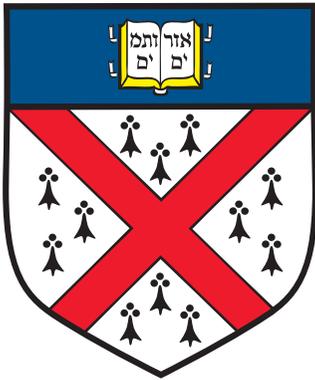


Yale College
Programs of Study
Fall and Spring Terms
2018–2019



BULLETIN OF YALE UNIVERSITY

Series 114 Number 9 August 1, 2018

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MISSION STATEMENT OF YALE COLLEGE The mission of Yale College is to seek exceptionally promising students of all backgrounds from across the nation and around the world and to educate them, through mental discipline and social experience, to develop their intellectual, moral, civic, and creative capacities to the fullest. The aim of this education is the cultivation of citizens with a rich awareness of our heritage to lead and serve in every sphere of human activity.

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KEY TO COURSE LISTINGS

AFAM	Course subjects are listed by three- or four-letter abbreviations in capitals. See the complete list of Subject Abbreviations.
MATH 112a or b	The letters “a” and “b” after a course number denote fall- and spring-term courses, respectively. A course designated “a or b” is the same course given in both terms.
Staff	Multiple course instructors are commonly listed as “Staff.” Refer to Yale Course Search (https://courses.yale.edu) for individual section instructors.
Prerequisite: MATH 112	Prerequisites and recommendations are listed at the end of the course description.
L5, HU	Foreign language courses are designated L ₁ (first term of language study), L ₂ (second term), L ₃ (third term), L ₄ (fourth term), or L ₅ (beyond the fourth term). Other distributional designations are QR, WR, HU, SC, and SO, representing quantitative reasoning, writing, humanities and arts, science, and social science, respectively. See “Distributional Requirements” under “Requirements for the B.A. or B.S. Degree” (http://catalog.yale.edu/ycps/academic-regulations/requirements-for-ba-bs-degree/) in the Academic Regulations.
½ Course cr	Most courses earn one course credit per term; variations are noted.
RP	A course designated “RP” meets during the reading period. See “Reading Period and Final Examination Period” (http://catalog.yale.edu/ycps/academic-regulations/reading-period-final-examination-period/) in the Academic Regulations.
[ASTR 320]	Courses in brackets are not offered during the current year but are expected to be given in the succeeding academic year.
*HIST 012	All seminars are starred and enrollment is limited. The instructor’s permission may be required.
ITAL 310/LITR 183	A course with multiple titles, i.e., with two or more departments in the title line, counts toward the major in each department where it appears.
TR	The abbreviation “TR” denotes a literature course with readings in translation.
English: Pre-1900 Lit	Courses with department-specific designations are applied toward the requirements of certain majors. See the program descriptions of the relevant majors.
HIST 130]b, MCDB 201Lb	A capital J or L following the course number denotes a History departmental seminar or a science laboratory, respectively.
Cognitive Science Courses: ECON 159	Related courses appear in departments other than their own (e.g., ECON 159 might be listed under Cognitive Science). Such courses may count toward the major of the relating department.

BUILDING ABBREVIATIONS

AKW	Arthur K. Watson Hall	LFOP	Leitner Family Observatory and Planetarium
BASS	Bass Center for Molecular and Structural Biology	LGH	Abby and Mitch Leigh Hall
BASSLB	Bass Library	LOM	Leet Oliver Memorial Hall
BCMM	Boyer Center for Molecular Medicine	LORIA	Jeffrey H. Loria Center
BCT	Becton Engineering and Applied Science Center	LUCE	Henry R. Luce Hall
BF	Benjamin Franklin College	LWR	Lanman-Wright Memorial Hall
BK	Berkeley College	MC	Morse College
BM	Charles W. Bingham Hall	MEC	Malone Engineering Center
BML	Brady Memorial Laboratory	ML	Mason Laboratory
BR	Branford College	MY	Pauli Murray College
BRBL	Beinecke Rare Book and Manuscript Library	OML	Osborn Memorial Laboratories
C	Connecticut Hall	PC	Pierson College
CRB	Class of 1954 Chemistry Research Building	PH	Phelps Hall
CSC	Child Study Center	PM	Peabody Museum of Natural History
D	Durfee Hall	PWG	Payne Whitney Gymnasium
DAVIES	Davies Auditorium, Becton Center	RDH	Rudolph Hall
DC	Davenport College	RKZ	Rosenkranz Hall
DL	Dunham Laboratory	SB	Sage Hall
DOW	Dow Hall	SCL	Sterling Chemistry Laboratory
EAL	Electron Accelerator Laboratory	SDQ	Sterling Divinity Quadrangle
EM	Edwin McClellan Hall	SHM	Sterling Hall of Medicine
ES	Ezra Stiles College	SLB	Sterling Law Building
ESC	Class of 1954 Environmental Science Center	SM	Silliman College
EVANS	Edward P. Evans Hall	SMH	Sprague Memorial Hall
F	Farnam Hall	SML	Sterling Memorial Library
GH	Grace Hopper College	SPL	Sloane Physics Laboratory
GML	Greeley Memorial Laboratory	SSS	Sheffield-Sterling-Strathcona Hall
GRN	Holcombe T. Green, Jr., Hall	STOECK	Stoeckel Hall
HENDRIE	Hendrie Hall	SY	Saybrook College
HGS	Hall of Graduate Studies	TAC	The Anlyan Center
JE	Jonathan Edwards College	TC	Trumbull College
K	Kirtland Hall	TD	Timothy Dwight College
KBT	Kline Biology Tower	UT	University Theatre
KCL	Kline Chemistry Laboratory	V	Vanderbilt Hall
KGL	Kline Geology Laboratory	W	Welch Hall
KRN	Kroon Hall	WL	Wright Laboratory
L	Lawrance Hall	WL-W	Wright Laboratory West
LC	Linsly-Chittenden Hall	WLH	William L. Harkness Hall
LEPH	Laboratory of Epidemiology and Public Health	WTS	Watson Center
		YCBA	Yale Center for British Art
		YUAG	Yale University Art Gallery

YALE COLLEGE CALENDAR WITH PERTINENT DEADLINES

This calendar includes a partial summary of deadlines given in the Academic Regulations (p. 33) and in the Yale College online publication *Undergraduate Regulations*. Unless otherwise specified, references are to sections in the Academic Regulations, and deadlines fall at 5 p.m.

Fall Term 2018

Aug. 22	W	Residences open to upper-level students, 9 a.m.
Aug. 24	F	Residences open to first-year students, 9 a.m. Required registration meetings for first-year students, 8 p.m.
Aug. 28	T	Required registration meetings for upper-level students (Class of 2021, 9 a.m.; Class of 2020, 9:45 a.m.; Class of 2019, 10:30 a.m.).
Aug. 29	W	Fall-term classes begin, 8:20 a.m.
Aug. 31	F	Friday classes do not meet; Monday classes meet instead. Deadline to complete applications for financial aid for the 2019 spring term, for students not enrolled in the 2018 fall term. See <i>Undergraduate Regulations</i> .
Sept. 3	M	Labor Day; classes do not meet.
Sept. 10	M	Final course schedules due for the Class of 2022.*
Sept. 11	T	Final course schedules due for the Classes of 2020 and 2021.*
Sept. 12	W	Final course schedules due for the Class of 2019.* All students planning to complete degree requirements at the end of the fall term must file a petition by this date. Final deadline to apply for a fall-term Leave of Absence. See Leave of Absence, Withdrawal, and Reinstatement (p. 59). Withdrawal from Yale College on or before this date entitles a student to a full rebate of fall-term tuition. See <i>Undergraduate Regulations</i> .
Sept. 21	F	Last day to withdraw from a course offered in the first half of the fall term without the course appearing on the transcript. See Withdrawal from Courses (p. 50) and Grades (p. 40). Last day to convert from a letter grade to the Credit/D/Fail option in a course offered in the first half of the fall term. See Grades (p. 40).
Sept. 22	S	Withdrawal from Yale College on or before this date entitles a student to a rebate of one-half of fall-term tuition. See <i>Undergraduate Regulations</i> .
Oct. 5	F	Last day to withdraw from a course offered in the first half of the fall term. See Withdrawal from Courses (p. 50) and Grades (p. 40).
Oct. 15	M	Classes begin for courses offered in the second half of the fall term. Deadline to apply for a spring 2019 Term Abroad. See Special Arrangements (p. 64).
Oct. 16	T	October recess begins, 11 p.m.
Oct. 22	M	Classes resume, 8:20 a.m.

Oct. 26	F	Midterm. Last day to withdraw from a fall full-term course without the course appearing on the transcript. See <i>Withdrawal from Courses</i> (p. 50) and <i>Grades</i> (p. 40). Last day to convert from a letter grade to the Credit/D/Fail option in a fall full-term course. Deadline to apply for double credit in a single-credit course. See <i>Special Arrangements</i> . Withdrawal from Yale College on or before this date entitles a student to a rebate of one-quarter of the fall term's tuition. See <i>Undergraduate Regulations</i> .
Nov. 9	F	Last day to withdraw from a course offered in the second half of the fall term without the course appearing on the transcript. See <i>Withdrawal from Courses</i> (p. 50) and <i>Grades</i> (p. 40). Last day to convert from a letter grade to the Credit/D/Fail option in a course offered in the second half of the fall term. See <i>Grades</i> (p. 40).
Nov. 16	F	November recess begins, 5:30 p.m.
Nov. 26	M	Classes resume, 8:20 a.m.
Nov. 30	F	Last day to relinquish on-campus housing for the spring term without charge. See <i>Undergraduate Regulations</i> .
Dec. 7	F	Classes end, 5:30 p.m.; reading period begins. Last day to withdraw from a fall full-term course or a course offered in the second half of the fall term. See <i>Withdrawal from Courses</i> (p. 50) and <i>Grades</i> (p. 40).
Dec. 13	TH	Reading period ends, 5 p.m. Final examinations begin, 7 p.m.† Deadline for all course assignments, other than term papers and term projects. This deadline can be extended only by a Temporary Incomplete authorized by the student's residential college dean.
Dec. 14	F	Application for 2019 Yale Summer Session Programs Abroad opens.
Dec. 19	W	Examinations end, 5:30 p.m.; winter recess begins. Deadline for all term papers and term projects. This deadline can be extended only by a Temporary Incomplete authorized by the student's residential college dean.
Dec. 20	TH	Residences close, 12 noon.

Spring Term 2019

Jan. 9	W	Residences open, 9 a.m.
Jan. 13	SU	Required registration meetings for first-year students, 9 p.m.
Jan. 14	M	Spring-term classes begin, 8:20 a.m. Upper-level students pick up registration materials by 5 p.m. in their residential college dean's office. Application for 2019 New Haven and online Summer Session courses opens. Rolling admissions for New Haven and online courses.
Jan. 18	F	Friday classes do not meet; Monday classes meet instead.
Jan. 21	M	Martin Luther King Jr. Day; classes do not meet.
Jan. 23	W	Final course schedules due for the Class of 2022.*
Jan. 24	TH	Final course schedules due for the Classes of 2020 and 2021.*
Jan. 25	F	Final course schedules due for the Class of 2019.* Last day for students in the Class of 2019 to petition for permission to complete the requirements of two majors.

Jan. 28	M	Final deadline to apply for a spring-term Leave of Absence. See Leave of Absence, Withdrawal, and Reinstatement (p. 59). Withdrawal from Yale College on or before this date entitles a student to a full rebate of spring-term tuition. See <i>Undergraduate Regulations</i> .
Feb. 1	F	Last day to withdraw from a course offered in the first half of the spring term without the course appearing on the transcript. See Withdrawal from Courses (p. 50) and Grades (p. 40). Last day to convert from a letter grade to the Credit/D/Fail option in a course offered in the first half of the spring term. See Grades (p. 40).
Feb. 7	TH	Withdrawal from Yale College on or before this date entitles a student to a rebate of one-half of spring-term tuition. See <i>Undergraduate Regulations</i> .
Feb. 15	F	Last day to withdraw from a course offered in the first half of the spring term. See Withdrawal from Courses (p. 50) and Grades (p. 40). Deadline for applications for Yale Summer Session Programs Abroad.
Feb. 27	W	Classes begin for courses offered in the second half of the spring term.
Mar. 1	F	Deadline to apply for Non-Yale Summer Abroad.
Mar. 5	T	Deadline to apply for a fall 2019 Term Abroad or a 2019–2020 Year Abroad.
Mar. 8	F	Midterm. Spring recess begins, 5:30 p.m. Last day to withdraw from a spring full-term course without the course appearing on the transcript. See Withdrawal from Courses (p. 50) and Grades (p. 40). Last day to convert from a letter grade to the Credit/D/Fail option in a spring full-term course. Deadline to apply for double credit in a single-credit course. See Special Arrangements (p. 69). Withdrawal from Yale College on or before this date entitles a student to a rebate of one-quarter of the spring term's tuition. See <i>Undergraduate Regulations</i> .
Mar. 25	M	Classes resume, 8:20 a.m.
Apr. 5	F	Last day to withdraw from a course offered in the second half of the spring term without the course appearing on the transcript. See Withdrawal from Courses (p. 50) and Grades (p. 40). Last day to convert from a letter grade to the Credit/D/Fail option in a course offered in the second half of the spring term. See Grades (p. 40).
Apr. 26	F	Classes end, 5:30 p.m.; reading period begins. Last day to withdraw from a spring full-term course or a course offered in the second half of the spring term. See Withdrawal from Courses (p. 50) and Grades (p. 40).
May 1	W	Applications for fall-term Leaves of Absence due. See Leave of Absence, Withdrawal, and Reinstatement (p. 59).
May 2	TH	Reading period ends, 5 p.m. Final examinations begin, 7 p.m. [†] Deadline for all course assignments, other than term papers and term projects. This deadline can be extended only by a Temporary Incomplete authorized by the student's residential college dean.
May 8	W	Examinations end, 5:30 p.m. Deadline for all term papers and term projects. This deadline can be extended only by a Temporary Incomplete authorized by the student's residential college dean.

May 9	TH	Residences close for all students except seniors, 12 noon.
May 20	M	University Commencement.
May 21	T	Residences close for seniors, 12 noon.

Summer Session 2019

Courses in summer are offered through Yale Summer Session. Important application deadlines that occur during the spring and fall terms are also listed below. Further information is available from the Yale Summer Session office or on the website.

Dec. 14	F	Application for 2019 Yale Faculty-led Programs Abroad opens.
Jan. 14	M	Application for 2019 New Haven and online Summer Session courses opens. Rolling admissions for New Haven and online courses.
Feb. 15	F	Deadline for applications for Yale Faculty-led Programs Abroad.
May 22	W	Last day to add a Session A online course.
May 27	M	Session A classes begin, 9 a.m.
May 31	F	Last day to add a Session A on-campus course. Withdrawal from Session A on or before this date entitles a student to a full rebate of Session A tuition. Withdrawal from housing on or before this date entitles a student to a partial room and board rebate. No housing refunds will be made after this date.
Jun. 7	F	Withdrawal from Session A on or before this date entitles the student to a rebate of one-half of Session A tuition.
Jun. 12	W	Last day to withdraw from a Session A course without a W appearing on the transcript (4 p.m.). Last day to convert a Session A course from a letter grade to the Credit/D/Fail option.
Jun. 28	F	Session A classes end. Deadline for all Session A papers, projects, and exams. This deadline can be extended only by prior permission of the dean of Yale Summer Session. Residences close, 6 p.m. Last day to add a Session B online course.
Jul. 1	M	Session B classes begin, 9 a.m.
Jul. 5	F	Last day to add a Session B on-campus course. Withdrawal from Session B on or before this date entitles a student to a full rebate of Session B tuition. Withdrawal from housing on or before this date entitles a student to a partial room and board rebate. No housing refunds will be made after this date.
Jul. 12	F	Withdrawal from Session B on or before this date entitles the student to a rebate of one-half of Session B tuition.
Jul. 17	W	Last day to withdraw from a Session B course without a W appearing on the transcript. Last day to convert a Session B course from a letter grade to the Credit/D/Fail option.
Aug. 2	F	Session B classes end. Deadline for all Session B papers, projects, and exams. This deadline can be extended only by prior permission of the dean of Yale Summer Session.
Aug. 3	S	Residences close, 9 a.m.

* Late schedules from all classes are fined. See Grades and Registration and Enrollment in Courses (p. 46).

† Examinations will be held on Saturdays and Sundays, December 15 and 16; May 4 and 5.

YALE COLLEGE ADMINISTRATIVE OFFICERS

ADMINISTRATIVE OFFICERS

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Jonathan Edwards College, Christina Ferando, Ph.D.
Benjamin Franklin College, Jessie Royce Hill, M.S.
Grace Hopper College, David Francis, Ph.D.
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Scott Wallace-Juedes, B.A., Director of Undergraduate Financial Aid
Caesar Storlazzi, M.M., University Director of Financial Aid
Kerry Worsencroft, B.S., Deputy University Director of Financial Aid

FINAL EXAMINATION SCHEDULES

Rules governing the conduct of final examinations are given under Reading Period and Final Examination Period (p. 51).

An examination group number is assigned to every course. Examination group assignments are based on course meeting times, according to the following scheme. Hours shown are the times at which courses begin:

- | | | | |
|------|----------------------------|------|-------------------------|
| (31) | M, W, or F, 8:20 a.m. | | |
| (32) | M, W, or F, 9 or 9:25 a.m. | (22) | T or Th, 9 or 9:25 a.m. |
| (33) | M, W, or F, 10:30 a.m. | (23) | T or Th, 10:30 a.m. |
| (34) | M, W, or F, 11:35 a.m. | (24) | T or Th, 11:35 a.m. |
| (36) | M, W, or F, 1 or 1:30 p.m. | (26) | T or Th, 1 or 1:30 p.m. |
| (37) | M, W, or F, after 2 p.m. | (27) | T or Th, after 2 p.m. |

Note: With the exception of courses assigned to common examination groups, a change in class meeting time will alter the examination time.

Courses with multiple sections but a common examination are assigned to an examination group from (61) to (69). Typical assignments include (but are not limited to): (61) foreign languages; (63) introductory-level English; (64) introductory economics; (65) physics; (69) introductory mathematics.

The examination group (50) is assigned to courses whose times are published HTBA, or whose times belong to more than one of the groups listed above.

Courses in group (o) usually have no regular final examination, concluding instead with a term essay or other final exercise. Instructors of such courses may schedule a regular final examination based on the course starting time.

Final examination dates and times for 2018-2019 are:

2018	9 a.m.	2 p.m.	7 p.m.	2019	9 a.m.	2 p.m.	7 p.m.
13 Dec. Th			(65)	2 May Th			(22)
14 Dec. F	(61)	(32)		3 May F	(64)	(24)	
15 Dec. Sa	(64)	(34)	(36)	4 May Sa	(37)	(26)	(32)
16 Dec. Su		(24)	(27)	5 May Su		(33)	(27)
17 Dec. M	(63)	(33)	(37)	6 May M	(61)	(34)	(69)
18 Dec. Tu	(69)	(26)	(31)	7 May Tu	(63)	(36)	(23)
19 Dec. W	(22)	(23)		8 May W	(65)	(31)	

A student who in a given term elects two courses with the same examination group number will be charged \$35 for a makeup examination. (See "Postponement of Final Examinations" under Completion of Course Work.)

SUBJECT ABBREVIATIONS

ACCT	Accounting	FILM	Film and Media Studies
AFAM	African American Studies	FNSH	Finnish
AFST	African Studies	FREN	French
AKKD	Akkadian	G&G	Geology and Geophysics
AMST	American Studies	GLBL	Global Affairs
AMTH	Applied Mathematics	GMAN	Germanic Languages and Literatures
ANTH	Anthropology	GREK	Ancient Greek
APHY	Applied Physics	HEBR	Hebrew
ARBC	Arabic	HGRN	Hungarian
ARCG	Archaeological Studies	HIST	History
ARCH	Architecture	HLTH	Global Health Studies
ART	Art	HMRT	Human Rights
ASL	American Sign Language	HNDI	Hindi
ASTR	Astronomy	HSAR	History of Art
BENG	Biomedical Engineering	HSHM	History of Science, Medicine, and Public Health
BIOL	Biology	HUMS	Humanities
BNGL	Bengali	INDN	Indonesian
BRST	British Studies	ITAL	Italian
BURM	Burmese	JAPN	Japanese
CENG	Chemical Engineering	JDST	Judaic Studies
CGSC	Cognitive Science	KHMR	Khmer
CHEM	Chemistry	KREN	Korean
CHLD	Child Study Center	LAST	Latin American Studies
CHNS	Chinese	LATN	Latin
CLCV	Classical Civilization	LING	Linguistics
CLSS	Classics	LITR	Literature
CPAR	Computing and the Arts	MATH	Mathematics
CPSC	Computer Science	MB&B	Molecular Biophysics and Biochemistry
CZEC	Czech	MCDB	Molecular, Cellular, and Developmental Biology
DEVN	DeVane Lecture Course	MENG	Mechanical Engineering
DRST	Directed Studies	MGRK	Modern Greek
DUTC	Dutch	MMES	Modern Middle East Studies
EALL	East Asian Languages and Literatures	MTBT	Modern Tibetan
EAST	East Asian Studies	MUSI	Music
ECON	Economics	NAVY	Naval Science
EDST	Education Studies	NELC	Near Eastern Languages and Civilizations
E&EB	Ecology and Evolutionary Biology	NSCI	Neuroscience
EENG	Electrical Engineering	PERS	Persian
EGYP	Egyptian	PHIL	Philosophy
ENAS	Engineering and Applied Science	PHYS	Physics
ENGL	English Language and Literature	PLSC	Political Science
ENVE	Environmental Engineering	PLSH	Polish
EP&E	Ethics, Politics, and Economics		
ER&M	Ethnicity, Race, and Migration		
EVST	Environmental Studies		
F&ES	Forestry & Environmental Studies		

PNJB	Punjabi
PORT	Portuguese
PSYC	Psychology
RLST	Religious Studies
ROMN	Romanian
RSEE	Russian and East European Studies
RUSS	Russian
S&DS	Statistics and Data Science
SAST	South Asian Studies
SBCR	Bosnian-Croatian-Serbian
SCIE	Science
SKRT	Sanskrit
SLAV	Slavic Languages and Literatures
SNHL	Sinhala
SOCY	Sociology
SPAN	Spanish
SPEC	Special Divisional Major
STCY	Study of the City
SWAH	Kiswahili
TAML	Tamil
TBTN	Classical Tibetan
THST	Theater Studies
TKSH	Turkish
UKRN	Ukrainian
USAF	Aerospace Studies
VIET	Vietnamese
WGSS	Women's, Gender, and Sexuality Studies
WLOF	Wolof
YORU	Yorùbá
ZULU	isiZulu

A MESSAGE FROM THE DEAN OF YALE COLLEGE

We officially call this publication *Yale College Programs of Study*, but generations of students and faculty have known it simply as the blue book. A compendium of roughly 2,000 courses to be offered in Yale College in 2018–2019, the blue book is a resource to use. Bookmark pages you wish to return to; browse the subjects that you find yourself called to. Let the blue book be your key to the renowned faculty at Yale, through whose courses you will develop the intellectual knowledge, skills, and sense of citizenship that will serve you all the days of your lives.

Of course, a listing of individual courses does not constitute an education. To help shape that education, we offer you the counsel of faculty and deans and the guiding principles of our distributional requirements, but in the end we are counting on you to explore your old passions and new interests in ways that will lead you to become cultivated citizens of the world. Our expectation is that when you leave Yale, you will not only have acquired a trained mind, broadened knowledge, and a greater sense of citizenship; you also will have come to a deeper understanding of the continuing joy of disciplined learning.

We hope that the blue book will stir you to consider courses of study that you had never before imagined and lead you deeper into intellectual worlds you already have explored. It represents the heart and soul of what the Yale faculty holds in promise for you. It comes to you with our best wishes for a successful year.

Marvin M. Chun, Ph.D.

Dean of Yale College

Richard M. Colgate Professor of Psychology; Neuroscience; Cognitive Science

I. YALE COLLEGE

The Undergraduate Curriculum

Yale College, founded in 1701, is a coeducational undergraduate institution offering instruction in the liberal arts and sciences to about 5,200 students. The College is the oldest and the largest school of the University, which also comprises the Graduate School of Arts and Sciences and ten professional schools.

Yale College offers a liberal arts education, one that aims to cultivate a broadly informed, highly disciplined intellect without specifying in advance how that intellect will be used. Such an approach to learning regards college as a phase of exploration, a place for the exercise of curiosity, and an opportunity for the discovery of new interests and abilities. The College does not seek primarily to train students in the particulars of a given career, although some students may elect to receive more of that preparation than others. Instead, its main goal is to instill knowledge and skills that students can bring to bear in whatever work they eventually choose. This philosophy of education corresponds with that expressed in the Yale Report of 1828, which draws a distinction between “expanding [the mind’s] powers, and storing it with knowledge.” Acquiring facts is important, but learning how to think critically and creatively in a variety of ways takes precedence.

To ensure that study is neither too narrowly focused nor too diffuse, the College stands behind the principle of distribution of studies as strongly as it supports the principle of concentration. It requires that study be characterized, particularly in the earlier years, by a reasonable diversity of subject matter and approach, and in the later years, by concentration in one of the major programs or departments. In addition, the College requires that all students take courses that develop certain foundational skills—writing, quantitative reasoning, and foreign language—that hold the key to opportunities in later study and later life. People who fail to develop these skills at an early stage unknowingly limit their futures. In each skill, students are required to travel some further distance from where they were in high school so that each competence matures and deepens. The best high school writer is still not the writer he or she could be; students who do not use their mathematics or foreign language skills in college commonly lose abilities they once had and can graduate knowing less than when they arrived.

In a time of increasing globalization, both academic study of the international world and firsthand experience of foreign cultures are crucial. No Yale College student can afford to remain ignorant of the forces that shape our world. Yale College urges all of its students to consider a summer, a term, or a year abroad sometime during their college careers.

A student working toward a bachelor’s degree takes four or five courses each term and normally receives the B.A. or B.S. degree after completing thirty-six term courses or their equivalent in eight terms of enrollment. To balance structure with latitude and to achieve a balance of breadth and depth, a candidate for the bachelor’s degree

is required, in completing the thirty-six term courses, to fulfill the distributional requirements described in this bulletin, as well as the requirements of a major program.

Distributional Requirements

The distributional requirements described below are intended to insure that all graduates of Yale College have an acquaintance with a broad variety of fields of inquiry and approaches to knowledge. These requirements are the only specific rules limiting the selection of courses outside a student's major program. By themselves, the distributional requirements constitute a minimal education, not a complete one, and represent the least that an educated person should seek to know. They are to be embraced as starting points, not goals.

DISTRIBUTIONAL REQUIREMENTS FOR THE BACHELOR'S DEGREE

Students must fulfill disciplinary area requirements by taking no fewer than two course credits in the humanities and arts, two in the sciences, and two in the social sciences. Students must also fulfill skills requirements by taking at least two course credits in quantitative reasoning, two course credits in writing, and courses to further their foreign language proficiency. Depending on their level of accomplishment in foreign languages at matriculation, students may fulfill this last requirement with one, two, or three courses or by certain combinations of course work and approved study abroad.

Area requirement in the humanities and arts (two course credits) Study of the humanities and arts—those subjects that explore how we chronicle and interpret the expression of human experience—cultivates an appreciation of the past and enriches our capacity to participate in the life of our times. By engaging other cultures and civilizations, both ancient and modern, students gain insight into the experiences of others while also obtaining an opportunity to critically examine their own. Through the study and practice of the arts, students analyze, create, and perform works allowing them to explore or experience firsthand the joy and discipline of artistic expression. Rigorous and systematic study of the humanities and the arts fosters tolerance for ambiguity and sophisticated analytic skills that provide essential preparation for careers in most areas of contemporary life. But independently of any specific application, study of these subjects teaches understanding and delight in the highest achievements of humanity.

Area requirement in the sciences (two course credits) Science is the study of the principles of the physical and the natural world through observation and experimentation. The theoretical inquiry, experimental analysis, and first-hand problem-solving inextricably linked to scientific inquiry give rise to new modes of thought. Acquiring a broad view of what science is, what it has achieved, and what it might continue to achieve is an essential component of a college education. Close study of a science develops critical faculties that educated citizens need to evaluate natural phenomena and the opinions of experts, and to make, understand, and evaluate arguments about them. Scientific literacy teaches students to appreciate the beauty of the natural and physical worlds often hidden from casual observation but which, once revealed, lend richness to everyday life.

Area requirement in the social sciences (two course credits) Broadly conceived, the social sciences study human social behavior and networks using a variety of methodologies and both qualitative and quantitative analysis. The disciplines in the social sciences teach us about who we are as social beings and help us appreciate the perspective of the other as well as the particularities of society. Methods in the social sciences test for connections between the familiar and the foreign, the traditional and the contemporary, the individual and the group, the predicted result and the anomalous outcome. Their theories propose explanations for the entire range of human phenomena. Study of the social sciences prepares students for lives of civic engagement and develops a nuanced sense of the world around them.

Skills requirement in foreign language (at least one course, depending on preparation) The study of languages has long been one of the distinctive and defining features of a liberal arts education and, in the world of the twenty-first century, knowledge of more than one language is increasingly important. The benefits of language study include enhanced understanding of how languages work, often resulting in heightened sophistication in the use of one's own language; unmediated access to texts otherwise available only in translation, or not at all; and the ability to recognize and cross cultural barriers.

All Yale College students are required to engage in study of a foreign language, regardless of the level of proficiency at the time of matriculation. Depending on their preparation, students take one, two, or three terms of foreign language study to fulfill the distributional requirement. Students may complete an approved study abroad program in lieu of intermediate or advanced language study at Yale. Details of the foreign language distributional requirement are listed under Distributional Requirements (p. 33) in the Academic Regulations (p. 33).

Skills requirement in quantitative reasoning (two course credits) The mental rigor resulting from quantitative study has been celebrated since ancient times, and applications of quantitative methods have proven critical to many different disciplines. Mathematics and statistics are basic tools for the natural and the social sciences, and are useful in many of the humanities as well. Information technology and the rigorous dissection of logical arguments in any discipline depend on algorithms and formal logical constructs. An educated person must be able to use quantitative information to make, understand, and evaluate arguments.

Many quantitative reasoning courses are taught through the departments of Mathematics, Statistics and Data Science, Computer Science, Economics, and the academic programs in engineering. Quantitative reasoning courses may also be found in a range of other programs.

Skills requirement in writing (two course credits) The ability to write well is one of the hallmarks of a liberally educated person and is indispensable to advanced research in most disciplines. As students strengthen their writing skills, they develop intellectual practices that distinguish active from passive learners.

The English department in particular offers many courses that focus on writing clearly and cogently, and courses in other departments stress writing skills within the context of their disciplines. Hundreds of courses, spanning most academic programs, give special attention to writing. Such courses, designated WR, do not necessarily

require more writing than other courses; rather, they provide more help with writing assignments. Some characteristics of WR courses include writing to discover ideas, learning from model essays, detailed feedback, and reviewing writing in small groups. Note that credit toward the writing requirement cannot be earned in courses in creative writing (specifically poetry, fiction, and playwriting) nor in courses conducted in a language other than English.

