry; general, organic, and physical chemistry; physics; and math. A pertinent GRE Subject Test is strongly recommended.

### Computational Biology and Bioinformatics

All applicants are expected to meet general BBS requirements for entrance. In addition, successful applicants will have a strong foundation in the basic sciences such as biology, chemistry, and mathematics. Training in computing/informatics is also essential and should include significant computer programming experience. The GRE Subject Test in Biochemistry, Cell and Molecular Biology; Biology; Chemistry; Computer Science; or other relevant discipline is recommended. The MCAT is also accepted.

### Immunology

All applicants are expected to meet general BBS requirements for entrance. In addition, successful applicants are expected to have a firm foundation in the biological and physical sciences. It is preferred that students have taken courses in biology, organic chemistry, biochemistry, genetics, cell biology, physics, and mathematics. Actual course requirements are not fixed, however, and students with outstanding records in any area of the biological sciences may qualify for admission. There are no specific grade requirements for prior course work, but a strong performance in basic science courses is

of great importance for admission. In special cases the Medical College Admission Test (MCAT) may be substituted.

## Microbiology

No additional requirements or recommendations.

## Molecular Cell Biology, Genetics, and Development

In addition to general BBS requirements, the GRE Subject Test in Biochemistry, Cell and Molecular Biology; Biology; or Chemistry is recommended.

## Molecular Medicine, Pharmacology, and Physiology

All applicants are expected to meet general BBS requirements for entrance. Successful applicants should have a strong background in the biological, chemical, and/or physical sciences. For example, an undergraduate major/degree in biology, biochemistry, physiology, genetics, chemistry, physics, mathematics, engineering, or computer science could be appropriate. Courses in biology, biochemistry, organic and physical chemistry, and mathematics through elementary calculus are strongly recommended.

## Neuroscience

All applicants are expected to meet general BBS requirements for entrance. Successful applicants will have a firm foundation in the sciences. The Neuroscience track will accept the Medical College Admission Test (MCAT) in lieu of the Graduate Record Examination (GRE) General Test.

## Plant Molecular Biology

All applicants are expected to meet general BBS requirements for entrance.

## INTEGRATED GRADUATE PROGRAM IN PHYSICAL AND ENGINEERING BIOLOGY (PEB)

Students applying to the Computational Biology and Bioinformatics track, the Molecular Cell Biology, Genetics, and Development track, the Neuroscience track, or the Biochemistry, 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 <http://peb.yale.edu> for more information about the benefits of this program and application instructions.

## MEDICAL RESEARCH SCHOLARS PROGRAM (MRSP)

The Medical Research Scholars Program bridges barriers between traditional predoctoral and medical training by providing both medically oriented course work and a mentored clinical experience to select BBS students. The course work provides a grounding in biomedicine, and the clinical experience enables students to interact with patients to learn firsthand about disease symptoms, treatment options, and the limitations of current therapies. This combination of medical knowledge and face-to-face interaction with patients and their doctors provides a new perspective to Ph.D. students and enhances the training in basic science already provided within the BBS program. Upon completion of their training, MRSP graduates will be capable of

working much more closely with physicians and physician-scientists and will be better prepared to conduct clinically relevant basic research.

The MRSP is open only to students who have already been accepted into the BBS program, and a separate application is required. Five or six incoming students are admitted into the program each year. They remain in their BBS tracks but will participate in the additional MRSP curriculum. For more information see <http://bbs.yale.edu/training/nihprograms/mrsp.aspx>.

Program materials are available upon request to Bonnie Ellis, Assistant Administrative Director, BBS Program, Yale University, PO Box 208084, New Haven CT 06520-8084; telephone 203.785.5663; fax 203.785.3734; e-mail, [bbs@yale.edu](mailto:bbs@yale.edu); website, <http://bbs.yale.edu>.

## COURSES

### **B&BS 503b, RCR Refresher for Senior BBS Students** Anthony Koleske

This course meets the NIH requirement that students receive training in the responsible conduct of research at least every four years. The course has two components: (1) one large-group session is held for all fourth-year BBS students; the main topics are scientific misconduct and authorship; and (2) each Ph.D. program will subsequently host one or two additional sessions just for fourth-year students in its program. Attendance is taken, and students who attend both components of the course receive a grade of Satisfactory. The course is graded Satisfactory/Unsatisfactory.

### **B&BS 640a / PATH 640a, Developing and Writing a Scientific Research Proposal**

Katarina Politi

The course covers the intricacies of scientific writing and guides students in the development of a scientific research proposal on the topic of their research. All elements of an NIH fellowship application are covered, and eligible students submit their applications for funding. Enrollment limited to fifteen. Registration allowed by prior authorization from course directors only.

### **B&BS 681a / PATH 681a, Advanced Topics in Cancer Biology** Qin Yan

This advanced course focuses on readings and discussion on three or four major topics in cancer biology, such as targeted therapy, tumor immunology, tumor metabolism, and genomic evolution of cancer. For each topic, the class starts with an interactive lecture, followed by critical analysis of primary research literature. Recent research articles are assigned, and a student leads discussions with input from faculty who are experts in the topic area. Prerequisite: PATH 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

30 Hillhouse Avenue, 203.432.3702

<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](http://www.econ.yale.edu/~egcenter)

### **Director**

Mark Rosenzweig

The Economic Growth Center is a research organization within the Yale Department of Economics that was created in 1961 to analyze, both theoretically and empirically, economic growth and development. The research program emphasizes the search for regularities in the process of growth and changes in economic structure. In recent years the center has also undertaken new and continuing long-term panel studies and is carrying out randomized field experiments in a number of countries to provide new information on and analyses of the consequences and mechanisms of development. An increasing share of the research involves historical analysis of long-term processes as part of the Economic History Program that is housed in the Economic Growth Center. Current projects in the center include research on technology adoption; microfinance and credit markets; formal insurance; household consumption; investment and demographic behavior; the role of networks; agricultural research and productivity growth; labor markets and the returns to education of women and men; entrepreneurship; income distribution; domestic and international migration; the relationship between trade and development; and international political economy. The center's research faculty hold appointments in the Department of Economics and other departments and schools at Yale, and accordingly have teaching as well as research responsibilities.

The center sponsors a number of activities, including a regular series of workshops on development, trade, and economic history, and provides competitive research grants to graduate students and faculty as well as graduate student fellowships.

The Economic Growth Center Collection, housed in a separate facility at the Center for Science and Social Science Information, is a special collection focused on the statistical, economic, and planning documents of developing countries, including government documents.

The center administers, jointly with the Department of Economics, the Yale master's degree program in International and Development Economics.

# Graduate School of Arts and Sciences (GSAS) Summer Programs

<http://gsas.yale.edu>

## Dean

Lynn Cooley

The Graduate School offers two courses, GSAS 901c and GSAS 902c, to support summer training through practical internships. For the summer of 2018, students will register for these courses as part of the internship approval process and not through the typical online or paper registration processes.

## COURSES

### **GSAS 901c, Pre-candidacy Applied Research Experience** Richard Sleight

The purpose of this course is to provide students with the opportunity of gaining practical experience in research. This experience provides a basis for developing a dissertation thesis prospectus that addresses significant research questions. Students work with a faculty mentor to select a suitable placement for the summer internship. A one-page description of the student's research plan will be submitted to the DGS at least three weeks prior to starting the program, for approval within two weeks. Upon completion of the internship, a written report of the work must be submitted to the DGS no later than October 1. Prerequisites: completion of one year of the Ph.D. program; and approval of the DGS. 1 credit; graded Satisfactory/Unsatisfactory.

### **GSAS 901c, Post-candidacy Applied Research Experience** Richard Sleight

The purpose of this course is to provide students with the opportunity to perform dissertation research or to gain practical experience using the methodology or results of their dissertation research. Students work with a faculty mentor to select a suitable placement for the summer internship. A one-page description of the student's research plan will be submitted to the student's dissertation adviser and DGS at least three weeks prior to starting the program, for approval within two weeks. Upon completion of the internship, a written report of the work must be submitted to the adviser and DGS no later than October 1. Prerequisites: completion of one year of the Ph.D. program and admission to candidacy; and approval of the dissertation adviser and DGS. 1 credit; graded Satisfactory/Unsatisfactory.

## Institution for Social and Policy Studies

77 Prospect Street, 203.432.3234

<http://isps.yale.edu>

### **Director**

Jacob Hacker

**Executive Committee** Nicholas Christakis, John Dovidio, Heather Gerken, James Levinsohn, 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.

Recognizing that important social problems cannot be studied adequately by a single discipline, the Yale Corporation established ISPS in 1968 to stimulate interdisciplinary collaboration within the University, both across the social sciences and between the social sciences and other disciplines. Today, ISPS hosts a number of major programs, including the Center for the Study of American Politics, the Center for the Study of Inequality, and ISPS Health—a University-wide health policy center. ISPS also supports the Program in Ethics, Politics, and Economics; the ISPS Policy Lab; and the Yale Interdisciplinary Center for Bioethics. Through these and other programs, ISPS sponsors high-level conferences, interdisciplinary faculty seminars, targeted research projects on key policy issues, graduate and undergraduate fellowship programs, and postdoctoral appointments.

As the hub for problem-oriented interdisciplinary research at Yale, ISPS provides intellectual leadership in the social sciences; fosters sound and creative research on public policies of local, state, and national significance; and informs both teaching at Yale and academic and public debates beyond Yale.

# International Security Studies

31 Hillhouse Avenue, 203.432.6242

<http://iss.yale.edu>

## **Director**

Paul Kennedy

International Security Studies (ISS) at Yale was founded in 1988 and is supported by the Smith Richardson Foundation and the Friends of ISS. The Brady-Johnson Program in Grand Strategy, directed by Beverly Gage, also falls under the auspices of ISS.

Although ISS is not a degree-granting program, its faculty members, fellows, and affiliates write and teach about numerous aspects of international history and world affairs. Their interests range from high politics and economic change to cultural transfer and nongovernmental activism. ISS strives to understand the genealogy of the present through diverse historical and methodological approaches, and to develop and apply holistic insights into the most pressing concerns of global life.

ISS organizes an array of extracurricular activities each academic year. It hosts lectures, dinner debates, conferences, colloquia, and discussion groups. In addition to hosting a running graduate and faculty forum on the historical roots of contemporary issues, ISS provides competitive summer grants to support language training and archival research for Yale students. Postdoctoral fellowships and predoctoral fellowships are available to scholars from other universities. ISS also provides academic fellowships and visiting affiliations to serving members of the U.S. Armed Forces.

Inquiries should be directed to [iss@yale.edu](mailto:iss@yale.edu) or to International Security Studies, Yale University, PO Box 208353, New Haven CT 06520-8353. Further information on ISS can be found at <http://iss.yale.edu>.

## Jackson Institute for Global Affairs

Horchow Hall, 203.432.6253

<http://jackson.yale.edu>

### **Director**

James Levinsohn (*Global Affairs; School of Management*)

### **Faculty**

For faculty listings, see the section on Global Affairs under Degree-Granting Departments and Programs in this bulletin.

The Jackson Institute for Global Affairs promotes education and scholarship on global affairs at Yale. The institute serves the entire University through courses and core teaching programs in global affairs, career counseling, and public lectures. The institute's mission is to inspire and prepare Yale students for global leadership and service.

Jackson's academic programs are interdisciplinary, embedded in Yale, and designed to help students gain a comprehensive understanding of global affairs. Jackson Institute faculty study, teach, and research global affairs across disciplines ranging from diplomacy to public health and from international finance to law. For a full list of faculty affiliated with Jackson, see <http://jackson.yale.edu/faculty>.

Each year the Jackson Institute hosts Senior Fellows, leading practitioners in government, business, international organizations, the NGO community, and other global affairs fields. Senior Fellows spend a term or full academic year at Yale, teaching classes and mentoring students. For a full list of Senior Fellows, see <http://jackson.yale.edu/senior-fellows>.

Jackson's Career Services Office provides career counseling services to all Yale students interested in careers in public service and other areas of international affairs.

As of 2015, the Jackson Institute is also home to Yale's World Fellows program and the Global Health Initiative.

For more information, visit <http://jackson.yale.edu>, e-mail [jackson.institute@yale.edu](mailto:jackson.institute@yale.edu), or call 203.432.6253.

# Judaic Studies

451 College Street, 203.432.0843

<http://judaicstudies.yale.edu>

## Chair and Director of Graduate Studies

Steven Fraade

**Professors** Joel Baden (*Divinity*), Elitzur Bar-Asher Siegal (*Visiting, Near Eastern Languages & Civilizations*), Michal Bar-Asher (*Visiting, Religious Studies*), 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*), Christoph Schmidt (*Visiting*), David Sorkin (*History*), Francesca Trivellato (*History*), Laura Wexler (*Women's, Gender & Sexuality Studies; American Studies*), Robert Wilson (*Divinity; Religious Studies*)

**Associate Professor** Eliyahu Stern (*Religious Studies; History*)

**Senior Research Scholar** Margaret Olin (*Divinity; History of Art; Religious Studies*)

**Senior Lecturer** Peter Cole (*Comparative Literature*)

**Lecturers** Asaf Angermann (*Philosophy*), Noah Bickart, Liran Yadgar (*History*)

**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 651a / GMAN 649a / PHIL 617a, Critical Theory and the Frankfurt School**

Asaf Angermann

This course is an introduction to the thought and writings of the philosophers known as the Frankfurt School, who founded and developed the idea of Critical Theory. Taken in its original meaning as a method or even a practice, rather than a systematic theory, Critical Theory suggests a way of thinking about the interrelations between philosophy and society, culture and politics, and on the complex relation between philosophical concepts and social reality. By reading key texts of Frankfurt School authors such as Adorno, Horkheimer, Marcuse, Benjamin, Kracauer, and Fromm, the course inquires into the meaning of concepts such as critique, history, freedom, individuality, emancipation, and aesthetic experience.

### **JDST 653b / ANTH 531b / ARCG 531b / CLSS 815b / CPLT 547b / HIST 502b / NELC 533b / RLST 803b, Slavery, Dependency, and Genocide in the Ancient and Premodern World**

Noel Lenski and Benedict Kiernan

Covers the subject of class and ethnic repression from the third millennium B.C.E. to the mid-second millennium C.E. Analyzes textual, epigraphic, and iconographic sources for slavery, dependency, and genocide in Assyrian, Greek, Roman, Germanic, Angkorian, Vietnamese, Burmese, Chosun, Mayan, and Aztec cultures.

### **JDST 672b / SMTC 535b, Readings in Babylonian Aramaic Texts**

Elitzur Bar-Asher

This course builds on SMTC 534. We read different texts from all sources of Jewish Babylonian Aramaic, with concentration on a variety of linguistic topics.

### **JDST 695b / HEBR 563b, From Biblical to Modern Hebrew**

Dina Roginsky

This course aims to support students who have reading knowledge of Biblical Hebrew but cannot read or converse in Modern Hebrew. The course concentrates on reading and aims at enabling students to use Modern Hebrew for research purposes. The texts chosen are tailored to students' particular areas of interest. Prerequisite: two years of Biblical or Modern Hebrew studies, or permission of the instructor. Conducted in English.

### **JDST 707a, Christians in Early Jewish Sources**

Staff

The course explores Jewish and Christian texts from the first centuries (1-6th) C.E. Christian writers are at the center of class readings: writings of Church fathers, east and west, and church canons of laws. The focus is on comparing texts produced by Jewish and Christian writers in various geographical areas and communities. We discuss the contacts and interactions between the two religious communities as they appear in these texts: the way they saw each other, and the world in which they both lived. All these serve to demonstrate the complex picture of Jewish-Christian interactions in this early period.

### **JDST 721b / NELC 703b / 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 757b, Capital Punishment in Judaism and Christianity** Noah Bickart  
Study of religious texts as basis for capital punishment. Special attention to the (in)famous trial and execution of Jesus of Nazareth in both the Bible and literatures of Rabbinic Judaism and early Christianity. Further exploration of how medieval and modern Jews and Christians alike attempt to apply values from documents of late antiquity to changing circumstances both in medieval Europe and contemporary America.