Major Programs

All candidates for a bachelor's degree in Yale College must elect a major program. The requirements for a major are described in general terms in the sections below, and in more detail under Subjects of Instruction. Students plan a schedule of courses in their major in consultation with a representative of the department or program concerned, and must secure the consultant's written approval. Students should acquaint themselves fully with all the requirements of the major they plan to enter, considering not only the choice of courses in the current term but also the plan of their entire work in the last two or three years in college.

Students seeking the B.S. or the B.A. degree with a major in science are expected to declare their majors at the beginning of sophomore year, although a student who has completed the prerequisites may elect a science major later. Sophomores interested in majoring in science should have their schedules approved by the director of undergraduate studies or the adviser designated by the department. Students seeking the B.A. degree with a major in a field other than a science typically declare their major by the end of the sophomore year and should do so no later than the beginning of the junior year. In the sophomore year, these students' schedules are signed by a sophomore adviser, chosen by the student, with whom the program has been discussed.

SELECTION OF A MAJOR

In designing a program of study, the student ought to plan for depth of concentration as well as breadth of scope. To study a subject in depth can be one of the most rewarding and energizing of human experiences and can form the basis of the interests and occupations of a lifetime. Knowledge advances by specialization, and one can gain some of the excitement of discovery by pressing toward the outer limits of what is known in a particular field. Intense study of a seemingly narrow area of investigation may disclose ramifications and connections that alter perspectives on other subjects. Such study also sharpens judgment and acquaints a person with processes by which new truths can be found.

In order to gain exposure to this kind of experience, students must elect and complete a major, that is, the subject in which they will work more intensively than in any other. Yale College offers more than eighty possible majors (p. 90). The department or program concerned sets the requirements for each major, which are detailed under Subjects of Instruction.

Some students will have made a tentative choice of a major before entering college. Others will have settled on a general area—for example, the natural sciences or the humanities—without being certain of the specific department or program of their major. Still others will be completely undecided. Many students who arrive with their minds made up change them after a year or two. Even students who feel certain of their

choices should keep open the possibility of a change. In selecting courses during their first two years, students should bear in mind not only the distributional requirements, but also the need for some exploration of the subjects to which they feel drawn.

THE MAJOR (B.A. OR B.S.)

A major program usually includes at least twelve term courses in the same area, progressing from introductory to advanced work, which become the focus of a student's program in the junior and senior years. Majors are offered by departments, interdepartmental programs, or interdisciplinary programs. In many departments and programs, a limited number of courses in related fields may be offered in fulfillment of the requirements for the major. Many majors have prerequisites, usually taken in the first year or sophomore year.

In all majors, the student must satisfy a senior requirement, usually a senior essay, senior project, or senior departmental examination. In an intensive major, the student must fulfill additional requirements, such as taking a prescribed seminar, tutorial, or graduate course, or completing some other project in the senior year.

SPECIAL DIVISIONAL MAJORS

A Special Divisional Major affords an alternative for the student whose academic interests cannot be met within one of the existing major programs. Such students may, with the approval of the Committee on Honors and Academic Standing, design special majors of their own in consultation with members of the faculty and in accordance with the procedures (p. 708) outlined under Subjects of Instruction. A Special Divisional Major may not be offered as one of two majors.

Multidisciplinary Academic Programs

Multidisciplinary Academic Programs provide opportunities for Yale College students to examine pressing social challenges from a variety of disciplinary perspectives among a community of students and faculty who have shared interests. Students from any major can apply to these programs, and faculty from across the University participate in them. Each program focuses centrally on a distinct and different set of issues, but they all share common features, including a core curriculum—beginning with a gateway course and culminating in a senior capstone project—and opportunities for practical experience that allow students to combine theory and practice, applying what they have learned in the classroom and in their research.

EDUCATION STUDIES

The Education Studies program comprises an interdisciplinary cohort of scholars who are interested in education practice, policy, and/or research. Each scholar completes electives within the Education Studies curriculum, a summer or academic-year field experience, and a senior capstone seminar and thesis-equivalent project. Education Studies Scholars also explore educational topics through symposia led by Yale faculty and advising relationships with mentors. Students may apply to the Education Studies Undergraduate Scholars program in their sophomore year. The prerequisite for applying is EDST 110. For more information, see the program's website.

ENERGY STUDIES

The Energy Studies multidisciplinary academic program is designed to provide select undergraduates with the broad knowledge and skills needed for advanced studies, leadership, and success in energy-related fields, at a time when the world faces enormous challenges in moving its energy systems toward greener, more sustainable sources, while eliminating energy poverty around the world. The curriculum is divided in three tracks, Energy Science and Technology, Energy and the Environment, and Energy and Society, and requires the completion of six graded term courses plus a senior capstone project. Admission to the Energy Studies Undergraduate Scholars program is by application in the fall term of sophomore year. Accepted students are normally required to enroll in the program's gateway course, APHY 100. For more information, see the program's website.

GLOBAL HEALTH STUDIES

The Global Health Studies program is designed for students interested in understanding and addressing pressing global health challenges. Although courses in global health are open to all undergraduates, students desiring greater depth in the field are encouraged to apply to become a Global Health Scholar. Scholars are typically selected in the fall of their sophomore year although, in exceptional cases, juniors may also be accepted. Students in the program complete an interdisciplinary course of study that includes required and elective courses and fieldwork (e.g., internships with NGOs, or field-based research either with faculty or independently with faculty guidance). In the summer after junior year, Global Health Scholars conduct their own independent global health fieldwork, for which they receive support in the form of designated funding and mentorship from an assigned global health faculty adviser. During their senior year, students in the program are expected to incorporate their fieldwork and classroom experiences into their senior requirement and to develop a publication-worthy written product. For more information, see the program's website.

HUMAN RIGHTS STUDIES

The Human Rights Studies program seeks to equip students with an academic foundation from which to engage meaningfully with human rights scholarship and practice. The program is based on an understanding that human rights constitutes a rich and interdisciplinary field of study, drawing on bodies of work in history, literature, economics, political science, philosophy, anthropology, law, and area studies. The program provides students with relevant analytical, conceptual, and practical skills; connects students to affiliated faculty and peers; supports student research projects and internship opportunities; and offers career guidance in the field. Students interested in admission to the Human Rights Studies program must apply in the fall semester of their sophomore year. For more information, see the program's website.

International Experience

Experience abroad is an invaluable complement to academic training. Such experience may include course work at foreign universities, intensive language training, directed research, independent projects, internships, laboratory work, and volunteer service. Yale College provides a variety of international opportunities during term time, summers, and post-graduation, as well as a large and growing number of fellowships

to support students abroad, all of which augment students' education in a globalizing world. Students can visit the Center for International and Professional Experience to explore options for study abroad, search for international internships and careers, and seek funding for study, research, and work experiences off campus. Summer courses abroad are offered by Yale Summer Session. Students can also apply to receive transfer credit from eligible outside summer study abroad programs. To learn more, visit the Study Abroad Website. Students receiving financial aid may be eligible for summer funding through the International Summer Award (ISA) program.

YEAR OR TERM ABROAD

In recognition of the special value of formal study abroad, Yale College allows juniors and second-term sophomores to earn a full year or term of credit toward the bachelor's degree through the Year or Term Abroad program. Participation in the program provides students the opportunity to approach academic study through a different cultural perspective. Students apply to the Yale College Committee on the Year or Term Abroad for approval of a program of study abroad. The pertinent application procedures and regulations are listed under Special Arrangements (p. 64) in the Academic Regulations. Additional information is available from the Study Abroad Office.

YALE-IN-LONDON

The Yale-in-London program offers spring-term courses in British culture and society at the Paul Mellon Centre for Studies in British Art, located in central London. The program is open to undergraduates, carries full Yale course credit, and counts as a term of enrollment. Instruction is designed to take advantage of the cultural resources of London and its environs, with regular field trips (including overnight stays) to museums, historic houses, and other sites of interest. Accommodations are provided for students in shared apartments. Further information is available on the program's website, or from the Yale-in-London office at the Yale Center for British Art, or by email to yaleinlondon@yale.edu.

YALE-IN-LONDON SUMMER PROGRAM

Yale-in-London offers two overlapping summer sessions at the Paul Mellon Centre for Studies in British Art, each lasting six weeks. There are two courses in each session, which vary from year to year and cover topics in humanities and social sciences, including history, history of art, architecture, sociology, literature, and drama. The courses are open to undergraduates and carry full Yale course credit, although enrollment in Yale-in-London summer session does not count as a term of enrollment in Yale College. Overnight field trips may be included. Accommodations are provided. Course descriptions and further information are available on the program's website, or from the Yale-in-London office at the Yale Center for British Art, or by email to yaleinlondon@yale.edu.

THE MACMILLAN CENTER

The Whitney and Betty MacMillan Center for International and Area Studies at Yale is the University's focal point for promoting teaching and research on all aspects of international affairs, societies, and cultures around the world. It brings together scholars from relevant schools and departments to provide comparative and problem-

oriented teaching and research on regional, international, and global issues. The MacMillan Center oversees six undergraduate majors: African Studies, East Asian Studies, Latin American Studies, Modern Middle East Studies, Russian and East European Studies, and South Asian Studies. Language training is integral to each of the majors.

Further information about the MacMillan Center is available on the Yale MacMillan Center Website.

JACKSON INSTITUTE FOR GLOBAL AFFAIRS

The Jackson Institute's mission is to inspire and prepare Yale students for global citizenship and service. The Institute administers the undergraduate major in Global Affairs and offers a number of courses that are open to students in Yale College, including GLBL 101, Gateway to Global Affairs. The Institute also administers several undergraduate fellowship competitions available to any Yale College student wishing to conduct independent research abroad, language study, or an internship related to international affairs.

Each year the Jackson Institute hosts Senior Fellows, leading practitioners and experts in global affairs who teach courses, give public lectures, and are available to consult with students on their career plans. The Jackson Institute's career services office serves as a resource for Yale College students contemplating careers in public service and other areas of global affairs. For further information, consult the Institute's Website.

Yale Summer Session

Yale Summer Session offers courses in the arts, engineering, humanities, mathematics, biological and physical sciences, and the social sciences. While most Summer Session courses are offered on campus in New Haven, an increasing number are offered online, and several others are offered as part of programs abroad. Courses in Summer Session are, in most cases, equivalent in credit and satisfy the same distributional requirements as their academic year counterparts, but are offered in a more concentrated and intensive form. Yale College students receive credit in Yale College for work successfully completed in Yale Summer Session. There are no auditing privileges in Yale Summer Session. Further information is available from the Yale Summer Session office or on the Summer Session Website.

Advising and Academic Resources

ADVISING

What students ultimately take away from their four years at Yale largely depends on the careful planning they apply to their programs of study. It would be premature—and unrealistic—for beginning students to map out a fixed schedule of courses for the subsequent four years, yet it is advisable that they think ahead and make plans for the terms to come. There will be time and opportunity for students to revise such plans as their academic ideas develop.

Yale College does not prescribe a set program of study, in the belief that students who select their own courses are inevitably more engaged with them. As students shape their educational goals, it is important that they seek informed advice. For incoming

students who have not yet developed relationships with academic advisers on campus, Yale College furnishes a constellation of advising linked to the residential colleges. As students progress in their studies, usually by sophomore year, they select as their adviser a member of the faculty in an intended or potential major to guide their course selection.

In addition to these advisers, students often seek advice about academic matters, internship and research opportunities, student life, study abroad, and post-graduation options from other offices on campus, including the Center for International and Professional Experience, the Health Professions Advisory Program, the Office of Career Strategy, the University Libraries, the Yale College Dean's Office, and the cultural centers.

Residential Colleges

There are fourteen residential colleges: Berkeley, Branford, Davenport, Timothy Dwight, Jonathan Edwards, Benjamin Franklin, Grace Hopper, Morse, Pauli Murray, Pierson, Saybrook, Silliman, Ezra Stiles, and Trumbull. Leading each one is a resident head of college; and in each college a resident dean advises students on both academic and nonacademic matters. Associated with the head and the dean as fellows of the college are about fifty additional members of the University drawn from different departments and schools, many of whom serve as advisers to first-year students in the college. In addition, a group of seniors in each residential college, known as first-year counselors, serve as peer advisers to first-year students. Additional information about advising resources in the residential colleges can be found on each college's website and the Advising Resources Website.

Academic Departments

In each academic department and for every undergraduate major, a director of undergraduate studies (DUS) oversees the curriculum, placement matters, and advising resources for the major. In small majors, the DUS also typically serves as the primary adviser for all students in the major; in large majors, other members of the faculty often assist the DUS in providing advice for students. Much information about course placement and prerequisites, as well as requirements for each major, can be found in Chapter III. Additional information about advising resources and faculty in a department or program can be found on the relevant department's website.

ACADEMIC RESOURCES

Center for Teaching and Learning

The Yale Center for Teaching and Learning (CTL) provides an array of teaching, tutoring, writing, and technology-enabled learning programs distributed across the University. The Center supports student learning and provides opportunities for students to develop as teachers, mentors, and leaders. Additionally, the Center houses the Academic Strategies program, which provides information, workshops, and individual mentoring to Yale College students on the skills central to active, empowered learning. More information is available on the Center for Teaching and Learning Website.

WRITING TUTORS AND WRITING PARTNERS

The Yale Center for Teaching and Learning provides several ways for students to get help with writing. The most important of these is the presence of a writing tutor in each residential college. Tutors meet with students on a one-to-one basis to discuss rough drafts of work in progress, research techniques, revision strategies, or other matters relevant to effective writing. Tutors can help with any writing project: senior essays, course papers, graduate school and fellowship applications, or anything intended for publication. The Writing Partners, another resource, are undergraduate and graduate students who offer drop-in help to students at any stage of writing. Finally, the CTL Website offers information on using sources effectively and avoiding plagiarism.

SCIENCE AND QUANTITATIVE REASONING TUTORS

Tutoring programs for science (SC) and quantitative reasoning (QR) courses are offered through the Yale Center for Teaching and Learning. The CTL provides quantitative reasoning and science tutoring for every field in Yale College. Many courses provide their own Course-Based Peer Tutors (CBPTs) who can help students as they work on problem sets or study for exams, and who can review returned assignments. Information about CBPTs is available on the course syllabus and Canvas Website. If a particular course does not have a CBPT, or if a student requires more help, the Residential College Math/Science tutors offer drop in hours during which any science or quantitative reasoning topic can be addressed. Finally, students who need more individual attention can apply for small-group tutoring. More information on all of these programs can be found at the CTL Website.

Center for Language Study

The Center for Language Study (CLS), provides resources for students of foreign languages and for language courses. The CLS also provides support for nonnative speakers of English through its English Language Program. For undergraduates enrolled in a foreign language course, the CLS offers peer tutoring in the target language. For students in Yale College and in the graduate and professional schools, the CLS offers specialized language programs such as Directed Independent Language Study (DILS) for the study of languages not taught at Yale, and the Fields program for discipline-specific language study at advanced levels. For professional school students, the CLS offers courses in language for special purposes, such as Spanish or Chinese for medical professionals. All language learners at Yale have access to CLS facilities, including its study rooms, distance facilities, and flexible learning spaces. For more information, including hours, a list of resources, and information about Yale's foreign language requirement and placement testing, see the Center's Website.

Resource Office on Disabilities

To ensure that all students have an equal opportunity to make the most of their Yale education, the Resource Office on Disabilities facilitates individual accommodations for students with disabilities, and works to remove physical and attitudinal barriers to their full participation in the University community. The Office provides technical assistance, information, and disability awareness training to any member of the Yale community. Services include, but are not limited to, classroom and special testing accommodations, visual materials in alternative formats, and loans of special equipment. The required

first step for students with a disability is to contact the Resource Office on Disabilities to initiate the process of obtaining disability-related accommodations. Registration with the Resource Office is confidential.

Every term, students are required to submit an electronic Course Accommodation Form within ten days after registering for classes. At any time during a term, students with a newly diagnosed disability or recently sustained injury requiring accommodations should contact Sarah Chang (sarah.chang@yale.edu), Associate Director. All students with disabilities are encouraged to contact the Resource Office on Disabilities to schedule a meeting with staff at 35 Broadway (rear entrance), room 222. Inquiries can be made by mail to Resource Office on Disabilities, Yale University, P.O. Box 208305, New Haven, CT 06520-8305, or by phone at (203) 432-2324. Additional information is available on the Resource Office Website.

Special Programs

DIRECTED STUDIES

Directed Studies (DS), a selective program for first-year students, is an interdisciplinary introduction to influential texts that have shaped Western civilization, spanning from ancient Greece to the twentieth century. Consisting of three integrated full-year courses in Literature, Philosophy, and Historical and Political Thought, Directed Studies provides a coherent program of study that encourages students to put rich and complex texts into conversation with one another across time and disciplinary boundaries. Students in Directed Studies learn to analyze challenging and urgent texts, participate meaningfully in seminar discussions, and write clear and persuasive analytic essays. Directed Studies has no prerequisites and provides a strong foundation for any major. Approximately ten-percent of the first-year class is admitted each year to the program, which also satisfies Yale College Distribution requirements in Humanities and Arts (HU), Social Sciences (SO), and Writing (WR). Students entering the program must enroll in all three courses and are expected to enroll for both semesters. Students participating in DS become members of a close-knit and supportive intellectual cohort that endures well beyond the end of the first year. Additional information is available on the program's website.

THE DEVANE LECTURES

The DeVane Lectures are a special series of lectures that are open to the general public as well as to students and to other members of the Yale community. They were established in 1969 in honor of William Clyde DeVane, Dean of Yale College from 1939 to 1963. Details of the course are listed under DeVane Lecture Course (p. 240) in Subjects of Instruction. Supplementary meetings will be held for those students taking the lectures for credit.

FIRST-YEAR SEMINAR PROGRAM

The First-Year Seminar program offers first-year students the opportunity to enroll in small classes with some of Yale's most eminent faculty members. Roughly sixty first-year seminars across a wide range of subjects are offered every year, in both fall and spring terms. Some seminars provide an introduction to a particular field of study; others take an interdisciplinary approach to a variety of topics. Whatever the subject and method of instruction, all seminars are designed with first-year students in mind

and provide a context for developing relationships with faculty members and peers. A description of the program and application procedures can be viewed on the program's website (p. 373).

RESERVE OFFICERS TRAINING CORPS (ROTC)

Yale hosts both Naval and Air Force ROTC units, which offer qualified Yale College students an opportunity to pursue their regular Yale degrees while also preparing for leadership positions in the United States Air Force, Navy, or Marine Corps. Regardless of financial need, participating students may receive significant help in meeting the costs of a Yale education. Further information about the Air Force ROTC program can be found on the Yale AFROTC website or under Aerospace Studies (p. 93) in Subjects of Instruction. Further information about the Naval ROTC program (including the Marine Corps program) can be found on the Yale NROTC website or under Naval Science (p. 582) in Subjects of Instruction. Students not matriculated at Yale who are participating in the Air Force ROTC program as part of a cross-town arrangement are subject to Yale College's *Undergraduate Regulations*.

RESIDENTIAL COLLEGE SEMINARS

The Residential College Seminar program, instituted in 1968, is devoted to the development of innovative courses that fall outside traditional departmental structures. The instructors for the seminar program are drawn from the University community and from the region, including individuals outside academic life such as writers, artists, participants in government and the public sector, and experts from the arts and the media. The college seminar program encourages innovative courses, and student committees in the residential colleges play a significant role in selecting seminars, but all courses in the program must satisfy standard requirements for academic credit in Yale College and must be approved by the relevant faculty committees that oversee the curriculum. Each residential college sponsors at least one seminar each term. Additional seminars are occasionally sponsored directly by the program and are equally open to students from all residential colleges. Descriptions of the seminars are found on the program's website.

STUDIES IN GRAND STRATEGY

Studies in Grand Strategy is a two-semester, calendar-year interdisciplinary seminar, offered jointly by the Departments of History and Political Science and the School of Management. The class investigates methods and materials for teaching and understanding grand strategy as a historical concept and as an active approach to geopolitics, statecraft, and social change. Each course, worth one credit, emphasizes connections between history and strategy, scholarship and real-world practice, leadership and citizenship. The two-term seminar aims to educate students intending to pursue careers in a wide variety of fields and is part of the Brady-Johnson Program in Grand Strategy. Additional information can be found on the program's website.

YALE JOURNALISM INITIATIVE

The Yale Journalism Initiative brings a distinguished writer to campus each semester to teach an advanced journalism seminar, ENGL 467. The seminar is open to undergraduates and select graduate and professional students; application is required through the English department's selection process for creative writing classes. Students

who complete the seminar may apply to become a Yale Journalism Scholar, a distinction that provides access to summer support for internships, career counseling with a journalism specialist, and invitations to meet professional journalists at events both on and off campus. For more information on the initiative or on becoming a Journalism Scholar, see the Journalism Initiative Website.

Honors

GENERAL HONORS

The bachelor's degree *cum laude*, *magna cum laude*, or *summa cum laude* is awarded at graduation on the basis of a student's general performance in courses taken at Yale. At Commencement, General Honors are awarded to no more than 30 percent of the class. The bachelor's degree is awarded *summa cum laude* to no more than the top 5 percent of the graduating class, *magna cum laude* to no more than the next 10 percent of the graduating class, *cum laude* to no more than the next 15 percent of the graduating class. Eligibility for General Honors is based on the grade point average (GPA) earned in courses taken only at Yale, with letter grades carrying the following values:

A	4.00	B-	2.67	D+	1.33
A-	3.67	C+	2.33	D	1.00
B+	3.33	C	2.00	D-	0.67
B	3.00	C-	1.67	F	0.00

Marks of CR in courses taken on a Credit/D/Fail basis are not included in the calculation of grade point averages. Marks of W, for Withdrawal, carry no course credit, and do not figure in a grade point average.

DISTINCTION IN THE MAJOR

Distinction in the Major is conferred at graduation on any senior who, on nomination by the student's department or program, and with the concurrence of the Committee on Honors and Academic Standing, merits such an award for the quality of work completed in the major subject.

Distinction is awarded to students who have earned grades of A or A- in three-quarters of the credits in the major subject or program and who have earned a grade of A or A- on the senior departmental examination, senior essay, or senior project. All courses taken for the major are included in these calculations for Distinction in the Major. Grades of F and marks of CR in courses taken Credit/D/Fail are included as non-A grades. Marks of W, for Withdrawal, which carry no course credit, and marks of P, for Pass, do not figure in the calculation for Distinction.

PHI BETA KAPPA

Election to Phi Beta Kappa is based on the percentage of grades of A earned at Yale. The grade point average (GPA) is not a factor. Marks of CR in courses taken Credit/D/Fail are counted as non-A grades. Marks of P in courses that are graded only on a Pass/Fail basis, such as independent study courses, are not included in the calculations. Marks of W, for Withdrawal, carry no course credit, and do not figure in the calculation for Phi Beta Kappa. Grades earned outside Yale, including those earned during study abroad other than at Yale-in-London, are also not included in the calculation. Further

information about the criteria for election and about the Yale chapter can be found on the Yale Phi Beta Kappa Website.

PRIZES

For a list of the numerous prizes open annually to students in Yale College, consult the Yale Prizes Website.

II. ACADEMIC REGULATIONS

Academic Regulations

As a condition of enrollment in Yale College, every student is required to comply with the academic regulations. Students are expected to familiarize themselves with these regulations, and an assertion of ignorance of their provisions cannot be accepted as a basis for an exception to them. No student or group of students should expect to be warned individually to conform to any of the regulations contained in this publication. Students are advised to pay special attention to all deadlines given in the academic regulations. Students who have questions or concerns about these regulations should consult with their residential college dean.

A. Requirements for the B.A. or B.S. Degree

To qualify for the bachelor's degree, B.A. or B.S., a student must successfully complete thirty-six term courses in Yale College or their equivalent. In doing so, the student must fulfill the distributional requirements of Yale College and the requirements of a major program. A student may normally complete no more than eight terms of enrollment in order to fulfill these requirements.

During the terms that students are enrolled and in residence in Yale College, they cannot be simultaneously enrolled, neither full-time nor part-time, in any other school or college at any other institution, with the exception of other Yale University schools that permit currently enrolled undergraduates to be admitted to programs that have been established within Yale College. Examples of such programs include the simultaneous award of the bachelor's and master's degree and the five-year B.A.-B.S./M.P.H. degree program in Public Health. Exceptions will also be made for Yale College students whose participation in the Reserve Officers Training Corps program requires enrollment in courses offered outside of Yale.

Students enrolled in the Eli Whitney Students program should consult section M, Eli Whitney Students Program (p. 76).

Students who have already earned a bachelor's degree, at Yale or at another institution, are not eligible for degree enrollment in Yale College.

DISTRIBUTIONAL REQUIREMENTS

All students in Yale College must fulfill distributional requirements in order to qualify for the bachelor's degree. For a general introduction to the distributional requirements and a definition of the disciplinary areas and skills categories, refer to the Undergraduate Curriculum (p. 19) section.

1. **Distributional requirements for the first, sophomore, and junior years** Students must partially fulfill the distributional requirements during the first, sophomore, and junior years in order to be eligible for promotion.

Distributional requirements for the first year Students must have enrolled for at least one course credit in two skills categories by the end of the second term of enrollment in order to be eligible for promotion to sophomore standing. They may elect no more than four course credits in a single department, and no more than six

course credits in a single disciplinary area, except that a student taking a laboratory course may elect as many as seven course credits in the sciences.

Note that credit from outside Yale may not be applied toward the distributional requirements for the first year; accordingly, students who are permitted by the Committee on Honors and Academic Standing to repair a deficiency in these requirements over the summer following their first year must do so by means of enrollment in Yale Summer Session.

Distributional requirements for the sophomore year Students must have enrolled for at least one course credit in each of the three disciplinary areas and for at least one course credit in each of the three skills categories by the end of the fourth term of enrollment in order to be eligible for promotion to junior standing.

Distributional requirements for the junior year Students must have completed all of their skills requirements, and must have earned at least one course credit in each of the three disciplinary areas, by the end of the sixth term of enrollment in order to be eligible for promotion to senior standing.

2. **Multiple distributional designations** Although some courses may carry more than one distributional designation, a single course may be applied to only one distributional requirement. For example, if a course is designated both HU and SO it may be applied toward either the humanities and arts requirement or the social science requirement, but not both. Similarly, if a course is designated QR and SC, it may be applied toward either the quantitative reasoning requirement or the science requirement, but not both.

A course with multiple distributional designations, once applied toward one distributional requirement, may subsequently be applied toward a different distributional requirement. During the summer after each academic year, the University Registrar's Office optimizes the use of each student's completed courses toward fulfillment of the distributional requirements.

3. **Foreign language distributional requirement** All students are required to engage in the study of a foreign language while enrolled in Yale College. The most common paths to fulfillment of the foreign language distributional requirement are illustrated in the chart at the end of this section.

Students who matriculate at Yale with no previous foreign language training must complete three terms of instruction in a single foreign language. This requirement is fulfilled by the completion of courses designated L1, L2, and L3.

Students who have taken the Advanced Placement examination in French, German, Italian, Latin, or Spanish and who present scores of 5, are recognized as having completed the intermediate level of study. Scores of 6 or 7 on the International Baccalaureate Advanced-Level examination are also accepted as evidence of intermediate-level accomplishment. Students at this level fulfill the language distributional requirement by completing one course designated L5. Alternatively, they may successfully complete one or more courses in a different foreign language at least through the level designated L2.

Students who have studied a foreign language before matriculating at Yale but who have not achieved a score of 5 on the Advanced Placement test in French, German, Italian, Latin, or Spanish must take a placement test offered by the appropriate

language department or, for languages in which no departmental placement test is offered, consult the appropriate director of undergraduate studies. Dates and times of placement tests are given in the *Calendar for the Opening Days of College* and on the Website of the Center for Language Study. The departmental test determines whether students place into the first, second, third, or fourth term of language study (courses designated L1, L2, L3, or L4), or whether they qualify for language courses beyond the fourth term of study (L5).

Students who place into the first term of a foreign language must successfully complete three courses in that language, designated L1, L2, and L3.

Students who matriculate at Yale able to place into the second term of a foreign language must successfully complete three courses in that language, designated L2, L3, and L4. Alternatively, they may successfully complete three courses in a different foreign language at least through the level designated L3.

Students who matriculate at Yale able to place into the third term of a foreign language must successfully complete two courses in that language, designated L3 and L4. Alternatively, they may successfully complete two or more courses in a different foreign language at least through the level designated L3.

Students who matriculate at Yale able to place into the fourth term of a foreign language must successfully complete one course in that language, designated L4. Alternatively, they may successfully complete one or more courses in a different foreign language at least through the level designated L3.

Students who matriculate at Yale able to place into the fifth term of a foreign language must successfully complete one course in that language, designated L5. Alternatively, they may successfully complete one or more courses in a different foreign language at least through the level designated L2.

Students whose secondary school transcript shows that the language of instruction was other than English may fulfill the foreign language requirement by successfully completing ENGL 114, 115, 120, 121, or 450. Alternatively, students in this category may fulfill the requirement by successfully completing one or more courses in a third language, neither English nor the language of their secondary school instruction, at least through the level designated L2.

In order to promote firsthand experience in foreign cultures and the learning of language in real-world settings, students are permitted to apply toward the satisfaction of the foreign language requirement the completion of an approved study abroad program in a foreign-language-speaking setting if they have first completed or placed out of a language course designated L2. Students seeking to undertake study at another institution or program for this purpose must consult the relevant director of undergraduate studies in advance of their proposed study for advice about appropriate programs and courses, and for information about the approval process. See section P, Credit from Other Universities (p. 81). Study abroad may be used in place of L1 and L2 courses only if it is part of a Yale College program, such as Yale Summer Session. Study abroad opportunities are described in the Undergraduate Curriculum section under the heading International Experience (p. 24).

Intensive language courses provide the equivalent of a full year of instruction in a single term. A course designated L1–L2 fulfills both the L1 and the L2 levels of the foreign language distributional requirement. Similarly, a course designated L3–L4 satisfies both the L3 and the L4 levels.

Not all of the languages offered in Yale College are offered at all levels, and it may not be possible to fulfill the language requirement in some of them. Languages currently offered in Yale College are Akkadian, American Sign Language, Arabic, Bengali, Bosnian-Croatian-Serbian, Chinese, Czech, Dutch, hieroglyphic Egyptian, French, German, ancient Greek, modern Greek, biblical Hebrew, modern Hebrew, Hindi, Hungarian, Indonesian, isiZulu, Italian, Japanese, Khmer, Kiswahili, Korean, Latin, Persian, Polish, Portuguese, Punjabi, Romanian, Russian, Sanskrit, Sinhala, Spanish, Tamil, classical Tibetan, modern Tibetan, Turkish, Ukrainian, Vietnamese, Wolof, and Yorùbá. Students wishing to fulfill the foreign language requirement in a less commonly taught language should consult the director of undergraduate studies in the relevant department to verify that the appropriate level of study will be offered. Students who have intermediate- or higher-level proficiency in a language other than those listed here should consult the appropriate director of undergraduate studies or the director of the Center for Language Study to arrange for a placement examination.

Students who, for medical reasons, are not able to complete the language requirement may petition the Committee on Honors and Academic Standing for a partial waiver of the requirement. In granting such a waiver, the committee will normally require that a student complete four course credits in the study of a specific non-English-speaking culture.

4. **Courses taken on the Credit/D/Fail basis** A student may not apply any course credit earned on the Credit/D/Fail basis toward satisfaction of the distributional requirements for the junior year nor for the distributional requirements for the bachelor's degree.
5. **Independent study courses** A student may not apply any course credit earned through independent study courses toward satisfaction of any of the distributional requirements.
6. **Acceleration credits** Acceleration credits may not be employed to satisfy the distributional requirements for the bachelor's degree, nor may they be employed to meet the distributional requirements for the first, sophomore, or junior years.
7. **Course credit earned at Yale before matriculation** Course credit earned at Yale before a student's matriculation, either at Yale Summer Session or in the Non-degree Students program while the student was enrolled as a secondary school student in the New Haven area, may be applied to the distributional requirements for the bachelor's degree and to those for the sophomore and junior years, but it may not be applied to the distributional requirements for the first year.
8. **Courses in the graduate and professional schools** It is the expectation that Yale College students, including candidates for the simultaneous award of the bachelor's and master's degrees, will fulfill their distributional requirements in courses taken in Yale College. Credit earned in a course offered in the Graduate School of Arts and Sciences or in one of the professional schools of the University may be applied toward the distributional requirements only if the course instructor has secured, in advance of the term in which the course will be given, approval from Yale College.

Instructors interested in making such an advance arrangement can contact the Dean of Academic Affairs to be directed to the appropriate authority for such approval.

9. **Course credit from outside Yale** Course credit earned at another university may be applied toward the distributional requirements for the bachelor's degree and to those for the sophomore and junior years whether or not it is counted toward the 36-course-credit requirement for graduation. Credit from outside Yale may not be applied toward the distributional requirements for the first year. See section P, Credit from Other Universities (p. 81). Note particularly that Yale does not award course credit or distributional credit for courses completed at another college or university before the student graduated from secondary school.
10. **Major programs** Courses taken in fulfillment of a student's major requirements may be applied toward satisfaction of the distributional requirements for the first, sophomore, and junior years and toward the distributional requirements for the bachelor's degree.
11. **Permission for a partial waiver of the distributional requirements for the first year** If, with the permission of the residential college dean, a first-year student enrolls in a program of study for the first two terms of enrollment worth more than nine course credits, the dean may waive the year limit on the number of course credits that a student may elect in a single department or disciplinary area. Under no circumstances may a student be promoted to sophomore standing without having enrolled for at least one course credit in two skills categories (foreign language, quantitative reasoning, writing).
12. **Permission to postpone fulfillment of the distributional requirements for the sophomore year** A student may petition the Committee on Honors and Academic Standing for permission to fulfill the distributional requirements for the sophomore year in the fifth term of enrollment. Such a petition must be filed no later than the date of midterm of the fourth term of enrollment; it should explain the sound academic reasons why these requirements cannot be satisfied within four terms of enrollment and give an exact description of how they shall be fulfilled in the fifth term. Students who have not fulfilled the distributional requirements for the sophomore year by the end of the fourth term of enrollment and who have not been granted permission by the Committee on Honors and Academic Standing to postpone their fulfillment will normally not be promoted to junior standing.
13. **Permission to postpone fulfillment of the distributional requirements for the junior year** In exceptional circumstances, a student may petition the Committee on Honors and Academic Standing for permission to fulfill the distributional requirements for the junior year in the seventh term of enrollment. Such a petition, which must include the written support of the residential college dean and, where applicable, that of the director of undergraduate studies in the student's major, should be filed no later than the date on which the student's course schedule is due in the sixth term of enrollment; in no case will a petition be accepted later than the date of midterm in the sixth term of enrollment. It should explain the sound academic reasons why these requirements cannot be satisfied within six terms of enrollment and give an exact description of how they shall be fulfilled in the seventh term. Students who have not fulfilled the distributional requirements for the junior year by the end of the sixth term of enrollment and who have not

been granted permission by the Committee on Honors and Academic Standing to postpone their fulfillment will normally not be promoted to senior standing.

MAJOR REQUIREMENTS

The requirements of the various major programs are given under the heading for each department or program. Every major program includes a senior requirement, which may take the form of a senior essay, a senior project, or a senior departmental examination.

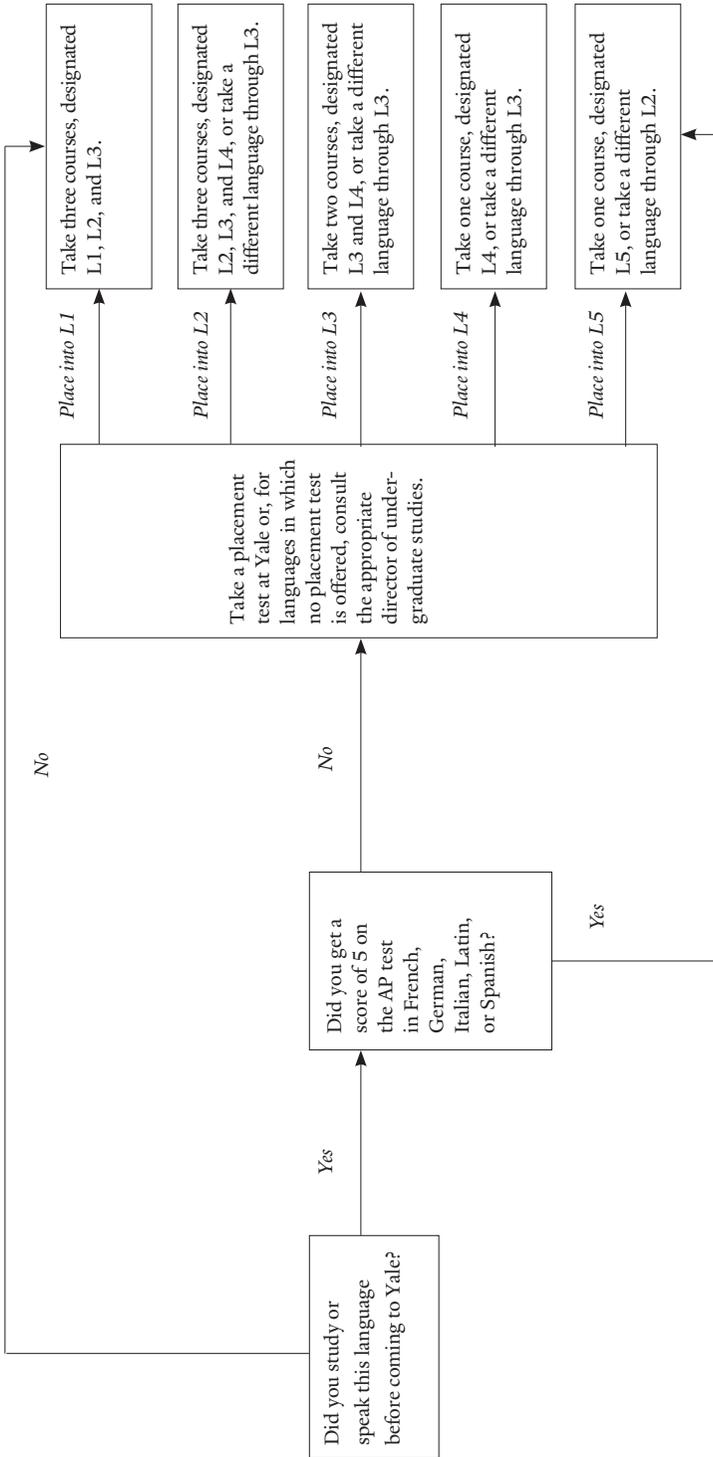
EIGHT TERMS OF ENROLLMENT

A student must complete the requirements for the bachelor's degree in no more than eight terms of enrollment. Terms spent on a Year or Term Abroad, or in the Yale College program at the Paul Mellon Centre in London during a spring term, are considered the equivalent of terms of enrollment in Yale College. Note, however, that course credits earned in terms spent on a Year or Term Abroad may not be applied to acceleration by the early accumulation of thirty-six course credits all earned at Yale. See section Q, Acceleration Policies (p. 84). (Attendance at the summer program at the Paul Mellon Centre in London or Yale Summer Session does not constitute a term of enrollment in Yale College.)

In exceptional circumstances, a student may petition the Yale College Committee on Honors and Academic Standing for permission to enroll for an additional term. Such a petition should be made no later than the beginning of a student's seventh term of enrollment; it should describe precisely, giving detailed information on specific courses, why it is impossible for the student to complete the requirements for a bachelor's degree within eight terms; and it should be accompanied by detailed, informative letters of endorsement from the student's director of undergraduate studies and residential college dean. When the request is being made in whole or in part on medical grounds, documentation must be provided by a treating physician or therapist, or the Resource Office on Disabilities, or both. The Committee on Honors and Academic Standing cannot grant permission for a ninth term in order for a student to undertake an optional arrangement not necessary for the acquisition of a bachelor's degree, such as, for example, the completion of two majors, or enrollment in the Program for the Simultaneous Award of the Bachelor's and Master's Degrees, or completion of the entrance requirements for graduate or professional school. A student given permission to enroll for a ninth term is not eligible for scholarship assistance from Yale, although other forms of financial aid may be available. See "Financial Aid" under "Regulations" in the Yale College online publication *Undergraduate Regulations*.

Graduation in fewer than eight terms of enrollment is possible: see section Q, Acceleration Policies (p. 84). Under no circumstances may a student graduate in fewer than six terms of enrollment, unless the student was admitted by transfer from another college or university. Transfer students should consult section L, Transfer Students (p. 75).

MOST COMMON PATHS TOWARD FULFILLMENT OF THE LANGUAGE REQUIREMENT



B. Grades

LETTER GRADES

The letter grades in Yale College are as follows:

A	Excellent	B+		C+		D+		F	Fail
A-		B	Good	C	Satisfactory	D	Passing		
		B-		C-		D-			

CREDIT/D/FAIL OPTION

The opportunity to elect courses on a Credit/D/Fail basis has been provided by the Yale College Faculty in order to encourage academic exploration and to promote diversity in students' programs.

1. **Reporting of grades** In all courses (except for a few professional school courses), instructors report letter grades for all students. If the student has chosen the Credit/D/Fail option in a course, the registrar converts grades of A, A-, B+, B, B-, C+, C, and C- into the notation CR, which is entered on the student's transcript. Grades of D+, D, D-, and F are entered on the transcript as reported. A student may not be required to disclose to the instructor of a course whether the student has enrolled in the course for a letter grade or under the Credit/D/Fail option.
2. **Eligibility** All courses offered in Yale College during the fall and spring terms are available for election under the Credit/D/Fail option.
3. **Total number of course credits** A student may offer as many as four course credits earned on the Credit/D/Fail basis toward the bachelor's degree.
4. **Number of courses and course credits in a term** As many as two credits may be elected under the Credit/D/Fail option in a term; thus in an academic year a student may earn as many as four credits on the Credit/D/Fail option. In each term, a student must elect at least two courses, representing at least two course credits, for letter grades or the mark of Pass, in any combination.

For students enrolled in the Eli Whitney Students Program, who are permitted to enroll in as few as three course credits in a calendar year and thus sometimes enroll in only one course credit in a term, different limits apply. An Eli Whitney student who is enrolled in fewer than two course credits in a term may elect no course credits that term under the Credit/D/Fail option. An Eli Whitney student who is enrolled in two or more but fewer than four course credits in a term may elect no more than one course credit that term under the Credit/D/Fail option. An Eli Whitney student who is enrolled in four or more course credits in a term is bound by the limits given in the paragraph immediately above.

5. **Distributional requirements** A student may not apply any course credit earned on the Credit/D/Fail basis toward satisfaction of the distributional requirements for the junior year, nor toward satisfaction of the distributional requirements for the bachelor's degree.
6. **Requirements of the major** The program description of each major specifies whether or not courses taken on the Credit/D/Fail basis count toward the requirements of that major.

7. **Credit/year course sequences** A credit/year course sequence may be taken under the Credit/D/Fail option for one term while the other term of the yearlong sequence is taken for a letter grade. For credit/year course sequences in which a student receives a separate letter grade for each of the two terms, each term will be governed by the enrollment option the student elected for that term. For credit/year course sequences in which a student receives the mark of SAT or NSAT for the first term and a letter grade for the second, the enrollment option that the student elects for the second term governs both terms of the course sequence; that is, students will receive either the mark of CR for both terms or a letter grade for both terms, depending on the option elected for the second term.
8. **Course schedules** At the start of each term, students enroll in all courses without selecting any for the Credit/D/Fail option. They may subsequently select that option in any Yale College course – other than those independent study courses graded on a Pass/Fail basis – by midterm, as published in the Yale College Calendar with Pertinent Deadlines. After the midterm deadline, election of the Credit/D/Fail option is not permitted. As indicated above, in a given term a student may elect as many as (but no more than) two course credits on the Credit/D/Fail basis; and must elect at least two courses, representing at least two course credits, for letter grades or the mark of Pass, in any combination.
9. **Conversion back to a letter grade** Once a student converts a course to the Credit/D/Fail mode, this change cannot be reversed, even if that action is sought before the midterm deadline.
10. **Acceleration credit** Work completed under the Credit/D/Fail option cannot yield acceleration credit.
11. **Prizes and honors** Marks of CR are included in the calculations for some prizes, for Distinction in the Major, and for election to Phi Beta Kappa as non-A grades, but marks of CR are not included in the calculation for General Honors. See under Honors (p. 31) in the Yale Curriculum section.
12. **Courses in the graduate and professional schools** Courses in the Graduate School of Arts and Sciences and in the professional schools of the University are not available on the Yale College Credit/D/Fail option. Some courses in certain professional schools of the University are, however, graded on a Pass/Fail basis only, and grades for undergraduates in these courses are recorded as CR or F. Such credits are counted in the total earned on the Credit/D/Fail basis that a student is permitted to offer in a term as well as the total offered toward the requirements of a bachelor's degree. Marks of CR in professional school courses are included in the calculations for Distinction in the Major as non-A grades. Marks of CR in professional school courses are not included in the calculation for General Honors. See “General Honors” and “Distinction in the Major” under Honors (p. 31) in the Yale Curriculum section.

INDEPENDENT STUDY COURSES

Independent study courses, other than senior essays or projects and other exempted courses as explained below, are graded on a Pass (“P”)/Fail (“F”) basis, with the additional requirement that the instructor of record submit a substantive report that both describes the nature of the independent study and evaluates the student’s performance in it. These reports will be shared with the student and the director of

undergraduate studies in the department or program in which the course is offered, and kept in the office of the student's residential college dean.

Senior projects and courses deemed by a department or program to be a constituent of the senior requirement are evaluated with a letter grade. Additionally, the department or program offering a particular independent study course may deem that such a course should be exempted from Pass/Fail grading for a particular student because the course meets an important requirement in the major. In such a case, the director of undergraduate studies in the department or program that is offering the course may petition the Committee on Honors and Academic Standing to permit the student's work in the course to be evaluated with a letter grade. Such a petition should be filed by the date on which the student's schedule is due in the term in which the student is enrolling in the course, and should provide sound academic reasons for the exception. In no case will such a petition be accepted later than the date of midterm in the term in which the course is being taken.

GENERAL REGULATIONS CONCERNING GRADES AND TRANSCRIPTS

1. **Record of courses** A transcript is the record of courses in which a student has enrolled during the student's progress in completing the requirements of the bachelor's degree. All grades, passing and failing, thus appear on the transcript and are counted in the calculation of grade point average (GPA). These include passing grades earned in the first term of a credit/year course sequence in which the second term is not completed, even though such grades do not count toward the 36-course-credit requirement for graduation. If a student remains in a course after the date of midterm, the student is considered to have been enrolled in that course; therefore, if a student withdraws from the course after midterm and before the first day of the reading period, the mark W (for Withdraw) appears on the transcript in association with the course. See paragraph 4 below.
2. **Equal value of courses** Passing grades contribute equally, to the extent to which they carry course credit, toward the 36-course-credit requirement for graduation. A grade of D in a course, for example, does not need to be balanced with a higher grade in some other course.
3. **Change of a grade** A grade, once submitted by the instructor of a course to the registrar, may not be changed except by vote of the Yale College Committee on Honors and Academic Standing on petition of the instructor, unless it is the result of a clerical error made in the instructor's computation or in transcription of a grade.
4. **Deadlines for withdrawal from courses** If a student has elected a full-term course on the course schedule but formally withdraws from it before midterm, as published in the Yale College Calendar with Pertinent Deadlines (p. 8), the student's transcript will contain no indication of that course after the withdrawal has been recorded by the registrar. If a student has elected a half-term course on the course schedule but formally withdraws from it by the relevant deadline published in the Yale College Calendar with Pertinent Deadlines (p. 8), the student's transcript will contain no indication of that course after the withdrawal has been recorded by the registrar. See section F, Withdrawal from Courses (p. 50).

If a student enrolled in a full-term course formally withdraws from it after midterm but before the first day of the reading period, the student's transcript will record the designation W (Withdraw) for the course. In credit/year course sequences in which a student receives the mark of SAT or NSAT for the first term and a letter grade for the second, a student who completes the first term but does not subsequently enroll in the second term, or who subsequently withdraws from the second term before the second term is completed, will have the designation W (Withdraw) recorded for the first term of the sequence.

If a student enrolled in a half-term course formally withdraws from it after the deadline for the course to be removed from the transcript, but by the last date a withdrawal is permitted from the course, the student's transcript will record the neutral designation W (Withdraw) for the course. See the Yale College Calendar with Pertinent Deadlines (p. 8) for both dates in each term.

The mark of W is a neutral designation indicating simply that the student has been enrolled in, but has withdrawn from, a course; while the course obviously carries no credit toward the degree, the W implies no evaluation of a student's work and carries no implication whatsoever of failure. Withdrawal from a course after the last day of classes, as published in the Yale College Calendar with Pertinent Deadlines (p. 8), is not possible. See section F, Withdrawal from Courses (p. 50).

5. **Incomplete work and postponed final examinations** A student who has received permission for a mark of Temporary Incomplete in a course, or who has been authorized to take a makeup final examination in a course, is allowed the specified period of time to repair the deficiency in the course. If the deficiency is not repaired by a satisfactory performance within the stipulated time, then the designation TI (Authorized Temporary Incomplete) or ABX (Authorized Absence from Final Examination) is automatically converted by the registrar to the grade of F. See "Postponement of Final Examinations" and "Work Incomplete at the End of Term" in section H (p. 54).
6. **Withdrawal from Yale College** Whether a student withdraws from Yale College for personal, medical, academic, or financial reasons, the entry placed in each case on the student's transcript is the word "Withdraw" together with the date of the withdrawal. When a student is withdrawn for disciplinary reasons, the entry placed on the student's transcript is the word "Suspended" together with the date of the suspension.
7. **Tracks and programs within majors** A transcript may show as a student's major subject only a designation approved for that purpose by the Yale College Faculty; "tracks" or programs within majors may not appear on transcripts. The majors approved by the faculty are listed under Majors in Yale College (p. 90).
8. **Access to grades** Access to recorded grades is available online to students in any Yale College course for which they have completed or actively declined to complete the online course evaluation form through the Yale Student Information System (SIS). Students have the opportunity to grant online access to their grades to certain other parties through the Proxy Management menu in the Student Information System. The Registrar's Office will provide paper grade reports only upon the specific written request of the student.

9. **Transcript orders** Transcript ordering instructions can be found on the University Registrar's Office Website. The charge is \$8 per transcript.

C. Course Credits and Course Loads

CREDIT VALUE OF COURSES

Most courses in Yale College are term courses that carry one course credit if completed with a passing grade. There are, however, some variations:

1. **Double-credit courses** Certain courses in Yale College, including intensive language or research courses, award two course credits for a single term's work.
2. **Yearlong course sequences** There are some yearlong course sequences in which two course credits are awarded upon the satisfactory completion of both terms of the sequence; other course sequences, including some research and laboratory courses, give one or four course credits for the successful completion of the full year's work. A student who fails the first term of a year-long course sequence may continue the sequence only with the instructor's written permission, and will receive course credit only for the successful completion of the second term's work. A student who satisfactorily completes the first term of a year-long course sequence may receive course credit routinely for that term's work, except where noted otherwise in the course listing.

The completion of the first term only of an introductory modern foreign language earns credit whether or not a subsequent term of that language is completed. Neither instructors nor departments have the authority to make an exception to this rule.

3. **Laboratory courses** Some laboratory courses carry no separate credit toward the degree; others carry a full course credit for a term's work; and still others carry one-half course credit.
4. **Half-credit courses** All courses that carry 0.5 or 1.5 course credits and that are not bound by the credit/year restriction count toward the 36-course-credit requirement for the bachelor's degree.

NORMAL PROGRAM OF STUDY

A student in Yale College normally takes four or five term courses, or their equivalent, for each of eight terms.

1. **Minimum course load** A student may not enroll in a program of study worth fewer than three course credits in one term. A student enrolled for three course credits may withdraw from one course credit between midterm and the first day of the reading period, receiving the neutral designation W (Withdrawn) in that course. Similarly, a student enrolled for four or more course credits may withdraw from one or more courses as described above, but at no time may any student carry a schedule of courses that will earn fewer than two course credits in a term.
2. **Course loads requiring permission** A three-course-credit program of study or a six-course-credit program of study requires the permission of the residential college dean. It is assumed that any student who requests permission to carry more than five course credits does not intend to drop any of them. Permission for a program

of six course credits will normally not be given to a student who is not in academic good standing.

3. **Seven course credits in a term** A student must petition the Yale College Committee on Honors and Academic Standing for permission to take a program worth seven credits in a term. In the petition the student must explicitly state an intention to complete all the courses proposed.
4. **Independent study** Opportunities for independent study exist in many programs and departments under various designations: directed reading or research; individual reading or research; independent research or study; independent or special projects; individual instruction in music performance; independent, individual, or special tutorials; and the senior essay or project, among others. Note that course credit earned in such study may not be used toward fulfillment of the distributional requirements, and students may not enroll in independent study courses in the graduate or professional schools. Approval for any such particular course is given by the department or program; however, approval for an independent study course is also required from the Yale College Committee on Honors and Academic Standing if certain limits are exceeded. A student must petition the Committee for permission to enroll in more than one such course credit in any one term before the senior year, or in more than two such course credits in any one term during the senior year. Permission is also required for a student to enroll in more than three such course credits in the first six terms of enrollment; included in this total are any independent study courses completed in Yale Summer Session that are applied to the Yale College transcript. In the petition the student must give sound academic reasons for exceeding these limits, and provide evidence that the additional work in independent study will not be done at the expense of the breadth and depth of study being pursued in regular Yale College courses. Students admitted to the Program for the Simultaneous Award of the Bachelor's and Master's Degrees are not required to seek permission of the Committee on Honors and Academic Standing to enroll in independent study courses when such work is required for the completion of that program.

D. Promotion and Good Standing

REQUIREMENTS FOR PROMOTION

1. To be promoted to sophomore standing after two terms of enrollment, a student must have earned at least eight course credits or the equivalent and have fulfilled the distributional requirements for the first year.
2. To be promoted to junior standing after four terms of enrollment, a student must have earned at least sixteen course credits or the equivalent and is expected to have fulfilled the distributional requirements for the sophomore year.
3. To be promoted to senior standing after six terms of enrollment, a student must have earned at least twenty-six course credits or the equivalent and is expected to have fulfilled the distributional requirements for the junior year.

REQUIREMENTS FOR ACADEMIC GOOD STANDING

At the conclusion of each term of enrollment, a student must have earned enough course credits to be in academic good standing.

1. At the end of the first term at Yale, a student must have earned at least four course credits.
2. At the end of the second term, a student must have earned at least eight course credits.
3. At the end of the third term, a student must have earned at least twelve course credits.
4. At the end of the fourth term, a student must have earned at least sixteen course credits.
5. At the end of the fifth term, a student must have earned at least twenty-one course credits.
6. At the end of the sixth term, a student must have earned at least twenty-six course credits.
7. At the end of the seventh term, a student must have earned at least thirty-one course credits.

Regardless of the number of credits accumulated, a student is not in academic good standing if the student's record shows three grades of F in a term or over two or three successive terms. "Successive terms" means successive terms in which the student enrolls, whether or not broken by a withdrawal or by a leave of absence. See "Dismissal for Academic Reasons" and "Makeup of Course Deficiencies for Promotion or Academic Good Standing" in section I, Academic Penalties and Restrictions (p. 57).

E. Registration and Enrollment in Courses

REGISTRATION

All students are required to register, and to create a preliminary online course schedule as described below under "Enrollment in Courses," at the beginning of each term in which they are to be enrolled in courses at Yale College.

1. **Fall-term registration** To register for the fall term, all first-year students must attend a registration meeting with their residential college dean and first-year counselor on the Friday before classes begin, as published in the Yale College Calendar with Pertinent Deadlines (p. 8). Upper-level students must attend the registration meeting conducted by the office of the residential college dean on the day before classes begin, as published in the Yale College Calendar with Pertinent Deadlines (p. 8). Students whose registration is being temporarily withheld by the Office of Student Financial Services or by any other administrative office of the University are nonetheless required to attend the appropriate registration meeting.
2. **Spring-term registration** To register for the spring term, first-year students are required to attend a registration meeting in their residential college on the day before classes begin, as specified in the Yale College Calendar with Pertinent Deadlines (p. 8). Sophomores, juniors, and seniors are required to pick up registration materials from the office of the residential college dean on the first day of classes, as specified in the Yale College Calendar with Pertinent Deadlines (p. 8). Students whose registration is being temporarily withheld by an administrative office of the University are nonetheless required to report for spring-term registration as indicated immediately above.

3. **Late registration** A student who, for reasons other than incapacitating illness, the death of a family member, or a comparable emergency, fails to follow the registration procedures in paragraph 1 or 2 above may register for the term only by exceptional action of the Committee on Honors and Academic Standing and will be liable for a fine of \$50.

ENROLLMENT IN COURSES

Enrollment in courses can be accomplished only by the submission of an approved course schedule or, an amendment of the course schedule, by the submission of an approved course change notice. Attendance at a class does not constitute enrollment. The course schedule is an important document. A student is responsible for the timely submission of the course schedule and for the accuracy of all the information that the student enters upon it. The course elections that a student indicates on a course schedule or course change notice shall appear on the student's transcript unless a student formally withdraws from a course before the relevant deadline, as listed in the Yale College Calendar with Pertinent Deadlines (p. 8). See section F, Withdrawal from Courses (p. 50).

The following rules govern students' enrollment in courses during the fall and spring terms of the academic year:

1. **Preliminary online course schedule** In both fall and spring terms, all students must create a preliminary course schedule in Online Course Selection (OCS) by 11:59 p.m. on the day before classes begin. Students who fail to submit a preliminary schedule by the deadline will be charged a fine of \$50. The preliminary course schedule must contain at least three course credits. Students are expected to edit their online course schedules regularly during the course selection period, retaining courses they are actively considering and removing courses in which they do not plan to enroll.
2. **Deadline for submitting final schedules** Every student must submit a final course schedule for each term at the office of the residential college dean by 5 p.m. on the deadline indicated on the student's course schedule and listed in the Yale College Calendar with Pertinent Deadlines (p. 8). Students whose registration has been withheld by the Office of Student Financial Services or any other administrative office of the University must nonetheless submit their course schedules by these same deadlines.

It is the student's responsibility to obtain all necessary signatures, except that of the residential college dean, before the schedule is due. In the rare instance that the student's adviser is unavailable before the deadline, the student should nonetheless submit the schedule on time, and take a copy to be signed by the adviser and submitted to the dean as soon as possible. If the student does not submit a copy of the schedule signed by the adviser within one week of the deadline, the student will be subject to the fines and restrictions described under paragraphs 4, 5, and 6 below.

3. **Addition of a new course after the deadline** The election of a new course after the deadline for submitting a course schedule will not be permitted save by exceptional action of the Committee on Honors and Academic Standing. Students who seek such an exception should consult immediately with the residential college

dean. Permission to elect a new course must be requested by a petition that is accompanied by the written approval of the course instructor and the submission of a course change notice at the office of the residential college dean. The petition should explain in detail why the course is necessary to the student's schedule and why the student was unable to elect the course during the course selection period. Timeliness is an essential feature of any request to add a course to the course schedule; a delay in consulting with the dean or in submitting a complete petition will normally be grounds for denial. A fee of \$20 will be charged for the processing of an approved course change notice on which the election of a new course is requested. A student may not elect a new course after midterm, as published in the Yale College Calendar with Pertinent Deadlines (p. 8), unless such election is made to correct a clerical error on the course schedule. A change of level in courses in which the subject is taught in an ordered progression, as for example in languages or in mathematics, is not considered the addition of a new course. Such a change may be made with the approval of the instructors involved (and, if necessary, with the added permission of the director of undergraduate studies in the subject). Similarly, a change of section in the same course is not considered the addition of a new course.

4. **Fines for late schedules** Students who submit their schedules after the deadlines will be fined at least \$50. Additional fines, increased \$5 daily according to lateness, will be imposed for schedules submitted more than one week after the deadlines. A schedule received more than two weeks after it is due will be accepted only by exceptional action of the Committee on Honors and Academic Standing and will be subject to an increased fine or other penalty.
5. **Fines for clerical errors** A student who submits a course schedule or course change notice with clerical errors or omissions of data is liable to a fine of \$50.
6. **Overlapping meeting times** A student may not elect courses with meeting times that overlap. If, for good cause, a student is obliged to elect two courses with a small and insignificant overlap in meeting times, the student must supply the residential college dean with the written permission of both instructors at the beginning of the term and must petition the Committee on Honors and Academic Standing, explaining why the student must enroll in both courses in the current term and how the student will meet all the requirements for both courses. Failure to file a complete and timely petition may result in the loss of credit for both courses.
7. **Courses requiring permission** Some courses require permission of the instructor to enroll; others require permission of the director of undergraduate studies. It is the responsibility of the student to secure the appropriate permission before enrolling in a course.
8. **Courses that do not require permission** Courses that do not require permission for enrollment may nevertheless be limited in their enrollment (i.e., "capped") at the beginning of the term, depending upon, for example, the number of teaching assistants available, the size of the appropriate meeting space, or other instructional needs.
9. **Prerequisites** Students are expected to have met the prerequisites published in course descriptions. If a student wishes to elect a course for which prerequisites are indicated but has not met those prerequisites, it is the student's responsibility to secure the permission of the instructor and, where appropriate, the director of

- undergraduate studies before enrolling. The registrar may drop the student from the class if the student has not met the prerequisites for enrollment.
10. **Teaching evaluations** For the advancement of teaching in Yale College, anonymous teaching evaluations are made available through the Yale Student Information System (SIS). Students are expected to participate in this evaluation process for any Yale College course in which they are enrolled. Students who withdraw from a course after midterm are invited but not required to participate.
 11. **Selection of a less advanced course in the same subject** In certain subjects, such as mathematics, foreign languages, and the sciences, knowledge of the subject is acquired in an ordered progression. That is, the concepts and skills introduced in one course are necessary, or prerequisite, for mastery of the material in subsequent courses in that field. Occasionally a student, having completed an intermediate or advanced course in a subject, may take a less advanced one in that same subject. In such a case, although the student obviously cannot receive course credit for both courses, each course will appear on the student's transcript with the grades earned; however, the student will receive course credit only for the more advanced course. A student may sometimes be permitted to complete an intermediate or advanced course without having first completed a less advanced course in a subject; in such a case, the student does not receive course credit for the less advanced course by virtue of having completed the more advanced course.
 12. **Repeated enrollment in the same course** Courses may not be repeated for credit, except for courses marked "May be taken more than once" or "May be repeated for credit." In such cases, the repeated course earns no additional distributional credit. On some rare occasions, a student may take the same course over again, or may take a course with the same content as another course the student has already passed. In such cases, the student receives credit for the course only once. Should a student take the same or an equivalent course twice, each course with its grade appears on the transcript. The student receives course credit for the higher grade if one is earned; in such an event, course credit is not given for the lower grade. Note, however, that both grades are included in the calculation of a student's grade point average (GPA) and in the calculation for General Honors.
 13. **Placement in foreign language courses** Students placed by a language program or by their score on the Advanced Placement examination into a particular level of a foreign language may not earn course credit for the completion of a course in that language at a level lower than the placement. For example, a student placed into the third term (L3) of a foreign language earns no course credit for the completion of an L1 or L2 course in that language. Should a student complete a foreign language course at a level lower than the placement, the lower-level course with its grade appears on the transcript but earns no credit toward graduation.
 14. **Use of vertebrate animals** If the satisfactory completion of a course will require the use of vertebrate animals in experiments, the student must be notified of that requirement at the first meeting of the course. If a student objects on ethical grounds to participating in the animal usage in question, it is the student's responsibility to discuss the matter with the faculty member in charge and not to enroll in the course if no alternative acceptable to the faculty member can be arranged.