**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 / 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 / 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 790b / HIST 601b / RLST 776b, Jewish History, Thought, and Narratives in Medieval Societies** Ivan Marcus  
Research seminar that focuses on the two medieval Jewish subcultures of Ashkenaz (northern Christian Europe) and Sefarad (mainly Muslim and Christian Spain).

**JDST 793b / HIST 587b / RLST 799b, Introduction to Modern Jewish Thought** Eliyahu Stern  
An overview of Jewish philosophical trends, movements, and thinkers from the seventeenth to the twenty-first century. Topics include enlightenment, historicism, socialism, secularism, religious radicalism, and Zionism.

**JDST 838b / CPLT 690b / RLST 762b, Politics of Modern Hebrew Literature** Hannan Hever  
An overview of the poetics, culture, history, and political dynamics of modern Hebrew literature over the past 250 years. No background in Jewish literature and Jewish culture is required. All readings in English.

**JDST 844b / HIST 595b / RLST 692b, Introduction to Modern European Jewish History** David Sorkin  
This course introduces students to European Jewish history since approximately 1648. It teaches the major historiographical traditions as well as the major themes of European Jewish history. Its audience is students specializing in Jewish history but

also other historians who wish to add an understanding of Jewish history to their understanding of Europe.

**JDST 856b / CPLT 686b, Jewish Literary Masterpieces** Hannan Hever

Exploration of the nature of Jewish identity through a literary prism, focusing on novels, stories, poetry, and homilies. Study of texts written over a three thousand year period by Jews living in the Middle East, Europe, and America, from biblical writings through modern works composed by Franz Kafka, Philip Roth, as well as Israeli literature. Special attention given to the role of gender, minority identities, and the idea of nationalism. Taught in translation, readings in English.

# The Whitney and Betty MacMillan Center for International and Area Studies at Yale

Luce Hall, 203.432.0694  
<http://macmillan.yale.edu>

## Director

Ian Shapiro (*Political Science*)

For more than half a century the Whitney and Betty MacMillan Center for International and Area Studies at Yale has been the University's principal institution for encouraging and coordinating teaching and research on all aspects of international affairs, societies, and cultures around the world. The MacMillan Center seeks to make understanding the world outside the borders of the United States an integral part of liberal education and professional training at the University. It brings together scholars from all relevant schools and departments to provide insightful interdisciplinary, comparative, and problem-oriented teaching and research on regional, international, and global issues.

The MacMillan Center administers nine degree programs. The six undergraduate majors include African Studies; East Asian Studies; Latin American Studies; Modern Middle East Studies; Russian and East European Studies; and South Asian Studies. The three graduate degree programs award master's degrees in African Studies, East Asian Studies, and European and Russian Studies. There are joint-degree graduate programs with the schools of Forestry & Environmental Studies, Law, Management, and Public Health. Additionally, the programs offer four graduate certificates of concentration: in African Studies, European Studies, Latin American and Iberian Studies, and Modern Middle East Studies.

The many councils, committees, and programs at the MacMillan Center support research and teaching across departments and professions, support doctoral training, advise students at all levels, and provide extracurricular learning opportunities, as well as funding resources for student and faculty research related to their regions and subject areas. Regional studies programs include African Studies, Arabic Program, Baltic Studies, British Historical Studies, Canadian Studies, East Asian Studies, European Studies, Stavros Niarchos Foundation Center for Hellenic Studies, Himalaya Initiative, Iranian Studies Program, Japan at the Crossroads Project, Latin American and Iberian Studies, Middle East Studies, Religious Freedom and Society in Africa Project, Russian Studies Project, South Asian Studies, and Southeast Asia Studies. Comparative and international programs include Agrarian Studies; Center for the Study of Globalization; Center for the Study of Representative Institutions; Conflict, Resilience, and Health Program; Program on Democracy; European Union Studies; Genocide Studies; Gilder Lehrman Center for the Study of Slavery, Resistance, and Abolition; Global Justice; Center for Historical Enquiry & the Social Sciences; InterAsia Initiative; Georg Leitner Program in International and Comparative Political Economy; Program on Order, Conflict, and Violence; Political Violence FieldLab; Religion, Politics, and Society; and Program on Refugees, Forced Displacement, and Humanitarian Responses.

The MacMillan Center's regional councils regularly teach all levels of eight foreign languages (Modern Greek, Hindi, Indonesian, Sanskrit, Swahili, Vietnamese, Yorùbá,

Zulu). Additionally, the MacMillan Center collaborates with the Center for Language Study (CLS) in supporting Directed Independent Language Study of another sixty-four languages for undergraduate, graduate, and professional school students. Regional councils and language faculty participate actively in the Cornell, Columbia, and Yale shared course initiative led by CLS, using distance learning technology for Bengali, Modern Greek, Romanian, Tamil, Yorùbá, and Zulu.

The MacMillan Center provides opportunities for scholarly research and intellectual innovation; awards nearly 500 fellowships and grants each year to students and faculty; encourages faculty/student interchange; sponsors some 800 lectures, conferences, workshops, seminars, and films each year (most of which are free and open to the public); produces a range of working papers and other academic publications; and contributes to library collections comprising 1.4 million volumes in the languages of various areas. The MacMillan Center is home to the Fox International Fellowship, a graduate student exchange program between Yale University and nineteen world-renowned academic partners. Through the Programs in International Educational Resources (PIER), the MacMillan Center brings international education and training to educators, K-12 students, and the community at large. The MacMillan Center supports *The MacMillan Report*, an online show that features Yale faculty in international and area studies and their research in a one-on-one interview format. Webisodes can be viewed at <http://macmillanreport.yale.edu>. The MacMillan Center is also home to *Yale Global Online*.

For details on degrees, programs, and faculty leadership, please consult <http://macmillan.yale.edu>.

## GRADUATE CERTIFICATES OF CONCENTRATION IN AREA STUDIES

### General Guidelines – Program Description

The Whitney and Betty MacMillan Center for International and Area Studies at Yale, through the regional councils on African Studies, European Studies, Latin American and Iberian Studies, and Middle East Studies, sponsors graduate certificates of concentration that students may pursue in conjunction with graduate-degree programs in the Graduate School of Arts and Sciences and the professional schools. The certificate is intended for students seeking to demonstrate substantial preparation in the study of one of four areas of concentration: Africa, Europe, Latin America, and the Middle East.

Candidates for the certificate must demonstrate expertise in the area of concentration through their major graduate or professional field, as well as show command of the diverse interdisciplinary, geographic, and cultural-linguistic approaches associated with expertise in the area of concentration. Admission to the graduate certificate is contingent on the candidate's acceptance into a Yale graduate-degree program. Award of the graduate certificate, beyond fulfilling the relevant requirements, is contingent on the successful completion of the candidate's Yale University degree program.

### Application Procedure

Specific requirements of each council are reflected in its application, monitoring, and award procedures. Application forms can be picked up at the relevant council

or downloaded from its 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, when the candidate is a native speaker of one of the area's major languages, the candidate 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, the student will submit the request no later than the fourth week of the term in which the student plans to submit the qualifying paper.

The interdisciplinary research paper may be the result of original research conducted under the supervision of a faculty member in a graduate seminar or independent readings course or in field research related to the student's studies. An M.A. thesis, Ph.D. prospectus, or dissertation may also be acceptable if it is interdisciplinary as well as focused on the area of concentration. The qualifying paper should examine questions concerning the area of concentration in a comparative and/or interdisciplinary context. It should also use relevant international and area-focused resource materials from a relevant region and/or resource materials in the language(s) of a relevant region or regions. Normally the paper should incorporate at least two of the following elements:

- Address more than one country relevant to the area of concentration
- Draw on more than one disciplinary field for questions or analytic approaches
- Address a transregional or transnational theme relevant to the area of concentration

The paper will be read by two faculty members selected in agreement with the council adviser. The readers will be evaluating the paper for the quality of research, knowledge of the relevant literature, and depth of analysis of the topic. The qualifying paper must be fully footnoted and have a complete bibliography. The council adviser may call for a third reader as circumstances warrant.

### Progress Reports and Filing for the Award of the Certificate/Qualification

Students should submit a progress report along with a copy of their unofficial transcript to the council faculty adviser at the end of each term. Ideally, this will include a brief narrative describing the student's engagement in the relevant council's intellectual community and participation in its events, speaker series, and the like, as well as any planned or newly completed experience overseas.

A student who intends to file for the final award of the certificate should contact the council no later than the end of the term prior to award. By the fourth week of the term of the expected award at the latest, 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

309 Luce Hall, 203.432.9903

<http://african.macmillan.yale.edu>

Graduate Certificate of Concentration in African Studies

### Chair

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

### Faculty

For faculty listings, see 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 764, Topics in African Studies, or AFST 501, Research Methods in African Studies).
2. Demonstration of proficiency in an African language.
3. Evidence of research expertise in African Studies. Research expertise may be demonstrated by completion of an interdisciplinary thesis, dissertation prospectus, or dissertation, or by completion of a substantive research seminar paper or the equivalent as approved by the faculty adviser.

The certificate courses and research work should be planned to demonstrate clearly fulfillment of the goals of the certificate. Certificate candidates should design their course schedules in consultation with the director of graduate studies (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.

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*)

## Acting Chair [F]

Fabian Drixler (*History*)

## 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 educational activities open to students, faculty, K-16 educators, and the general public. With nearly thirty core faculty and more than twenty language instructors spanning thirteen departments on campus, East Asian Studies remains one of Yale's most extensive area studies programs. Its interdisciplinary emphasis encourages collaborative linkages across fields and departments and contributes to diversity across the curriculum and in the classroom. Approximately one hundred fifty courses on East Asia in the humanities and social sciences are offered each year.

CEAS administers Bachelor of Arts (B.A.) and Master of Arts (M.A.) programs. While the B.A. program focuses on the study of either a country or an area within East Asia, the M.A. program focuses on the study of China, Japan, or a transnational region in East Asia. Graduates of the East Asian Studies B.A. and M.A. programs have gone on to distinguished careers in the fields of academia, business, nonprofit organizations, and government service. For details on the M.A. program, see East Asian Studies under Degree-Granting Departments and Programs in this bulletin.

Every year, CEAS welcomes domestic and international scholars to campus as guest lecturers, visiting fellows, research scholars, and professors. The CEAS Postdoctoral Associates Program brings talented individuals into the community of scholars at Yale to conduct research and teach advanced undergraduate seminars. East Asian Studies endowments make it possible for CEAS to offer grants and fellowships for Yale students conducting East Asian-related research and language study, as well as to support student organization programming.

Study and research in East Asian Studies at Yale are supported by one of the finest library collections in the country. The Chinese-, Japanese-, and Korean-language print resources in the East Asia Library at Sterling Memorial Library constitute one of the oldest and largest collections found outside of East Asia. The Asian art collection at the

Yale University Art Gallery also supports classroom instruction, faculty research, and community outreach activities.

CEAS is committed to providing leadership in the study and understanding of East Asia on campus and in the region through support of educational and outreach activities with emphasis on joint endeavors across institutions both regionally and internationally.

# European Studies Council

The MacMillan Center

332 Luce Hall, 203.432.3423

<http://europeanstudies.macmillan.yale.edu>

Graduate Certificate of Concentration in European Studies

## Chair

Francesca Trivellato (*History*)

## 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 Studies, and Hellenic Studies; a Polish cultural initiative; and the Center for Historical Enquiry and the Social Sciences (CHESS).

In addition to the M.A. degree program, the council offers students in the University's doctoral and other professional degree programs the chance to obtain a Graduate Certificate of Concentration in European Studies by fulfilling a supplementary curriculum. The undergraduate major in Russian and East European Studies is administered by the Department of Slavic Languages and Literatures.

The benefits provided to the Yale community by the European Studies Council include its affiliation with interuniversity and international organizations that can offer specialized training programs and research grants for graduate students (see <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 and Eastern Europe or (2) Central and Western Europe. Admission is contingent on the candidate's acceptance and matriculation into a Yale graduate-degree program. To complete the certificate, candidates must demonstrate expertise in the area through their major graduate or professional field, as well as show command of the diverse interdisciplinary, geographic, and cultural-linguistic approaches associated with expertise in the area of concentration. In order to be awarded the certificate, 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 two modern European languages, in addition to English. Students wishing to focus on Russia and Eastern Europe must demonstrate knowledge of Russian or an Eastern European language; those focusing on Central and Western Europe must demonstrate knowledge of one of the appropriate languages. Students must demonstrate proficiency in oral (speaking/listening), reading, and writing skills.
2. Six graduate-level courses in the area of concentration, of which:
  - a. three courses must offer transnational approaches to Europe-related issues, and
  - b. of the remaining three courses, students focusing on Russia and Eastern Europe must take at least one course concerning the nations of Central and Western Europe. For those focusing on Central and Western Europe, at least one course must concern Russia and Eastern Europe.
3. Interdisciplinary research qualifying paper written either in the context of one of the six courses in the area of concentration, or as independent work under faculty

supervision. The paper is required to demonstrate field-specific research ability in the area of concentration. After they have completed substantial course work in the area, students must seek approval from the council faculty adviser for the research project they propose as the qualifying paper. Normally, students will submit their proposals no later than the fourth week of the term in which they plan to submit the qualifying paper.

For more information, contact the European Studies Council, Yale University, PO Box 208206, New Haven CT 06520-8206; [european.studies@yale.edu](mailto:european.studies@yale.edu); 203.432.3423.

For course listings, see European and Russian Studies under Degree-Granting Departments and Programs in this bulletin.

# Council on Latin American and Iberian Studies

The MacMillan Center

232 Luce Hall, 203.432.3422

<http://clais.macmillan.yale.edu>

Graduate Certificate of Concentration in Latin American and Iberian Studies

## Chair

Susan Stokes (*Political Science*)

**Professors** Rolena Adorno (*Spanish & Portuguese*), Ned Blackhawk (*History; American Studies*), Richard Burger (*Anthropology*), Hazel Carby (*African American Studies; American Studies*), 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*), Stathis Kalyvas (*Political Science*), Daniel Markovits (*Law*), Mary Miller (*History of Art*), Stephen Pitti (*History*), Susan Rose-Ackerman (*Law; Political Science*), Alicia Schmidt Camacho (*American Studies*), Stuart Schwartz (*History*), Susan Stokes (*Political Science*), Robert Thompson (*Emeritus, History of Art; African American Studies*), Noël Valis (*Spanish & Portuguese*), Frederick Wherry (*Sociology*), Elisabeth Wood (*Political Science*)

**Associate Professors** Rodrigo Canales (*Management*), Ana De La O Torres (*Political Science*), Moira Fradinger (*Comparative Literature*)

**Assistant Professors** Ryan Bennett (*Linguistics*), Oswaldo Chinchilla (*Anthropology*), Marcela Echeverri (*History*), Anne Eller (*History*), Leslie Harkema (*Spanish & Portuguese*), Seth Jacobowitz (*East Asian Languages & Literatures*), Albert Laguna (*American Studies*), Dixá Ramirez (*American Studies*)

**Senior Lectors and Lectors (Spanish & Portuguese)** Sybil Alexandrov, Marta Almeida, Maria Pilar Asensio-Manrique, Mercedes Carreras, Ame Cividanes, Fabiana DePaula, Sebastián Díaz, María de La Paz García, María Jordán, Rosamaría León, Juliana Ramos-Ruano, Lissette Reymundi, Maria-Lourdes Sabé Colom, Terry Seymour, Margherita Tortora, Sonia Valle

**Others** Jane Edwards (*Associate Dean, Yale College*), Jana Krentz (*Curator, Latin American Collection, Library*), Florencia Montagnini (*Senior Research Scientist, Forestry & Environmental Studies*), Nancy Ruth (Visiting Fellow in Higher Education and International Affairs)

A variety of Latin American Studies options are available for graduate students in history and other humanities disciplines, the social sciences, and the professional schools. Latin American area course offerings are available in twenty-five disciplines with distinct strengths in Anthropology, History, Political Science, and Spanish and Portuguese. Latin Americanist faculty specialize in the Andes (Burger), Brazil (Jackson, Jacobowitz, Schwartz), the Caribbean (Carby, Echeverri, Eller, Thompson), Central America (Chinchilla, Joseph, Miller, Wood), Colombia (Echeverri), Costa Rica (Wherry), Cuba (Laguna), Mexico (Canales, De La O Torres, Joseph, Miller, Pitti, Schmidt Camacho), and the Southern Cone (Fradinger, Stokes). F&ES faculty (Ashton, Bell, Berlyn, Clark, Dove, Geballe, Gentry, Mendelsohn, Montagnini) have

tropical research interests or participate in educational exchanges with Argentina, Brazil, Chile, Costa Rica, Dominica, Ecuador, Haiti, Honduras, Mexico, Nicaragua, Panama, Peru, and Venezuela. Latin American content courses are also offered in the Schools of Law, Management, and Public Health.