15. **Field trips** If the satisfactory completion of a course will require participation in a field trip, students should understand that there are inherent risks, including the risks of travel, involved in such an activity. If a student objects to assuming these risks, it is the student's responsibility to discuss the matter with the faculty member in charge and not to enroll in the course if no alternative acceptable to the faculty member can be arranged. Yale College's policies regarding field trips can be found at the Yale College Academic Field Trip Policies Website.
16. **Fieldwork** If a student is conducting fieldwork away from the Yale campus, under the supervision of a faculty member, he or she should discuss the inherent risks of such work and pre-departure guidelines with the supervising faculty member or director of undergraduate studies.

F. Withdrawal from Courses

Students are permitted to withdraw from courses for which they have enrolled in a term until 5 p.m. on the last day of classes before the reading period in that term. Withdrawal from a course can be accomplished only by the submission of a course change notice at the office of the residential college dean. A fee of \$20 will be charged for the processing of an approved course change notice on which withdrawal from a course is requested. Formal withdrawal is important, because failure to receive credit for courses in which students are enrolled will be recorded as F on their transcripts and may open them to the penalties described under "Academic Warning" and "Dismissal for Academic Reasons" in section I (p. 57).

1. **Transcripts** Each course listed on a student's course schedule appears on the student's transcript unless the student withdraws from the course by midterm. See paragraph 3 below.
2. **Permission** All course withdrawals require the permission of the residential college dean.
3. **Deadlines for withdrawal from courses** If a student formally withdraws from a full-term course by midterm, as published in the Yale College Calendar with Pertinent Deadlines (p. 8), then after the registrar has recorded the withdrawal, the transcript will contain no indication of that course. If a student formally withdraws from a half-term course by the relevant deadline published in the Yale College Calendar with Pertinent Deadlines (p. 8), then after the registrar has recorded the withdrawal, the transcript will contain no indication of that course.

If a student formally withdraws from a full-term course after midterm but before 5 p.m. on the last day of classes before the reading period, the transcript will record the course and show the neutral designation W (Withdraw) for the course. If a student enrolled in a half-term course formally withdraws from it after the deadline for the course to be removed from the transcript, but by the last date a withdrawal is permitted from the course, the student's transcript will record the neutral designation W (Withdraw) for the course. See the Yale College Calendar with Pertinent Deadlines (p. 8) for both dates in each term. The deadlines apply to all courses, whether or not a particular course observes the reading period.

A change of level in courses in which the subject is taught in an ordered progression, as, for example, in foreign languages or in mathematics, is not considered a course withdrawal and does not result in the recording of a W.

After these deadlines, withdrawal from a course is not permitted. An exception will be made only for a student who withdraws from Yale College for medical reasons as certified by Yale Health after the beginning of the reading period but by the last day of the final examination period; in such a case the student will be permitted to withdraw from a course with a mark of W.

4. **Withdrawal from a credit/year sequence** For those credit/year course sequences in which a student receives the mark of SAT or NSAT for the first term and a letter grade for the second, withdrawal from the sequence after the first term is completed but before the second term is completed will result in the recording of a mark of W for the first term.
5. **Lack of formal withdrawal** If, when grades are due, the instructor of a course notifies the registrar that a student has not successfully completed a course from which the student has not formally withdrawn, then a grade of F will be recorded for that course on the student's transcript. See "General Regulations Concerning Grades and Transcripts" in section B (p. 40). See also "Work Incomplete at the End of Term" and "Postponement of Final Examinations" in section H (p. 54).
6. **Withdrawal from Yale College** A student who has withdrawn from Yale College for any reason, including medical, is no longer enrolled. Consequently, as of the date of the withdrawal, such a student cannot continue to attend classes or complete work that was assigned in the term in which the withdrawal occurred, even if the deadline for such assignments was previously extended by the instructor or by the residential college dean.
7. **Transcripts of students withdrawn from Yale College** It follows that if a student withdraws from Yale College by midterm, the transcript will not show that the student has been enrolled in any course during that term. If a student withdraws from Yale College after midterm, but before 5 p.m. on the last day of classes before the reading period, the transcript will record the student's courses with the designation W (Withdrawn). If a student withdraws from Yale College after the beginning of the reading period, the transcript will show the student's courses with grades of F unless an instructor reports a passing grade for the student in any of the courses. The only exception is for a student who withdraws from Yale College for medical reasons after the beginning of the reading period but before the end of the term; see paragraph 3 above.

G. Reading Period and Final Examination Period

1. **Due dates for course work** It is expected that instructors will require all course assignments, other than term papers and term projects, to be submitted at the latest by the last day of reading period. Term papers and term projects are to be submitted at the latest by the last day of the final examination period. For the dates of the reading period and final examination period, consult the Yale College Calendar with Pertinent Deadlines (p. 8). Instructors do not have the authority to give permission for these deadlines to be extended; only the residential college dean has this authority. See "Work Incomplete at the End of Term" in section H (p. 54). Even if an extended deadline should be announced by the instructor, a grade reflecting work submitted after the end of the term cannot be accepted unless a Temporary Incomplete was authorized by the student's residential college dean.

- 2. Reading period** The Yale College Faculty established the reading period between the end of classes and the beginning of final examinations in order to provide a period of about a week during which students might conclude their course work and prepare for final examinations. The instructor of each course determines whether or not that course observes the reading period. A course that does not observe the reading period is identified in the course listings by the abbreviation “RP” at the end of the course description or by a phrase such as “Meets RP” or “Meets during reading period.”

The assumption underlying the faculty’s institution of the reading period was that no additional assignments would be required during the reading period in a course observing it, but that students would use the reading period in their own way to consolidate and augment the work of the course. Such being the case, no final examination may be administered during the reading period. A final examination in a course, whether or not the course observes the reading period, must be administered during the final examination period. No take-home final examination may be due during the reading period. An instructor may, however, set the due date for a term paper or project during the reading period.

- 3. Final examinations** Yale College expects every course to conclude with a regular final examination or with a substitute for such an examination. The substitute should be in the nature of a final examination in that it requires the student to demonstrate proficiency in the discipline and subject matter of the course. Substitutes may include, for example, an oral presentation or examination, a term essay, or the last of a series of hour tests administered during the last week of classes. Final examinations normally last either two or three hours but, in either case, students are permitted to take an additional half-hour before being required to turn in their answers. This additional time is given for improving what has already been written, rather than for breaking new ground.
- 4. Scheduling of final examinations** The University Registrar’s Office has assigned a specific time and date for the administration of final examinations in most courses in Yale College. The time of the final examination is determined by the meeting time of a course during the term. If the meeting time of a course is changed from that originally published, the time of the examination is defined by the new meeting time. If a course is published with no scheduled examination but the instructor subsequently decides to offer a final examination, it must be administered at the time defined by the meeting time of the course. A schedule of final examinations may be found on the page Final Examination Schedules (p. 15).
- 5. Date of administering final examinations** Since the final examination schedule has been carefully designed to make efficient use of the entire final examination period and to minimize overcrowding of students’ schedules, a final examination must be administered on the date and at the time specified. On occasion instructors have administered final examinations at times different from those assigned. Such an arrangement is allowed under the following conditions: (a) that two different and distinct final examinations be administered; (b) that one of these examinations be administered at the regularly specified time within the final examination period; (c) that the alternative examination be administered at a regular examination starting time during the final examination period; and (d) that no student be required to obtain permission to take the alternative examination.

6. **Take-home final examinations** Take-home final examinations are sometimes substituted for regular final examinations. If a course has been assigned a final examination date, a take-home examination for that course is due on the scheduled examination day. If a course has not been assigned a final examination date, a take-home examination for the course is due on the day specified in the final examination schedule by the meeting time of the course. See Final Examination Schedules (p. 15). If a course does not meet at a time covered by the final examination schedule, a take-home examination may not be due during the first three days of the final examination period. No take-home examination may be due during the reading period.
7. **Due dates for term grades** An instructor is required to submit term grades promptly after the completion of a course. Fall-term grades are due by 5 p.m. on January 2, 2019; spring-term grades are due within one week of the end of the final examination period; grades for seniors in the spring term are due within forty-eight hours of the end of the final examination period.

In submitting term grades, the instructor is expected to apply appropriate penalties for missed or incomplete work unless the late submission of the work has been authorized by the student's residential college dean or by the Committee on Honors and Academic Standing. If an instructor reports a mark of Incomplete for which there has been no authorization by the college dean, the Incomplete will be recorded by the University Registrar's Office as a grade of F.

8. **An hour test at the end of term instead of a final examination** Some instructors do not give final examinations of the usual two-and-one-half-hour or three-and-one-half-hour length, but instead terminate their courses with an hour test that is the last in a succession of hour tests administered during the term.

For courses that do not observe the reading period, this hour test may be administered during the reading period, since, in such courses, regular class meetings are scheduled to extend through the reading period. A course that does not observe the reading period may also administer the hour test during the final examination period at the time specified in the final examination schedule.

For courses that do observe the reading period, the hour test may not be administered during the reading period, but may be administered only during the last week of classes or during the final examination period at the time specified in the final examination schedule.

9. **Senior departmental examinations** In those major programs requiring a senior departmental examination, that examination is scheduled on the two weekdays preceding the final examination period in the fall and spring terms. In a department or program in which a two-day written senior departmental examination is administered on those days, a senior may, with the written consent of the appropriate instructors, be excused from final examinations in as many as two courses in the major in the term in which he or she takes the departmental examination. In a department or program in which the senior departmental examination takes place on only one of the two scheduled days, a senior may, with the written consent of the instructor, be excused from the final examination in one course in the major in the term in which the departmental examination is taken. If the senior departmental examination takes place before the scheduled days, or if a

senior essay or senior project takes the place of the examination, a student may not omit a final examination.

H. Completion of Course Work

SUBMISSION OF COURSE WORK TO INSTRUCTORS

Students in Yale College are expected to take personal responsibility for the timely delivery to their instructors of all course work, including examinations, in the manner and format prescribed by the instructors. In person submission, either to the instructor or to someone explicitly designated by the instructor, such as a teaching fellow or an administrative assistant, is always the best way to ensure that the work has been received. Students who submit course work in a manner other than in person and directly to an appropriate individual (e.g., place it under a door or in a box in a hallway or send it via electronic means), should—even when that is the method directed by the course instructor—confirm as soon as possible after the submission that the work has been received. Students who must use postal services to submit a course assignment, because they will be unavoidably absent from campus at the time an assignment is due, should ascertain in advance from the instructor the correct mailing address and use receipted mail services to establish the date of mailing.

Instructors are not required to accept course work sent over a computer network to their computer, printer, or email account unless they have explicitly authorized such electronic submission in the syllabus for the course or have made a special arrangement with the student. Instructors may establish a deadline for electronic submission of a particular assignment different from the deadline for submission of the same assignment on paper.

LATE OR POSTPONED WORK

There are three kinds of late or postponed work: (1) work late during term time; (2) work incomplete at the end of term; and (3) postponed final examinations. Instructors of courses may, during term time, give permission to make up late or missed work, provided that such work is submitted before the end of term. Only the residential college dean, however, may authorize the late submission of work still incomplete at the end of term, or the postponement of a final examination.

When students know in advance that they must miss or postpone work for a legitimate reason, as described below in “Work Missed During the Term” and in “Postponement of Final Examinations,” they should inform the instructor and the residential college dean as soon as possible.

WORK MISSED DURING THE TERM

The basic responsibility for permitting postponement of work during the term is the instructor’s. However, the residential college dean may give permission for a student to make up work missed or delayed during the term because of an incapacitating illness, the death of a family member, or a comparable emergency. The residential college dean also has authority to give permission to make up work missed because of the observance of religious holy days and because of participation required in intercollegiate varsity athletic events. Only in these cases does a residential college dean have authority to give permission to make up late work during term time. This

permission is conveyed by means of a special form from the college dean that the student delivers to the instructor. Students participating in events of intramural or club sports, as differentiated from varsity events sponsored by the Department of Athletics, are not eligible for a postponement of work by the dean on account of those events.

In all other cases of work missed during the term, permission to make up course work must be secured directly from the instructor of the course, since the instructor is the only person who can decide, in the context of the nature and requirements of the course, whether such permission is appropriate. This permission may not, however, extend beyond the end of the term. Permission to submit work still incomplete at the end of term may be granted only by a student's residential college dean. See "Work Incomplete at the End of Term."

WORK INCOMPLETE AT THE END OF TERM

Only the residential college dean has authority to give permission to a student to submit work in a course after the end of term. The college dean may give such permission because of an incapacitating illness, because of a serious family emergency, or because of another matter of comparable moment. In such cases the college dean may authorize a mark of Temporary Incomplete for a period not to exceed one month from the beginning of the final examination period. Note that the mark of Temporary Incomplete refers to unfinished course work, not to a final examination missed for any reason; see "Postponement of Final Examinations."

The residential college dean, in authorizing a mark of Temporary Incomplete, will stipulate the date on which the student's late work will be due and the date on which the instructor is expected to submit a course grade to the registrar. The college dean may not set this second date later than one month after the beginning of the final examination period. If the student's work has not been completed in time for the instructor to report a grade to the registrar by the deadline stipulated, then the instructor will submit a grade for the student that reflects the absence of the missing work, or the registrar will convert the mark of Temporary Incomplete to a grade of F. See "General Regulations Concerning Grades and Transcripts" in section B, Grades, (p. 40) and section F, Withdrawal from Courses (p. 50).

Permission for a mark of Temporary Incomplete to last beyond one month from the beginning of the final examination period can be granted only by the Yale College Committee on Honors and Academic Standing. Such an extension may be given only for a brief period of time, usually one to two weeks, and only in response to extraordinary circumstances, usually of a medical nature. A petition for such permission must be submitted at the earliest possible date. In considering such requests, the Committee on Honors and Academic Standing takes into account the original deadline for submission of the work and the date on which a petition is delivered to the committee.

USE OF COMPUTERS AND POSTPONEMENT OF WORK

Problems that may arise from the use of computers, software, and printers normally are not considered legitimate reasons for the postponement of work. A student who uses computers is responsible for operating them properly and completing work on time. (It is expected that a student will exercise reasonable prudence to safeguard materials, including backing up data in multiple locations and at frequent intervals and

making duplicate copies of work files.) Any computer work should be completed well in advance of the deadline in order to avoid last-minute technical problems as well as delays caused by heavy demand on shared computer resources in Yale College.

POSTPONEMENT OF FINAL EXAMINATIONS

Only the residential college dean may authorize postponement of a final examination. The residential college dean may give such permission because of an incapacitating illness, because of a family emergency requiring the student's absence from New Haven, or because of another matter of comparable moment. The residential college dean may also authorize such a postponement because of the observance of religious holy days, or because of participation required in an intercollegiate varsity athletic event. Students participating in events of intramural or club sports, as differentiated from varsity events sponsored by the Department of Athletics, are not eligible for a postponement of final examinations on account of those events. Finally, the college dean may authorize postponement of a final examination if a student has three examinations scheduled during the first two days of the final examination period, or three examinations scheduled consecutively in the final examination schedules.* The postponement of a final examination for any other reason requires the permission of the Committee on Honors and Academic Standing. A student's end-of-term travel plans are not a basis for the postponement of a final examination. See Final Examination Schedules (p. 15) and paragraph 4 in section G, Reading Period and Final Examination Period (p. 51).

* The final examination schedules indicate three examination sessions, or time slots, per day: one in the morning, one in the afternoon, and one in the evening. Some of these time slots contain examinations; others do not. A college dean may postpone an examination if a student has three examinations scheduled within any four consecutive time slots, whether or not each of those time slots has an examination assigned to it. See Final Examination Schedules (p. 15). Occasionally an instructor may arrange an option for an alternative final examination in addition to the regularly scheduled examination. See paragraph 5 in section G, Reading Period and Final Examination Period (p. 51). Such an optional arrangement cannot be the basis for a postponement of an examination if three of a student's final examinations would thereby acquire "consecutive" status.

It is normally the expectation that when a student begins a final examination but does not complete it, the student will receive credit only for the work completed on the examination. If, however, a student becomes unable to complete an examination because of a sudden and serious illness or other emergency during the examination, the student may request authorization from the residential college dean to take a makeup final examination. In such a case, the student must explain his or her departure to the instructor, or to some other person proctoring the examination, before leaving the room, and must contact Yale Health or the residential college dean as soon as possible thereafter.

Makeup examinations for the fall term are scheduled to take place at the end of the second week of classes in the spring term. Makeup examinations for underclassmen who miss final examinations in the spring term are scheduled at the end of the second week of classes in the following fall term. Makeup final examinations are administered by the University Registrar's Office only at these times. Students who will not be

enrolled at these times—whether because they are on leave of absence or on a Year or Term Abroad, or because they have withdrawn from Yale—must make alternative arrangements with the University Registrar’s Office in advance of the dates on which makeup final examinations are administered by that office. The registrar automatically records a grade of F in a course for a student who fails to take an officially scheduled makeup examination in that course at the appointed time. If an examination is not administered by the registrar, it is the student’s responsibility to make arrangements with the instructor to take the makeup examination. In such cases, if a grade is not received by the midterm following the original examination date, the registrar automatically records a grade of F in the course.

No fee will be charged for a makeup examination necessitated by illness, family emergency, the observance of a religious holy day, or participation required in an intercollegiate varsity athletic event. A charge of \$35 will be made for the administration of a makeup examination occasioned by a conflict between two final examinations scheduled at the same time, or three examinations scheduled in the first two days of the examination period, or three final examinations scheduled in consecutive examination periods. Ordinarily there will be a charge of \$35 for makeup examinations authorized for special reasons approved by the Committee on Honors and Academic Standing.

Permission to postpone a final examination does not also carry authorization for a student to submit other work late in that course. See “Work Incomplete at the End of Term.”

I. Academic Penalties and Restrictions

CUT RESTRICTION

Regular classroom attendance is expected of all students. While Yale College enforces no general regulation concerning attendance, instructors of individual courses may require it of all students. This is particularly the case in discussion groups, seminars, laboratories, and courses in foreign languages.

A student who, in the opinion of the instructor and of the residential college dean, has been absent from a course to an excessive degree and without excuse may at any time be placed on Cut Restriction in that course or in all courses. A student on Cut Restriction who continues to be absent from a course may, with the concurrence of the college dean and the Committee on Honors and Academic Standing, be excluded from it without credit. See “Exclusion from Courses.”

EXCLUSION FROM COURSES

Any student may, because of excessive absences or unsatisfactory work, be excluded from a course without credit at any time upon recommendation, made by the instructor or department concerned, to the residential college dean and the Committee on Honors and Academic Standing. If the exclusion occurs after midterm and before the first day of the reading period, the student’s record will show a mark of W for the course.

ACADEMIC WARNING

Academic Warning is an indication that a student’s scholastic record is unsatisfactory. Students on Academic Warning who do not pass all of their courses in the term in which they are on Academic Warning will be dismissed for academic reasons. No

matter how many course credits a student has earned, Academic Warning is automatic in the following cases: (a) failure in one term to earn more than two course credits; (b) a record that shows two grades of F in one term; (c) in two successive terms, a record that shows a grade of F for any course. The college deans attempt to give written notification of Academic Warning to students whose records show these deficiencies, but such students should regard themselves as being on warning even in the absence of written notification. A student permitted to continue in Yale College with fewer than the number of course credits ordinarily required for academic good standing may be placed on Academic Warning, and in such a case the student will be notified that he or she has been placed on warning. See “Requirements for Academic Good Standing” in section D, Promotion and Good Standing (p. 45). The Committee on Honors and Academic Standing may at its discretion disqualify a student on Academic Warning from participation in recognized University organizations.

DISMISSAL FOR ACADEMIC REASONS

1. **Failure in three classes** A record that shows three grades of F in a term or over two or three successive terms will normally result in the student’s dismissal from Yale College. “Successive terms” means successive terms in which the student enrolls, whether or not broken by a withdrawal or by a leave of absence. While Yale Summer Session grades are recorded on the Yale College transcript, they are not counted towards this total, because attendance at Yale Summer Session does not constitute a term of enrollment in Yale College.
2. **Failure to meet requirements for good standing or promotion** A student who has not, at the end of a term, met the minimum requirements for academic good standing, or a student who has failed to meet the minimum standards for promotion, may be dismissed unless permitted by the Committee on Honors and Academic Standing to repair the deficiency. See “Makeup of Course Deficiencies for Promotion or Academic Good Standing” below and section D, Promotion and Good Standing. (p. 45) A student who is short by more than two credits of the minimum requirements for academic good standing or promotion, even if the student has no grades of F, will be dismissed.
3. **Students on Academic Warning** A record that shows a grade of F for a student who is on Academic Warning in that term will result in that student’s dismissal for academic reasons. See “Academic Warning.”
4. **Reinstated students** A student reinstated to Yale College who does not, in the first or second term following reinstatement, pass all the courses completed in that term will be dismissed for academic reasons. See “Reinstatement” in section J (p. 59).

In addition, at any point during the year a student may be dismissed from Yale College if in the judgment of the Yale College Committee on Honors and Academic Standing the student’s academic record is unsatisfactory.

MAKEUP OF COURSE DEFICIENCIES FOR PROMOTION OR ACADEMIC GOOD STANDING

A student who has failed to satisfy the requirements for promotion or for academic good standing, if permitted to continue by the Committee on Honors and Academic Standing, must repair the deficiency promptly. Such deficiencies are to be repaired

before the opening of the next fall term by work in summer school. The institution to be attended and the courses to be taken require the approval of the residential college dean. See section P, Credit from Other Universities (p. 81). Only in extraordinary circumstances will a student be allowed to repair a deficiency by carrying an additional course during the following academic year. Course deficiencies may not be repaired under any circumstances by the application of acceleration credits.

J. Leave of Absence, Withdrawal, and Reinstatement

LEAVE OF ABSENCE

Any student in Yale College who is in academic good standing will normally receive permission, upon petition to the Committee on Honors and Academic Standing through the residential college dean, to take one or two terms of leave of absence, provided that the student departs in academic good standing at the end of a term and returns at the beginning of a term. See “Requirements for Academic Good Standing” in section D (p. 45). In order that the University may make plans to maintain enrollment at the established level, students desiring leaves of absence are requested to make their intentions known to their residential college deans as soon as possible. Yale College assumes that students who take leaves of absence will inform their parents or guardians in good time that they intend to do so. Ordinarily, residential college deans do not notify parents or guardians that a student has taken a leave of absence, though they may do so if they believe that such notification is appropriate.

1. **Petition for a fall-term leave** For a fall-term leave of absence, a student is requested to submit a petition by May 1. Since a student’s plans often change during the summer, however, the Committee on Honors and Academic Standing will ordinarily grant a petition for a leave that is received on or before the fifteenth day of the term in the fall.
2. **Petition for a spring-term leave** For a spring-term leave of absence, a student’s petition must be received on or before the fifteenth day of the term in the spring.
3. **Relinquishing housing** Students considering a leave of absence should be aware that there is a substantial financial penalty for relinquishing on-campus housing after the relevant deadlines for relinquishing such housing. See “Rebates of Undergraduate Charges” in the section “Financial Services” in the Yale College online publication *Undergraduate Regulations*.
4. **Canceling a leave** A student may cancel a leave of absence for either term as late as the first day of classes in the term for which the leave has been requested. However, the deadlines for payment of the term bill and the penalties for late payment apply in such cases. See “Payment of Bills” in the section “Financial Services” in the *Undergraduate Regulations*.
5. **Total terms of leave** A student is eligible for a total of two terms of leave of absence. These two terms need not be taken consecutively.
6. **Accelerated students** A student taking an accelerated degree by use of acceleration credits who has had two terms of leave of absence may receive a third term of leave if the third term of leave is needed to bring the student’s pattern of attendance into

conformity with the pattern of attendance stipulated for an accelerated degree. See section Q, Acceleration Policies (p. 84).

7. **Returning from a leave** Permission to take a leave of absence normally includes the right to return, with prior notification to the residential college dean but without further application, at the beginning of the term specified in the student's petition to the Committee on Honors and Academic Standing. In the case, however, in which a student achieved eligibility for a leave of absence because of a postponement of a deadline for course work as a result of an identified medical problem, the Yale College Dean's Office may require medical clearance from Yale Health before the student's return from the leave of absence. Such clearance may also be required for a student who had sought and had been granted, on medical grounds, a waiver of the fee for the late relinquishment of housing at the time the leave of absence was requested.
8. **Financial aid** Students taking leaves of absence who have received long-term loans will be sent information about their loan repayment obligations, which in most cases begin six months after the last day of formal enrollment at Yale. A student taking a leave of absence who is receiving financial aid through Yale must consult with a counselor in Student Financial Services before leaving Yale; see "Rebates of Undergraduate Charges" in the section "Financial Services" in the *Undergraduate Regulations*.
9. **Health coverage** A student on a leave of absence is eligible to retain coverage by Yale Health during the time of the leave, but the student must take the initiative to apply for continued membership in Yale Health by completing an application form and paying the fee for membership. See "Leave of Absence" in the section "Health Services" in the *Undergraduate Regulations*. Application forms and details about medical coverage while on leave of absence may be obtained from the Member Services Department of Yale Health.

MEDICAL WITHDRAWAL

A withdrawal for medical reasons must be authorized by the director of Yale Health or the chief of the Mental Health and Counseling department, or by their official designees within the Health Center. If a student under the care of a non-Yale Health physician wishes to withdraw for medical reasons, that physician should submit sufficient medical history to the director of Yale Health for a final decision on the recommendation. A student planning to return to Yale should discuss the requirements for reinstatement with the residential college dean or the chair of the Committee on Reinstatement, (203) 432-2914.

Yale College reserves the right to require a student to withdraw for medical reasons when, on recommendation of the director of Yale Health or the chief of the Mental Health and Counseling department, the dean of Yale College 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 withdrawal must be made in writing to the dean of Yale College no later than seven days from the date of withdrawal.

WITHDRAWAL FOR PERSONAL REASONS

At any time during the year, a student may withdraw from Yale College for personal reasons. After consulting with the residential college dean, a student wishing to withdraw should write a letter of resignation to the college dean. In consulting with the college dean, a student planning to return to Yale should discuss the requirements for reinstatement. Also, students in academic good standing who fail to register in a term will be withdrawn for personal reasons.

A student who withdraws from Yale College for personal reasons rather than face disciplinary charges that are pending against that student will not be eligible for Yale College reinstatement, re-enrollment, or a Yale College degree until the student's case has been adjudicated by the Executive Committee or the University-Wide Committee on Sexual Misconduct.

REBATES OF UNDERGRADUATE CHARGES

For information on financial rebates on account of withdrawal from Yale College, consult the section “Financial Services” in the *Undergraduate Regulations*.

REINSTATEMENT

During the time that a student who has withdrawn is away from Yale College, the Committee on Reinstatement expects him or her to have been constructively occupied and to have maintained a satisfactory standard of conduct.

Students whose withdrawal was for either academic reasons or personal reasons must remain away for at least one fall term and one spring term, in either order, not including the term in which the withdrawal occurred. (Note that students who withdrew for personal reasons rather than face disciplinary charges that are pending against them are not eligible for reinstatement; see above under “Withdrawal for Personal Reasons.”) Students whose withdrawal had been authorized as medical by the director of Yale Health or the chief of the Mental Health and Counseling department must normally remain away at least one full term before a return to Yale College, not including the term in which the withdrawal occurred. The period of withdrawal for disciplinary reasons is set by the Yale College Executive Committee at the time the student's enrollment is suspended.

Further requirements depend to some extent on the circumstances of the withdrawal and its duration. Students who are not in academic good standing, i.e., students who withdrew while a term was in progress or who were dismissed for academic reasons, must ordinarily complete the equivalent of at least two term courses, either in Yale Summer Session or at another college or university, earning grades of A or B. See section I, Academic Penalties and Restrictions (p. 57). Courses conducted online, whether taken at Yale Summer Session or elsewhere, do not fulfill this reinstatement requirement. In general, such a record of course work is also required of students who withdrew for medical reasons and of any students who have been away from full-time academic work for two years or more, whether or not they were in academic good standing at the time of their departure, in order to demonstrate that upon return they can satisfactorily complete their academic program. Courses themselves, as well as the institution at which they are taken, should be cleared in advance with the chair of the Committee on Reinstatement. All such course work must be completed no later than

the opening of the term to which the student has applied to be reinstated, but no earlier than two years before the date that term begins. Courses completed in fulfillment of reinstatement that are eligible for graduation credit must be applied to the student's Yale College transcript.

While the majority of students who apply for reinstatement do return to Yale College, reinstatement is not guaranteed to any applicant. Since the committee seeks to reinstate only those students who have demonstrated the ability henceforth to remain in academic good standing and thus complete degree requirements within the specific number of terms of enrollment remaining to them, the committee may sometimes advise an applicant to defer his or her return until a time later than the one originally proposed. At the conclusion of each of the two terms following their reinstatement, students are expected to complete and pass all of the courses in which they remained enrolled. A student who fails to meet this condition is ordinarily required to withdraw after his or her record has been reviewed by the Committee on Honors and Academic Standing. A student is eligible to be reinstated only once; a second reinstatement may be considered only under unusual circumstances, ordinarily of a medical nature.

Inquiries about reinstatement should be directed to the chair of the Committee on Reinstatement, Yale College Dean's Office, Yale University, P.O. Box 208295, New Haven, CT 06520-8295. For reinstatement to a fall term, applications must be submitted in person or by receipted mail by June 1. For reinstatement to a spring term, applications must be submitted in person or by receipted mail by November 1. These deadlines are strictly enforced.

FINANCIAL WAIVERS AND REINSTATEMENT

Students on financial aid who have successfully completed the course requirements for reinstatement *in the summer prior to reinstatement* will be forgiven their Student Income Contribution (SIC) for the subsequent summer. Students may apply for a waiver of the SIC through Yale's Student Financial Services.

Some students require, upon reinstatement in Yale College, a ninth term of enrollment in order to complete their bachelor's degree. Students who receive financial aid and find themselves in such a situation should consult with a counselor in Student Financial Services about possible Federal financial aid implications.

REINSTATEMENT INTERVIEWS

Interviews with members of the Committee on Reinstatement are required of all applicants for reinstatement. The committee cannot approve a student's return to Yale College until after the necessary interviews have taken place. These may include individual in-person meetings for any applicant with the chair of the committee and any other member of the committee, including a member of the Yale Health staff. Interviews are normally conducted prior to the beginning of the term to which the student is seeking reinstatement. While the expectation is that these meetings will take place in person, they may be conducted by video teleconference when circumstances warrant. Contact the chair of the Committee on Reinstatement with questions.

As an integral part of the application for reinstatement, students who withdrew for medical reasons must obtain a recommendation from Yale Health. Such a recommendation must come from either the director of Yale Health or the chief

of the Mental Health and Counseling department, or from their official designees within the Health Center; no such recommendation can be made in the absence of documentation provided to Yale Health that the student has had successful treatment from an appropriate health clinician.

U.S. MILITARY SERVICE REINSTATEMENT POLICY

Students who interrupt their studies to perform U.S. military service are subject to a separate U.S. military leave reinstatement policy.

In the event a student withdraws or takes a leave of absence from Yale College on or after August 14, 2008, in order to serve in the U.S. military, the student will be entitled to guaranteed reinstatement 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 verbal notice of such service to his or her residential college dean. In providing the advance notice the student does not need to indicate whether he or she intends to return. This advance notice need not come directly from the student, but, rather, can be made by an appropriate officer of the U.S. Armed Forces or official of the U.S. Department of Defense. Notice is not required if precluded by military necessity. In all cases, this requirement of giving notice can be fulfilled at the time the student seeks reinstatement, by submitting an attestation that the student performed the service.
3. The student must not be away from the University 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 University 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 his or her residential college dean to determine if the student remains eligible for guaranteed reinstatement.
4. The student must notify Yale within three years of the end of the U.S. military service of his or her intention to return. However, a student who is hospitalized or recovering from an illness or injury incurred in or aggravated during the U.S. military service has up until two years after recovering from the illness or injury to notify Yale of his or her intent to return.
5. The student cannot have received a dishonorable or bad conduct discharge or have been sentenced in a court-martial.

A student who meets all of these conditions will be reinstated for the following term unless the student requests, in writing, a later date of reinstatement. Any student who fails to meet one of these requirements may still be eligible for reinstatement under Yale's general reinstatement policy but is not guaranteed reinstatement. Upon returning to Yale, the student will resume his or her education without repeating completed course work for courses interrupted by U.S. military service. The student will have the same enrolled status last held and will be in 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 veterans' education benefits will cover the difference between the amounts currently charged other students and the amount charged for the academic year in which the student left. In the case of a student who is not prepared to resume his or her studies with the same enrollment status and academic standing as when he or she left or who will not be able to complete the program of study, Yale will undertake reasonable efforts to help the student become prepared. If, after reasonable efforts, Yale determines that the student remains unprepared or will be unable to complete the program, or Yale determines that there are no reasonable efforts it can take, Yale may deny the student reinstatement.

K. Special Arrangements

YEAR OR TERM ABROAD

In recognition of the value of international study, Yale College encourages students to spend a term or an academic year studying in an approved program abroad. In order to participate in a Year or Term Abroad, students must have the approval of the Yale College Committee on the Year or Term Abroad and have been accepted into an approved and accredited study-abroad program. Students on disciplinary probation are not eligible to participate in a Year or Term Abroad.

Students in any major may apply. Please note that a term abroad may be taken only during the second term of the sophomore year or either the first or second term of the junior year, and that a year abroad may be taken only during the junior year. Within the limits of the eligibility requirements given below, other combinations of terms of study abroad may be permitted with the approval of the Committee on the Year or Term Abroad. Students are limited to a total of two terms abroad for full Yale credit and financial aid transfer.

Students must be in academic good standing as a junior or second-term sophomore to begin an approved term or year abroad and be able to return to enrollment at Yale in academic good standing. See "Requirements for Academic Good Standing" in section D (p. 45). Students must also have at least a B average at the time of their application and demonstrate sufficient competence in the language of the host country to do university-level course work. Students seeking to study abroad in a country where the primary language is not English are generally expected to take all of their courses in the language of the host country and meet the minimum language requirement. In general, by the time they go abroad, students should have completed the relevant intermediate-level foreign language course (typically a course numbered 140 with an L4 designation) or have demonstrated the equivalent proficiency by examination. Applicants may petition the committee for an exception to eligibility requirements if they believe they have compelling reasons for the exception.

Application forms for a Year or Term Abroad are available on the Study Abroad Website of the Center for International and Professional Experience. A complete application includes all of the following: the application form; an approval form from the student's director(s) of undergraduate studies; an evaluation form from the student's residential college dean; and a statement concerning the proposed course of study. Students on Yale financial aid must also submit a Year Abroad Budget for Financial Aid Applicants to the appropriate office. Approval from the Yale College Committee on the Year or

Term Abroad is contingent upon the student's acceptance into a program or university abroad. Students must provide a copy of their acceptance letter to the committee before departure.

Applications for permission to study abroad in the spring term of the academic year 2018–2019 are due on October 15, 2018. Applications for study in the fall term of the academic year 2019–2020 or for the full academic year 2019–2020 are due on March 5, 2019.

Applications for programs or universities abroad are available directly from the sponsoring institutions. Information about specific programs and evaluations from past Yale participants are available on the Study Abroad Website. Note that application deadlines differ from program to program and usually also differ from the Yale College committee's deadline. Students are responsible for meeting the deadlines set by the programs they seek to attend, whether those deadlines fall before or after the Yale College committee's deadline.

In selecting programs abroad in which to enroll, students should be aware that such programs vary in quality, and some may not be approved for a Year or Term Abroad. At a minimum, approved programs must involve full-time work at the university level and must be undertaken during the regular academic year at an institution outside the United States. Students should note that programs in the Southern Hemisphere are subject to a different academic calendar, one which extends into the months of June, July, and August. With this exception, summer terms do not qualify as part of a Year or Term Abroad.

Students should choose from the list of designated programs available on the Study Abroad Website. Students applying to enroll in programs not previously reviewed or approved may be required to furnish informational literature about the program, course syllabi, or a letter of support from a Yale faculty member familiar with the program. The Yale College Committee on the Year or Term Abroad evaluates programs primarily on the quality and structure of their academic offerings. Study abroad advisers are available in the Center for International and Professional Experience to assist students in selecting an appropriate program.

1. **Course credit from a Year or Term Abroad** Students on a Year Abroad who complete a full program of study for the equivalent of two terms of enrollment at Yale may earn up to nine course credits. Students on a Term Abroad who complete a full program of study for the equivalent of one term of enrollment at Yale may earn up to four course credits. What the committee considers a full program of study varies from program to program. Students should consult with the Study Abroad office to ensure that they are enrolled in a full program abroad.

Usually, if the student has consulted with the director of undergraduate studies and a Study Abroad adviser before going abroad, the award of credit upon return from a Year or Term Abroad is routine.

2. **Other course credit from outside Yale** Enrollment in the Year or Term Abroad program is the only arrangement by which students may offer more than two outside credits toward the thirty-six course credits required for the bachelor's degree.* Students receiving credit for a Year Abroad may not apply any other credits from outside Yale toward the 36-course-credit requirement. Students receiving

credit for a Term Abroad may apply up to two other course credits from outside Yale toward the 36-course-credit requirement.

Because the maximum number of outside credits allowed is nine, students who have previously transferred one or two outside credits are normally eligible only for one term abroad. Students who wish to take a year abroad, but who are ineligible by virtue of having transferred one or two outside credits may, with the exception noted below†, request that the University Registrar remove such credit from the transcript by petitioning the Committee on Honors and Academic Standing through their dean's office. If that petition is approved, the Registrar will remove the relevant outside course credit, but the course title will remain on the transcript. Accordingly, this course work may also continue to be applied towards major and distributional requirements.

3. **Evidence of course work** To be awarded credit toward degree requirements, students must submit to the committee such evidence of their achievement as transcripts or other official academic records, wherever possible. Students should also be prepared to provide on their return to Yale copies of all course work, syllabi, and letters from instructors describing the nature and quality of their work.
4. **Grades** No credit will be awarded for a course in which the grade earned was lower than a C or its equivalent in other grading scales. Nor will credit be awarded for a course taken on a Pass/Fail option, if the student had the choice of taking the course for a letter grade.
5. **Distributional requirements and major requirements** In addition to applying credits earned on a Year or Term Abroad toward the 36-course-credit requirement, students may, with appropriate permissions, apply these course credits toward fulfillment of distributional requirements and some of the requirements of their major programs. Instructions on applying such credit toward the distributional requirements are available on the Fulfilling Requirements While Away web page; petitions for credit toward major requirements should be directed to the relevant director of undergraduate studies.
6. **Academic regulations** Because a Year or Term Abroad counts as the equivalent of one or two terms of enrollment in Yale College, the academic regulations of Yale College pertain to enrollment abroad. Students must earn a sufficient number of credits abroad to remain in academic good standing. Failure to do so will result in academic warning or dismissal for academic reasons. See section I (p. 57), Academic Penalties and Restrictions. Withdrawal from an approved program abroad has the same consequences as withdrawal from Yale College.
7. **Canceling a Year or Term Abroad** Students who have received permission to study abroad but later decide not to do so must notify their residential college dean in writing of their change of plans, and then either enroll as usual in Yale College or apply for a leave of absence before the deadline. See section J (p. 59), Leave of Absence, Withdrawal, and Reinstatement. Students should also notify the Study Abroad office. In some cases, such students will have to withdraw from Yale College if the deadline for requesting a leave has passed, or they have already taken two terms of leave, or the deadline for enrolling in courses in Yale College has passed. Under no circumstances can a Year or Term Abroad be converted retroactively to a leave of absence. Similarly, a leave of absence cannot be converted retroactively to a Year or Term Abroad.

8. **Enrollment in Yale College after a Year or Term Abroad** After returning from a Year or Term Abroad, students must enroll in Yale College for at least two terms. Students who have accelerated should speak with their residential college dean about the possible need to decelerate. See section Q, Acceleration Policies (p. 84).
9. **Financial aid** Students who have been approved by the committee to study abroad and who receive financial aid from Yale are eligible for aid while abroad. For information about financial aid support, consult a counselor in the Student Financial Services Center, 246 Church Street, 432-2700.

* Study during the academic year at the Paul Mellon Centre in London (Yale-in-London) is equivalent to enrollment in Yale College and is not considered a Term Abroad. Application to the Yale-in-London program should be made directly to that office at the Yale Center for British Art. For details, see the British Studies program description (p. 180).

† Students on promotion hold who employ outside course credits to repair a credit deficiency cannot subsequently have those credits removed from their transcript for any reason and are thus ineligible to take a year abroad.

COMPLETION OF DEGREE REQUIREMENTS AT THE END OF A FALL TERM

Students who at the end of a fall term complete the requirements for graduation may be of three kinds: (1) those who complete such requirements in eight terms of regular enrollment; (2) those who have accumulated thirty-six course credits or more, all earned at Yale, in fewer than eight terms of regular enrollment; and (3) students admitted by transfer to Yale College and students whose admission to Yale College was deferred until a spring term. Note that acceleration credits may not yield a completion of degree requirements at the end of a fall term; see section Q, Acceleration Policies (p. 84). The following rules apply to students of these three kinds.

1. **Notification by the student** By the day on which the student's course schedule is due in the final term of enrollment, the student must notify the Committee on Honors and Academic Standing through the residential college dean that the fall term will be the student's last term of enrollment. Forms on which to make such notification are available in the offices of the college deans. Notification must include written certification from the student's director of undergraduate studies that the student will have completed all the requirements of the major program by the end of the fall term, and from the student's residential college dean that the student will have fulfilled the distributional requirements by that time. Failure to observe the deadline will result in the students being charged a fine of \$100.
2. **Award of degrees and diplomas** Students who complete degree requirements at the end of a fall term are awarded their degrees and their diplomas at Commencement at the conclusion of the spring term of that academic year and are considered to be members of the class that graduates at that Commencement. General Honors and Distinction in the Major are also awarded at that time. If a student who completes degree requirements at the end of a fall term wishes to participate in the Commencement exercises held in the previous academic year, however, the student may do so with the permission of the residential college master and dean.

Such might be the case, for example, of a student who because of a leave of absence did not qualify for graduation with the class in Yale College with which he or she entered as a freshman. Such a student would not receive the degree or diploma until the May of the academic year in which degree requirements were completed.

3. **Health coverage** A student whose last term of enrollment is a fall term is eligible, upon application and payment of a fee, for continued coverage by Yale Health during the subsequent spring term, just as if the student were on leave of absence for that term. Such coverage extends to August 31. See “Leave of Absence” in section J (p. 59).

TWO MAJORS

A student must petition the Committee on Honors and Academic Standing for permission to complete the requirements of two major programs. Application forms are available from the residential college deans. A student contemplating the completion of two majors should bear in mind that doing so will almost invariably limit the opportunities for a wider distribution of studies over different subjects.

Each major must be completed independently of the other, with no more than two term courses overlapping. Prerequisites in either major are not considered to be overlapping courses. Other than such prerequisites, all courses taken in a major – including those taken in excess of the minimum requirements of the major – are counted in the consideration of overlapping courses unless such courses are in excess of the minimum requirements for both majors. Overlapping courses may not include the senior essay or senior project, unless the essay or project is unusually substantial and represents at least the equivalent of the minimum essay or project requirement of the one major in addition to the minimum essay or project requirement of the other major. If a single senior essay or project is approved for the two majors, no additional overlap in course credits is permitted.

It is not possible to offer as two majors a combined major with one of its component majors. For example, a major in Economics and Mathematics cannot be joined with a second major in either Economics or Mathematics. Similarly, a student completing a major that permits the inclusion of a concentration of courses from another major or program cannot also major in that second major or program. For example, a major in Sociology with Psychology cannot have a second major in Psychology. A Special Divisional Major may not be offered as one of two majors.

A petition for two majors should show clearly how the requirements for each of the two programs will be met, and should include the approval of the appropriate directors of undergraduate studies. The completion of two majors does not result in the award of two degrees; a student who completes a major that leads to the award of the B.A. degree and another major that leads to the award of the B.S. degree may choose the degree to be conferred. A petition to complete the requirements of two majors should be made only after the student’s plans are definite, but no later than the due date for course schedules in the student’s final term of enrollment. Petitions submitted after this deadline will be accepted only by exceptional action of the Committee on Honors and Academic Standing and will be fined \$50.

A student may not petition for permission to complete the requirements of more than two major programs.

DOUBLE CREDIT FOR A SINGLE-CREDIT COURSE

Two course credits for a course in Yale College normally carrying one course credit may be awarded to a student under the following conditions:

1. **Deadline** Permission must be requested by midterm, as published in the Yale College Calendar with Pertinent Deadlines (p. 8).
2. **Petition and approvals** The student's petition must be approved by the instructor of the course, the director of undergraduate studies in the instructor's department, and the Committee on Honors and Academic Standing. The petition should include a detailed syllabus and an explanation of how the student's proposed work represents at least twice the normal expectations of the course.
3. **Distributional requirements** When a petition for double credit is approved for a course that fulfills a distributional requirement, the additional credit may not be applied toward the distributional requirement, although it may be applied toward the 36-course-credit requirement for graduation.
4. **Multiple courses** A student may make use of this arrangement rarely, no more than once or twice.

SPECIAL TERM COURSES

With the approval of the Yale College Committee on Honors and Academic Standing, a student may arrange with a member of the faculty to take a Special Term Course, or individual tutorial, for credit toward the bachelor's degree, provided that certain requirements are met. First, the material of the proposed course must be appropriate to the qualifications of the student and it must be otherwise unavailable in the Yale University curriculum. If the subject can be pursued through independent study in an existing tutorial course in a department (e.g., AMST 471 or CGSC 473), the student must apply for enrollment in that course through the director of undergraduate studies. Second, the instructor of the proposed special course must hold a teaching appointment in the University. Third, the student must describe in detail the nature of the proposed course work and submit a syllabus.

Requests for Special Term Courses should be made to the Committee on Honors and Academic Standing, 25 SSS, on forms available from the residential college deans. The application form must be completed by the student and then approved and signed by the proposed instructor and the director of undergraduate studies of the instructor's department. A request for a Special Term Course should be made during the term immediately preceding the term during which the course is actually to be taken. An application will not be accepted by the committee after the second week of the term for which a course is proposed. It is expected that Special Term Courses will be taken for a letter grade. A student may not apply credit earned in a Special Term Course toward satisfaction of any of the distributional requirements.

LIMIT ON RESIDENTIAL COLLEGE SEMINARS

The number of residential college seminars is limited and the demand for them is great. A student may therefore take no more than four residential college seminars, and no more than two in a single term. Permission to exceed these limits must be secured

in advance from the Yale College Committee on Honors and Academic Standing; such permission will be given only if the student can demonstrate that the integrity or coherence of the student's academic objectives would suffer without it.

COURSES IN THE YALE GRADUATE AND PROFESSIONAL SCHOOLS

When a course is open to undergraduate as well as either graduate or professional school students, a Yale College student must enroll under the undergraduate number, unless already accepted into the program for the simultaneous award of the bachelor's and master's degrees (see below).

A student may request to elect a graduate or professional school course, other than those designated independent study, by entering the course on the Course Schedule Selection Form and completing an additional form downloaded from the Website of the University Registrar's Office. This latter form must be completed by the student, signed by the course instructor, and attached to a copy of the syllabus. For enrollment in a course in the Graduate School of Arts and Sciences, the form must also be signed by the director of graduate studies in the department in which the course is offered. For enrollment in a course in any of the professional schools of the University, the form must also be signed by the appropriate agent of the dean or the registrar of the school in which the course is offered.

Requests should be made as early as possible in the term in which enrollment is sought and not later than three weeks after the first day of Yale College classes of the term. In recognition of the need to have a student's schedule of courses finalized promptly, forms that are submitted after this date or that are incomplete will normally not be approved. Exceptions require action of the Committee on Honors and Academic Standing, in response to a petition from the student, and will be subject to a fine of at least \$50, with increases of \$5 daily according to lateness.

Note that systems for the award of course credit in the professional schools differ and that not all courses in these schools yield a full course credit in Yale College. Once all materials for a request to elect a professional school course are received by the Office of the University Registrar, a review will be made and the student will be informed as to whether the course will earn Yale College course credit and, if so, how much. Courses that earn no Yale College credit will normally not be entered on the Yale College transcript.

Note also that Yale College students are not permitted to enroll in independent study courses in the Graduate School of Arts and Sciences or in any of the professional schools of the University, unless already accepted into the program for the simultaneous award of the bachelor's and master's degrees (see below).

A student may offer toward the 36-course-credit requirement for the bachelor's degree as many as four course credits earned in professional schools of the University. Courses taken in the Graduate School of Arts and Sciences are not included in this four-credit restriction.

Courses in performance in the School of Music may be taken only after completion of MUSI 363, Performance: Fourth Term, or MUSI 463, Advanced Performance: Fourth Term, in the Department of Music. Performance courses in the School of Music may

not be counted toward the 36-course-credit requirement for the bachelor's degree. Such courses will be included on the student's transcript, but must be offered in excess of the thirty-six credits required for graduation. For further information, see under Music. Nonperformance courses in the School of Music may be taken for credit without previous completion of MUSI 363 or 463; such courses are also included in the limit of four credits that may be earned in professional schools of the University.

The deadlines and regulations of Yale College are binding on all students, including candidates for the simultaneous award of the bachelor's and master's degrees, in regard to courses in which they are enrolled in the Graduate School of Arts and Sciences and the professional schools of the University. These include the deadlines and regulations pertaining to withdrawal from courses, late or postponed work, and work incomplete at the end of term. An exception in deadline may be made in a course offered in a professional school of the University in which the academic calendar differs from that of Yale College. A request for such an exception must be grounded in compelling academic reasons, and must be made in writing by the instructor of the course to the student's residential college dean in advance of the deadline in question. Instructors of courses in the Graduate School and in the professional schools of the University are expected to use the Yale College grading system when they report grades for undergraduates who have completed their courses.

SIMULTANEOUS AWARD OF THE BACHELOR'S AND MASTER'S DEGREES

Students of distinguished ability in a limited number of departments may undertake graduate work that will qualify them for the simultaneous award of the bachelor's and master's degrees at the end of their senior year. The simultaneous degree can be conferred only in a single department or program and only in departments or programs that confer both degrees. For example, a student may not complete a bachelor's degree in Economics and a master's degree in Political Science, nor may a student combine a bachelor's degree in a multi-departmental major (e.g., Ethics, Politics, and Economics) with a master's degree in one of its constituent departments. A student pursuing a simultaneous degree may, however, complete two separate undergraduate majors as long as one of the undergraduate majors is in the same department as the master's degree. Currently, the following departments offer the simultaneous degree option: American Studies (p. 109); Chemistry (p. 187); Classics (p. 202); Computer Science (p. 224); East Asian Studies (p. 253); Geology and Geophysics (p. 397); History (p. 434); Italian (p. 479); Linguistics (p. 499); Mathematics (p. 521); Molecular Biophysics and Biochemistry (p. 549); Molecular, Cellular, and Developmental Biology (p. 558); Music (p. 575); and Political Science (p. 626). For more information about this program, contact the Director of Academic and Educational Affairs (joel.silverman@yale.edu).

1. **Eligibility** Applicants cannot be considered for admission unless by the end of their fifth term of enrollment they have achieved at least two-thirds A or A- grades in all of their course credits, as well as in all of the course credits directly relating to their major. Some participating departments have additional eligibility requirements, and students should consult the relevant director of undergraduate studies for this information. Because the Eli Whitney Students program is for enrollment for the

degree of Bachelor of Arts (B.A.) or Bachelor of Science (B.S.) only, students in that program are ineligible for the simultaneous award of the bachelor's and master's degrees.

Prior to admission to the program, students enrolling in a course that carries both an undergraduate and a graduate number must do so under the undergraduate number. Students planning to apply to the program who enroll in such a course may request the permission of the instructor to complete the graduate-level requirements of the course and petition to have it converted to the graduate number on the academic record if they are subsequently admitted to the program. The petition, which is made to the director of the program, must be accompanied by certification that the course instructor has approved the student's proposal to complete the course at its graduate level.

2. **Application** Students must apply to their department for admission to the program through their director of undergraduate studies no later than the last day of classes in their fifth term of enrollment in Yale College. The proposal should provide evidence of eligibility, reasons for pursuing the simultaneous degree, and plans for completing the program requirements. If the department acts favorably on the student's application, it is forwarded with the formal approval of the director of undergraduate studies and of the director of graduate studies to the Director of Academic and Educational Affairs (joel.silverman@yale.edu) in the Yale College Dean's Office, where a joint committee of Yale College and the Graduate School acts upon the department's nomination and notifies the student of acceptance into the program.
3. **Program requirements** Specific requirements for the award of degrees will be determined by each department. Normally a student is expected to complete the requirements of the undergraduate major in addition to eight or more courses in the Graduate School. For all students in the program, graduate work must not be entirely concentrated in the final two terms, and students in the program must take at least six term courses outside the department during their last four terms at Yale and at least two undergraduate courses during their last two terms.

Students may not enroll in Yale College for more than eight terms in order to qualify for the simultaneous award of both degrees. It is possible to earn both degrees in fewer than eight terms, but not by the use of acceleration credits. Upon acceptance into the program, a student who has accelerated by the use of acceleration credits will automatically be decelerated, and may not, so long as the student remains in the simultaneous degree program, subsequently employ the credits to accelerate.

4. **Requirements for the master's degree** To qualify for the master's degree, students must complete eight term course credits in the Graduate School with grades of A in at least two term courses (or in one year course) and with a B average in the remaining ones. Students in those departments with a language requirement for the Ph.D. degree will be required to demonstrate proficiency in one of the specified languages.
5. **Approval of course schedules** Following notification that they have been accepted into the Program for the Simultaneous Award of the Bachelor's and Master's

Degrees, students must have their course schedules approved each term both by the director of undergraduate studies and by the director of graduate studies.

COMBINED BACHELOR'S AND MASTER'S DEGREE PROGRAMS IN THE PROFESSIONAL SCHOOLS

Well-qualified students may be able to structure their undergraduate programs so as to become eligible for a master's degree in Public Health, Forestry & Environmental Studies, or Music after one additional year of graduate study at Yale. For more information see the respective program descriptions in Subjects of Instruction.

COURSES IN YALE SUMMER SESSION

There is no limit on the number of on-campus courses in the Yale Summer Session that a Yale College student may offer toward the requirements for the bachelor's degree; however, only four online courses may be applied towards a Yale degree. A maximum of two online courses may be taken per summer by Yale College students. Furthermore, any Yale Summer Session courses selected as Credit/D/Fail will count towards the four-course-credit limit on Credit/D/Fail courses for the bachelor's degree.

Attendance at Yale Summer Session does not constitute a term of enrollment in Yale College. Thus a student accelerating by one term by use of acceleration credits may not offer attendance at Yale Summer Session as one of the required seven terms of enrollment in Yale College.

A student accelerating by the early accumulation of thirty-six course credits all earned at Yale may count credits earned for a grade in Yale Summer Session toward such acceleration. Work completed under the Credit/D/Fail option cannot yield acceleration credit. See "Acceleration by the Early Accumulation of Thirty-Six Course Credits All Earned at Yale" in section Q (p. 84).

Courses successfully completed in Yale Summer Session may, with the permission of the student's director of undergraduate studies, be counted toward the requirements of the student's major program. Courses taken for a grade may also be counted toward fulfilling distributional requirements. Courses taken on a Credit/D/Fail basis may not be counted toward fulfilling distributional requirements for the junior year nor toward satisfaction of the distributional requirements for the bachelor's degree. There are no auditing privileges in Yale Summer Session.

All courses completed in Yale Summer Session will be entered on the Yale College record and those taken for a grade will be included in the calculation of the student's eligibility for General Honors and Distinction in the Major. Marks of CR are included in the calculations for some prizes, for Distinction in the Major, and for election to Phi Beta Kappa as non-A grades, but marks of CR are not included in the calculation for General Honors. For further information about Summer Session courses and transcripts, refer to the Summer Session Website.

YALE-IN-LONDON SUMMER PROGRAM

Courses in the summer program at the Paul Mellon Centre in London carry full Yale course credit, but enrollment in the Yale-in-London summer program does not constitute a term of enrollment in Yale College. (Attendance at the Yale College program at the Paul Mellon Centre in London during a spring term does count as

a regular term of enrollment.) Thus a student accelerating by one term by use of acceleration credits may not offer attendance at the summer program at the Mellon Centre in London as one of the required seven terms of enrollment in Yale College.

A student accelerating by the early accumulation of thirty-six course credits all earned at Yale may count credits earned in the summer program at the Paul Mellon Centre in London toward such acceleration. See “Acceleration by the Early Accumulation of Thirty-Six Course Credits All Earned at Yale” in section Q (p. 84).

DIRECTED INDEPENDENT LANGUAGE STUDY

Students may study a language not taught in a department at Yale through the Directed Independent Language Study (DILS) program offered by the Center for Language Study. The selection process is competitive; students submit an application to the committee, which considers the strength of the applicant’s academic or professional reasons for studying the language. Students in the program are expected to be self-motivated and to spend significant time on language study. During the program, students meet with an educated native speaker—a language partner—for two hours per week of conversation, while also studying the language on their own. In consultation with their language partner and the director of DILS, students devise their own plan of study and locate study materials, including conventional textbooks and web-based language materials. Students are tested at the end of their program using a nationally recognized oral proficiency examination. DILS is open to undergraduates, graduate students, and professional school students. DILS courses do not award credit, do not satisfy the Yale College language requirement, and do not appear on transcripts. Interested students should apply at <http://cls.yale.edu/dils>.

AUDITING

Auditors are not permitted in courses taught in Yale College except for persons in one of the categories described below.

1. Students enrolled full time in Yale College or in one of the graduate or professional schools of the University. The permission of the instructor is required.
2. Current members of the Yale faculty and emeritus faculty. The permission of the instructor is required.
3. Spouses of full-time Yale faculty members, or of emeritus faculty, or of students enrolled full time in the University. The permission of the instructor and of the Director of Academic and Educational Affairs (joel.silverman@yale.edu) is required.
4. Employees of the University and their spouses, in accordance with applicable personnel policies. The permission of the instructor, the employee’s supervisor, and the Director of Academic and Educational Affairs (joel.silverman@yale.edu) is required.
5. Spouses of postdoctoral associates and fellows. The permission of the instructor and of the Director of Academic and Educational Affairs (joel.silverman@yale.edu) is required.

No other persons are permitted to audit courses in Yale College, except for alumni eligible for the Alumni Auditing program. The Alumni Auditing program is

administered separately from the general auditing program, and different rules may apply. Information is available at the Yale Alumni Auditing Program Website.

Persons auditing courses with limited laboratory or computer facilities must secure the explicit permission of the instructor to do so, and should understand that regularly enrolled students must at all times have priority in using such facilities. Computer or language laboratory facilities should be employed by auditors only during times when they are not in heavy demand, and in certain courses charges for computer use may be necessary. General access to the campus computing network may not be available to auditors.

It is the usual expectation that an auditor does not take tests or examinations or write papers for a course for evaluation by the instructor. Occasionally, however, an auditor may wish to do such work and may request the instructor to evaluate it. If the instructor wishes to cooperate with the auditor in this way, the instructor does so on a voluntary basis and not as an obligation.

The University Registrar's Office does not keep a record of courses audited. It is not possible, therefore, for a student's transcript to show that a course has been audited, or for a transcript to be issued that records the auditing of a course.

Persons interested in auditing a course should contact the Yale College Dean's Office, 1 Prospect Street, Academic Affairs suite (lower level).

L. Transfer Students

The following regulations apply to students admitted to Yale College by transfer from other colleges and universities:

1. **Degree requirements** In order to graduate from Yale College, transfer students must fulfill all the requirements for the bachelor's degree. They must thus earn a total of the equivalent of at least thirty-six course credits, that total consisting of the number of credits awarded for their work at their previous institutions combined with the number of course credits subsequently earned at Yale. They must also complete the requirements of a major program in Yale College and fulfill the distributional requirements for the bachelor's degree. Upon their arrival at Yale, transfer students should consult carefully with the director of the transfer program in order to ascertain their status with regard to the distributional requirements, especially the foreign language requirement.
2. **Terms of enrollment at Yale** Transfer students are expected to enroll in Yale College for the number of terms designated at the time of the final credit evaluation made of their work at previous institutions. Under no circumstances may a transfer student complete fewer than four terms of enrollment in Yale College or earn fewer than eighteen course credits at Yale. Transfer students are not eligible for the award of acceleration credit or for acceleration by use of acceleration credits.
3. **Transfer of credits** A preliminary evaluation of transferable credits is made at the time of the student's admission. Final determination of transfer credits is completed when all official transcripts from a student's previous institutions have been received.

4. **Additional terms at Yale** Students who must remain at Yale beyond the terms designated in the final determination of transfer credits must petition the Committee on Honors and Academic Standing for permission to do so. Such a petition will be considered only if it is impossible for the student to complete the requirements for the bachelor's degree in the designated number of terms. See section A (p. 33) under "Eight Terms of Enrollment." A student thus granted permission to remain at Yale for an additional term, if the term represents more than the equivalent of eight terms of enrollment at the college level, is not eligible for scholarship assistance from Yale for the additional term, although other forms of financial aid may be available.
5. **Transcripts** A transfer student's Yale transcript indicates the institutions from which the student transferred to Yale and the number of course credits earned there. It does not list the titles of courses taken or grades earned at the transfer student's previous colleges or universities. A transfer student who needs a record of studies completed before admission to Yale must secure a transcript from the previous institutions.
6. **Course credit from outside Yale** Transfer students may receive up to two course credits for work completed outside Yale after matriculation and may receive credit for a Year or Term Abroad according to the guidelines of section P, "Credit from Other Universities," and section K, "Year or Term Abroad," provided that they enroll in Yale College for at least four terms, earning by attendance at Yale a minimum of eighteen course credits.
7. **Distributional requirements** Transfer students are not bound by the distributional requirements for the first year, sophomore year, or junior year, but they must fulfill the distributional requirements for the bachelor's degree. See paragraph 1 above.
8. **Attendance at Yale before enrollment** Once a student has been accepted for admission as a transfer student, the student may not attend Yale as an Eli Whitney student or a non-degree student before his or her first term of enrollment at Yale.