Students may pursue the Graduate Certificate of Concentration in Latin American and Iberian Studies in conjunction with graduate degree programs in the Graduate School of Arts and Sciences and the professional schools. To complete the certificate, candidates must demonstrate expertise in the area through their major graduate or professional field, as well as show command of the diverse interdisciplinary, geographic, cultural, and linguistic approaches associated with expertise in Latin America or Iberia.

Admission is contingent on the candidate's acceptance into a Yale graduate degree program, and award of the certificate, beyond fulfilling the relevant requirements, requires the successful completion of the candidate's Yale University degree program. Active participation in the council's extracurricular and research programs and seminars is also strongly encouraged.

Limited financial resources, such as the LAIS Summer Research grants and Tinker Field Research grants, are available to graduate and professional school students for summer research. Information on grants is available at <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](mailto: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

Kishwar Rizvi (*History of Art*)

**Professors** Abbas Amanat (*History*), Harold Attridge (*Divinity*), Gerhard Böwering (*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 (*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*), Maurice Samuels (*French*), Lamin Sanneh (*Divinity*), Shawkat Toorawa (*Near Eastern Languages & Civilizations*), Harvey Weiss (*Near Eastern Languages & Civilizations*), Robert Wilson (*Divinity*)

**Associate Professors** Zareena Grewal (*American Studies*), Kaveh Khoshnood (*Public Health*), Mark Lazenby (*Nursing*), Kishwar Rizvi (*History of Art*), Jonathan Wrytzen (*Sociology*)

**Assistant Professors** Rosie Bsheer (*History*), Thomas Connolly (*French*), Robyn Creswell (*Comparative Literature*), Narges Erami (*Anthropology*), Jill Jarvis (*French*), Travis Zadeh (*Religious Studies*)

**Senior Lecturers and Lecturers** Karla Britton (*Architecture*), Karen Foster (*Near Eastern Languages & Civilizations; History of Art*), Tolga Köker (*Economics*), 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*), Shiri Goren (*Hebrew*), Dina Roginsky (*Hebrew*), Farkhondeh Shayesteh (*Persian*), Orit Yeret (*Hebrew*)

**Librarians and Curators** Roberta Dougherty (*Near East Collection*), Agnete Wisti Lassen (*Babylonian Collection*), Susan Matheson (*Ancient Art, Yale Art Gallery*), Nanette Stahl (*Judaica Collection*)

The Council on Middle East Studies is part of the Whitney and Betty MacMillan Center for International and Area Studies. The council brings together faculty and students sharing an interest in the Middle East by sponsoring conferences, discussions, films, and lecture series by scholars from Yale as well as visiting scholars. It provides information concerning grants, fellowships, research programs, and foreign study opportunities. It also administers research projects in a variety of Middle East-related areas.

In addition to the resources of the individual departments, Yale's library system has much to offer the student interested in Middle East studies. Of particular note are the collections of Arabic and Persian manuscripts, as well as large holdings on the medieval and modern Middle East.

The Council on Middle East Studies administers the Middle East Studies National Resource Center at Yale, which is funded by the U.S. Department of Education under HEA Title VI. As a National Resource Center, the council supports a number of projects and activities, including summer- and academic-year language fellowships and an extensive outreach program.

The council also offers a Graduate Certificate of Concentration in Modern Middle East Studies. Students with an interest in the Middle East should first apply to one of the University's degree-granting departments, such as Anthropology, History, Linguistics, Near Eastern Languages and Civilizations, Political Science, Religious Studies, or Sociology, and then apply for the graduate certificate of concentration no later than the beginning of their penultimate term of study.

## **GRADUATE CERTIFICATE OF CONCENTRATION IN MODERN MIDDLE EAST STUDIES**

The certificate represents acknowledgment of substantial preparation in Middle East Studies, both in the student's major graduate or professional field and also in terms of the disciplinary and geographical diversity required by the council for recognized competency in the field of Middle East Studies. As language and culture are the core of the area studies concept, students are required to attain or demonstrate language proficiency.

### **Requirements**

1. Language proficiency: the equivalent of two years of study at a passing grade in one of the four languages of the Middle East—Arabic, Hebrew, Persian, and Turkish.
2. Course work: six graduate courses in at least two different disciplines. No more than four courses may count in any one discipline. Included in these six courses must be an introductory Middle East history course, such as *State and Society and Culture in the Middle East* (taken with special supplemental graduate readings and assignments), and a foundations course, such as *Culture and Politics in the Contemporary Middle East* (ANTH 538).
3. Interdisciplinary coverage: both courses and any research project undertaken in lieu of a course must reflect experience of at least two disciplines.
4. Research: a major graduate course research paper, dissertation prospectus, dissertation, or thesis that demonstrates ability to use field resources, ideally in one or more languages of the region.

For more information on the Graduate Certificate and inquiries about Middle East Studies, contact the Council on Middle East Studies, Yale University, PO Box 208206, New Haven CT 06520-8206; [cmes@yale.edu](mailto:cmes@yale.edu).

# South Asian Studies Council

The MacMillan Center  
210 Luce Hall, 203.436.3517  
<http://southasia.macmillan.yale.edu>

## Chair

A. Mushfiq Mobarak (*School of Management*)

## Associate Chair

Harry Blair (*Political Science*)

**Professors** Tim Barringer (*History of Art*), Michael Dove (*Forestry & Environmental Studies*), Phyllis Granoff (*Religious Studies*), Inderpal Grewal (*Women's, Gender & Sexuality Studies*), Alan Mikhail (*History*), A. Mushfiq Mobarak (*School of Management*), Kalyanakrishnan Sivaramakrishnan (*Anthropology*), Shyam Sunder (*School of Management*), Steven Wilkinson (*Political Science*)

**Associate Professors** Nihal DeLanerolle (*School of Medicine*), Mayur Desai (*Public Health*), Zareena Grewal (*American Studies; Religious Studies*), Karuna Mantena (*Political Science*), Andrew Quintman (*Religious Studies*), Kishwar Rizvi (*History of Art*)

**Assistant Professors** Rohit De (*History*), Daniel Keniston (*Economics*)

**Senior Lecturer** Geetanjali Singh Chanda (*Women's, Gender & Sexuality Studies*)

**Lecturer** Carol Carpenter (*Forestry & Environmental Studies*)

**Senior Lectors** David Brick (*Sanskrit*), Seema Khurana (*Hindi*), Swapna Sharma (*Hindi*)

Students with an interest in South Asian Studies should apply to one of the University's degree-granting departments, such as Anthropology, History, Political Science, Economics, or Religious Studies. The South Asian Studies Council is part of the MacMillan Center for International and Area Studies. It has been organized to provide guidance to graduate students who desire to use the resources of the departments of the University that offer South Asia-related courses.

The South Asian Studies Council aims to bring together faculty and students sharing an interest in South Asia, and it supplements the curriculum with seminars, conferences, and special lectures by scholars from Yale as well as visiting scholars. It provides information concerning grants, fellowships, research programs, and foreign study opportunities.

Language instruction is offered in Hindi and Sanskrit. Students planning to undertake field research or language study in South Asia may apply to the council for summer fellowship support.

For information and program materials, contact the South Asian Studies Council, Yale University, PO Box 208206, New Haven CT 06520-8206; or 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** Seema Khurana and Swapna Sharma

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 598b, Advanced Tutorial** Swapna Sharma

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.

**SAST 559b / RLST 565b, Buddhist Traditions of Mind and Meditation** Andrew Quintman

Buddhist meditation practices examined in the context of traditional theories of mind, perception, and cognition. Readings both from Buddhist canonical works and from secondary scholarship on cognitive science and ritual practice. Recommended preparation: a course in Asian religions.

**SAST 567a / RLST 583a, Visual Worlds of Himalayan Buddhism** Andrew Quintman

The role of images and imagining in the religious traditions of Tibetan Buddhism. How Tibetan Buddhist cultures produce religious images; ways of visualizing those images to invest them with meaning. Topics include specific modes of visual representation, relationships between text and image, social lives of images, and processes of reading and interpretation.

**SKRT 510a / LING 515a, Introductory Sanskrit I** David Brick

An introduction to Sanskrit language and grammar. Focus on learning to read and translate basic Sanskrit sentences in the Indian Devanagari script. No prior background in Sanskrit assumed. Credit only on completion of SKRT 520/LING 525.

**SKRT 520b / LING 525b, Introductory Sanskrit II** David Brick

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 / LING 538a, Intermediate Sanskrit I** David Brick

The first half of a two-term sequence aimed at helping students develop the skills necessary to read texts written in Sanskrit. Readings include selections from the *Hitopadesa*, *Kathasaritsagara*, *Mahabharata*, and *Bhagavad Gita*. Prerequisite: SKRT 520 or equivalent.

**SKRT 540b / LING 548b, Intermediate Sanskrit II** David Brick

Continuation of SKRT 530, focusing on Sanskrit literature from the *kavya* genre. Readings include selections from the *Jatakamala of Aryasura* and the opening verses of Kalidasa's *Kumarasambhava*. Prerequisite: SKRT 530 or equivalent.

**SKRT 550a, Advanced Sanskrit: Dharmasastra** David Brick

Introduction to Sanskrit commentarial literature, particularly to *Dharmasastra*, an explication and analysis of dharma (law or duty). Discussion of normative rules of human behavior; historical traditions of writing on the Indian subcontinent. Prerequisite: SKRT 540.

## Council on Southeast Asia Studies

The MacMillan Center

311 Luce Hall, 203.432.3431, seas@yale.edu

<http://cseas.yale.edu>

### Chair

Michael Dove (*Forestry & Environmental Studies*)

**Professors** Michael Dove (*Forestry & Environmental Studies*), J. Joseph Errington (*Anthropology*), Benedict Kiernan (*History*), James Scott (*Political Science*), Frederick Wherry (*Sociology*), Mimi Hall Yiengpruksawan (*History of Art*)

**Associate Professor** Erik Harms (*Anthropology*)

**Lecturers and Lectors (I, II)** Dinny Risri Aletheiani (*Southeast Asian Languages*), Carol Carpenter (*Forestry & Environmental Studies*), Amity Doolittle (*Forestry & Environmental Studies*), Quang Phu Van (*Southeast Asian Languages*), Indriyo Sukmono (*Southeast Asian Languages*)

**Curators** Ruth Barnes (*Indo-Pacific Art, Yale Art Gallery*), Richard Richie (*Southeast Asia Collection, Yale University Library*)

Yale does not offer higher degrees in Southeast Asia Studies. Instead, students apply for admission to one of the 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 Richard Richie, Curator, Southeast Asia Collection, Sterling Memorial Library (203.432.1858, [rich.richie@yale.edu](mailto:rich.richie@yale.edu)).

**Language instruction** is offered to graduate and undergraduate students in two Southeast Asian languages, Indonesian and Vietnamese. The council supports language tables and 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.

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*.

**INDN 570a or b, Readings in Indonesian** Indriyo Sukmono and Dinny Risri Aletheiani

For students with advanced Indonesian language skills preparing for academic performance and/or research purposes. Prerequisites: advanced Indonesian and permission of the instructor.

**VIET 570a or b, Readings in Vietnamese** Quang Phu Van

For students with advanced Vietnamese language skills who wish to engage in concentrated reading and research. Prerequisite: permission of the instructor.

# Integrated Graduate Program in Physical and Engineering Biology (PEB)

<http://peb.yale.edu>

[peb@yale.edu](mailto:peb@yale.edu)

## Director

Lynne Regan (*Molecular Biophysics & Biochemistry; Chemistry*)

## Associate Director

Dorottya Noble

**Executive Committee** Joerg Bewersdorf (*Cell Biology; Biomedical Engineering*), Enrique De La Cruz (*Molecular Biophysics & Biochemistry*), Thierry Emonet (*Molecular, Cellular, & Developmental Biology; Physics*), Jonathon Howard (*Molecular Biophysics & Biochemistry; Physics*), Megan King (*Cell Biology*), Andre Levchenko (*Biomedical Engineering*), Kathryn Miller-Jensen (*Biomedical Engineering; Molecular, Cellular, & Developmental Biology*), Simon Mochrie (*Physics; Applied Physics*), Corey O'Hern (*Mechanical Engineering & Materials Science; Physics; Applied Physics*), Thomas Pollard (*Molecular, Cellular, & Developmental Biology; Molecular Biophysics & Biochemistry*), Anna Pyle (*Molecular, Cellular, & Developmental Biology; Chemistry*), Lynne Regan (*Molecular Biophysics & Biochemistry; Chemistry*)

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; Computational Biology and Bioinformatics (BBS track and also degree-granting program); Mechanical Engineering & Materials Science; Molecular, Cellular, and Developmental Biology; Molecular Cell Biology, Genetics, and Development (BBS track); Neuroscience (BBS track); and Physics.

Upon completion of their Ph.D. in a home department, and satisfaction of the PEB curriculum, students receive a Certificate from the Integrated Graduate Program in Physical and Engineering Biology.

Students interested in participating in the PEB program may indicate their interest on their graduate application for admission to a home department or track. Students may also join the PEB after they have matriculated at Yale. After arriving at Yale, students should e-mail [peb@yale.edu](mailto:peb@yale.edu) to express their interest in the PEB, and the leadership will review their application materials.

PEB students acquire a depth of knowledge in their home department and also a breadth of knowledge across disciplines from PEB courses and activities. They will become skilled at applying physical and engineering methods and quantitative reasoning to biological problems, and at identifying and tackling cutting-edge problems in the life sciences, and they will be proficient at combining theory and computation with wet lab experiments. In addition, students will become comfortable working in an



interdisciplinary and collaborative research environment and adept at communicating with scientists from a variety of disciplines as well as with nonscientists.

## PEB CURRICULUM

The PEB curriculum consists of three core courses and the Integrated Workshop (see below), which all students, regardless of their undergraduate background, take together. Methods and Logic in Interdisciplinary Research (MB&B 517/ENAS 517/MCDB 517/PHYS 517) is typically taken in the first year. The second course, Biological Physics (ENAS 541/MB&B 523/PHYS 523), and the third, either Dynamical Systems in Biology (MCDB 562/AMTH 765/CB&B 562/ENAS 561/MB&B 562/PHYS 562) or Introduction to Dynamical Systems in Biology (MCDB 561/PHYS 561), should be completed by the end of the second year. With permission of the PEB leadership, one of the following three courses may be substituted to satisfy the third course requirement: (1) Systems Biology of Cell Signaling (ENAS 567), (2) 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.

PEB hosts an intensive two-week-long Integrated Workshop before orientation week for first-year incoming students.

In addition to the formal courses, there are a multitude of enrichment activities available to PEB students; see <http://peb.yale.edu>.

# Women's, Gender, and Sexuality Studies

315 William L. Harkness Hall, 203.432.0845

<http://wgss.yale.edu>

## Chair

Inderpal Grewal

## Director of Graduate Studies

Joseph Fischel

**Professors** Julia Adams (*Sociology*), Carol Armstrong (*History of Art*), Seyla Benhabib (*Political Science*), Jill Campbell (*English*), Hazel Carby (*African American Studies; American Studies*), Kang-i Sun Chang (*East Asian Languages & Literatures*), Jacqueline Goldsby (*English; African American Studies*), Inderpal Grewal (*Women's, Gender & Sexuality Studies; American Studies; Anthropology*), Margaret Homans (*English; Women's, Gender & Sexuality Studies*), Jennifer Klein (*History*), Marianne LaFrance (*Psychology; Women's, Gender & Sexuality Studies*), Kathryn Lofton (*American Studies; Religious Studies*), Mary Lui (*American Studies; History*), Joanne Meyerowitz (*History*), Sally Promey (*American Studies; Institute of Sacred Music; Religious Studies*), Ana Ramos-Zayas (*Ethnicity, Race & Migration; Women's, Gender & Sexuality Studies; American Studies*), Naomi Rogers (*History of Science & Medicine*), Alicia Schmidt Camacho (*American Studies*), Michael Warner (*English*), Laura Wexler (*American Studies; Women's, Gender & Sexuality Studies*)

**Associate Professors** Rene Almeling (*Sociology*), Crystal Feimster (*African American Studies; American Studies*), Joseph Fischel (*Women's, Gender & Sexuality Studies*), Moira Fradinger (*Comparative Literature*), Zareena Grewal (*American Studies; Religious Studies*), Angel David Nieves (*Women's, Gender & Sexuality Studies*)

**Assistant Professors** Marta Figlerowicz (*Comparative Literature*), Greta LaFleur (*American Studies*), Edi Pepi (*Women's, Gender & Sexuality Studies*), Dixa Ramirez (*American Studies*)

**Senior Lecturers** Becky Conekin (*MacMillan Center; History*), Andrew Dowe (*Women's, Gender & Sexuality Studies*), Igor De Sousa (*English; Women's, Gender & Sexuality Studies*), Maria Trumpler (*Women's, Gender & Sexuality Studies*)

**Lecturers** Melanie Boyd (*Women's, Gender & Sexuality Studies*), Igor De Souza (*Women's, Gender & Sexuality Studies; English*), Karen Foster (*Near Eastern Languages & Civilizations*), Graeme Reid (*Women's, Gender & Sexuality Studies*), George Syrimis (*Hellenic Studies*)

## FIELDS OF STUDY

The Program in Women's, Gender, and Sexuality Studies considers gender and sexuality as fundamental categories of social and cultural analysis and offers critical perspectives upon them as a basis from which to study the diversity of human experience. Gender (the social and historical meanings of the distinction between the sexes) and sexuality (the domain of sexual practices, identities, discourses, and institutions) are studied as they intersect with class, race, ethnicity, nationality, and other axes of human difference. The introduction of these perspectives into all fields of

knowledge necessitates new research, criticism of existing research, and the formulation of new paradigms and organizing concepts.

The Certificate (previously known as the Qualification) in Women's, Gender, and Sexuality Studies is open to students already enrolled in a Ph.D. program at Yale. Interested students are strongly encouraged to register for the certificate by meeting with the director of graduate studies (DGS) during their first year. Students who wish to receive the certificate must (1) complete a graduate course on the theory of gender and sexuality; (2) complete two electives, including one course that must be drawn from the WGSS curriculum; (3) complete one term of WGSS 900, WGSS Certificate Workshop; (4) demonstrate the capacity to pursue independent, interdisciplinary research in Women's, Gender, and Sexuality Studies by presenting a qualifying paper at a meeting of the WGSS Colloquium; and (5) fulfill a teaching requirement. Each of these requirements must be met in consultation with the DGS and the individual WGSS graduate adviser. Students who fulfill these expectations will receive a letter from the DGS, indicating that they have completed the work for the certificate.

Program information and the requirements for the certificate are available on the Women's, Gender, and Sexuality Studies website, or by contacting 203.432.0845 or [wgss@yale.edu](mailto:wgss@yale.edu).

## COURSES

**WGSS 625b, Sexual Orientation, Gender Identity, and Human Rights** Graeme Reid  
Examination of historical, cultural, and political aspects of sexual orientation, gender identity, and human rights in the context of globalization.

**WGSS 651b / ANTH 651b, 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 667b / FREN 900b / HIST 667b, History of Sexuality in Modern Europe**  
Carolyn Dean

An introduction to the various lines of inquiry informing the history of sexuality. The course asks how historians and others constitute sexuality as an object of inquiry and addresses different arguments about the evolution of sexuality in Europe, including the relationship between sexuality and the state and sexuality and gender.

**WGSS 730b / HIST 943b / HSHM 736b, Health Politics, Body Politics** Naomi Rogers

A reading seminar on struggles to control, pathologize, and normalize human bodies, with a particular focus on science, medicine, and the state, both in North America and in a broader global health context. Topics include disease, race, and politics; repression and regulation of birth control; the politics of adoption; domestic and global population control; feminist health movements; and the pathologizing and identity politics of disabled people.

**WGSS 740b / CPLT 639b / ITAL 705b, Gender and Genre in Renaissance Love Poetry**

Ayesha Ramachandran

This course interrogates a persistent theme in the literature of the European Renaissance: the love for a much-desired, frequently unobtainable beloved. How and why does love—erotic yearning, sexual passion, unfulfilled desire, religious devotion—become a key subject and metaphor from the fourteenth to the seventeenth century? Focusing on two main poetic genres of the Renaissance—the lyric and the epic-romance—we investigate how questions of desire, love, and gendered subjectivity become a potent means for articulating psychological, social, political, philosophic, and spiritual concerns. Engaging with normative views of gender, erotic discourse, and romantic love from a long historical perspective, this course investigates the development of modern poetry and sexuality in conjunction with each other.

**WGSS 761b / AMST 761b, Race and Affect in the Americas** Staff

The course explores how Latinx and Latin American/Caribbean populations have been historically imagined and racialized affectively—usually as being “hyper” emotional (but more recently as lacking any affect at all)—and the impact of this characterization on issues of power, inequality, and personhood, particularly under neoliberalism. The course examines the ways in which Latinx and Latin American populations have been produced affectively in medicine/mental health, corporate and media images, U.S. foreign policy, education, and urbanism. We analyze psychological and public health literature and consider a variety of pathological claims about Latinos’ physical and mental states and disorders; in particular, we consider concepts like “ataque de nervios” (Guarnaccia), fatalism; hysteria and the “Puerto Rican Syndrome”; and disordered eating (obesity, body image, diabetes). We explore how concepts from the sociology and anthropology of emotion (Illouz’s emotional capitalism, Berlant’s lateral agency, Stewart’s ordinary affects, Hochschild’s emotional labor/feeling rules) operate in the case of Latinx and Latin American populations, as well as alternative ways of understanding affect in terms of racialization theories. We draw from the works of feminist/queer/critical race theorists, including bell hooks, Gloria Anzaldúa, Cherríe Moraga, and others.

**WGSS 767a / PSYC 777a, Research Topics in Gender and Psychology** Staff

The “Gender Lab” meets weekly to consider research being done in the Psychology department that bears on some gender-related issue.

**WGSS 815b / AMST 810b, American Public Sculpture: History, Context, and Continuing Significance** Laura Wexler

Building on a new partnership between the Smithsonian Institution and Yale University, this course offers a broad-based and multidisciplinary exploration of public sculpture in the United States. Course work includes field trips and digital projects as well as readings in the scholarship of public memory, cultural heritage, conservation, and aesthetics.

**WGSS 850b / ENGL 982b, Sex and Citizenship** Jill Richards

This course surveys political theories of gender/sexuality through attention to citizenship, the nation-state, rights discourses, civil society, migration, biopolitics, criminality, security, and social death. The course looks to establish a foundational understanding of the conjunctures between liberal governance and the regulation of reproductive, sexual, and family life. At the same time, our wider conceptual arc takes up more recent critical debates on the entanglements of sexual intimacy,

race, and national belonging. Textual selections move across a variety of disciplines, including anthropology, sociology, history, literature, critical race theory, queer theory, indigenous studies, environmental studies, and law. Key authors include Hobbes, Locke, Marx, Engels, Habermas, Arendt, Foucault, Orlando Patterson, C.B. Macpherson, Wendy Brown, Ann Laura Stoler, Saidiya Hartman, Joan Wallach Scott, Cheryl Harris, Lauren Berlant, Michael Warner, Jasbir Puar, Elizabeth Povinelli, Paul Gilroy, Pheng Cheah, Inderpal Grewal, Frank Wilderson, Salamishah Tillet, Achille Mbembe, Adriana Petryna, Lisa Marie Cacho, Mark Rifkin, José Muñoz, Dean Spade, Lisa Lowe, Talal Asad.

**WGSS 900a or b, WGSS Certificate Workshop** Joseph Fischel

Built around the WGSS graduate Colloquium and Working Group series, with the addition of several sessions on topics of interdisciplinary methodology, theory, and professionalization. Offered in both fall and spring. Enrollment in one term of WGSS 900 is required of all students for completion of the certificate in WGSS. Graded Satisfactory/Unsatisfactory.

## Yale Center for the Study of Globalization

Betts House, 203.432.1900, [globalization@yale.edu](mailto: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 studies problems that, even if they do not result directly from globalization, are global in nature and can therefore be effectively addressed only through international cooperation. In pursuit of this mission, and to assist in Yale's effort to become a more international institution, the core of our strategy is collaboration both with the Yale community and with a variety of institutions and individuals across the globe.

One of the center's strengths, and an important area of focus, is its ability to engage with multilateral institutions and global organizations in activities pertinent to its mission, thereby connecting academia with the world of public policy. Through these projects, YCSG produces reports, policy papers, and other publications that contribute toward influencing the attitudes and actions of policy makers, academics, and institutions. Natural opportunities exist to present the results of this work at Yale through seminars, colloquia, and public lectures.

The center's strategy comprises four pillars. First, we focus on issues that are truly core to globalization, like international trade, global finance, inclusion, and the provision of key global public goods. Second, relying on a diversity of means—from closed brainstorming sessions among highly specialized thinkers to large multidisciplinary conferences—the center serves at Yale as a catalyst for debate and cutting-edge thought with a view to generate policy-relevant proposals. Third, in addition to our priority task of interacting with the Yale community, we seek actively to collaborate with a variety of institutions and individuals across the globe to leverage our own resources, reinforce the policy pertinence of our work, and support Yale's internationalization efforts. And fourth, in the endeavor of disseminating critical analysis and stirring constructive debate, we apply ourselves to reach not only the academic and policy worlds with printed publications, but also to communicate with a wide audience of informed citizens around the world.

On campus, the center hosts international conferences, organizes workshops and panels, and works constantly to bring to the Yale community individuals who have input on international policy. YCSG's Distinguished Visiting Fellows interact with faculty and students and are expected to produce one or more publications during their tenure.

# POLICIES AND REGULATIONS

## ADMISSIONS

<http://gsas.yale.edu/admission-graduate-school>

Application for admission to any of the Graduate School's programs should begin in the summer or fall of the academic year prior to the one in which the applicant proposes to matriculate. Application can be made to only one department, program, or combined program. The Graduate School utilizes an online application. Access to this application as well as application procedures, guidelines, requirements, fees, deadline dates, and all other information that an applicant will need are available at the 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 below 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/academics/departments>. Although programs may have varying prerequisites and special requirements for admission, all programs will require, in addition to an application and the application fee, three letters of recommendation, transcripts from each academic institution previously attended, and the results of the Graduate Record Examinations (GRE) General Test, which is administered in the United States and abroad by the Educational Testing Service (ETS). This examination, in addition to any GRE Subject Tests that may be required by the student's program of study, should be taken as early as possible to ensure that official scores are released and received no later than the stated deadline of the program for which the student is applying.

Applicants whose native language is not English must present evidence of proficiency in English by satisfactorily completing the Test of English as a Foreign Language (TOEFL), which is administered by ETS, or the International English Language Testing System (IELTS). This requirement is waived only for applicants who, prior to matriculation at Yale, will have received a baccalaureate degree or its international equivalent from a college or university where English is the primary language of instruction. The applicant must have studied in residence at the baccalaureate institution for at least three years to receive a waiver. The TOEFL or IELTS, if required, should be taken as early as possible to ensure that official scores are released and received no later than the stated deadline of the program for which the student is applying.

Students who do not demonstrate sufficient proficiency in English may be retested or asked to take courses in English for speakers of other languages. A higher level of proficiency will be required in order for students to serve as teaching fellows.

International applicants who accept offers of admission will be required to give appropriate evidence of necessary financial support before the University will be able to issue visa documents.

The application contains questions regarding prior or pending criminal convictions and disciplinary actions. When an applicant answers affirmatively to either of these questions, the Graduate School will evaluate the circumstances outlined by the applicant to determine if they are potentially relevant to 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 Degree Requirements, below.

### Nondegree Study

Qualified individuals who wish to study at the graduate level as nondegree candidates may be admitted to the Division of Special Registration (DSR). Admission to the DSR is for one term or for one year only and carries with it no commitment by the Graduate School for further study. Students admitted for the academic year must demonstrate satisfactory academic performance in the first term in order to register for the second term. Students in the DSR may obtain transcripts indicating the appropriate credit for work completed.

DSR students engaged in course work or a combination of course work and research are identified as *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 <http://gsas.yale.edu/admissions/application-process/non-degree->

programs-division-special-registration. DSR applicants must provide evidence of health care for the duration of their studies at Yale at the time of application.

Some departments at Yale have formal exchange agreements with universities in other countries that have been approved by the Graduate School. Graduate students who are admitted to Yale under such approved exchange agreements may be registered as *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, and Renaissance Studies pursue a combined Ph.D. with departments in related fields. In addition to these academic programs, there are several formal interdisciplinary Ph.D. programs in the Graduate School listed under the appropriate departmental entries of this bulletin. Ad hoc programs may also be approved. A student who is interested in an ad hoc program should prepare a written proposal for review and approval by the relevant departments and associate deans before the student has advanced to candidacy.

Students are encouraged to contact the appropriate directors of graduate studies about specific opportunities for interdisciplinary study throughout the Graduate School and the University.

The Graduate School also participates in 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 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 School of Medicine (see Requirements for Joint-Degree Programs, below).

## 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 Assistant Dean Jasmina Besirevic Regan ([jasmina.besirevic@yale.edu](mailto: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>

All international exchange agreements must be approved in advance by the Graduate School to ensure that they meet University policy and Graduate School guidelines. Departments interested in establishing an exchange program must prepare a statement that demonstrates that there is a clear academic and reciprocal need for such a program, and that the program will conform to the established guidelines for all such exchange agreements. Students and faculty interested in pursuing these exchanges should contact Assistant Dean Jasmina Besirevic Regan ([jasmina.besirevic@yale.edu](mailto:jasmina.besirevic@yale.edu)).