M. Eli Whitney Students Program

The Eli Whitney Students program is designed to meet the needs of students who may not be able to attend college full time by allowing nonresident students to enroll in Yale College. The Eli Whitney Students program is for enrollment for the degree of Bachelor of Arts (B.A.) or Bachelor of Science (B.S.) only; students in the program are therefore ineligible for the simultaneous award of the bachelor's and master's degrees. Like all others enrolled in Yale College, students in this program are required to comply with the academic regulations.

To qualify for the bachelor's degree through the Eli Whitney Students program, a student must successfully complete at least thirty-six course credits or the equivalent and must enroll in Yale College for at least four terms, earning by attendance in the Eli Whitney Students program at least eighteen of the required thirty-six credits. As many as eighteen course credits earned at another college or university or in the Non-degree Students program at Yale may be transferred toward the requirements for the bachelor's degree. Such credit will be awarded for academic courses that were taken at an accredited institution and that were similar in content to Yale College courses. Grades of A or B are expected, and no more than one-quarter of courses

accepted for transfer toward the requirements for the degree may have grades of C. The thirty-six course credits completed at Yale or elsewhere must meet the distributional requirements.

Candidates for a bachelor's degree must fulfill the requirements of one of the major programs. See Majors in Yale College (p. 90) and also Major Programs (p. 22) in the Undergraduate Curriculum section.

1. **Academic requirements** The Eli Whitney Students program normally is to be completed in a period not exceeding seven years from initial enrollment. In any calendar year, an Eli Whitney student must have completed three courses to remain in academic good standing. Eli Whitney students are required to meet all of the academic obligations of any course in which they enroll and all requirements of their degree program.
2. **Registration and enrollment** Eli Whitney students submit their course schedules for approval to their residential college dean according to the submission deadline for seniors. Students are permitted to enroll for a full course load, up to 5.5 course credits each term, with the possibility of a greater term load if appropriate permissions are secured. See "Normal Program of Study" in section C (p. 44), Course Credits and Course Loads. Eli Whitney students are not eligible to enroll in first-year seminars, even during their first year in the program.
3. **Tuition and financial aid** Tuition for the 2018–2019 academic year for Eli Whitney students is \$5,900 per course credit; students are eligible to apply for financial aid. Yale employees are entitled to a tuition reduction as determined by the Office of Human Resources. Tuition must be paid in full to the Office of Student Financial Services before registration.
4. **Facilities and services** Eli Whitney students are entitled to use the library system together with the other facilities that are required for the courses in which they are enrolled, such as laboratories, computers, and the like. They are also eligible for services such as career counseling through the Office of Career Strategy and for fellowships through the Center for International and Professional Experience. Eli Whitney students are entitled to purchase gymnasium memberships and Yale Health coverage. Students in the Eli Whitney program are not eligible for undergraduate housing and they may not serve as first-year counselors.
5. **Regulations** Eli Whitney students are governed by the academic regulations of Yale College, wherever appropriate, and by the rules contained in the *Undergraduate Regulations*. In disciplinary matters, Eli Whitney students are subject to the jurisdiction of the Yale College Executive Committee.
6. **Leave of absence and withdrawal** See section J, Leave of Absence, Withdrawal, and Reinstatement (p. 59). All regular deadlines and policies apply.
7. **Course credit from outside Yale** Students enrolled in the Eli Whitney Students program may receive up to two course credits for work completed outside Yale after matriculation, according to the guidelines of Section P, Credit from Other Universities, provided that they enroll in Yale College for at least four terms, earning by attendance at Yale a minimum of eighteen course credits.
8. **Year or Term Abroad** With the approval of the director of the Eli Whitney Students Program and the Committee on the Year or Term Abroad, students enrolled in the Eli Whitney Students program may undertake study outside the

United States for a Year or Term Abroad. An Eli Whitney student must comply with all deadlines and requirements of the Committee on the Year or Term Abroad. See “Year or Term Abroad” in section K (p. 64), Special Arrangements. To be eligible to apply, an Eli Whitney student must have accumulated, before enrolling abroad, at least twelve course credits but no more than twenty-two course credits toward the 36-course-credit requirement. Study abroad must involve full-time work at the university level. Eli Whitney students must enroll for at least two terms in Yale College after their return from study abroad.

9. **Yale students** No person who was ever a regular student in Yale College may enter the Eli Whitney Students program before the lapse of five years after withdrawing from Yale College. A person who in the past has withdrawn from Yale College without graduating and who wishes to return to Yale as a candidate for the bachelor’s degree as an Eli Whitney student must make application to the Eli Whitney Students program and fulfill all of its requirements for the bachelor’s degree, including the requirement that at least eighteen course credits must be earned while the student is enrolled in the Eli Whitney Students program. Once a former Yale College student has entered the Eli Whitney Students program, that student may pursue the bachelor’s degree only through the Eli Whitney Students program.

Further information and application forms for the Eli Whitney Students program are available on the Eli Whitney Students Program Website.

N. Non-degree Students Program

The Non-degree Students program is designed to meet the needs of students with specific and defined educational goals, which may include personal or professional enrichment, exploration of new fields, or preparation for career changes. Normally, students are admitted for a period of one to two terms; students wishing to extend their enrollment must reapply through the Admissions Office.

The Non-degree Students program offers nonresident students who are unable to attend college full time the opportunity to enroll in Yale College courses for credit. The Non-degree Students program is open to graduates of Yale College, and is also open to academically qualified persons who have attended other colleges and universities or who have not continued their education beyond high school. Like all Yale College students, students in this program are required to comply with the academic regulations. Students not matriculated at Yale but participating in one of Yale’s Reserve Officers Training Corps (ROTC) programs under a cross-town arrangement are registered as non-degree students. As such, they are subject to Yale College undergraduate regulations as a condition of their participation in Yale’s ROTC program.

Non-degree students may enroll in from one to five courses in any academic term. Non-degree students may not take more than a total of eighteen course credits in the Non-degree Students program.

1. **Academic requirements** Non-degree students are required to meet all of the academic obligations of any course in which they enroll. At the end of a term, the record of any non-degree student who does not have at least a C average for

that term will be reviewed and that student may not be permitted to enroll in a subsequent term. To remain in academic good standing, a student is furthermore expected to complete at least one course per term. Withdrawal from all courses in any given term may jeopardize good standing and enrollment in a subsequent term. Students who plan not to enroll in courses in any given term must apply for a leave of absence on or before the fifteenth day of the term in question. A leave of absence may be granted for no more than two terms. Any student who does not enroll in courses in a term and does not apply for a leave of absence may be removed from the program.

2. **Enrollment and registration** Non-degree enrollment may begin in either the fall or the spring term. All non-degree students register for courses with the Director of Special Programs, 1 Prospect Street, Academic Affairs suite (lower level). In general, admission to limited-enrollment courses is not available to non-degree students. Auditing is not permitted in the Non-degree Students program. Non-degree students are not eligible for enrollment in individual tutorial courses; nor are they eligible, while in the Non-degree Students program, for enrollment in courses in the graduate or the professional schools. Those interested in enrolling in such courses should apply directly to the Graduate School of Arts and Sciences or to the particular professional school in whose courses they wish to enroll.
3. **Credit/D/Fail option** Non-degree students who wish to elect a course under the Credit/D/Fail option must make a compelling case for that election in a petition to the Director of Special Programs at least one week prior to the Credit/D/Fail conversion deadline. Non-degree students may take no more than one course in a term using the Credit/D/Fail option, and must be enrolled in at least one other course worth a minimum of one course credit during the same term. A maximum of two courses may be taken Credit/D/Fail during a student's time in the Non-degree Students program.
4. **Tuition** The tuition for non-degree students during 2018–2019 is \$5,900 per course credit; Yale employees and their spouses are entitled to a tuition reduction as determined by the Office of Human Resources. Tuition must be paid in full to the Office of Student Financial Services before registration. Yale provides no financial assistance for non-degree students. Students withdrawing from a course may be eligible for a refund of all or a portion of the tuition fees, in accordance with the tuition refund policy: (a) a student who drops a course for any reason on or before the last day of the course selection period will be refunded the tuition fees paid for that course; (b) a student who drops a course for any reason after the course selection period but on or before the day of midterm will be refunded one-half the tuition paid for that course; (c) a student who drops a course after midterm will not be refunded any portion of the tuition. Fees for late submission of course schedules apply as outlined in section E, Registration and Enrollment in Courses (p. 46). Late tuition payments will be accepted no later than September 12, 2018, for fall 2018, and January 25, 2019, for spring 2019. Any student who has not completed payment in full for courses by these dates will not be permitted to enroll for that term.
5. **Facilities and services** Non-degree students are entitled to use the library system and other facilities that are required for the courses in which they are enrolled, such as laboratories, computers, and the like. For a fee, they are entitled to purchase

- gymnasium memberships and Yale Health coverage. Non-degree students are not eligible for undergraduate housing and they may not serve as first-year counselors.
6. **Regulations** Non-degree students are governed by the academic regulations of Yale College and by the rules contained in the *Undergraduate Regulations*. In disciplinary matters, non-degree students are subject to the jurisdiction of the Yale College Executive Committee.
 7. **Yale students** Students who have withdrawn from Yale College or who did not complete degree requirements within the number of terms of enrollment for which they were admitted may not return to Yale College to complete degree requirements as non-degree students. This rule includes former Yale College students who are currently employees of the University. Students on leave of absence may not be admitted to the Non-degree Students program.
 8. **Yale graduates** Graduates of Yale College who have received the bachelor's degree after eight terms of regular enrollment are eligible to apply as non-degree students either on a full-time or on a part-time basis. But Yale College graduates who have taken degrees after fewer than eight terms of regular enrollment are eligible to apply as non-degree students only on a full-time basis until they have completed the equivalent of eight terms of enrollment in Yale College. Thus a student who took a seven-term degree must be a full-time student for the first term in which he or she is a non-degree student, but may be a part-time non-degree student in a subsequent term. For example, a student who has completed degree requirements at the end of a fall term after eight terms of regular enrollment is eligible to apply as a non-degree student either on a full-time basis or on a part-time basis during the subsequent spring term, but a student who has completed degree requirements at the end of a fall term after seven terms of regular enrollment is eligible to apply as a non-degree student during the subsequent spring term only on a full-time basis. Please note that any courses taken by a former Yale College student in the Non-degree Students program will appear on the undergraduate transcript.
 9. **Transfer students** Students who have been accepted for admission as transfer students may not attend Yale as non-degree students before their first term of enrollment at Yale.
 10. **Yale employees** Yale employees require permission of their supervisors to apply.

Further information and application forms are available at the Non-degree Students Program Website.

O. Visiting International Student Program

The Yale Visiting International Student program (Y-VISP) invites selected undergraduate students from Y-VISP partner institutions to pursue full-time study in Yale College during one academic year. Y-VISP students maintain a full course load, live in the residential colleges alongside Yale College students, and are fully integrated members of Yale College's academic, residential, and extracurricular communities. Y-VISP oversight and governance is managed by the program's director and the Y-VISP Steering Committee. Additional information is available on the program's website.

P. Credit from Other Universities

A student may not employ course credits earned at another college or university to reduce the expected number of terms of enrollment in Yale College. Under the conditions described below, a student may apply as many as two course credits earned at another college or university toward the 36-course-credit requirement for graduation from Yale College. Before undertaking such outside study, the student should consult the residential college dean about both the institution to be attended and the course to be taken there.

Courses in Yale Summer Session are not considered outside courses, and there is no limit on the number of such courses that a student may offer toward the requirements of the bachelor's degree; see "Courses in Yale Summer Session" in section K (p. 64). Similarly, courses taken in the Yale College program at the Paul Mellon Centre in London are Yale courses and do not count as outside credit. Students who wish to receive credit for summer study abroad with outside programs must apply for approval through the Study Abroad office (see point 9, Summer Abroad, below).

1. **Approval of credit** In order for credit to be given for courses taken elsewhere, all of the following conditions must be met:
 - a. The director of undergraduate studies in the subject of a course taken elsewhere must approve the award of credit at Yale for the course.
 - b. A student who has studied at an American university, or abroad on a program sponsored by an American university, must provide the office of the residential college dean with an official transcript of the work completed. A student who has enrolled in a program that is not sponsored by an American university should supply an official transcript if the sponsoring institution issues transcripts; if it does not, then the student must furnish an official certificate of enrollment, showing if possible the course or courses completed.
 - c. Students seeking outside credit should be prepared to furnish a copy of the course syllabus, as well as essays and examinations written in the course. In some cases, a letter from the instructor of the course may be required, or the student may be asked to pass an examination on the material of the course. Such information may be particularly necessary in the case of study at a foreign university.
 - d. Study undertaken in the United States must be at a four-year accredited institution that grants a bachelor's degree in the arts and sciences. Foreign study must be completed at a university or other approved institution. Credit may be awarded only for work done while a student was officially enrolled at such an institution, and cannot be given for any work completed independently of such formal enrollment.
 - e. A grade of A or B is expected; a grade of C is acceptable. Credit cannot be given for a mark of Credit on a Credit/D/Fail option, nor for a grade of Pass on a Pass/Fail option, if the student had the choice of taking the course for a letter grade.
 - f. In order for credit to be given for a course completed at another college or university, the course must carry a value of at least three semester credit hours;

if the course is taken at an institution on the quarter system, it must carry a value of at least four-and-one-half quarter units.

- g. In order for credit to be given for a course completed at another college or university, the number of contact hours for the course must equal or exceed the number of contact hours for an equivalent course offered in Yale College during the fall or spring term, and the length of term (from the first to the last day of classes) must be at least four consecutive weeks.
2. **Residential college seminars** Residential college seminars are, by definition, courses that extend beyond the Yale College curriculum. They are not used as comparables for credit for outside courses, whether in Year or Term Abroad or for other considerations for outside credit.
 3. **Work done while in secondary school** Course credit or distributional credit cannot be given for any college or university course taken while the student was still enrolled in secondary school. Work done after graduation from secondary school but before matriculation at Yale may be accepted on recommendation from the appropriate director of undergraduate studies.

As a regular exception to this rule, students who earned credits while still enrolled in secondary school as members of the Non-degree Students program in Yale College or as students in Yale Summer Session may apply such credits toward the requirements of the bachelor's degree.

4. **Limit of two course credits** Credit cannot be given for more than two course credits earned at another institution. An exception of one additional course credit may be made only by action of the Committee on Honors and Academic Standing upon the student's petition, normally after the final term of enrollment.
5. **Distributional requirements** With permission, course credit earned at another college or university may be applied toward the distributional requirements for the bachelor's degree and to those for the sophomore and junior years whether or not it is counted toward the 36-course-credit requirement for graduation; students should consult with the residential college dean to be directed to the appropriate authority for such approval. Credit from outside Yale may not be applied toward the distributional requirements for the first year. Note particularly that Yale does not award course credit or distributional credit for courses completed at another college or university before the student graduated from secondary school.
6. **The foreign language requirement and courses taken elsewhere** Students who have taken a course in a foreign language at another institution, either in the United States or through a program abroad, and who wish to offer that course toward fulfillment of the foreign language distributional requirement must secure the approval of the relevant director of undergraduate studies. While the approval process varies across departments, in no case can it be completed until an official transcript of the work has been received and reviewed by the department. Typically, an additional assessment of the student's work will be necessary, especially with respect to the level (e.g., L₃ through L₅) that has been achieved by the outside study. Such assessment might include a written or oral examination or both, a review of the course syllabus and written assignments, or other methods of evaluation. Some departments maintain a list of programs that have been previously evaluated, in which case the approval process is often

simplified. Students are therefore strongly encouraged to consult the relevant department before undertaking language study elsewhere.

7. **Major requirements** At the discretion of the director of undergraduate studies in a student's major, work done at another institution may be counted as fulfilling a requirement of the student's major program. This may be done whether or not a course is credited toward the 36-course-credit requirement.
8. **Year or Term Abroad** Students receiving credit for study on a Year Abroad are not eligible to apply additional credit from outside Yale toward the 36-course-credit requirement. Students receiving such credit on a Term Abroad may apply up to two course credits from outside Yale toward the 36-course-credit requirement.

By contrast, students receiving credit for study on a Year or Term Abroad may apply such credit toward the distributional requirements for the bachelor's degree or toward a requirement of the student's major program (see points 5 and 7 above). Because the maximum number of outside credits allowed is nine, students who have previously transferred one or two outside credits are normally eligible only for one term abroad. Students who wish to take a year abroad, but who are ineligible by virtue of having transferred one or two outside credits may, with the exception noted below†, request that the University Registrar remove such credit from the transcript by petitioning the Committee on Honors and Academic Standing through their dean's office. If that petition is approved, the Registrar will remove the relevant outside course credit, but the course title will remain on the transcript. Accordingly, this course work may also continue to be applied towards major and distributional requirements.

9. **Non-Yale Summer Abroad** Students who wish to receive credit for summer study abroad with non-Yale programs must apply for approval through the Study Abroad office. The deadline to apply for 2019 non-Yale Summer Abroad credit is March 1, 2019. Information about the application process, including a list of eligible non-Yale programs, is available on the Study Abroad Website. Students receiving credit for summer study abroad may apply such credit toward the distributional requirements for the bachelor's degree or toward a requirement of the student's major program (see points 5 and 7 above).
10. **Transfer students** Transfer students may receive up to two course credits for work completed outside Yale after matriculation and may receive credit for a Year or Term Abroad according to the guidelines of section L, "Transfer Students," and section K, "Year or Term Abroad," provided that they enroll in Yale College for at least four terms, earning by attendance at Yale a minimum of eighteen course credits.
11. **Online courses, internships, and the like** Course credit cannot be given for a course taken online even if it is sponsored by another university, including accredited four-year institutions granting a bachelor's degree. Course credit also cannot be given for such programs as internships, field studies, or workshops, unless such programs include as a component a full, regular, academic course of instruction, and are certified by a transcript from an accredited four-year institution granting a bachelor's degree.
12. **Yale transcript** Outside courses may be entered on a student's Yale transcript only if they are applied to the 36-course-credit requirement, the distributional requirements, or the requirements of a major program. Such courses must

be entered on the Yale transcript if they are to be applied toward any of these requirements. Except for transcripts of transfer students – on which see section L, Transfer Students (p. 75) – courses that are applied toward the 36-course-credit requirement are listed by title with indication of the credit units earned, but without grades. Courses that are applied only toward the distributional requirements are listed without grades and with the designation “for distributional credit only.”

Courses that are applied only toward the requirements of a major program are listed without grades and with the designation “for credit toward the major only.” Once a course has been entered on a student’s Yale transcript at the student’s request, or as a consequence of reinstatement, the entry may not subsequently be removed at the student’s request.

13. **Acceleration** See section Q, Acceleration Policies (p. 84).

† Students on promotion hold who employ outside course credits to repair a credit deficiency cannot subsequently have those credits removed from their transcript for any reason and are thus ineligible to take a year abroad.

Q. Acceleration Policies

ACCELERATION BY THE EARLY ACCUMULATION OF THIRTY-SIX COURSE CREDITS ALL EARNED AT YALE

A student may accelerate progress toward graduation by accumulating thirty-six course credits in fewer than eight terms of enrollment. Such a student must earn all thirty-six course credits at Yale and may not offer course credits earned at another institution in order to reduce the number of terms of enrollment at Yale.

1. **Study abroad** Terms spent on a Year or Term Abroad count as if they were terms of enrollment in Yale College, but course credits earned therein may not be applied to acceleration by the early accumulation of thirty-six course credits because all such credits must be earned at Yale. A spring term at the Yale College program at the Paul Mellon Centre in London is, in fact, a term of enrollment in Yale College, and credits earned in that program may be applied to such acceleration. Attendance at Yale Summer Session or the summer program at the Paul Mellon Centre in London does not count as a term of enrollment, but course credits earned in these summer programs may be applied toward acceleration by the early accumulation of thirty-six credits all earned at Yale. See “Courses in Yale Summer Session” and “Yale-in-London Summer Program” in section K (p. 64).
2. **Patterns of attendance** While students employing acceleration credits in order to acquire an accelerated degree are required to attend Yale in certain patterns of attendance (see point 4 under “Acceleration by Use of Acceleration Credits”), no particular pattern of attendance is required from a student accelerating by the early accumulation of thirty-six course credits all earned at Yale.
3. **Six or seven terms of enrollment** Either a six-term degree or a seven-term degree may be acquired by the accumulation of thirty-six course credits earned at Yale; graduation after fewer than six terms of enrollment in Yale College by such an early accumulation of course credits is not permitted.
4. **Notification by the student** A student intending to accelerate through the early accumulation of thirty-six course credits all earned at Yale must notify the

Committee on Honors and Academic Standing through the residential college dean of that intention by the day on which the student's course schedule is due in the final term of enrollment. Such notification must include written certification from the student's director of undergraduate studies that the student will have completed all of the requirements of the major program, and from the residential college dean that the student will have fulfilled the distributional requirements at the conclusion of that term. Failure to do so will result in the student being charged a fine of \$100.

5. **Deceleration** A student may subsequently decelerate and take an eight-term degree. A reversion to an eight-term degree will not affect a student's academic good standing or eligibility for eight terms of financial aid.

ACCELERATION BY USE OF ACCELERATION CREDITS

For the definition of acceleration credits and the criteria for their award, see the First-Year Student Website. For the sake of equity and fairness, no exceptions can be made to the regulations governing the use of acceleration credits. Inquiries about acceleration may be addressed to the residential college dean or to the University Registrar's Office, 246 Church Street, 432-2330.

1. **Eligibility** The following charts list the number of total credits needed to accelerate by one or two terms during a given term of enrollment:

Acceleration by One Term	Minimum Total Credits	Minimum Yale Course Credits	Activated Acceleration Credits
In the third term	12	8	4
In the fourth term	16	12	4
In the fifth term	21	17	4
In the sixth term	26	22	4
Acceleration by Two Terms	Minimum Total Credits	Minimum Yale Course Credits	Activated Acceleration Credits
In the third term	17	8	9
In the fourth term	21	12	9
In the fifth term	26	17	9

2. **Application deadline** Application to accelerate is made by submission of the required form to the office of the residential college dean. The deadline for applying for acceleration is the last day of classes in the respective term of enrollment given in the eligibility charts above. As a special exception, a student accelerating by one or two terms who wishes to complete a term of study abroad as early as during the third term of enrollment would have to petition to accelerate before the third term of enrollment. Such a student should consult with the residential college dean. The absolute and final deadline for applying for acceleration by one term is the last day of classes in the sixth term of enrollment. The absolute and final deadline for applying for acceleration by two terms is the last day of classes in the fifth term of enrollment.
3. **Course credit requirement for graduation** A student accelerating by two terms must earn at least twenty-seven course credits at Yale, and a student accelerating by one term must earn at least thirty-two course credits at Yale. Therefore, with the exception of credit earned through enrollment in the Year or Term Abroad program,

a student accelerating by use of acceleration credits may not apply any credit earned at another college or university toward the 36-course-credit requirement for the bachelor's degree.

4. **Enrollment requirements, including required patterns of attendance** A student intending to accelerate by two terms must complete six terms of full-time enrollment in Yale College. Those six terms may be in any pattern of enrollment as long as the student's sixth and final term of enrollment is a spring term.

A student intending to accelerate by one term must complete seven terms of full-time enrollment in Yale College. Those seven terms may be in any pattern of enrollment as long as the student's seventh and final term of enrollment is a spring term.

A student accelerating by two terms may not combine acceleration credits and course credits to graduate in fewer than six terms; six terms of enrollment is the minimum as well as the maximum requirement for acceleration by two terms. Likewise, a student accelerating by one term may not combine acceleration credits and course credits to graduate in fewer than seven terms; seven terms of enrollment is the minimum as well as the maximum requirement for acceleration by one term.

5. **Deceleration** A student accelerating by two terms or one term may subsequently apply to decelerate by submitting the required form to the office of the residential college dean. A student who is considering whether to decelerate should consult with the residential college dean as soon as possible. A student accelerating by two terms who subsequently decides to accelerate by only one term must meet the requirements for acceleration by one term. A student accelerating by two terms or one term may subsequently decide to decelerate completely and take an eight-term degree. Since by definition an eight-term degree is not an accelerated degree, such a student will lose the use of acceleration credits. A reversion to an eight-term degree will not adversely affect a student's academic good standing or eligibility for eight terms of financial aid.
6. **Reacceleration** A student who has declared an intention to decelerate and to relinquish the use of acceleration credits is permitted to accelerate again through the use of acceleration credits as long as the student meets the eligibility requirements and application deadline for one or two terms of acceleration given in points 1 and 2 above.

GENERAL RULES RELATING TO THE USE OF ACCELERATION CREDITS

1. **Notification** The chief responsibility for ascertaining eligibility and for meeting the deadline to apply for acceleration rests with the students themselves. However, the University Registrar's Office will make reasonable efforts to inform students, at the beginning of the third term of enrollment, of their eligibility to accelerate by one or two terms.

It is not the responsibility of the University Registrar's Office or Yale College to remind students who have declared an intention to accelerate of the rules on the pattern of attendance stipulated for the use of acceleration credits. Students who are accelerating are themselves responsible for planning to meet these rules, and if a student's pattern of attendance does not conform to them, it will be concluded

- that the student has decided to relinquish the use of acceleration credits and not to accelerate. Such a student will be automatically decelerated.
2. **Interruption of studies by leave or withdrawal** Terms of enrollment need not be consecutive. A student accelerating by one or two terms has the same privileges of leave of absence or withdrawal that a nonaccelerating student has.
 3. **A third term of leave of absence** A student taking an accelerated degree by use of acceleration credits who has had two terms of leave of absence may receive a third term of leave if it is needed to bring the student's pattern of attendance into conformity with the pattern of attendance stipulated for an accelerated degree. See "Leave of Absence" in section J (p. 59); a student who has received long-term loans through Yale or who is receiving financial aid from Yale should particularly note paragraph 8 under "Leave of Absence."
 4. **Withdrawal** If a student withdraws from a term after the date on which course schedules for that term are due, the uncompleted term counts as a term of enrollment, both in the determination of the student's eligibility to accelerate and in the calculation of the number of terms in which the student has been in attendance at Yale. As an exception to this rule, if an accelerating student withdraws from Yale College on the recommendation of Yale Health without having successfully completed a term, the student has the option of not counting the uncompleted term as one of the six or seven terms of enrollment.
 5. **Enrollment in Yale Summer Session or the Yale-in-London summer program** Attendance at Yale Summer Session or the summer program at the Paul Mellon Centre in London does not constitute a term of enrollment. Thus a student accelerating by one term may not offer attendance at Yale Summer Session or the summer program at the Paul Mellon Centre in London as one of the required seven terms of enrollment in Yale College. Course credits earned by attendance at these summer programs, however, may be applied toward the requirements for the bachelor's degree by accelerating students, provided that such students meet the conditions specified for acceleration by one or two terms. See also "Courses in Yale Summer Session" and "Yale-in-London Summer Program" in section K (p. 64).
 6. **Course credit from outside Yale** A student accelerating by two terms must earn at least twenty-seven course credits at Yale, and a student accelerating by one term must earn at least thirty-two course credits at Yale. Therefore, an accelerating student may not apply any credit earned at another college or university toward the 36-course-credit requirement for the bachelor's degree. A student, whether accelerating or not, may be permitted to apply course credits earned at another college or university toward the requirements of the student's major program or toward any of the distributional requirements other than those for the first year. See section P, Credit from Other Universities (p. 81).

Please note that attendance at the Yale College program at the Paul Mellon Centre in London during the spring term counts just as if it were a term of enrollment at Yale College in New Haven. Attendance at the Paul Mellon Centre during the summer, however, does not count as a term of enrollment. See "Yale-in-London Summer Program" in section K (p. 64).

7. **Year or Term Abroad** A Year Abroad counts as two terms and a Term Abroad counts as one term of enrollment in Yale College. Credits earned on a Year or Term Abroad count as the equivalent of Yale course credits.

Note that after a Year or Term Abroad all students must attend two subsequent terms in Yale College; see “Year or Term Abroad” in section K (p. 64). In many cases a student must relinquish the use of acceleration credits and decelerate in order to take a Year or Term Abroad. As a special exception, a student accelerating by one or two terms who wishes to complete a term of study abroad as early as during the third term of enrollment would have to petition to accelerate before the third term of enrollment. A student who wishes to accelerate and to take a Year or Term Abroad should consult with the residential college dean and the Center for International and Professional Experience at the earliest opportunity.

An accelerating student who wishes also to complete a Year or Term Abroad must conform to one of the following schemes:

Terms of Acceleration	Total Terms at Yale	Total Terms on YA/TA	Acceleration Credits	Minimum Course Credits Earned at Yale	Maximum Course Credits Earned on YA/TA
1	6	1	4	28	4
1	5	2	4	23	9
2	5	1	9	23	4
2	4	2	9	18	9

8. **Distributional requirements** Acceleration credits may not be employed to meet the distributional requirements for the first, sophomore, or junior years, or the distributional requirements for the bachelor’s degree, including the foreign language requirement. With permission, an accelerating student may apply course credit earned at another college or university toward the distributional requirements for the bachelor’s degree and to those for the sophomore and junior years; students should consult with the residential college dean to be directed to the appropriate authority for such approval.
9. **Major requirements** With the permission of the director of undergraduate studies, an accelerating student may apply credit earned at another university toward the requirements of the student’s major program.
10. **Makeup of course credit deficiency** If an accelerating student’s record at the end of a term of enrollment shows a deficiency for promotion, academic good standing, or graduation, the student will be allowed to repair the deficiency without forfeiting the use of acceleration credits only through enrollment in Yale Summer Session if the credit earned is to be applied toward the 36-course-credit requirement for the bachelor’s degree. See section D, Promotion and Good Standing (p. 45).
11. **Enrollment after graduation as a non-degree student** Accelerating students who have qualified for the award of the bachelor’s degree are eligible, as are all Yale College graduates, for full-time enrollment in Yale College as non-degree students. Because such students will have graduated, they will not be eligible for financial aid. See section N, Non-degree Students Program (p. 78).
12. **Transfer students** Students admitted by transfer from other colleges and universities are not eligible for acceleration by the use of acceleration credits.

R. Amendments

The University reserves the right to amend or supplement these regulations at any time upon such notice to students as it deems appropriate.