### INTERNATIONAL EXCHANGE PROGRAMS

#### **Anthropology**

Masarykova Univerzita, Brno, Czech Republic; Peking University, Beijing, China; Université de Toliara, Madagascar

#### **Comparative Literature**

Peking University, Beijing, China

#### **Council on East Asian Studies**

Peking University, Beijing, China; Sophia University, Tokyo, Japan; University of Tokyo, Japan

#### **Economic Growth Center**

Research Institute for Economics and Business Administration, Kobe University, Japan

#### **Economics**

Aalto University, Helsinki, Finland; Institut d'Études Politiques de Paris, France; Università Bocconi, Milan, Italy; Universität Bonn, Germany; Universität Mannheim, Germany

#### **French**

École Normale Supérieure, Paris, France; Institut d'Études Politiques de Paris, France

**German**

Humboldt-Universität zu Berlin, Germany

**Graduate School**

Connecticut Department of Education and the State of Baden-Württemberg Exchange, Germany; Graduate Institute of International and Development Studies, Geneva, Switzerland; Peking University, Beijing, China; Royal Holloway College, University of London, England; Secretariat of Higher Education, Science, Technology and Innovation, Ecuador; Universität Konstanz, Germany; University College London, England

**History**

Institut d'Études Politiques de Paris, France; Peking University, Beijing, China

**History of Art**

Peking University, Beijing, China

**Political Science**

Institut d'Études Politiques de Paris, France; Nuffield College, University of Oxford, England; Peking University, Beijing, China

**Religious Studies**

Aarhus University, Denmark; Peking University, Beijing, China

**Sociology**

Institut d'Études Politiques de Paris, France; Peking University, Beijing, China; University of Copenhagen, Denmark

**Summer Study**

Doctoral students are funded year-round and are expected to make progress toward the completion of their degrees during the summer months (see Summer Registration under Registration Status and Leaves of Absence, below). See individual departmental policies in this bulletin regarding specific expectations for degree programs during the summer. Although the Graduate School does not offer courses in the summer, intensive language instruction is available through the Yale Summer Session, and graduate students may wish to take advantage of those programs while in New Haven. For further details on summer offerings at Yale, please consult the Yale Summer Session 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 or two full-term graduate courses taken after matriculation in the Graduate School and during the nine-month academic year. The Honors requirement must be met in courses other than those concerned exclusively with dissertation research and preparation.

A student who has not met the Honors requirement at the end of the fourth term of full-time study will not be permitted to register for the fifth term. A student who is not in 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. PTAs are responsible for small undergraduate courses, subject to guidance and advice by department faculty. For a more detailed description of these types of appointments, see Teaching Fellow Levels under Financing Graduate School.

Faculty should clearly communicate to students and teaching fellows their expectations about evaluation of work, feedback to students, and grading policies. Faculty are expected to prepare course syllabi, assignments, and examinations. Typically, they should not ask teaching fellows to give lectures when they are unable to attend class, although they are encouraged to offer occasional opportunities for student lectures when they can attend and advise. While on rare occasions teaching fellows may be asked to assist with administrative activities (such as placing course material on library reserve or online, making photocopies for class, ensuring that audiovisual resources are available and working, and the like), in general such activities should not be done by students.

Graduate students may occasionally serve as graders for graduate-level courses, but only in highly quantitative courses with grading demands for frequent assignments. To avoid conflicts of interest, teaching fellows should not normally be assigned to evaluate the work of graduate student peers. However, in courses requiring extensive quantitative work, teaching fellows may score quantitative homework and exams submitted by graduate students, using nondiscretionary scoring keys approved by the faculty instructor. In these instances, the faculty member should review the teaching fellow's scoring and must assign the final grade. In courses that are double-titled with both graduate and undergraduate numbers, the same guidelines hold for the grading of assignments; all other grading of graduate students should be done by the faculty member.

The Graduate School requires that all students who teach be in 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 SPEAK test, (2) passing the Center for Language Study oral exam, (3) passing the speaking section of the iBT TOEFL, (4) passing the speaking portion of the IELTS exam, or (5) having received an undergraduate baccalaureate degree or its equivalent from an institution where the principal language of instruction is English 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.

#### DEFERRAL OF TEACHING YEAR

In the humanities and social sciences, students in a teaching year, normally years three and four, may defer a teaching year or term into the fifth or sixth year.

#### 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 one unbound copy of the dissertation, softbound copies that will be distributed to each reader, a completed set of required forms ([http://gsas.yale.edu/sites/default/files/dissertation\\_checklist\\_and\\_phd\\_petition\\_02.16.16\\_secured\\_for\\_web.pdf](http://gsas.yale.edu/sites/default/files/dissertation_checklist_and_phd_petition_02.16.16_secured_for_web.pdf)), and any requisite fees to the Graduate School. The department must submit to the Graduate

School a fully completed Notification of Readers form that has been approved by the director of graduate studies.

Registered doctoral candidates must have a principal adviser with an appointment on the Graduate School faculty. The Graduate School requires that each dissertation be read by at least three 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 seventeen departments and programs: African Studies, American Studies, Applied Physics, Archaeological Studies, Computational Biology and Bioinformatics, Computer Science, East Asian Studies, Engineering and Applied Science, English, European and Russian

Studies, Global Affairs, History, International and Development Economics (IDE), Music, Near Eastern Languages and Civilizations, Public Health, and Statistics.

The residence and tuition requirements for a terminal M.A.S./M.A./M.S. degree are a minimum of one year of full tuition and course work in residence in one-year programs, or a minimum of two years of full tuition and course work in residence in two-year programs. For information about which departments offer one-year programs and which offer two-year programs, see the department listings.

With the approval of the department and the appropriate associate dean, a student may be admitted for part-time study toward the master's degree. In that case, tuition will be charged on a per-course basis. Part-time study does not change the one- or two-year full-tuition obligation described above. Part-time students must complete all degree requirements within five years of matriculation.

Individual departments establish the specific course and language requirements for these degrees. Although departments may set more stringent requirements, the minimum Graduate School requirement for students admitted for M.A.S./M.A./M.S. degrees is an overall grade average of High Pass, including a grade of Honors in at least one full-term graduate course (for students enrolled in one-year programs), or in at least two full-term graduate courses (for students enrolled in two-year programs). In order to maintain the minimum average of High Pass, each grade of Pass on the student's transcript must be balanced by one grade of Honors. Each grade of Fail must be balanced by two grades of Honors. If a student retakes a course in which 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 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 is provided by each school according to its own criteria, typically for two and one-half years in the Law School and three and one-half years in the Graduate School, and is awarded by each school during the terms in which the student pays tuition in that school. Students are not eligible for financial aid from the Graduate School during terms in which they are registered at another school.

In the J.D./M.A. program, the J.D. and M.A. degrees are awarded simultaneously at the end of the fourth year of study in one-year M.A. programs and at the end of four

and one-half years of study in two-year M.A. programs. The Graduate School tuition requirement for J.D./M.A. students in one-year M.A. programs is one year of tuition; students in two-year M.A. programs have a one and one-half year tuition requirement in the Graduate School. In all cases students pay three years of tuition in the Law School. Students in J.D./M.A. programs, like other students in M.A. programs, are not ordinarily eligible for University Fellowship aid through the Graduate School. Students usually enroll in the Law School during the first year of study. The pattern of enrollment in subsequent years depends on whether the M.A. program is a one-year or a two-year program.

#### **M.D./PH.D. PROGRAM**

This program is sponsored jointly by the Graduate School and the School of Medicine. Applications for admission to the joint program are reviewed by a committee composed of faculty members and deans from both schools. Normally, admission to the program includes simultaneous admission to both schools. However, students may apply to the joint program by October 15 of their second year of study in either the M.D. or Ph.D. program, and they must matriculate in the joint program no later than the beginning of the following year.

Students request affiliation with a particular department or program in the Graduate School by the middle of their third year of study in the joint program, after their course and research interests have been defined. Although students usually pursue their research in one of the biological sciences, those interested in earning the Ph.D. through work in another department may do so under certain circumstances, with the approval of the M.D./Ph.D. committee.

The residence requirement in this program is seven years. The full-tuition requirement is three and one-half years in the School of Medicine and two and one-half years in the Graduate School. To qualify for the M.D. and Ph.D. degrees, students must satisfy all degree requirements of both schools. Normally, a student admitted to this joint program must satisfy the Graduate School Honors requirement by the end of the second year of study and must complete all remaining predissertation requirements within four terms of affiliation with the Ph.D. department. This schedule may be adjusted for students who have been enrolled in either the School of Medicine or the Graduate School before admission to the M.D./Ph.D. program.

#### **PH.D./M.B.A. 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 take both the GRE tests and the GMAT. Prospective students who are currently enrolled neither in the Graduate School nor in SOM may apply to both schools simultaneously. Students already enrolled in the Graduate School normally apply to SOM after taking one course at SOM for matriculation any time after they have passed their Ph.D. qualifying examinations at the Graduate School but prior to beginning the fifth year of study. This pattern, however, is flexible, and students interested in the joint degree should consult the 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

<http://gsas.yale.edu/academics/commencement>  
[GScommencement@yale.edu](mailto:GScommencement@yale.edu)

There is only one University Commencement ceremony each year, in May. All degrees awarded for both December and May of each academic year are presented at the May ceremony. Graduating students must complete the Commencement form found at the site listed above by 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 and rubella has been presented to Yale Health (see Health Services under Yale University Resources and Services for more information).

Satisfactory progress means that the student has met all Graduate School and departmental requirements normally expected for each stage of the student's program. For Ph.D. students before admission to candidacy and for M.A.S./M.A./M.S. students,

this includes satisfactory completion of courses from the preceding term(s). As indicated in the sections on Course and Honors Requirements and Admission to Candidacy, students in Ph.D. programs must satisfy the Honors requirement before beginning the fifth term of study and must be admitted to candidacy by the appropriate time. In addition to satisfying these general Graduate School requirements, students must meet any additional requirements specified by their departments. Students who fail to make satisfactory progress may be placed on a probationary status pending satisfactory completion of requirements. Ph.D. students who have been admitted to candidacy must continue to demonstrate satisfactory progress toward the degree in the annual Dissertation Progress Report (DPR). Students who fail to meet departmental or Graduate School requirements by the designated deadlines, and students who have been admitted to candidacy who fail to submit the annual DPR, will be administratively withdrawn.

Students must register each term until the dissertation is submitted or until six years (twelve terms) of study have been completed. Registered students who submit dissertations will remain registered until the end of the term (i.e., through December for those submitting during the fall term, through May for those submitting before the spring degree deadline, and through August for those submitting after the spring degree deadline) and will retain all privileges of registration (e.g., library privileges, health care coverage, and e-mail accounts). Students who complete all Ph.D. requirements within four continuous years of full-time study in the Ph.D. program will be registered and charged full tuition only through the term in which the dissertation is submitted. Students who have registered part-time or taken a leave of absence must complete the four-year, full-tuition obligation, regardless of when they submit the dissertation.

Students are expected to complete the dissertation within six years of study or less. Students who have not submitted the dissertation by the end of the sixth year of study may do so subsequently, at the discretion of the department, without registering or may request a period of extended registration by submitting the petition for extended registration, which includes the standard DPR that is required annually by May 1 of all students admitted to candidacy. Before a seventh year of registration is approved, the student and the student's adviser, as well as the director of graduate studies, must complete a report that specifies the progress the student has already made in writing the dissertation and that also includes a detailed plan for completing the dissertation in the seventh year. Very rarely, students may request an eighth year of registration due to serious circumstances beyond their control that have prevented them from completing the dissertation by the end of the seventh year of study. Students who receive extended registration must register online each term and are normally expected to be in residence.

Alternatively, a doctoral student who is not eligible for full-time registration may request to enroll with the status "Dissertation Completion." This part-time status enables advanced students to maintain an active NetID in order to access electronic library resources and their Yale e-mail accounts while completing their dissertations under the supervision of a member of the Graduate School faculty. A student may hold this status for a maximum of four consecutive terms and will be charged the Continuous Registration Fee in each term for which it is approved. Students on this status are not eligible to teach in the Teaching Fellow Program or to purchase health

coverage as Yale affiliates. Once a student enters this status, 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 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 (OCS) process. The deadlines for registration each term are listed in the Schedule of Academic Dates and Deadlines. Students who submit course enrollment forms after the appropriate deadline will be assessed a fee.

No student may attend any class unless officially registered in the course. No credit will be given for work done in any course for which a student is not officially registered, even if the student entered the course with the approval of the instructor and the director of graduate studies. Graduate students who wish to register for courses that are offered on both the graduate and undergraduate levels must register with the

graduate-level course number (i.e., 500 or higher) in order to receive credit toward their degrees. In rare instances, a graduate student may be granted permission to register for an undergraduate course that will count toward the fulfillment of course requirements for the student's graduate degree. In such cases, the student must file an approved Graduate Credit Request form ([http://gsas.yale.edu/sites/default/files/files-forms/credit\\_request\\_form.pdf](http://gsas.yale.edu/sites/default/files/files-forms/credit_request_form.pdf)) with the Registrar's Office by the end of the registration period. Graduate students may not utilize the "Credit/D/Fail" option within the Yale College grading scale. Students enrolling in courses offered by a Yale professional school are subject to all policies and deadlines of both the professional school and the Graduate School. Graduate students taking a course through the School of Management and the Law School must also obtain written permission from the respective schools' registrars to be officially enrolled. Permission must be obtained within two weeks of the close of registration at the Graduate School.

A student who wishes to audit a course must receive permission from the instructor (as not all faculty permit auditors in their classes) and register for the course as an auditor. The minimum general requirement for auditing is attendance in two-thirds of the class sessions; instructors may set additional requirements for auditing their classes. Audited courses appear on the student's transcript.

### COURSE CHANGES

Once the Online Course Selection (OCS) process has closed for a given term, all subsequent changes must be made using the Course Schedule Change Notification Form, approved by the student's director of graduate studies and then filed with the registrar. If a student is enrolled in a professional school course, all changes in enrollment status must be reported to the registrar of that school as well as to the Graduate School. Forms for reporting changes to the Graduate School are available at the Graduate School Student Information Office (Warner House, 1 Hillhouse Ave.), through the student's department, or online at <http://gsas.yale.edu/forms>.

The dates for changing enrollment in a course from Credit to Audit or Audit to Credit and for withdrawing from a course are listed in the Schedule of Academic Dates and Deadlines. If a student officially withdraws from a course by the stated deadline, the course will be removed from the student's transcript. If a student ceases to participate in a course without officially withdrawing from that course by the stated deadline, it is at the instructor's discretion to assign an appropriate qualitative grade or a grade of "Incomplete."

### Grades

The grades assigned in the Graduate School are:

H	Honors
HP	High Pass
P	Pass
F	Fail
TI	Temporary Incomplete
I	Incomplete

A mark of “Y” is assigned as the grade for the first term of a full-year course and will be converted to a standard grade once both terms are completed, depending on the number of credits the course fulfills.

Marks of Satisfactory/Unsatisfactory may be assigned only when the department sponsoring the course has designated such marks. In such cases, the grading mode is the same for all students enrolled in the course.

The Graduate School does not calculate grade-point averages, nor does it assign numerical or letter equivalents to Graduate School grades. Grades assigned according to grading scales other than those described above will be returned to the instructor for conversion. If a student retakes a course, both grades remain on the transcript, but only the higher grade is counted toward the program requirements.

The Schedule of Academic Dates and Deadlines indicates the dates on which grades are due for the current year. Instructors have the responsibility for assigning dates for submission of course work to meet these grade deadlines. If a student and instructor have agreed that an extension is appropriate, the student must submit to the Registrar’s Office a request for the Temporary Incomplete (TI) (available on the Graduate School 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 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 <http://world.yale.edu/travel> to facilitate communication with the University in case of an emergency.

### CONTINUOUS REGISTRATION FEE

Ph.D. students who have completed the tuition and residence requirements described above must continue to register each term through the sixth year whether in residence or in absentia, or until they submit the dissertation, whichever occurs first. Students who have met the tuition requirement are charged a Continuous Registration Fee (CRF) for each term in which they remain registered. Students who are granted permission to register beyond the sixth year are also charged the CRF. The Graduate

School will cover the cost of the CRF for Ph.D. students registered full-time in year seven and beyond for any term in which they serve as Teaching Fellows.

### SUMMER REGISTRATION

Ph.D. students receive funding and are expected to continue full-time independent study or research during the summer. Continuing students who were registered during the preceding spring term remain registered through August 31. Ph.D. students who wish to interrupt their studies during the summer (e.g., to accept an internship) must notify their associate dean prior to May 15.

Many M.A./M.S. students continue full- or half-time independent study or research during the summer. Continuing students who were registered during the preceding spring term remain registered through August 31.

Students can obtain verification of summer registration from the Registrar's Office.

### SUMMER INTERSHIPS

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 nonenrollment.
7. A student on leave of absence is not eligible for the use of any University facilities normally available to enrolled students.
8. A student on leave of absence may continue to be enrolled in Yale Health by purchasing coverage through the Student Affiliate Coverage plan. In order to secure continuous coverage from Yale Health, enrollment in this plan must be requested prior to the beginning of the term in which the student will be on leave or, if the leave commences during the term, within thirty days of the date 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 require a student to take a leave for medical reasons when, on recommendation of the director of Yale Health or the chief of the Mental Health and Counseling department, an associate dean of the Graduate School determines that the student is a danger to self or others because of a serious medical problem, or that the student has refused to cooperate with efforts deemed necessary by Yale Health to determine if the student is such a danger. An appeal of such a leave must be made in writing to the dean of the Graduate School no later than seven days from the effective date of the leave.

A student who is placed on medical leave during any term will have 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.

**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 student progress four months prior to a birth or adoption. This benefit is limited to two birth or adoption events. If both parents are graduate students at Yale, only one student may receive this benefit per birth or adoption event, though the second student may consult with the associate dean for graduate student advising and academic support regarding a modification of academic responsibilities.

Graduate students in terminal M.A.S./M.A./M.S. programs may modify their academic responsibilities because of the birth or adoption of a child. They should contact 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 and photocopying equipment.
6. Violation of University rules for using information technology services and facilities, including computers, the University network, 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, 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 gates, and sprinkler systems.
18. Unlawful manufacture, possession, use, or distribution of illicit drugs or alcohol on University property or as part of any University activity.

Violations of any of the above regulations will be referred to the Graduate School Committee on Regulations and Discipline, composed of three graduate students, three faculty members, normally one from each division, and an associate dean. Violations of regulations pertaining to sexual misconduct or the University's Consensual Relations Policy will be referred to the University-Wide Committee on Sexual Misconduct. Students found guilty of such violations will be subject to one or more of the following disciplinary penalties:

Reprimand  
 Probation  
 Suspension  
 Dismissal  
 Fines

## Restitution

## Restriction

Penalties of suspension or dismissal will be noted on the student's transcript. Pending disciplinary charges will be noted on a student's transcript if 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.



## PROVOST'S PROCEDURE

The Provost's Procedure governs most student complaints, including, but not limited to, complaints of discrimination on the basis of race, sex, color, religion, national or ethnic origin, disability, or sexual orientation, against a faculty member who is not a member of the Faculty of Arts and Sciences, or against an employee who is not an administrator in the Graduate School or who is not subject to discipline by the student's dean. This procedure is available at [www.yale.edu/equalopportunity/grievance](http://www.yale.edu/equalopportunity/grievance). Complaints of sexual misconduct, which includes sexual harassment and sexual assault, may be brought to a Title IX Coordinator or to the University-Wide Committee on Sexual Misconduct (UWC). For more information on the University's Title IX Coordinators or the UWC, please see Resources on Sexual Misconduct under Yale University Resources and Services.

## Freedom of Expression

The Yale 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 <http://studentlife.yale.edu/guidance-regarding-free-expression-students-yale>.

# FINANCING GRADUATE SCHOOL

## TUITION AND FEES, 2017–2018

### Tuition\*

Full-time study, per term: \$20,500

Full-time study in IDE, per term: \$21,000

Half-time study, per term: \$10,250

Master's programs, less than half-time per term

One-quarter time study, per term: \$5,125

Division of Special Registration (DSR, nondegree study)

Course work, per course, per term (including audited courses): \$5,125

Visiting Affiliated Research Graduate Students, per term: \$20,500

Visiting Assistants in Research, per month: \$425

### Fees†

Continuous Registration Fee (CRF), per term‡: \$600

Special in absentia registration, per term‡: \$600

Yale Health Hospitalization/Specialty Coverage, twelve months§: \$2,332

\* It is anticipated that tuition will be increased in subsequent years.

† It is anticipated that the Continuous Registration Fee will be increased in subsequent years.

Other fees are subject to change without notice. For fees relating to registration and course enrollment, see Course Enrollment, under Academic Regulations.

‡ See Registration Status and Leaves of Absence, under Academic Regulations.

§ Hospitalization fees are for single students. Rates are higher for students needing dependent coverage. Hospitalization/Specialty Coverage includes prescription coverage.

Appointment to a University post does not exempt a student from registration and payment of other fees. Full-time (and certain part-time) Yale managerial and professional employees and their spouses, postdoctoral appointees and their spouses, as well as the spouses of Yale faculty, are eligible for a tuition reduction in the DSR and master's programs. They should consult Human Resources for details. Postdoctoral appointees (whose appointment is at least half-time) may only receive tuition benefits if the classes taken are consistent with their educational training. With the permission of the instructor, full-time faculty members and their spouses, emeritus faculty and their spouses, postdoctoral appointees and their spouses, and University employees may audit courses without charge. The audited courses are not recorded on Graduate School transcripts. Classes audited by postdoctoral appointees should be consistent

with the appointees' training objectives, and appointees should discuss their plans with their mentors to ensure that the course work does not interfere with research activities.

Candidates for degrees in the Graduate School, nondegree students paying full tuition, and spouses of full-time candidates for degrees in the Graduate School may audit courses without charge provided that they have received the approval of the course instructor.

## STUDENT ACCOUNTS AND BILLS

Student accounts, billing, and related services are administered through the Office of Student Financial Services, which is located at 246 Church Street. The office's website is <http://student-accounts.yale.edu>.

### Bills

Yale University's official means of communicating monthly financial account statements is through the University's Internet-based system for electronic billing and payment, Yale University eBill-ePay. Yale does not mail paper bills.

Student account statements are prepared and made available twelve times a year at the beginning of each month. Payment is due in full by 4 p.m. Eastern Time on the first business day of the following month. E-mail notifications that the account statement is available on the University eBill-ePay website (<http://student-accounts.yale.edu/ebep>) are sent to all students at their official Yale e-mail addresses and to all student-designated proxies. Students can grant others proxy access to the eBill-ePay system to view the monthly student account statements and make online payments. For more information, see <http://sfas.yale.edu/proxy-access-and-authorization>.

Bills for tuition, room, and board are available during the first week of July, due and payable by August 1 for the fall term; and during the first week of November, due and payable by December 1 for the spring term. The Office of Student Financial Services will impose late fees of \$125 per month (up to a total of \$375 per term) if any part of the term bill, less Yale-administered loans and scholarships that have been applied for on a timely basis, is not paid when due. Nonpayment of bills and failure to complete and submit financial aid application packages on a timely basis may result in the student's involuntary withdrawal from the University.

No degrees will be conferred and no transcripts will be furnished until all bills due the University are paid in full. In addition, transcripts will not be furnished to any student or former student who is in default on the payment of a student loan.

The University may withhold registration and certain University privileges from students who have not paid their term bills or made satisfactory payment arrangements by the day of registration. To avoid delay at registration, students must ensure that payments reach Student Financial Services by the due dates.

### Payments

There are a variety of options offered for making payments. Yale University eBill-ePay (<http://student-accounts.yale.edu/ebep>) is the *preferred* means for payment of your monthly student account bill. The ePayments are immediately posted to the student account. There is no charge to use this service. Bank information is password-

protected and secure, and a printable confirmation receipt is available. On bill due dates, payments using the eBill-ePay system can be made up to 4 p.m. Eastern Time in order to avoid late fees.

For those who choose to pay the student account bill by check, a remittance advice and mailing instructions are included with the online bill available on the eBill-ePay website. All bills must be paid in U.S. currency. Checks must be payable in U.S. dollars drawn on a U.S. bank. Payments can also be made via wire transfer. Instructions for wire transfer are available on the eBill-ePay website.

Yale does *not* accept credit card payments.

A processing charge of \$25 will be assessed for payments rejected for any reason by the bank on which they were drawn. In addition, the following penalties may apply if a payment is rejected:

1. If the payment was for a term bill, 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

The Yale Payment Plan (YPP) is a payment service that allows students and their families to pay tuition, room, and board in ten equal monthly installments throughout the year based on individual family budget requirements. It is administered by the University's Office of Student Financial Services. The cost to enroll in the YPP is \$100 per contract. The deadline for enrollment is June 25. Additional details concerning the Yale Payment Plan are available at <http://student-accounts.yale.edu/ypp>.

## TRANSCRIPTS

Transcripts may be ordered online at [www.yale.edu/sis](http://www.yale.edu/sis) or in writing from the Registrar's Office (246 Church St., 3rd floor).

## FINANCIAL AID

Financial assistance is provided in the form of Yale University Fellowships, tuition fellowships, teaching fellowships, traineeships, and research assistantships. The nature of the assistance varies among the divisions and departments. In most departments and programs, doctoral students are guaranteed five years of twelve-month stipend and tuition support. Applicants for admission to Ph.D. programs will automatically be considered for all Yale fellowships, traineeships, research assistantships, and teaching fellowships for which they are eligible. These awards of financial aid are announced in letters of admission, which are usually mailed during the month of March. Applicants for admission to nondegree and terminal master's programs are required to complete the financial statement contained in the application brochure. Students are strongly encouraged to seek financial support from external sources (see External Fellowships and Combined Award Policy, below).

In addition to grants and fellowships for tuition and living costs, Yale Health Basic Coverage is provided at no cost to students enrolled at least half-time in degree-granting programs. Eligible Ph.D. students also receive a Health Award, which covers the full cost of single-student Yale Health Hospitalization/Specialty Coverage (includes coverage for prescriptions), half the cost of two-person coverage, and the full cost for family coverage. Students who do not participate in Yale Health Hospitalization/Specialty Coverage will not be provided with Health Awards. The graduate dental and vision plans are options that eligible students may choose to purchase for themselves and their dependents and are not covered by the Health Award. (For further information regarding health care options through Yale Health, see Health Services under Yale University Resources and Services.)

## University Fellowships

The Graduate School provides all Ph.D. students with a minimum level of support for five years upon admission. Fellowships are awarded at admission to entering students on the basis of merit and recommendations made by individual departments. In most departments, the source of stipend support will change after the first or second year of study to a teaching fellowship or research assistantship. Students who teach when such teaching is not part of the standard departmental pattern defer their University Fellowships to a later year and do not receive more than the standard departmental stipend while teaching.

Students awarded a University Fellowship may not accept any other award without the permission of the appropriate associate dean. The Graduate School is the final authority on University Fellowships and any combination of University funding with other sources of financial aid (see External Fellowships and Combined Award Policy, below).

## Dissertation Fellowships

The Graduate School offers University Dissertation Fellowships (UDF) as part of its financial aid package to eligible advanced graduate students in the humanities and social sciences once they have advanced to doctoral candidacy. Students receive the UDF when engaged in full-time research and writing, normally in the fifth year of study. The UDF is usually taken in consecutive terms (beginning in either the fall or spring term) and must be completed by the end of the sixth year of study. Students on the UDF may not teach in the GSAS Teaching Fellow Program, 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.

#### ACCESS TO TEACHING FELLOWSHIPS

When departments are considering applications for teaching fellowships, priority is given to qualified graduate students who are expected to teach as indicated in their letter of admission or who are eligible for a guaranteed sixth year teaching position. Students in years two through six who have completed their required teaching may teach if enrollments permit and as long as they have been admitted to candidacy and do not concurrently hold a dissertation fellowship. Students who are permitted to register beyond the sixth year of study may be appointed as TFs or PTAIs, but only if there is no other qualified candidate available in the first six years of study in any department or program of the Graduate School. In cases where an appointing department must choose between two or more graduate students who are each well qualified to teach a particular course, the student or students who have not yet had a chance to teach or who have taught the least will be given preference.

#### LIMITS ON TEACHING

Except when specified in their letters of admission, first-year doctoral students may be appointed as teaching fellows only in exceptional cases, and only after prior approval by their director of graduate studies and the associate dean. In any year of study, the maximum amount of teaching a student in years one through six may do is one Level 20 assignment (up to twenty hours per week) or one PTAI per term. Students in the natural sciences teaching above the requirement are limited to one Level 10 assignment per term. Seventh-year students may teach up to three Level 20 assignments (up to twenty hours per week) per year. Students may not serve as faculty members while registered in the Graduate School.

Students seeking TF appointments outside of their departments should discuss their plans with their director of graduate studies well in advance of the start of a term.

Students with outside fellowships are eligible to serve as TFs according to the policies of the Graduate School and the conditions of their outside awards.

## 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. Level 10 TFs are expected to teach for 6–10 hours per week. Level 20 TFs are expected to teach for 15–20 hours per week. Science students engaged in required teaching and doctoral students in the humanities and social sciences who teach in years one through six receive the standard departmental stipend irrespective of assignment. All students, including master's and professional school students, who are teaching outside of a doctoral financial aid package will receive \$4,000 for a Level 10 assignment and \$8,000 for a Level 20 assignment.

## Traineeships and Assistantships in Research

Traineeships (National Research Service Awards) from the National Institutes of Health are available in most of the biological sciences and in some other departments. These awards support full-time Ph.D. study by U.S. citizens, noncitizen nationals of the United States, and permanent residents. In combination with University and departmental supplements, they provide payment of tuition, a monthly stipend, and the hospitalization premium. Federal rules require that trainees pursue their research training on a full-time basis. In some instances, there is a federal payback provision, which is ordinarily satisfied by serving in health-related research or teaching at the conclusion of training. Information about this obligation and other matters relating to traineeships is available from the director of graduate studies or the principal investigator of the specific training grant in question.

## Research Appointments

Doctoral students in departments where the faculty receive research grants or contracts may be eligible for appointments as assistants in research (AR). In most of the science departments, advanced Ph.D. students are normally supported as ARs by individual faculty research grants. An assistantship in research provides a monthly salary at a rate agreed upon by the department and the Graduate School. It is understood that the work performed not only is part of the faculty principal investigator's research project but also is the student's dissertation research and therefore in satisfaction of a degree requirement. For a standard AR appointment, in addition to the salary, the grant pays half of the tuition or all of the CRF. When the appointee is eligible for a University Fellowship, the other half of tuition is covered by a fellowship.

An appointment as a project assistant (PA) is intended for a student who performs services for projects that are not a part of the student's degree program. A project assistant may normally work no more than ten hours per week. The rate of compensation is based on the department-approved rate paid to assistants in research. With the permission of the director of graduate studies and the appropriate associate dean, a student may receive a combination of project assistant and assistant in research appointments.



Questions about AR or PA appointments should be directed to the director of graduate studies or the appropriate associate dean in the Graduate School.

## EXTERNAL FELLOWSHIPS AND COMBINED AWARD POLICY

To benefit both their current work and their future career prospects, students are strongly encouraged to seek funding from external agencies through grants. These awards, sponsored by both public and private agencies, confer distinction on a student who wins an award in a national competition. They are often more generous than the fellowships the University is able to provide.

Students receiving external awards have two options. They may either (1) hold the outside awards in conjunction with University stipends (including research and teaching fellowships) up to the total of the standard department/program stipend plus \$4,000 or (2) defer financial support awarded in their admission offer for up to one year. Students must report to their associate dean any scholarship/fellowship received from an outside agency or organization. The dean will then assist students in considering the benefits of each option.

### Option 1: Supplementation of an External Fellowship

During the twelve-month academic year (September 1–August 31), the Graduate School's stipend award, made at the time of admission, may be used to supplement the sum of all external stipend awards to a maximum stipend equal to the total of the standard department/program stipend plus \$4,000. If the sum of the Graduate School's initial stipend award and all outside awards exceeds this limit, the Graduate School's stipend award will be reduced accordingly. In instances where an external award does not cover the full twelve-month academic year, the combined award will be determined by prorating the combined award over the period when the internal and external awards overlap.