III. SUBJECTS OF INSTRUCTION

Majors in Yale College

- African American Studies (B.A.)
 African Studies (B.A.)
 American Studies (B.A.)
 Anthropology (B.A.)
 Applied Mathematics (B.A. or B.S.)
 Applied Physics (B.S.)
 Archaeological Studies (B.A.)
 Architecture (B.A.)
 Art (B.A.)
 Astronomy (B.A.)
 Astrophysics (B.S.)
 Biomedical Engineering (B.S.)
 Chemical Engineering (B.S.)
 Chemistry (B.A. or B.S.)
 Classical Civilization (B.A.)
 Classics (B.A.)
 Cognitive Science (B.A. or B.S.)
 Computer Science (B.A. or B.S.)
 Computer Science and Mathematics
 (B.S.)
 Computer Science and Psychology (B.A.)
 Computing and the Arts (B.A.)
 East Asian Languages and Literatures
 (B.A.)
 East Asian Studies (B.A.)
 Ecology and Evolutionary Biology (B.A.
 or B.S.)
 Economics (B.A.)
 Economics and Mathematics (B.A.)
 Electrical Engineering (B.S.)
 Electrical Engineering and Computer
 Science (B.S.)
 Engineering Sciences (Chemical) (B.S.)
 Engineering Sciences (Electrical) (B.A. or
 B.S.)
 Engineering Sciences (Environmental)
 (B.A.)
 Engineering Sciences (Mechanical) (B.A.
 or B.S.)
 English (B.A.)
 Environmental Engineering (B.S.)
 Environmental Studies (B.A. or B.S.)
 Ethics, Politics, and Economics (B.A.)
 Ethnicity, Race, and Migration (B.A.)
 Film and Media Studies (B.A.)
 French (B.A.)
 Geology and Geophysics (B.S.)
 Geology and Natural Resources (B.A.)
 German Studies (B.A.)
 Global Affairs (B.A.)
 Greek, Ancient and Modern (B.A.)
 History (B.A.)
 History of Art (B.A.)
 History of Science, Medicine, and Public
 Health (B.A.)
 Humanities (B.A.)
 Italian (B.A.)
 Judaic Studies (B.A.)
 Latin American Studies (B.A.)
 Linguistics (B.A.)
 Literature and Comparative Cultures
 (B.A.)
 Literature, Comparative (B.A.)
 Mathematics (B.A. or B.S.)
 Mathematics and Philosophy (B.A.)
 Mathematics and Physics (B.S.)
 Mechanical Engineering (B.S.)
 Modern Middle East Studies (B.A.)
 Molecular Biophysics and Biochemistry
 (B.A. or B.S.)
 Molecular, Cellular, and Developmental
 Biology (B.A. or B.S.)
 Music (B.A.)
 Near Eastern Languages and Civilizations
 (B.A.)
 Neuroscience (B.A. or B.S.)
 Philosophy (B.A.)
 Physics (B.S.)
 Physics and Geosciences (B.S.)
 Physics and Philosophy (B.A.)
 Political Science (B.A.)
 Portuguese (B.A.)
 Psychology (B.A. or B.S.)
 Religious Studies (B.A.)

Russian (B.A.)
Russian and East European Studies (B.A.)
Sociology (B.A.)
South Asian Studies (second major only)
Spanish (B.A.)
Special Divisional Major (B.A. or B.S.)
Statistics and Data Science (B.A. or B.S.)
Theater Studies (B.A.)
Women's, Gender, and Sexuality Studies
(B.A.)

Accounting

Courses

* **ACCT 270a or b, Foundations of Accounting and Valuation** Rick Antle

Modern accounting practices and their use in distinguishing value creation from value redistribution. Basic determinants of value and the techniques used to assess it; the creation of value through the production and delivery of goods or services; the conversion of that value into cash flows; basic financial statements, balance sheets, income statements, and cash flow statements, and the accounting mechanics with which they are built. Undergraduate enrollment limited to 50. Juniors and seniors only.

Aerospace Studies

Program adviser: Lieutenant Colonel Holly Hermes, USAF; Rm. 450, 55 Whitney Ave., 432-9431; airforce@yale.edu; afrotc.yalecollege.yale.edu

Aerospace Studies is the academic component of the Yale Air Force Reserve Officer Training Corps (AFROTC) Detachment 009. Typically, students pursue the Aerospace Studies curriculum in tandem with AFROTC program requirements, including military leadership preparation and physical training. After completing all Air Force ROTC requirements and Yale College academic degree requirements, cadets commission as officers into the Air Force upon graduation from Yale College, serving in a variety of military specialties such as aviation, intelligence, logistics, and medicine. The Aerospace Studies Program and the AFROTC prepare students to excel as Air Force leaders and to operate effectively in a dynamic military environment.

For additional information about Yale's Air Force Reserve Officers Training Corps program, visit the program's website or send questions to Lt Col Holly Hermes. (holly.hermes@yale.edu)

COURSES FOR NONMAJORS

Enrollment in Aerospace Studies courses is not limited to cadets; courses are open to any Yale student.

ACADEMIC REQUIREMENTS OF THE MAJOR

The Aerospace Studies core curriculum introduces topics such as the profession of arms, military history, military communication, national security, and the philosophy of warfare. The Department of Aerospace Studies presents this content in the context of military leadership to prepare students for active duty service. Most Aerospace Studies courses count for enrollment credit only; they do not count toward the thirty-six course credits required for the Yale bachelor's degree.

Students in the AFROTC program must successfully complete eight courses total, typically taking one course per semester, in addition to the requirements of their Yale College major. The Department of Aerospace Studies offers seven of these requisite courses: USAF 101, 102, 202, 301, 302, 401, and 402. The Department of History offers the remaining course, HIST 221, required to complete the AFROTC program. HIST 221, Military History of the West since 1500, fulfills the first term of the 200-level AFROTC requirement and also counts toward the bachelor's degree. AFROTC scholarship recipients must also complete either three credits in a foreign language or six credits in any combination of mathematics, physics, chemistry, or engineering. Cadets become involved in the management of their own cadet wing through a mandatory two-hour leadership laboratory each week.

Credit/D/Fail No course taken Credit/D/Fail may be counted toward the program in Aerospace Studies.

FACULTY ASSOCIATED WITH THE PROGRAM OF AEROSPACE STUDIES

Professor Colonel Thomas McCarthy, USAF (*Adjunct*)

Lecturers Captain Estelle Baik, USAF, Lieutenant Colonel Holly Hermes, USAF, Lieutenant Colonel Kristen Snow, USANG

Courses

*** USAF 101a and USAF 102b, Foundation of the U.S. Air Force** Estelle Baik

Introduction to the U.S. Air Force and how it works as a military institution, including an overview of its basic characteristics, missions, and organizations. Students attend one 50-minute lecture and one 110-minute laboratory each week. For enrollment credit only; cannot be applied toward the 36-course-credit requirement for the Yale bachelor's degree. Grades earned in this course do not count toward GPA or eligibility for General Honors.

*** USAF 202a, The Evolution of U.S. Air and Space Power** Estelle Baik

The development and employment of American air and space power from the Korean Conflict to the present. The distinctive capabilities and functions of air and space power; Air Force heritage and leaders; continued application of communication skills. Prerequisites: USAF 101, 102, and HIST 221. For enrollment credit only; cannot be applied toward the 36-course-credit requirement for the Yale bachelor's degree. Grades earned in this course do not count toward GPA or eligibility for General Honors.

*** USAF 301b and USAF 302a, Air Force Leadership Studies** Staff

Advanced study of leadership concepts and ethics, management and communication skills, and Air Force personnel and evaluation systems. Emphasis on the enhancement of leadership skills. Case studies and exercise of leadership and management techniques in a supervised environment. Prerequisite: USAF 202. For enrollment credit only; cannot be applied toward the 36-course-credit requirement for the Yale bachelor's degree. Grades earned in this course do not count toward GPA or eligibility for General Honors.

*** USAF 402a, National Security Affairs and Preparation for Active Duty** Staff

Overview of the complex social and political issues facing the military profession. Designed to provide seniors with a foundation for understanding their role as military officers in American society. Prerequisites: USAF 301, 302 and field training. For enrollment credit only; cannot be applied toward the 36-course-credit requirement for the Yale bachelor's degree. Grades earned in this course do not count toward GPA or eligibility for General Honors.

HIST 221b / GBLB 281b, Military History of the West since 1500 Paul Kennedy

A study of the military history of the West since 1500, with emphasis on the relationship between armies and navies on the one hand, and technology, economics, geography, and the rise of the modern nation-state on the other. The coming of airpower in its varied manifestations. Also meets requirements for the Air Force and Naval ROTC programs. HU

African American Studies

Director of undergraduate studies: Anthony Reed, Rm. 202, 81 Wall St., 436-3556; anthony.reed@yale.edu; afamstudies.yale.edu

The African American Studies major examines, from numerous disciplinary perspectives, questions of race, culture, and modern struggles for equality centering on the experiences of people of African descent in Black Atlantic societies such as the United States, the Caribbean, and Latin America, including the global impact of those experiences. Students in the department explore the historical, cultural, political, economic, and social development of Black Atlantic societies. Majors work to become informed thinkers who are intellectually prepared to offer clarity and insight to ongoing academic and public debates centered in questions concerning race and inequality.

African American Studies majors become knowledgeable about the history, primary methodologies, and interdisciplinary breadth of the field. Students learn to critique, articulate, analyze, and interpret universal themes concerning both individuals in society and group interactions as they relate to the work of scholars, scientists, writers, artists, musicians, economists, and entrepreneurs.

REQUIREMENTS OF THE MAJOR

African American Studies can be taken either as a stand-alone major or as one of two majors in consultation with the director of undergraduate studies. Pertinent regulations can be found under Two Majors (p. 68) in section K of the Academic Regulations.

The major in African American Studies requires twelve term courses, including seven core courses and five electives in an area of concentration. The seven core courses include the African American history sequence AFAM 160 and AFAM 162, which can be taken in either order; one course in African American literature; one course in the social sciences relevant to African American studies; the junior seminar (AFAM 410); the senior colloquium (AFAM 480) and senior essay (AFAM 491).

Area of concentration Students majoring in African American Studies are required to choose an area of concentration comprised of five courses. This cluster of interrelated courses is intended to ground the student's learning experience in one area of investigation. Often students will choose an area of concentration in a traditional discipline such as political science, art history, economics, sociology, American studies, history, or English language and literature. Students can also construct interdisciplinary areas of concentration that span traditional departments and encompass broader theoretical frameworks such as race and ethnicity, cultural studies, black arts, or feminism and gender studies. All majors are encouraged to take upper-level courses as part of their concentration, especially those courses centering on research and methodology.

None of the seven core courses may be counted among the required electives in the area of concentration.

Junior seminar In their junior year students must take the junior seminar, AFAM 410. This course provides majors with theoretical and methodological bases for the work they will do during their research-oriented senior year.

Credit/D/Fail No more than one course taken Credit/D/Fail may be counted toward the major.

SENIOR REQUIREMENT

Senior majors participate in a colloquium in AFAM 480 that gives them an opportunity to exchange ideas with each other and with more advanced scholars. Students in AFAM 480 submit a prospectus, compile a working bibliography, begin or continue research, and write the first twenty pages of the senior essay. After completing the colloquium, each student carries out the remaining research and writing of a senior essay in AFAM 491 under the guidance of a faculty member in the chosen discipline or area of concentration.

Students are strongly encouraged to use the summer between the junior and senior years for research directly related to the senior essay. For example, field or documentary research might be undertaken in urban or rural communities in America and throughout the diaspora. The particular research topic and design are to be worked out in each case with a faculty adviser.

ADVISING

Application to the major Students considering a program of study in African American Studies should consult the director of undergraduate studies as early as possible. Areas of concentration and schedules for majors must be approved by the director of undergraduate studies.

Graduate work African American Studies offers training of special interest to those considering admission to graduate or professional schools and careers in education, journalism, law, the arts, business management, city planning, international relations, politics, psychology, publishing, public health, or social work. The interdisciplinary structure of the department offers students an opportunity to satisfy the increasingly rigorous expectations of admissions committees and prospective employers.

STUDY ABROAD

A limited number of courses taken during sophomore and or junior semesters abroad can be counted toward the major in consultation with, and the approval of the director of undergraduate studies (DUS).

REQUIREMENTS OF THE MAJOR

Prerequisites None

Number of courses 12 term courses

Specific courses required AFAM 160, 162, 410

Distribution of courses 1 relevant humanities course and 1 relevant social science course, both approved by DUS; 5 courses in area of concentration

Senior requirement Senior colloquium (AFAM 480) and senior essay (AFAM 491)

FACULTY OF THE DEPARTMENT OF AFRICAN AMERICAN STUDIES

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

Associate Professors Simone Browne (*Visiting*), Aimee Cox, Crystal Feimster, Anthony Reed, Edward Rugemer

Assistant Professors Rizvana Bradley, Carolyn Roberts

Lecturers Aaron Carico, Thomas Allen Harris, Lauren Meyer

Courses

AFAM 160a / AFST 184a / AMST 160a / HIST 184a, The Rise and Fall of Atlantic Slavery Staff

The history of peoples of African descent throughout the Americas, from the first African American societies of the sixteenth century through the century-long process of emancipation. HU

AFAM 162b / AMST 162b / HIST 187b, African American History from Emancipation to the Present Staff

An examination of the African American experience since 1861. Meanings of freedom and citizenship are distilled through appraisal of race and class formations, the processes and effects of cultural consumption, and the grand narrative of the civil rights movement. WR, HU

AFAM 172b / HIST 119b, The Civil War and Reconstruction Era, 1845–1877 David Blight

The causes, course, and consequences of the American Civil War. A search for the multiple meanings of a transformative event, including national, sectional, racial, constitutional, social, gender, intellectual, and individual dimensions. HU

AFAM 185b / ENGL 193b, The Harlem Renaissance Anthony Reed

Study of the social, political, and aesthetic circumstances of the Harlem Renaissance, one of the most important periods in African American life. Focus on constitutive debates and key texts to better understand the origins and aims of the movement and its connection to formal politics and activism. Frequent use of relevant materials in Beinecke Library. WR, HU

AFAM 186b / LAST 214b / PLSC 378b / SOCY 170b, Contesting Injustice Elisabeth Wood

Exploration of why, when, and how people organize collectively to challenge political, social, and economic injustice. Cross-national comparison of the extent, causes, and consequences of inequality. Analysis of mobilizations for social justice in both U.S. and international settings. Intended primarily for freshmen and sophomores. SO

AFAM 195b / PLSC 424b / SAST 440b, Gandhi, King, and the Politics of Nonviolence Karuna Mantena

A study of the theory and practice of nonviolent political action, as proposed and practiced by M. K. Gandhi and Martin Luther King, Jr. The origins of nonviolence in Gandhian politics and the Indian independence movement; Gandhian influences on the Civil Rights movement; King's development of nonviolent politics; the legacies and lessons for nonviolent politics today. SO

AFAM 198b / CGSC 277b / EDST 177b / EP&E 494b / PHIL 177b, Propaganda, Ideology, and Democracy Jason Stanley

Historical, philosophical, psychological, and linguistic introduction to the issues and challenges that propaganda raises for liberal democracy. How propaganda can work to

undermine democracy; ways in which schools and the press are implicated; the use of propaganda by social movements to address democracy's deficiencies; the legitimacy of propaganda in cases of political crisis. HU

* **AFAM 206b / ENGL 234b, Literature of the Black South** Sarah Mahurin

Examination of the intersections between African American and Southern literatures, with consideration of the ways in which the American South remains a space that simultaneously represents and repels an African American ethos. HU

* **AFAM 212b / ENGL 221b, African American Literature in the Archives** Melissa Barton

Examination of African American literary texts within their archival context; how texts were planned, composed, revised, and received in their time. Students pair texts with archival materials from Beinecke Library, including manuscripts, correspondence, photographs, and ephemera. Readings include Lorraine Hansberry, Langston Hughes, James Weldon Johnson, August Wilson, and Richard Wright. HU

* **AFAM 213a / HIST 383Ja / HSHM 481a, Medicine and Race in the Slave Trade** Carolyn Roberts

Examination of the interconnected histories of medicine and race in the slave trade. Topics include the medical geography of the slave trade from slave prisons in West Africa to slave ships; slave trade drugs and forced drug consumption; mental and physical illnesses and their treatments; gender and the body; British and West African medicine and medical knowledge in the slave trade; eighteenth-century theories of racial difference and disease; medical violence and medical ethics. HU

* **AFAM 216a or b, Family Narratives/Cultural Shifts** Thomas Harris

This course looks at films that are redefining ideas around family and family narratives in relation to larger social movements. We focus on personal films by filmmakers who consider themselves artists, activists, or agents of change but are united in their use of the nonfiction format to speak truth to power. In different ways, these films use media to build community and build family and ultimately, to build family albums and archives that future generations can use to build their own practices. Just as the family album seeks to unite people across time, space, and difference, the films and texts explored in this course are also journeys that culminate in linkages, helping us understand nuances of identity while illuminating personal relationships to larger cultural, social, and historical movements. HU

AFAM 241a / AFST 262a / MUSI 276a, Traditional and Contemporary Musics of Sub-Saharan Africa Michael Veal

A survey of the traditional and popular musics of black Africa, organized both by nation, such as Ghana, and by region, such as Senegambia. Introduction to the fundamental musical principles, materials, and performance contexts of African music. WR

* **AFAM 256b / FILM 399b / HSAR 329b, The Migrant Image** Rizvana Bradley

Cinematic as well as post-cinematic representation of both the migrant and the immigrant body; authorship of the anticolonial struggle. Focus on migrants, refugees, and immigrants, and the emergence of the "global citizen" with respect to digital artistic practices. Prerequisites: FILM 150 or 160; or permission of instructor. HU

- * **AFAM 272a / AMST 408a / ER&M 408a, Race and Comedy** Albert Laguna
Introduction to theories of the ludic and to critical race theory. Ways in which comic modes have been utilized by racialized subjects to represent and issue critiques of the dominant culture. Analysis of stand-up comedy, film, television, and novels. HU
- * **AFAM 278a / SOCY 360a, Black Urban America As Sociological Memoir** Staff
This interdisciplinary course traces formation of contemporary African American class and family structures through investigation of how evolving racialized class-gender relations shaped twenty-first-century populations of poor and affluent blacks. Sources drawn from social sciences, history, literature to explore relationships between social behavior (agency) and blocked opportunity (structure). SO
- * **AFAM 305a, African American Autobiography** Staff
Examination of African American autobiography, from slave narratives to contemporary memoirs, and how the genre approaches the project (and problem) of knowing, through reading, the relationships of fellow humans. Chronological consideration of a range of narratives and their representations of race, of space, of migration, of violence, of self, and of other, as well as the historical circumstances that inform these representations. Prerequisite: one college-level literature course. HU
- * **AFAM 313a / THST 319a, Embodying Story** Renee Robinson
The intersection of storytelling and movement as seen through historical case studies, cross-disciplinary inquiry, and studio practice. Drawing on eclectic source materials from different artistic disciplines, ranging from the repertory of Alvin Ailey to journalism, architectural studies, cartoon animation, and creative processes, students develop the critical, creative, and technical skills through which to tell their own stories in movement. No prior dance experience necessary. HU
- * **AFAM 346a / HSAR 471a, Black Atlantic Photography** Kobena Mercer
Introduction to the social and artistic history of photography in Black Atlantic contexts from the mid-nineteenth century to the present. Uses of the photographic image in shaping understandings of race relations and black identities. Codes and conventions by which photographs are evaluated in terms of truth, reflection, testimony, expressivity, and construction. HU
- * **AFAM 353b / HSAR 472b, Black British Art and Culture** Kobena Mercer
Introduction to black British visual artists and cultural theorists, with a focus on those of African, Caribbean, and South Asian descent. Postcolonial perspectives on diaspora identities and cross-cultural aesthetics in art, film, and photography from 1945 to the present. HU
- * **AFAM 358b / ER&M 463b / SOCY 373b, Ethnography of Policing and Race** Staff
Ethnography is the systematic study of culture and a method of knowledge production utilized by social scientists to apprehend, comprehend, and represent cultural groups and other social phenomena. This course explores the ethnographic representations of policing historically alongside the American construction of race. It explores the complex nature of policing in racially concentrated contexts. Additionally, it explores the warrants of ethnography as it relates to the study of policing and race. Students examine the tension between typical racial minorities and policing and the experiences of various other racialize groups that have appeared in and fallen out of focus as targets for racialize police contact. SO

*** AFAM 379b / FREN 410b / LITR 299b, Colonial Narrative, Postcolonial Counternarrative** Christopher Miller

Readings of paradigmatic, colonial era texts that have provoked responses and rewritings from postcolonial writers and filmmakers. In some cases the rewriting is explicit and direct, in other cases the response is more oblique. Both profound differences of perspective and unexpected convergences will emerge. Readings may include: Aimé Césaire's *A Tempest* after Shakespeare's *Tempest*, Kamel Daoud's *The Meursault Investigation* after Camus's *The Stranger*, and Claire Denis's film *Chocolat* after Ferdinand Oyono's *Houseboy*.

*** AFAM 390a / ER&M 419a / SOCY 319a, Ethnography of the African American Community** Elijah Anderson

An ethnographic study of the African American community. Analysis of ethnographic and historical literature, with attention to substantive, conceptual, and methodological issues. Topics include the significance of slavery, the racial ghetto, structural poverty, the middle class, the color line, racial etiquette, and social identity. SO

*** AFAM 406b / AMST 405b / ENGL 405b, Autobiography in America** Robert Stepto

A study of autobiographical writings from Mary Rowlandson's Indian captivity narrative (1682) to the present. Classic forms such as immigrant, education, and cause narratives; prevailing autobiographical strategies involving place, work, and photographs. Authors include Franklin, Douglass, Jacobs, Antin, Kingston, Uchida, Balakian, Rodriguez, and Bechdel. WR, HU

*** AFAM 410b / AMST 310b / WGSS 410b, Interdisciplinary Approaches to African American Studies** Anthony Reed

An interdisciplinary, thematic approach to the study of race, nation, and ethnicity in the African diaspora. Topics include class, gender, color, and sexuality; the dynamics of reform, Pan-Africanism, neocolonialism, and contemporary black nationalism. Use of a broad range of methodologies. WR, HU, SO

*** AFAM 413b / AMST 448b / THST 420b / WGSS 415b, Race, Sex, and Gender in Downtown New York City 1945–1984** Tavia Nyong'o

Archivally-driven exploration of the post-war downtown scene in New York City. Particular attention to the intersections of jazz, nightlife, avant-garde performance, literature, and visual art, within the context of social movements for black and brown power and women's and gay liberation. HU

*** AFAM 428a / THST 406a, Dance and Black Popular Culture** Brian Seibert

Examination of dance in black popular culture and of black dance in American popular culture, more generally, from 19th-century slave dances and blackface minstrelsy through MTV and Beyoncé's *Lemonade*. Course materials include primary source documents from the white and black press, theoretical and historical essays, and film. WR, HU

*** AFAM 440a / FREN 421a, Intercultural Literary Hoaxes** Christopher Miller

Study of literary works that test the bounds of propriety by borrowing or stealing an alien identity and passing the imposture off as authentic. Cases in Anglo-American and French-Francophone literature, ranging from the hilarious to the reprehensible. Attention to issues in the ethics of representation. Works include Diderot, Mérimée, George Eliot, pseudo-slave narratives, Camara Laye, Romain Gary, Forrest Carter, JT

LeRoy, Paul Smail, Margaret B. Jones, and Misha Defonseca. Prerequisite: Reading knowledge of French at the L4 level. HU

*** AFAM 449a / AFST 449a / ENGL 449a, Challenges to Realism in Contemporary African Fiction** Stephanie Newell

Introduction to experimental African novels that challenge realist and documentary modes of representation. Topics include mythology, gender subversion, politics, the city, migration, and the self. Ways of reading African and postcolonial literature through the lenses of identity, history, and nation. WR, HU

AFAM 469b / ECON 171b / EDST 271b, Urban Inequalities and Educational Inequality Gerald Jaynes

Analysis of contemporary policy problems related to academic under performance in lower income urban schools and the concomitant achievement gaps among various racial and ethnic groups in United States K-12 education. Historical review of opportunity inequalities and policy solutions proposed to ameliorate differences in achievement and job readiness. Students benefit from practical experience and interdisciplinary methods, including a lab component with time spent in a New Haven high school. Prerequisites: Any course offered by Education Studies, or one course in history or any social science, either: Anthropology, Economics, Political Science, Psychology, Sociology. EDST 110 is preferred, although not required. SO

*** AFAM 471a and AFAM 472b, Independent Study: African American Studies** Staff

Independent research under the direction of a member of the department on a special topic in African American studies not covered in other courses. Permission of the director of undergraduate studies and of the instructor directing the research is required. A proposal signed by the instructor must be submitted to the director of undergraduate studies by the end of the second week of classes. The instructor meets with the student regularly, typically for an hour a week, and the student writes a final paper or a series of short essays. May be elected for one or two terms.

*** AFAM 480a, Senior Colloquium: African American Studies** Crystal Feimster

A seminar on issues and approaches in African American studies. The colloquium offers students practical help in refining their senior essay topics and developing research strategies. Students discuss assigned readings and share their research experiences and findings. During the term, students are expected to make substantial progress on their senior essays; they are required to submit a prospectus, an annotated bibliography, and a draft of one-quarter of the essay.

*** AFAM 491b, The Senior Essay** Staff

Independent research on the senior essay. The senior essay form must be submitted to the director of undergraduate studies by the end of the second week of classes. The senior essay should be completed according to the following schedule: (1) end of the sixth week of classes: a rough draft of the entire essay; (2) end of the last week of classes (fall term) or three weeks before the end of classes (spring term): two copies of the final version of the essay.

African Studies

Director of undergraduate studies: Daniel Magaziner, 2685 HGS, 432-6110, daniel.magaziner@yale.edu; director of the program in African Languages: Kiarie Wa'Njogu, 309B LUCE, 432-0110, john.wanjogu@yale.edu; www.yale.edu/macmillan/african

The program in African Studies enables students to undertake interdisciplinary study of the arts, history, cultures, politics, and development of Africa. As a foundation, students in the program gain a cross-disciplinary exposure to Africa. In the junior and senior years, students develop analytical ability and focus their studies on research in a particular discipline such as anthropology, art history, history, languages and literatures, political science, or sociology or on topics such as global health, economic development, or human rights.

African Studies provides training of special interest to those considering admission to graduate or professional schools or careers in education, journalism, law, management, medicine, politics, psychology, international relations, creative writing, or social work. The interdisciplinary structure of the program offers students an opportunity to satisfy the increasingly rigorous expectations of admissions committees and prospective employers for a broad liberal arts perspective that complements specialized knowledge of a field.

REQUIREMENTS OF THE MAJOR

The program in African Studies consists of thirteen term courses, including (1) one African Studies course in the humanities and one in the social sciences; (2) two years of an African language (Arabic, Kiswahili, Yorùbá, isiZulu, or others with permission of the director of undergraduate studies), unless waived by examination; (3) AFST 401, the junior seminar on research methods, or an alternative course that either serves to deepen the concentration or provide methodological tools for the senior essay; and (4) a concentration of four term courses and one research methods seminar, selected in consultation with the director of undergraduate studies, in a discipline such as anthropology, art history, history, languages and literatures, political science, or sociology, or in an interdisciplinary program such as African American Studies; Ethnicity, Race, and Migration; or Women's, Gender, and Sexuality Studies; or in a cross-disciplinary area such as diaspora studies or development studies. The required courses represent the core of the program and are intended to expose the student both to the interdisciplinary nature of African studies and to the methodologies currently being brought to bear on the study of African cultures and societies.

Language requirement African Studies majors are required to complete two years of college-level study (or the equivalent) of an African language, and they are encouraged to continue beyond this level. For the language requirement to be waived, a student must pass a placement test for admission into an advanced-level course or, for languages not regularly offered at Yale, an equivalent test of speaking, listening, reading, and writing skills administered through the Center for Language Study. Students should begin their language study as early as possible. If the requirement is waived, students must substitute other African Studies courses for the four required language courses.

With permission of the DUS, students may count courses in an additional language, such as French or Portuguese, toward the major requirements. Students are encouraged to include upper-level courses, especially those centering on research and methodology.

Program in African Languages The language program offers instruction in four major languages from sub-Saharan Africa: Kiswahili (eastern and central Africa), Yorùbá (western Africa), Wolof (western Africa) and isiZulu (southern Africa). African language courses emphasize communicative competence, using 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 students are encouraged to spend a summer or term in Africa during their language study.

Courses in Arabic are offered through the Department of Near Eastern Languages and Civilizations (p. 586). Noncredit 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 (john.wanjogu@yale.edu) for information.

SENIOR REQUIREMENT

Students are required to complete a senior essay in AFST 491, working under the guidance of a faculty adviser. With prior approval by the DUS, a combined senior essay may be submitted for those pursuing a double major.

A preliminary statement indicating the topic to be addressed and the name of the faculty adviser must be submitted to the DUS by the end of the second week of the fall term in the senior year.

ADVISING AND APPLICATION TO THE MAJOR

Students planning to major in African Studies should consult the director of undergraduate studies as early as possible.

Graduate work, M.A. program Students in Yale College are eligible to complete the M.A. in African Studies in one year of graduate work if they begin the program in the third and fourth undergraduate years. Students interested in this option must complete eight graduate courses in the area by the time of the completion of the bachelor's degree. Only two courses may be counted toward both graduate and undergraduate degrees. Successful completion of graduate courses while still an undergraduate does not guarantee admission into the M.A. program.

REQUIREMENTS OF THE MAJOR

Prerequisites None

Number of courses 13 term courses (incl senior req)

Distribution of courses 1 AFST course in humanities and 1 in social sciences; 2 years of African lang; 4 courses and 1 research methods seminar in area of concentration

Specific course required AFST 401, or an alternative arranged in consultation with the DUS

Senior requirement Senior essay (AFST 491)

Substitution permitted If language req is waived, 4 addtl African Studies courses

FACULTY ASSOCIATED WITH THE PROGRAM OF AFRICAN STUDIES

Professors Lea Brilmayer (*Law School*), John Darnell (*Near Eastern Languages & Civilizations*), Owen Fiss (*Law School*), Robert Harms (*History*), Roderick McIntosh (*Anthropology*), Christopher Miller (*African American Studies, French*), Nicoli Nattrass (*Ethics, Politics, & Economics*) (*Visiting*), Catherine Panter-Brick (*Anthropology*), Lamin Sanneh (*History, Divinity School*), Jeremy Seekings (*Global Affairs*) (*Visiting*), Ian Shapiro (*Political Science*), Robert Thompson (*History of Art*), Michael Veal (*Music*), David Watts (*Anthropology*), Elisabeth Wood (*Political Science*)

Associate Professors Robert Bailis (*Forestry & Environmental Studies*), Daniel Magaziner (*History*)

Assistant Professors Katharine Baldwin (*Political Science*), Adria Lawrence (*Political Science*), Louisa Lombard (*Anthropology*), Jonathan Wrytzen (*Sociology*)

Senior Lecturer Cheryl Doss (*Economics*)

Lecturers Lacina Coulibaly (*Theater Studies*), Anne-Marie Foltz (*Public Health*), David Simon (*Political Science*)

Senior Lectors II Sandra Sanneh, Kiarie Wa'Njogu

Senior Lectors Oluseye Adesola, Matuku Ngame

Courses

* AFST 001b / ARCG 001b / NELC 001b, **Egypt and Northeast Africa: A Multidisciplinary Approach** John Darnell

Examination of approximately 10,000 years of Nile Valley cultural history, with an introduction to the historical and archaeological study of Egypt and Nubia. Consideration of the Nile Valley as the meeting place of the cultures and societies of northeast Africa. Various written and visual sources are used, including the collections of the Peabody Museum and the Yale Art Gallery. Enrollment limited to first-year students. Preregistration required; see under First-Year Seminar Program. WR, HU

* AFST 015a / AFAM 016 / ENGL 015a, **South African Writing after Apartheid** Stephanie Newell

An introduction to creative writing published in South Africa from the end of Apartheid in 1994 to the present. Close readings of contemporary fiction with additional material drawn from popular culture, including films, magazines, and music. Enrollment limited to first-year students. Preregistration required; see under First-Year Seminar Program. WR, HU

AFST 184a / AFAM 160a / AMST 160a / HIST 184a, **The Rise and Fall of Atlantic Slavery** Staff

The history of peoples of African descent throughout the Americas, from the first African American societies of the sixteenth century through the century-long process of emancipation. HU

AFST 238a / AMST 238a / ER&M 238a, **Introduction to Third World Studies** Gary Okihiro

Introduction to the historical and contemporary theories and articulations of Third World studies (comparative ethnic studies) as an academic field and practice.