Students who receive external fellowships providing yearly stipends that are more than the total of the standard department/program stipend plus \$4,000 will retain the full external fellowship funding and will receive no university supplement.

### Option 2: Deferral of Graduate School Funding

Students receiving external awards in years one through five of study may defer up to one year of the Graduate School's stipend award made at the time of admission. Stipend awards may not be deferred beyond the sixth year of study.

## ELIGIBILITY FOR FELLOWSHIPS

Students who hold Yale-administered fellowships are required to be engaged in full-time study. No fellowships will be paid for any period when a student is not registered.

Students are not eligible for stipend support from the Graduate School after six years of study, but they remain eligible for private (nongovernmental) student loans as long as they are enrolled at least half-time.

A fellowship will be withdrawn and a stipend withheld if the recipient's activities become detrimental to the purpose for which the fellowship was granted or if a student becomes ineligible to register for any reason.

## OTHER MEANS OF FINANCING GRADUATE EDUCATION

### Part-Time Employment

Unless otherwise noted in the letter of admission, students are expected to register on a full-time basis. Part-time employment at the University or elsewhere should not conflict with the obligations of the degree program or interfere with academic progress. International students must consult the Office of International Students and Scholars (OISS) regarding their eligibility for employment while in the United States.

Part-time employment beyond an average of ten hours per week requires permission of the director of graduate studies in consultation with the appropriate associate dean.

Students who hold student loans must report all part-time employment earnings to the Office of Financial Aid. Failure to do so may result in cancellation of the loan(s).

### Loans and Work-Study

U.S. citizens may be eligible to borrow through federally subsidized loan programs. Eligibility is based on federal regulations and University policies. Information is available from the Office of Financial Aid, 106 Warner House, 1 Hillhouse Ave.

Eligible students in the Graduate School may be able to borrow from the following federal student loan programs: Federal Direct Loans and Federal Perkins Loans.

The College Work-Study (CWS) program, which is federally funded, enables eligible graduate students to meet a portion of their academic year financial need through part-time employment.

All students applying for any of these federal programs must fill out a Free Application for Federal Student Aid (FAFSA). Information on loan and work-study programs is contained in *Financial Information for Entering Graduate Students*, included with the student's letter of admission. These documents are available from the Office of Financial Aid. Information and FAFSA applications are also available at the 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, 106 Warner House, 1 Hillhouse Ave.

# YALE UNIVERSITY RESOURCES AND SERVICES

## LIVING ACCOMMODATIONS

### Graduate Housing—On Campus

<http://housing.yale.edu>

The Yale Housing Office has dormitory and apartment units available for graduate and professional students. Dormitories are single occupancy of varying sizes and prices. They are located across the campus, from Edward S. Harkness Memorial Hall, serving the medical campus, to the Hall of Graduate Studies and Helen Hadley Hall serving the central/science campus. Unfurnished apartments consisting of efficiencies and one-, two-, and three-bedroom apartments for singles and families are also available. The office's website is the venue for graduate housing information and includes procedures, facility descriptions, floor plans, and rates. Applications for the new academic year are available beginning April 1 and can be submitted directly from the website.

The Yale Housing Office is located in Helen Hadley Hall (HHH) at 420 Temple Street. It is open from 9 a.m. to 4 p.m., Monday through Friday; 203.432.2167.

### Off-Campus Listing Service

<http://offcampusliving.yale.edu>

The Yale Housing Office also manages the Off Campus Living listing service (203.436.2881), 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](http://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

<http://hospitality.yale.edu/graduate-meal-plan-options>

Yale Hospitality has tailored its services to meet the particular needs of graduate and professional school students by offering meal plan options that allow flexibility and value. The HGS 150 Plan is a block meal plan that gives graduate and professional school students 150 meals to use anytime during the term. The plan is required for all Hall of Graduate Studies residents as a minimum meal plan; it is one of several optional meal plans available to students who live off-campus. For up-to-date information on all options, costs, and residential and retail dining locations, visit <http://hospitality.yale.edu>. Inquiries concerning food services should be addressed to Yale Hospitality, 246 Church Street, PO Box 208261, New Haven CT 06520-8261; e-mail, [yale.dining@yale.edu](mailto:yale.dining@yale.edu); tel, 203.432.0420.

## HEALTH SERVICES

<http://yalehealth.yale.edu>

The Yale Health Center is located on campus at 55 Lock Street. The center is home to Yale Health, a not-for-profit, physician-led health coverage option that offers a wide variety of health care services for students and other members of the Yale community. Services include student medicine, gynecology, mental health, pediatrics, pharmacy, laboratory, radiology, a seventeen-bed inpatient care unit, a round-the-clock acute care clinic, and specialty services such as allergy, dermatology, orthopedics, and a travel clinic. Yale Health coordinates and provides payment for the services provided at the Yale Health Center, as well as for emergency treatment, off-site specialty services, inpatient hospital care, and other ancillary services. Yale Health's services are detailed in the *Yale Health Student Handbook*, available through the Yale Health Member Services Department, 203.432.0246, or online at <http://yalehealth.yale.edu>.

## 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 <http://yalehealth.yale.edu>.

Students are automatically enrolled and charged a fee each term on their Student Financial Services bill for Yale Health Hospitalization/Specialty Coverage. Students with no break in coverage who are enrolled during both the fall and spring terms are billed each term and are covered from August 1 through July 31. For students entering Yale for the first time, readmitted students, and students returning from a leave of absence who have not been covered during their leave, Yale Health Hospitalization/Specialty Coverage begins on the day the dormitories officially open. A student who is enrolled for the fall term only is covered for services through January 31; a student enrolled for the spring term only is covered for services through July 31.

**Waiving Yale Health Hospitalization/Specialty Coverage** Students are permitted to waive Yale Health Hospitalization/Specialty Coverage by completing an online waiver form at <https://www.yhpstudentwaiver.yale.edu> that demonstrates proof of alternate coverage. It is the student's responsibility to report any changes in alternate insurance coverage to the Member Services Department. Students are encouraged to review their present coverage and compare its benefits to those available under Yale Health. The waiver form must be filed annually and must be received by September 15 for the full year or fall term or by January 31 for the spring term only.

**Revoking the waiver** Students who waive Yale Health Hospitalization/Specialty Coverage but later wish to be covered must complete and send a form voiding their waiver to the Member Services Department by September 15 for the full year or fall term, or by January 31 for the spring term only. Students who wish to revoke their waiver during the term may do so, provided they show proof of loss of the alternate insurance plan and enroll within thirty days of the loss of this coverage. Yale Health fees will not be prorated.

## YALE HEALTH STUDENT TWO-PERSON AND FAMILY PLANS

A student may enroll 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 two student dependent plans: the Two-Person Plan or the Student Family Plan. These plans include services described in both Yale Health Basic Coverage and Yale Health Hospitalization/Specialty Coverage. Coverage is not automatic, and enrollment is by application. Applications are available from the Member Services Department or can be downloaded from the website (<http://yalehealth.yale.edu>) and must be renewed annually. Applications must be received by September 15 for full-year or fall-term coverage, or by January 31 for spring-term coverage only.

## YALE HEALTH STUDENT AFFILIATE COVERAGE

Students on leave of absence or extended study, students paying less than half tuition, or students enrolled in the Eli Whitney Program prior to September 2007 may enroll in Yale Health Student Affiliate Coverage, which includes services described in both Yale Health Basic and Yale Health Hospitalization/Specialty Coverage. Applications are available from the Member Services Department or can be downloaded from the website (<http://yalehealth.yale.edu>) and must be received by September 15 for full-year or fall-term coverage, or by January 31 for spring-term coverage only.

## Eligibility Changes

**Withdrawal** A student who withdraws from the University during the first fifteen days of the term will be refunded the fee paid for Yale Health Hospitalization/Specialty Coverage. The student will not be eligible for any Yale Health benefits, and the student's Yale Health membership will be terminated retroactive to the beginning of the term. The medical record will be reviewed, and any services rendered and/or claims paid will be billed to the student on a fee-for-service basis. Assistance with identifying and locating alternative sources of medical care may be available from the Care Management Department at Yale Health. At all other times, a student who withdraws from the University will be covered by Yale Health for thirty days following the date of withdrawal. Fees will not be prorated or refunded. Students who withdraw are not eligible to enroll in Yale Health Student Affiliate Coverage. Regardless of enrollment in Yale Health Hospitalization/Specialty Coverage, students who withdraw will have access to services available under Yale Health Basic Coverage (including Student Health, Athletic Medicine, Mental Health & Counseling, and Care Management) during these thirty days to the extent necessary for a coordinated transition of care.

**Leaves of absence** Students who are granted a leave of absence are eligible to purchase Yale Health Student Affiliate Coverage during the term(s) of the leave. If the leave occurs 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 (<http://yalehealth.yale.edu>). Fees will not be prorated or refunded.

**Extended study or reduced tuition** Students who are granted extended study status or pay less than half tuition are not eligible for Yale Health Hospitalization/Specialty Coverage. They may purchase Yale Health Student Affiliate Coverage during the term(s) of extended study. This plan includes services described in both Yale Health Basic and Yale Health Hospitalization/Specialty Coverage. Coverage is not automatic, and enrollment forms are available at the Member Services Department or can be downloaded from the website (<http://yalehealth.yale.edu>). Students must complete an enrollment application for the plan prior to September 15 for the full year or fall term, or by January 31 for the spring term only.

For a full description of the services and benefits provided by Yale Health, please refer to the *Yale Health Student Handbook*, available from the Member Services Department, 203.432.0246, 55 Lock Street, PO Box 208237, New Haven CT 06520-8237.

## Required Immunizations

Please access the Incoming Student Vaccination Form for graduate and professional students at <http://yalehealth.yale.edu>. Connecticut state law requires that this form be completed and signed, for each student, by a physician, nurse practitioner, or physician's assistant. The deadline date for submission may be found on the form. The form must be completed, independent of any and all health insurance elections or coverage chosen.

**Measles, mumps, rubella, and varicella** All students who were born after January 1, 1957, are required to provide proof of immunization against measles (rubeola), mumps, German measles (rubella), and varicella. Connecticut state law requires two doses of measles vaccine, two doses of mumps vaccine, two doses of rubella vaccine, and two doses of varicella vaccine. The first dose must have been given on or after January 1, 1980, and after the student's first birthday; the second dose must have been given at least thirty (30) days after the first dose. If dates of vaccination are not available, titer results (blood test) demonstrating immunity may be substituted for proof of vaccination. The cost for all vaccinations and/or titers rests with the student, as these vaccinations are considered to be a pre-entrance requirement by the Connecticut State Department of Public Health. Students who are not compliant with this state law will not be permitted to register for classes or move into the dormitories for the fall term, 2017.

**Quadrivalent meningitis** All students living in on-campus dormitory facilities must be vaccinated against meningitis. The only vaccines that will be accepted in satisfaction of the meningitis vaccination requirement are ACWY Vax, Menveo, Nimenrix, Menactra, Mencevax, and Menomune. The vaccine must have been received after January 1, 2013. Students who are not compliant with this state law will not be permitted to register for classes or move into the dormitories for the fall term, 2017. The cost for all vaccinations and/or titers rests with the student, as these vaccinations are considered to be a pre-entrance requirement by the Connecticut State Department of Public Health. Please



note that the State of Connecticut does not require this vaccine for students who intend to reside off campus.

**TB screening** The University strongly recommends tuberculosis screening for all incoming students who have lived or traveled outside of the United States.

## OFFICE OF INTERNATIONAL STUDENTS AND SCHOLARS

<http://oiss.yale.edu>

The Office of International Students and Scholars (OISS) coordinates services and support for Yale's 5,200 international students, faculty, staff, and their dependents. OISS staff offers assistance with issues related to employment, immigration, and personal and cultural adjustment, as well as serves as a source of general information about living at Yale and in New Haven. As Yale University's representative for immigration concerns, OISS provides assistance to students, faculty, and staff on how to obtain and maintain legal nonimmigrant status in the United States. All international students and scholars must register with OISS as soon as they arrive at Yale; see <http://oiss.yale.edu/coming>.

OISS programs, like the Community Friends hosting program, daily English conversation groups, U.S. culture workshops and discussions, bus trips, and social events, provide an opportunity to meet members of Yale's international community and become acquainted with the many resources of Yale University and New Haven. Spouses and partners of Yale students and scholars will want to get involved with the International Spouses and Partners at Yale (ISPY), which organizes a variety of programs.

The OISS 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, and meet up with a friend or colleague. Open until 9 p.m. on weekdays during the academic year, the center—located at 421 Temple Street, across the street from Helen Hadley Hall—also provides meeting space for student groups and a venue for events organized by both student groups and University departments. For more information about reserving space at the center, go to <http://oiss.yale.edu/about/the-international-center/international-center-room-reservations>. For information about the center, visit <http://oiss.yale.edu/about/international-center>.

## RESOURCE OFFICE ON DISABILITIES

<http://rod.yale.edu>

The Resource Office on Disabilities facilitates accommodations for undergraduate and graduate and professional school students with disabilities who register with and have appropriate documentation on file in the Resource Office. Early planning is critical. Documentation may be submitted to the Resource Office even though a specific accommodation request is not anticipated at the time of registration. It is recommended that matriculating students in need of disability-related course accommodations at

Yale University contact the Resource Office by June 15. Special requests for University housing need to be made in the housing application. Returning students must contact the Resource Office at the beginning of each term to arrange for course and exam accommodations.

The Resource Office also provides assistance to students with temporary disabilities. General informational inquiries are welcome from students and members of the Yale community and from the public. The mailing address is Resource Office on Disabilities, Yale University, PO Box 208305, New Haven CT 06520-8305. The Resource Office is located at 35 Broadway (rear entrance), Room 222. Office hours are Monday through Friday, 8:30 a.m. to 4:30 p.m. Voice callers may reach staff at 203.432.2324; fax at 203.432.8250. The Resource Office may also be reached by e-mail (ROD@yale.edu) or through its website (<http://rod.yale.edu>).

## RESOURCES ON SEXUAL MISCONDUCT

Yale University is committed to maintaining and strengthening an educational, employment, and living environment founded on civility and mutual respect. Sexual misconduct is antithetical to the standards and ideals of our community, and it is a violation of Yale policy and the disciplinary regulations of Yale College and the graduate and professional schools.

Sexual misconduct incorporates a range of behaviors including sexual assault, sexual harassment, intimate partner violence, stalking, voyeurism, and any other conduct of a sexual nature that is nonconsensual, or has the purpose or effect of threatening, intimidating, or coercing a person. Violations of Yale's Policy on Teacher-Student Consensual Relations also constitute sexual misconduct. Sexual activity requires consent, which is defined as positive, unambiguous, and voluntary agreement to engage in specific sexual activity throughout a sexual encounter.

Yale aims to eradicate sexual misconduct through education, training, clear policies, and serious consequences for violations of these policies. In addition to being subject to University disciplinary action, many forms of sexual misconduct are prohibited by Connecticut and federal law and may lead to civil liability or criminal prosecution. Yale provides a range of services, resources, and mechanisms for victims of sexual misconduct. The options for undergraduate, graduate, and professional school students are described at <http://smr.yale.edu>.

## SHARE: Information, Advocacy, and Support

55 Lock Street, Lower Level

Office hours: 9 a.m.–5 p.m., M–F

24/7 hotline: 203.432.2000

<http://sharecenter.yale.edu>

SHARE, the Sexual Harassment and Assault Response and Education Center, has trained counselors available 24/7, including holidays. SHARE is available to members of the Yale community who wish to discuss any experience of sexual misconduct involving themselves or someone they care about. SHARE services are confidential and can be anonymous if desired. SHARE can provide professional help with medical and health issues (including accompanying students to the hospital), as well as advice and assistance with contacting police and/or initiating a formal or informal complaint, and

it offers ongoing counseling and support. SHARE works closely with the University-Wide Committee on Sexual Misconduct, the Title IX coordinators, the Yale Police Department, and other campus resources.

If you wish to make use of SHARE's services, you can call the SHARE number (203.432.2000) at any time for a phone consultation or to set up an in-person appointment. You may also drop in on weekdays during regular business hours. Some legal and medical options are time-sensitive, so if you have been assaulted, we encourage you to call SHARE and/or the Yale Police as soon as possible. Counselors can talk with you over the telephone or meet you in person at Acute Care in the Yale Health Center or at the Yale New Haven Emergency Room. If it is not an acute situation and you would like to contact the SHARE staff during regular business hours, you can contact Carole Goldberg, the director of SHARE (203.432.0310, [carole.goldberg@yale.edu](mailto:carole.goldberg@yale.edu)), Jennifer Czincz, assistant director (203.432.2610, [jennifer.czincz@yale.edu](mailto:jennifer.czincz@yale.edu)), Sherine Powerful (203.436.8217, [sherine.powerful@yale.edu](mailto:sherine.powerful@yale.edu)), or John Criscuolo (203.494.6247, [john.criscuolo@yale.edu](mailto:john.criscuolo@yale.edu)).

## Title IX Coordinators

203.432.4446

Office hours: 9 a.m.–5 p.m., M–F

<http://provost.yale.edu/title-ix>

Title IX of the Education Amendments of 1972 protects people from sex discrimination in educational programs and activities at institutions that receive federal financial assistance. Sex discrimination includes sexual harassment, sexual assault, and other forms of misconduct. The University is committed to providing an environment free from discrimination on the basis of sex.

Yale College, the Graduate School of Arts and Sciences, and the professional schools have each designated a senior administrator or faculty member to serve as a deputy Title IX coordinator, reporting to Stephanie Spangler, Deputy Provost for Health Affairs and Academic Integrity and the University Title IX Coordinator. Coordinators respond to and address specific complaints, provide information on and coordinate with the available resources, track and monitor incidents to identify patterns or systemic issues, deliver prevention and educational programming, and address issues relating to gender-based discrimination and sexual misconduct within their respective schools. Coordinators are knowledgeable about, and will provide information on, all options for complaint resolution, and can initiate institutional action when necessary. Discussions with a Title IX coordinator are confidential; at times, the coordinator may need to consult with other administrators or take action in the interest of safety. The coordinators also work closely with the SHARE Center, the University-Wide Committee on Sexual Misconduct, and the Yale Police Department.

## University-Wide Committee on Sexual Misconduct

203.432.4449

Office hours: 9 a.m.–5 p.m., M–F

<http://provost.yale.edu/uwc>

The University-Wide Committee on Sexual Misconduct (UWC) is an internal disciplinary board for complaints of sexual misconduct available to students, faculty, and staff across the University, as described in the committee's procedures. The UWC provides an accessible, representative, and trained body to fairly and expeditiously address formal complaints of sexual misconduct. UWC members can answer inquiries about procedures and the University definition of sexual misconduct. The UWC is comprised of faculty, administrative, and student representatives from across the University. In UWC cases, investigations are conducted by professional, independent fact finders.

## Yale Police Department

101 Ashmun Street

24/7 hotline: 203.432.4400

<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 Marnie Robbins Hoffman, the Sensitive Crimes & Support coordinator, she can be reached at 203.432.9547 during business hours or via e-mail at [marnie.robbs@yale.edu](mailto:marnie.robbs@yale.edu). Informational sessions are available with the Sensitive Crimes & Support coordinator to discuss safety planning, available options, etc. The YPD works closely with the New Haven State's Attorney, the SHARE Center, the University's Title IX coordinators, and various other departments within the University. Talking to the YPD does not commit you to submitting evidence or pressing charges; with few exceptions, all decisions about how to proceed are up to you.

# THE WORK OF YALE UNIVERSITY

The work of Yale University is carried on in the following schools:

**Yale College** Est. 1701. Courses in humanities, social sciences, natural sciences, mathematical and computer sciences, and engineering. Bachelor of Arts (B.A.), Bachelor of Science (B.S.).

For additional information, please visit <http://admissions.yale.edu>, e-mail [student.questions@yale.edu](mailto:student.questions@yale.edu), or call 203.432.9300. Postal correspondence should be directed to Office of Undergraduate Admissions, Yale University, PO Box 208234, New Haven CT 06520-8234.

**Graduate School of Arts and Sciences** Est. 1847. Courses for college graduates. Master of Advanced Study (M.A.S.), Master of Arts (M.A.), Master of Science (M.S.), Master of Philosophy (M.Phil.), Doctor of Philosophy (Ph.D.).

For additional information, please visit <http://gsas.yale.edu>, e-mail [graduate.admissions@yale.edu](mailto: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.

For additional information, please visit <http://medicine.yale.edu/education/admissions>, e-mail [medical.admissions@yale.edu](mailto:medical.admissions@yale.edu), or call the Office of Admissions at 203.785.2643. Postal correspondence should be directed to Office of Admissions, Yale School of Medicine, 367 Cedar Street, New Haven CT 06510.

**Divinity School** Est. 1822. Courses for college graduates. Master of Divinity (M.Div.), Master of Arts in Religion (M.A.R.). Individuals with an M.Div. degree may apply for the program leading to the degree of Master of Sacred Theology (S.T.M.).

For additional information, please visit <http://divinity.yale.edu>, e-mail [div.admissions@yale.edu](mailto: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 <http://law.yale.edu>, e-mail [admissions.law@yale.edu](mailto: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 <http://law.yale.edu>, e-mail [gradpro.law@yale.edu](mailto:gradpro.law@yale.edu), or call the Graduate Programs Office at 203.432.1696. Postal correspondence should be directed to Graduate Programs, Yale Law School, PO Box 208215, New Haven CT 06520-8215.

**School of Engineering & Applied Science** Est. 1852. Courses for college graduates. Master of Science (M.S.) and Doctor of Philosophy (Ph.D.) awarded by the Graduate School of Arts and Sciences.

For additional information, please visit <http://seas.yale.edu>, e-mail [grad.engineering@yale.edu](mailto:grad.engineering@yale.edu), or call 203.432.4252. Postal correspondence should be directed to Office of Graduate Studies, Yale School of Engineering & Applied Science, PO Box 208267, New Haven CT 06520-8267.

**School of Art** Est. 1869. Professional courses for college and art school graduates. Master of Fine Arts (M.F.A.).

For additional information, please visit <http://art.yale.edu>, e-mail [artschool.info@yale.edu](mailto:artschool.info@yale.edu), or call the Office of Academic Affairs at 203.432.2600. Postal correspondence should be directed to Office of Academic Affairs, Yale School of Art, PO Box 208339, New Haven CT 06520-8339.

**School of Music** Est. 1894. Graduate professional studies in performance, composition, and conducting. Certificate in Performance, Master of Music (M.M.), Master of Musical Arts (M.M.A.), Artist Diploma (A.D.), Doctor of Musical Arts (D.M.A.).

For additional information, please visit <http://music.yale.edu>, e-mail [gradmusic.admissions@yale.edu](mailto:gradmusic.admissions@yale.edu), or call the Office of Admissions at 203.432.4155. Postal correspondence should be directed to Yale School of Music, PO Box 208246, New Haven CT 06520-8246.

**School of Forestry & Environmental Studies** Est. 1900. Courses for college graduates. Master of Forestry (M.F.), Master of Forest Science (M.F.S.), Master of Environmental Science (M.E.Sc.), Master of Environmental Management (M.E.M.). Doctor of Philosophy (Ph.D.) awarded by the Graduate School of Arts and Sciences.

For additional information, please visit <http://environment.yale.edu>, e-mail [fesinfo@yale.edu](mailto:fesinfo@yale.edu), or call the Office of Admissions at 800.825.0330. Postal correspondence should be directed to Office of Admissions, Yale School of Forestry & Environmental Studies, 195 Prospect Street, New Haven CT 06511.

**School of Public Health** Est. 1915. Courses for college graduates. Master of Public Health (M.P.H.). Master of Science (M.S.) and Doctor of Philosophy (Ph.D.) awarded by the Graduate School of Arts and Sciences.

For additional information, please visit <http://publichealth.yale.edu>, e-mail [ysph.admissions@yale.edu](mailto:ysph.admissions@yale.edu), or call the Admissions Office at 203.785.2844.

**School of Architecture** Est. 1916. Courses for college graduates. Professional degree: Master of Architecture (M.Arch.); nonprofessional degree: Master of Environmental Design (M.E.D.). Doctor of Philosophy (Ph.D.) awarded by the Graduate School of Arts and Sciences.

For additional information, please visit <http://architecture.yale.edu>, e-mail [gradarch.admissions@yale.edu](mailto:gradarch.admissions@yale.edu), or call 203.432.2296. Postal correspondence should be directed to the Yale School of Architecture, PO Box 208242, New Haven CT 06520-8242.

**School of Nursing** Est. 1923. Courses for college graduates. Master of Science in Nursing (M.S.N.), Post Master's Certificate, Doctor of Nursing Practice (D.N.P.). Doctor of Philosophy (Ph.D.) awarded by the Graduate School of Arts and Sciences.

For additional information, please visit <http://nursing.yale.edu> or call 203.785.2389. Postal correspondence should be directed to Yale School of Nursing, Yale University West Campus, PO Box 27399, West Haven CT 06516-7399.

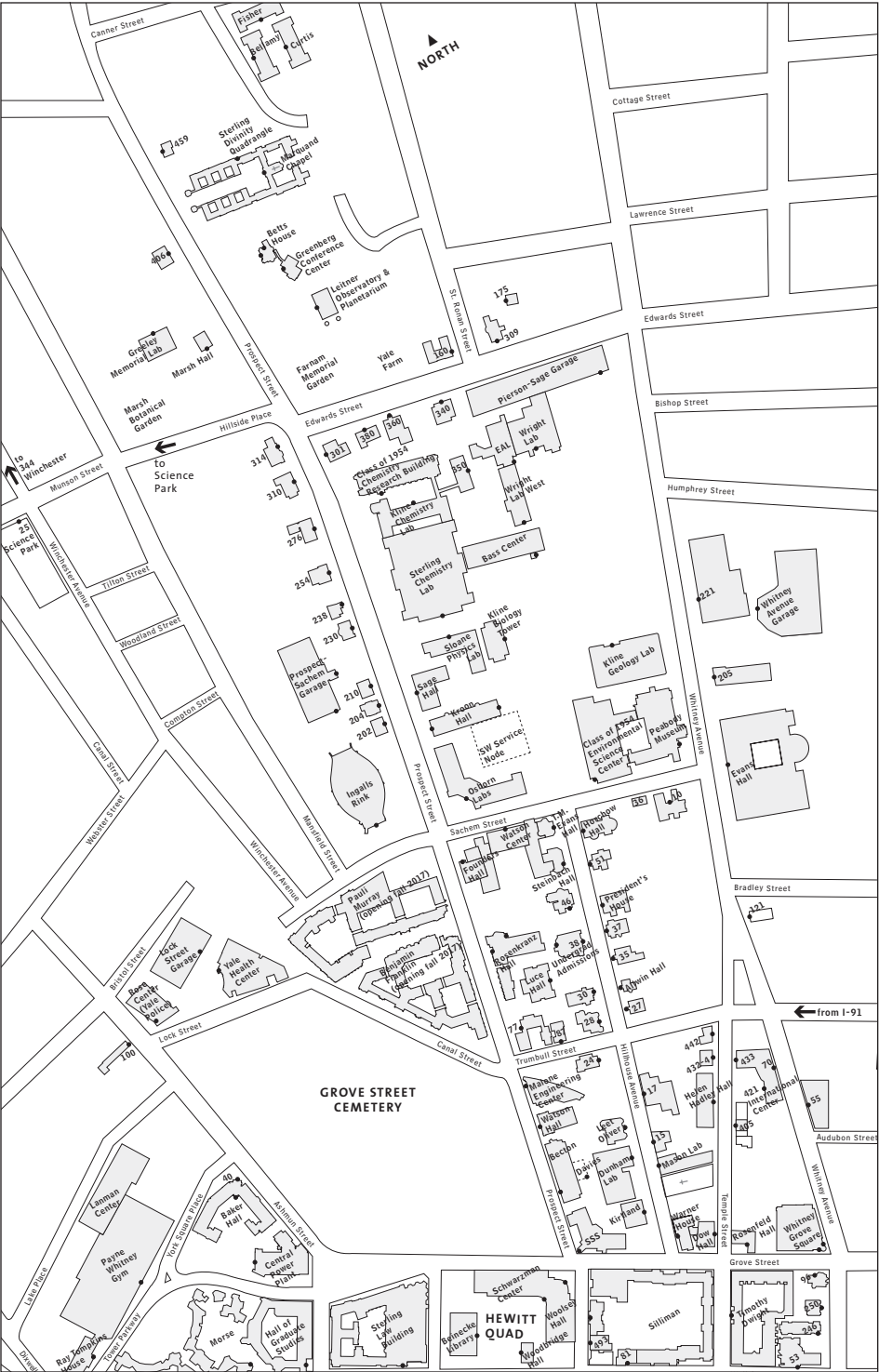
**School of Drama** Est. 1925. Courses for college graduates and certificate students. Master of Fine Arts (M.F.A.), Certificate in Drama, One-year Technical Internship (Certificate), Doctor of Fine Arts (D.F.A.).

For additional information, please visit <http://drama.yale.edu>, e-mail [ysd.admissions@yale.edu](mailto: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 <http://som.yale.edu>. Postal correspondence should be directed to Yale School of Management, PO Box 208200, New Haven CT 06520-8200.

YALE UNIVERSITY CAMPUS NORTH



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YALE UNIVERSITY CAMPUS SOUTH & YALE MEDICAL CENTER





The University is committed to basing judgments concerning the admission, education, and employment of individuals upon their qualifications and abilities and affirmatively seeks to attract to its faculty, staff, and student body qualified persons of diverse backgrounds. In accordance with this policy and as delineated by federal and Connecticut law, Yale does not discriminate in admissions, educational programs, or employment against any individual on account of that individual's sex, race, color, religion, age, disability, status as a protected veteran, or national or ethnic origin; nor does Yale discriminate on the basis of sexual orientation or gender identity or expression.

University policy is committed to affirmative action under law in employment of women, minority group members, individuals with disabilities, and protected veterans.

Inquiries concerning these policies may be referred to Valarie Stanley, Director of the Office for Equal Opportunity Programs, 221 Whitney Avenue, 3rd Floor, 203.432.0849. For additional information, see [www.yale.edu/equalopportunity](http://www.yale.edu/equalopportunity).

Title IX of the Education Amendments of 1972 protects people from sex discrimination in educational programs and activities at institutions that receive federal financial assistance. Questions regarding Title IX may be referred to the University's Title IX Coordinator, Stephanie Spangler, at 203.432.4446 or at [titleix@yale.edu](mailto: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](mailto:ocr.boston@ed.gov).

In accordance with federal and state law, the University maintains information on security policies and procedures and prepares an annual campus security and fire safety report containing three years' worth of campus crime statistics and security policy statements, fire safety information, and a description of where students, faculty, and staff should go to report crimes. The fire safety section of the annual report contains information on current fire safety practices and any fires that occurred within on-campus student housing facilities. Upon request to the Office of the Deputy Vice President for Human Resources and Administration, PO Box 208322, 2 Whitney Avenue, Suite 810, New Haven CT 06520-8322, 203.432.8049, the University will provide this information to any applicant for admission, or prospective students and employees may visit <http://publicsafety.yale.edu>.

In accordance with federal law, the University prepares an annual report on participation rates, financial support, and other information regarding men's and women's intercollegiate athletic programs. Upon request to the Director of Athletics, PO Box 208216, New Haven CT 06520-8216, 203.432.1414, the University will provide its annual report to any student or prospective student. The Equity in Athletics Disclosure Act (EADA) report is also available online at <http://ope.ed.gov/athletics>.

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