Consideration of subject matters; methodologies and theories; literatures; and practitioners and institutional arrangements. SO

AFST 262a / AFAM 241a / MUSI 276a, Traditional and Contemporary Musics of Sub-Saharan Africa Michael Veal

A survey of the traditional and popular musics of black Africa, organized both by nation, such as Ghana, and by region, such as Senegambia. Introduction to the fundamental musical principles, materials, and performance contexts of African music. WR

*** AFST 303b / EP&E 303b / SOCY 330b, Civil Sphere and Democracy** Jeffrey Alexander

Examination of civil sphere theory in dialogue with normative and empirical approaches to civil society. The sacred and profane binaries that animate the civil sphere are studied, as are such civil sphere organizations as polls, mass media, electoral system, law, and office. Topics include: United States presidential elections, immigration and its controversies, the civil rights movement, the crisis of contemporary journalism, recent controversies over church pedophilia, the financial system, telephone hacking, and the challenge of de-provincializing civil sphere theory. HU, SO

*** AFST 306a / GLBL 306a, Social Enterprise in Developing Economies II** Robert Hopkins

Summer research developed into a case-study project on a topic related to the use of social enterprise in regional economic development. Prerequisite: GLBL 305

AFST 333a / HIST 332a, African Encounters with Colonialism Daniel Magaziner
How African societies and peoples encountered, engaged, and endured the colonial and postcolonial world, from the arrival of Kiswahili-speaking traders at the shores of Lake Victoria in the 1840s through the rise and fall of European colonialism and the resulting forms of neocolonialism. Transformations and continuities in African religious life; gendered sociability; popular culture. HU

*** AFST 353b / MUSI 375b, Topics in World Music** Marissa Moore

A critical introduction to selected cultures of world music. Specific cultures vary from year to year but generally include those of Native America, South Asia, Southeast Asia, sub-Saharan Africa, the Middle East, and the Caribbean. Preference to Music majors according to class. HU

*** AFST 372a / HIST 375J / MMES 105a / SOCY 372a, Comparative Nationalism in North Africa and the Middle East** Jonathan Wyrzten

The rise of nationalism in the Maghreb (or Arab West) and Mashriq (or Arab East). Introduction to major debates about nationalism; the influence of transnational (pan-Islamic and pan-Arab) ideologies, ethnicity, gender, and religion. Case studies include Egypt, Iraq, Israel, Palestine, Jordan, Saudi Arabia, the Gulf monarchies, Morocco, Western Sahara, Algeria, and Berber and Kurdish movements. SO

AFST 381b / PLSC 381b, Government and Politics in Africa Katharine Baldwin

The establishment and use of political power in selected countries of tropical Africa. The political role of ethnic and class cleavages, military coups, and the relation between politics and economic development. SO

* **AFST 382a, Child Health and Development in Africa** Nicholas Alipui

Examination of the most critical issues and trends in child health, child survival and development, and efforts to incorporate priorities of children and future generations after the adoption of the 2030 Agenda for Sustainable Development in 2015 by the United Nations General Assembly. SO

* **AFST 414a / FREN 414a / LITR 269 / MMES 261a, Afterlives of Algeria's Revolution** Jill Jarvis

The Algerian War for Independence from France was the longest and most violent decolonizing war of the 20th century. This war and its aftermath transformed political, social, intellectual, and artistic life on both sides of the Mediterranean—and it became a model for other decolonizing and civil rights movements across the world. Memory of this war continues to shape current debates in Europe and North Africa about state violence, terrorism, racism, censorship, immigration, feminism, human rights, and justice. Through study of fiction, film, testimonies, graphic novels, and theater, this seminar charts the war's surprising and enduring legacies. Films may include Pontecorvo's *The Battle of Algiers*, Haneke's *Caché*, and Panijel's *Octobre à Paris*. Literary works by Djébar, Camus, Sebbar, Etcherelli, Dib, Cixous, Kateb, Fanon, De Beauvoir, Mechakra. The course is conducted in French. If you have any questions about your French ability, contact the instructor. L5, HU

* **AFST 435b / THST 335b, West African Dance: Traditional to Contemporary** Lacina Coulibaly

A practical and theoretical study of the traditional dances of Africa, focusing on those of Burkina Faso and their contemporary manifestations. Emphasis on rhythm, kinesthetic form, and gestural expression. The fusion of modern European dance and traditional African dance. Admission by audition during the first class meeting. HU RP

* **AFST 449a / AFAM 449a / ENGL 449a, Challenges to Realism in Contemporary African Fiction** Stephanie Newell

Introduction to experimental African novels that challenge realist and documentary modes of representation. Topics include mythology, gender subversion, politics, the city, migration, and the self. Ways of reading African and postcolonial literature through the lenses of identity, history, and nation. WR, HU

* **AFST 487a / HIST 387Ja, West African Islam: Jihad Tradition and Its Pacifist Opponents** Staff

The influence of Islam on state and society, and the encounters of Muslim Africans first with non-Muslim societies in Africa and then with the modern West in the colonial and postcolonial periods. Focus on Muslim religious attitudes and responses to the secular national state and to the Western tradition of the separation of church and state. WR, HU

* **AFST 491a or b, The Senior Essay** Daniel Magaziner

Independent research on the senior essay. By the end of the sixth week of classes, a rough draft of the entire essay should be completed. By the end of the last week of classes (fall term) or three weeks before the end of classes (spring term), two copies of the final essay must be submitted.

Kiswahili Courses

SWAH 110a, Beginning Kiswahili I Kiarie Wa'Njogu

A beginning course with intensive training and practice in speaking, listening, reading, and writing. Initial emphasis is on the spoken language and conversation. Credit only on completion of SWAH 120. L1 1½ Course cr

SWAH 130a, Intermediate Kiswahili I Veronica Waweru

Further development of students' 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. After SWAH 120. L3 1½ Course cr

SWAH 150a, Advanced Kiswahili I Kiarie Wa'Njogu

Development of fluency through readings and discussions on contemporary issues in Kiswahili. Introduction to literary criticism in Kiswahili. Materials include Kiswahili oral literature, prose, poetry, and plays, as well as texts drawn from popular and political culture. After SWAH 140. L5

SWAH 170a, Topics in Kiswahili Literature Kiarie Wa'Njogu

Advanced readings and discussion with emphasis on literary and historical texts. Reading assignments include materials on Kiswahili poetry, Kiswahili dialects, and the history of the language. After SWAH 160. L5, HU

Yoruba Courses

YORU 110a, Beginning Yorùbá I Oluseye Adesola

Training and practice in speaking, listening, reading, and writing. Initial emphasis is on the spoken aspect, with special attention to unfamiliar consonantal sounds, nasal vowels, and tone, using isolated phrases, set conversational pieces, and simple dialogues. Multimedia materials provide audio practice and cultural information. Credit only on completion of YORU 120. L1 1½ Course cr

YORU 130a, Intermediate Yorùbá I Oluseye Adesola

Refinement of students' 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. After YORU 120. L3 1½ Course cr

YORU 150a, Advanced Yorùbá I Oluseye Adesola

An advanced course intended to improve students' aural and reading comprehension as well as speaking and writing skills. Emphasis 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 movies and recorded poems (*ewi*); and music. After YORU 140. L5

Zulu Courses

ZULU 110a, Beginning isiZulu I Sandra Sanneh

A beginning course in conversational isiZulu, using Web-based materials filmed in South Africa. Emphasis on the sounds of the language, including clicks and tonal variation, and on the words and structures needed for initial social interaction. Brief dialogues concern everyday activities; aspects of contemporary Zulu culture are

introduced through readings and documentaries in English. Credit only on completion of ZULU 120. L1 1½ Course cr

ZULU 130a, Intermediate isiZulu I Sandra Sanneh

Development of fluency in speaking, listening, reading, and writing, 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. After ZULU 120.

L3 1½ Course cr

*** ZULU 150a, Advanced isiZulu I** Sandra Sanneh

Development of fluency in using idioms, speaking about abstract concepts, and voicing preferences and opinions. Excerpts from oral genres, short stories, and television dramas. Introduction to other South African languages and to issues of standardization, dialect, and language attitude. After ZULU 140. Course includes students from Cornell University via videoconference. L5

American Studies

Director of undergraduate studies: Albert Laguna, HGS 233, 432-1188, albert.laguna@yale.edu; americanstudies.yale.edu

The American Studies program encourages the interdisciplinary study of the cultures and politics of the United States, the changing representations of national identity, and the construction of borderland and diasporic cultures over time. Each student in the major combines courses in American Studies with courses from other relevant disciplines (literature, history, the arts, and the social sciences) to explore these broad topics from local, national, and global perspectives. Through the selection of an area of concentration, each student develops a focus for course work in the major. The program encourages scholarly work in nontraditional combinations of disciplines; at the same time, however, it assumes and requires a substantial foundation of knowledge in the history and culture of the United States. Students interested in the major are encouraged to consult with the director of undergraduate studies as early as possible.

REQUIREMENTS OF THE MAJOR

All students majoring in American Studies must take fourteen term courses approved by the program's faculty. Although a good deal of freedom in course selection is permitted, it is expected that all students will acquaint themselves with the materials, skills, and perspectives of cultural studies. Accordingly, the major requires completion – preferably by the end of the sophomore year, but no later than the end of the junior year – of at least four gateway courses (AMST 111–299), including two in cultural history/cultural studies, one broad survey course in American literature, and one course preparatory for work in the student's area of concentration, to be selected in consultation with the DUS. One of these four courses must be one of the designated "Early Americas" courses as listed on the American Studies Website. An additional five concentration courses from diverse disciplines must be taken for a letter grade, one of which must incorporate a comparable topic from a non-U.S. perspective. Two electives chosen from the American Studies course offerings are also required.

Students must take two junior seminars (AMST 300–399) during their junior year. At least one of the seminars must fall within the student's area of concentration, described below. In each of the seminars, students are expected to demonstrate proficiency in interdisciplinary research and analysis through the production of critical essays on primary source materials or a paper of fifteen to twenty pages. Sophomores contemplating a junior term abroad are urged to take one of the junior seminars in the spring term of their sophomore year.

Areas of concentration Each American Studies major selects an area of concentration, normally in the fall of the junior year, from six possible choices: (1) national formations, (2) the international United States, (3) material cultures and built environments, (4) politics and American communities, (5) visual, audio, literary, and performance cultures, and (6) public humanities. The concentration in national formations explores historic migrations, settlements, and encounters among peoples who have formed the American nation, with an emphasis on Native American history and the construction of America's frontiers and borderlands. The international United States concentration focuses on historic and contemporary diasporas, the role of the United States outside its national borders, and the flows of American peoples,

ideas, and goods throughout the globe. Students in the material cultures and built environments concentration examine the formation of the American landscape from the natural to the human-made, including the development of American architecture, and the visual and decorative arts. The concentration in politics and American communities investigates the emergence of social groups and their political struggles at the local and national levels, emphasizing the themes of power, inequality, and social justice. Majors with a concentration in visual, audio, literary, and performance cultures study American consumer culture, popular culture, representations, and media in relation to U.S. literatures. Students in the public humanities concentration explore various forms of public intellectual engagement, including museum studies, documentary work, public history, digital humanities, and archival based work in the visual or performing arts; senior projects in this area may consist of works or productions beyond the traditional scholarly essay. Students may also petition the director of undergraduate studies to develop an independent concentration.

Roadmap See visual roadmap of the requirements.

SENIOR REQUIREMENT

During the senior year, each student in the major completes work in the area of concentration in one of three ways. First, the student may enroll in a senior seminar within the area of concentration (AMST 400–490). Students should apply interdisciplinary methods and undertake original research to produce a final paper of twenty to twenty-five pages. Students must complete all course requirements to fulfill the senior requirement. Students electing this option should submit the senior seminar registration form, signed by the seminar instructor, to the director of undergraduate studies.

Second, the student may complete a one-term senior project or essay (AMST 491). The product should be a thirty-page essay or its equivalent in another medium. To apply for admission to AMST 491, a student should submit a prospectus, signed by the faculty adviser, to the DUS.

Third, the student may enroll in the intensive major (AMST 493 and 494) and work independently for two terms. The intensive major offers an opportunity for significant original research leading to a substantial senior project. AMST 493, 494 carries two terms of credit; its final product should be a sixty-page essay or its equivalent in another medium. All students in the intensive major participate in a yearlong proseminar on theory and method. One term of the two-term project may count as a course in the area of concentration. To apply for admission to AMST 493 and 494, a student should submit a prospectus, signed by the faculty adviser, to the DUS.

As a multidisciplinary program, American Studies draws on the resources of other departments and programs in the University. The list of American Studies courses is meant to be suggestive only: apart from those courses required for the major, it is neither restrictive nor exhaustive. Students are encouraged to examine the offerings of other departments in both the humanities and the social sciences, as well as residential college seminars, for additional relevant courses. The stated area of concentration of each student determines the relevance and acceptability of other courses.

ADVISING

Combined B.A./M.A. degree program Exceptionally able and well-prepared students may complete a course of study leading to the simultaneous award of the B.A. and M.A. degrees after eight terms of enrollment. See "Simultaneous Award of the Bachelor's and Master's Degrees" under Special Arrangements, section K (p. 64), in the Academic Regulations (p. 33). Interested students should consult the director of undergraduate studies prior to the sixth term of enrollment for specific requirements in American Studies.

REQUIREMENTS OF THE MAJOR

Prerequisites None

Number of courses 14 term courses (incl senior req)

Distribution of courses 4 gateway courses, as specified; 2 junior sems, 1 in area of concentration; 5 courses in area of concentration for letter grades, 1 on a related non-U.S. topic, (1 may be one term of two-term senior project); 2 electives

Substitution permitted 1 freshman sem for 1 gateway course; others with DUS permission

Senior requirement Senior sem (AMST 400–490) or one-term senior project (AMST 491) related to area of concentration

Intensive major Same, except a two-term senior project (AMST 493 and 494) replaces AMST 491

FACULTY ASSOCIATED WITH THE PROGRAM OF AMERICAN STUDIES

Professors Jean-Christophe Agnew (*History*), Ned Blackhawk (*History*), David Blight (*History, African American Studies*), Daphne Brooks (*African American Studies, Theater Studies*), Hazel Carby (*African American Studies*), Edward Cooke, Jr. (*History of Art*), Michael Denning (*English, Ethnicity, Race, & Migration*), Wai Chee Dimock (*English*), Kathryn Dudley (*Chair*) (*Anthropology*), Joanne Freeman (*History*), Beverly Gage (*History*), Jacqueline Goldsby (*English, African American Studies*), Inderpal Grewal (*Women's, Gender, & Sexuality Studies*), Matthew Jacobson (*African American Studies, History*), Kathryn Lofton (*Religious Studies*), Mary Lui (*History*), Joanne Meyerowitz (*History*), Charles Musser (*Film & Media Studies*), Tavia Nyong'o (*Theater Studies*), Gary Okihiro (*Theater Studies*), Stephen Pitti (*History, Ethnicity, Race, & Migration*), Sally Promey (*Divinity School*), Ana Ramos-Zayas (*Ethnicity, Race, & Migration, Women's, Gender & Sexuality Studies*), Joseph Roach (*English, Theater Studies*), Marc Robinson (*Theater Studies, English*), Alicia Schmidt Camacho (*Ethnicity, Race, & Migration*), Caleb Smith (*English*), Harry Stout (*Religious Studies, History*), Michael Veal (*Music, African American Studies*), John Warner (*History of Medicine*), Michael Warner (*English*), Laura Wexler (*Women's, Gender, & Sexuality Studies*)

Associate Professors Crystal Feimster (*African American Studies*), Zareena Grewal (*Ethnicity, Race, & Migration*), Daniel HoSang (*Ethnicity, Race, & Migration*), Paul Sabin (*History, Environmental Studies*), Tisa Wenger (*Divinity School*),

Assistant Professors Laura Barraclough (*Ethnicity, Race, & Migration*), Greta LaFleur, Albert Laguna (*Ethnicity, Race, & Migration*)

Senior Lecturer James Berger (*English*)

Lecturers Ryan Brasseaux, Irene Garza (*Ethnicity, Race, and Migration*), Christine Muller, Karin Roffman (*Humanities, English*), Joel Silverman, Quan Tran (*Ethnicity, Race, and Migration*)

First-Year Seminars

* **AMST 025b / WGSS 025b, The American Essay Tradition** Greta LaFleur

Exploration of the American essay tradition, from some of its earliest moments to more recent iterations. Consideration of the essay as a rhetorical form, a political tool, and a literary tradition. Authors include Thomas Paine, Claudia Rankine, Benjamin Franklin, Virginia Woolf, James Baldwin, Cherrie Moraga, Sherman Alexie, and Hilton Als. Students will write political essays, as well as develop competencies in literary analysis. Enrollment limited to first-year students. Preregistration required; see under First-Year Seminar Program. HU

Gateway Courses

AMST 133a / ER&M 187a / HIST 107a, Introduction to American Indian History

Ned Blackhawk

Survey of American Indian history, beginning with creation traditions and migration theories and continuing to the present day. Focus on American Indian nations whose homelands are located within the contemporary United States. Complexity and change within American Indian societies, with emphasis on creative adaptations to changing historical circumstances. HU

AMST 160a / AFAM 160a / AFST 184a / HIST 184a, The Rise and Fall of Atlantic Slavery Staff

The history of peoples of African descent throughout the Americas, from the first African American societies of the sixteenth century through the century-long process of emancipation. HU

AMST 162b / AFAM 162b / HIST 187b, African American History from Emancipation to the Present Staff

An examination of the African American experience since 1861. Meanings of freedom and citizenship are distilled through appraisal of race and class formations, the processes and effects of cultural consumption, and the grand narrative of the civil rights movement. WR, HU

AMST 188a / HIST 115a, The Colonial Period of American History Staff

Significant themes in American life, 1607-1750: politics and imperial governance, social structure, religion, ecology, race relations, gender, popular culture, the rhythms of everyday life. HU

AMST 197b / ARCH 280b / HSAR 219b, American Architecture and Urbanism Elihu Rubin

Introduction to the study of buildings, architects, architectural styles, and urban landscapes, viewed in their economic, political, social, and cultural contexts, from precolonial times to the present. Topics include: public and private investment in the built environment; the history of housing in America; the organization of architectural practice; race, gender, ethnicity and the right to the city; the social and political nature of city building; and the transnational nature of American architecture. HU

AMST 199b / HIST 165b, The American Century Beverly Gage

United States politics, political thought, and social movements in the 20th century. Pivotal elections and political figures (Wilson, Roosevelt, Nixon, Reagan) as well as politics from below (civil rights, labor, women's activism). Emphasis on political ideas such as liberalism, conservatism, and radicalism, and on the intersection between domestic and foreign affairs. Primary research in Yale archival collections. Students who have already completed HIST 136J must have the instructor's permission to enroll in this course, and will perform alternate readings during some weeks. WR, HU

*** AMST 206b / ER&M 221b / WGSS 222b, Introduction to Critical Refugee Studies**

Quan Tran

Reconfiguring refugees as fluid subjects and sites of social, political, and cultural critiques. Departing from dominant understandings of refugees as victims, consideration instead of refugees as complex historical actors, made visible through processes of colonization, imperialism, war, displacement, state violence, and globalization, as well as ethical, social, legal, and political transformations. Focus on second-half of the twentieth century. SO

AMST 234b / ER&M 243b / HIST 188b / RLST 342b, Spiritual But Not Religious

Zareena Grewal

Study of the historical and contemporary "unchurching" trends in American religious life in a comparative perspective and across different scales of analysis in order to think about the relationship between spirituality, formal religion, secular psychology and the self-help industry. HU, SO

AMST 236b / EVST 318b / HIST 199b / HSHM 207b, American Energy History Paul

Sabin

The history of energy in the United States from early hydropower and coal to present-day hydraulic fracturing, deepwater oil, wind, and solar. Topics include energy transitions and technological change; energy and democracy; environmental justice and public health; corporate power and monopoly control; electricity and popular culture; labor struggles; the global quest for oil; changing national energy policies; the climate crisis. HU

AMST 238a / AFST 238a / ER&M 238a, Introduction to Third World Studies Gary

Okhiro

Introduction to the historical and contemporary theories and articulations of Third World studies (comparative ethnic studies) as an academic field and practice. Consideration of subject matters; methodologies and theories; literatures; and practitioners and institutional arrangements. SO

AMST 247a / FILM 244a / HIST 147a / HLTH 170a / HSHM 202a, Media and Medicine in Modern America John Warner and Gretchen Berland

Relationships between medicine, health, and the media in the United States from 1870 to the present. The changing role of the media in shaping conceptions of the body, creating new diseases, influencing health and health policy, crafting the image of the medical profession, informing expectations of medicine and constructions of citizenship, and the medicalization of American life. HU

AMST 272a / ER&M 282a / HIST 183a / WGSS 272a, Asian American History, 1800 to the Present Mary Lui

An introduction to the history of East, South, and Southeast Asian migrations and settlement to the United States from the late eighteenth century to the present.

Major themes include labor migration, community formation, U.S. imperialism, legal exclusion, racial segregation, gender and sexuality, cultural representations, and political resistance. HU

* **AMST 281a / ENGL 278a, Antebellum American Literature** Michael Warner

Introduction to writing from the period leading up to and through the Civil War. The growth of African American writing in an antislavery context; the national book market and its association with national culture; emergence of a language of environment; romantic ecology and American pastoral; the "ecological Indian"; evangelicalism and the secular; sentimentalism and gender; the emergence of sexuality; poetics. WR, HU

AMST 299b / HIST 166b, The History of Right Now Matthew Jacobson

Historiographic narrative of United States history over the past century and critical/methodological practices of thinking historically and of identifying ways in which our present has been conditioned by historical legacies, both momentous and subtle. Topics include the New Deal, WWII, the arms race, Reaganomics, and 9/11 in terms of their lasting influence on American conditions in the present. HU RP

Junior Seminars

* **AMST 304b / EVST 352b, Food and Documentary** Ian Cheney

Survey of contemporary public debates and current scientific thinking about how America farms and eats explored through the medium of documentary film. Includes a brief history of early food and agrarian documentaries, with a focus on twenty-first century films that consider sustainable food. HU

* **AMST 310b / AFAM 410b / WGSS 410b, Interdisciplinary Approaches to African American Studies** Anthony Reed

An interdisciplinary, thematic approach to the study of race, nation, and ethnicity in the African diaspora. Topics include class, gender, color, and sexuality; the dynamics of reform, Pan-Africanism, neocolonialism, and contemporary black nationalism. Use of a broad range of methodologies. WR, HU, SO

* **AMST 314b / WGSS 306b, Gender and Transgender** Greta LaFleur

Introduction to transgender studies, an emergent field that draws on gender studies, queer theory, sociology, feminist science studies, literary studies, and history. Representations of gender nonconformity in a cultural context dominated by a two-sex model of human gender differentiation. Sources include novels, autobiographies, films, and philosophy and criticism. RP

* **AMST 324b / PLSC 262b, Race, Politics, and the Law** Daniel HoSang

Examination of how race—as a mode of domination and resistance—has developed and transformed in the United States since the early-twentieth-century. How political actors and social movements engage the law to shape visions of freedom, democracy, and political life. Consideration of critical race theory, political discourse analysis, intersectionality and women of color feminism, and American political development.

SO

* **AMST 332a, *Humbugs and Visionaries: American Artists and Writers Before the Civil War*** Bryan Wolf

This course examines American literature and visual culture of the seventeenth, eighteenth, and nineteenth centuries. We look in particular at outliers, prophets, and self-promoters, from the radical Puritan writer Anne Bradstreet to popular entertainers like P. T. Barnum. Topics include: visibility and the public sphere; landscape and politics; genre painting and hegemony; race and identity; managerial culture and disembodied vision. Class trips to the Yale University Art Gallery and the Metropolitan Museum (New York). HU

* **AMST 345a / ER&M 409a / WGSS 408a, *Latinx Ethnography*** Ana Ramos-Zayas
 Consideration of ethnography within the genealogy and intellectual traditions of Latinx Studies. Topics include: questions of knowledge production and epistemological traditions in Latin America and U.S. Latino communities; conceptions of migration, transnationalism, and space; perspectives on "(il)legality" and criminalization; labor, wealth, and class identities; contextual understandings of gender and sexuality; theorizations of affect and intimate lives; and the politics of race and inequality under white liberalism and conservatism in the United States. SO

* **AMST 346a / ENGL 235a / HUMS 252a, *Poetry and Objects*** Karin Roffman
 This course on 20th and 21st century poetry studies the non-symbolic use of familiar objects in poems. We meet alternating weeks in the Beinecke library archives and the Yale Art Gallery objects study classroom to discover literary, material, and biographical histories of poems and objects. Additionally, there are scheduled readings and discussions with contemporary poets. Assignments include both analytical essays and the creation of online exhibitions. WR, HU

* **AMST 349a / THST 427a, *Technologies of Movement Research*** Emily Coates
 Marshaling both artistic and academic methods, and with dance as the focal point, this course examines technologies that traverse disciplinary boundaries. Topics include: somatic practices that emphasize internal sense perception; choreographic notation; dance dramaturgy; digital motion capture; the intersection of cognitive science and dance; and ethnographies that draw strategies from the arts to probe social problems. Open to all students.

* **AMST 368b / ER&M 224b, *Marxism and Social Movements in the Nineteenth Century*** Michael Denning

The history and theory of the socialist and Marxist traditions from their beginnings in the early nineteenth century to the world upheavals of 1917–19. Relations to labor, feminist, abolitionist, and anticolonial movements. RP

* **AMST 370b / THST 380b, *The History of Dance*** Brian Seibert

An examination of major movements in the history of concert and social dance from the late nineteenth century to the present, including ballet, tap, jazz, modern, musical theater, and different cultural forms. Topics include tradition versus innovation, the influence of the African diaspora, and interculturalism. Exercises are used to illuminate analysis of the body in motion. WR, HU

* **AMST 371b / ER&M 297b, *Food, Race, and Migration in United States Society***
 Quan Tran

Exploration of the relationship between food, race, and migration in historical and contemporary United States contexts. Organized thematically and anchored in selected

case studies, this course is comparative in scope and draws from contemporary work in the fields of food studies, ethnic studies, migration studies, American studies, anthropology, and history. SO

* **AMST 398b / ER&M 308b / HIST 158Jb, American Indian Law and Policy** Ned Blackhawk

Survey of the origins, history, and legacies of federal Indian law and policy during two hundred years of United States history. The evolution of U.S. constitutional law and political achievements of American Indian communities over the past four decades.

WR, HU

Senior Seminars

* **AMST 403a, Introduction to Public Humanities** Ryan Brasseaux

Introduction to the various media, topics, debates, and issues framing public humanities. The relationship between knowledge produced in the university and the circulation of ideas among a broader public, including modes of inquiry, interpretation, and presentation. Public history, museum studies, oral and community history, public art, documentary film and photography, public writing and educational outreach, and the socially conscious performing arts. HU

* **AMST 405b / AFAM 406b / ENGL 405b, Autobiography in America** Robert Stepto

A study of autobiographical writings from Mary Rowlandson's Indian captivity narrative (1682) to the present. Classic forms such as immigrant, education, and cause narratives; prevailing autobiographical strategies involving place, work, and photographs. Authors include Franklin, Douglass, Jacobs, Antin, Kingston, Uchida, Balakian, Rodriguez, and Bechdel. WR, HU

* **AMST 408a / AFAM 272a / ER&M 408a, Race and Comedy** Albert Laguna

Introduction to theories of the ludic and to critical race theory. Ways in which comic modes have been utilized by racialized subjects to represent and issue critiques of the dominant culture. Analysis of stand-up comedy, film, television, and novels. HU

* **AMST 422a / ER&M 435a / HIST 151Ja, Writing Tribal Histories** Staff

Historical overview of American Indian tribal communities, particularly since the creation of the United States. Challenges of working with oral histories, government documents, and missionary records. WR, HU

* **AMST 425b / ENGL 430b / EVST 430b, American Culture and the Rise of the Environment** Michael Warner

U.S. literature from the late eighteenth century to the Civil War explored in the context of climate change. Development of the modern concept of the environment; the formation and legacy of key ideas in environmentalism; effects of industrialization and national expansion; utopian and dystopian visions of the future. WR, HU

* **AMST 439a / ER&M 439a, Fruits of Empire** Gary Okihiro

Readings, discussions, and research on imperialism and "green gold" and their consequences for the imperial powers and their colonies and neo-colonies. Spatially conceived as a world-system that enmeshes the planet and as earth's latitudes that divide the temperate from the tropical zones, imperialism as discourse and material relations is this seminar's focus together with its implantations—an empire of plants. Vast plantations of sugar, cotton, tea, coffee, bananas, and pineapples occupy land cultivated by native and migrant workers, and their fruits move from the tropical to

the temperate zones, impoverishing the periphery while profiting the core. Fruits of Empire, thus, implicates power and the social formation of race, gender, sexuality, class, and nation. HU, SO

* **AMST 448b / AFAM 413b / THST 420b / WGSS 415b, Race, Sex, and Gender in Downtown New York City 1945–1984** Tavia Nyong'o

Archivally-driven exploration of the post-war downtown scene in New York City. Particular attention to the intersections of jazz, nightlife, avant-garde performance, literature, and visual art, within the context of social movements for black and brown power and women's and gay liberation. HU

* **AMST 451a / HIST 174Ja / RLST 260a, Religion, War, and the Meaning of America** Harry Stout

The relationship between religion and war in American history from colonial beginnings through Vietnam. The religious meanings of Americans at war; the mutually reinforcing influences of nationalism and religion; war as the norm of American national life; the concept of civil religion; biblical and messianic contexts of key U.S. conflicts. HU

* **AMST 454b / ER&M 388b / FILM 454b, Narrating the Lives of Refugees** Zareena Grewal

Analysis of contemporary representations of refugee experiences with special attention to the processes by which war, colonialism, displacement, encampment, and racialization shape the lives of refugees in New Haven and beyond. Topics include the representation of refugees as a source of political crisis; one dimensional representations of refugees as victims in need of rescue, national subjects unfit for citizenship, and as a political and social threat; and how current refugee problems create definitional difficulties for states and international agencies. HU, SO

* **AMST 463a and AMST 464b / EVST 463a and EVST 464b / FILM 455a and FILM 456b, Documentary Film Workshop** Charles Musser

A yearlong workshop designed primarily for majors in Film and Media Studies or American Studies who are making documentaries as senior projects. Seniors in other majors admitted as space permits. RP

* **AMST 469a / EP&E 396a / PLSC 251a, Progressivism: Theory and Practice** Stephen Skowronek

The progressive reform tradition in American politics. The tradition's conceptual underpinnings, social supports, practical manifestations in policy and in new governmental arrangements, and conservative critics. Emphasis on the origins of progressivism in the early decades of the twentieth century, with attention to latter-day manifestations and to changes in the progressive impulse over time. SO

* **AMST 472b, Individual Reading and Research for Juniors and Seniors** Albert Laguna

Special projects intended to enable the student to cover material not otherwise offered by the program. The course may be used for research or for directed reading, but in either case a term paper or its equivalent is required as evidence of work done. It is expected that the student will meet regularly with the faculty adviser. To apply for admission, a student should submit a prospectus signed by the faculty adviser to the director of undergraduate studies.

* **AMST 475b / ENGL 438b, Performing American Literature** Wai Chee Dimock
A broad selection of short stories, poems, and novels, accompanied by class performances, and 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; book illustration; game design; and creative use of social media. Readings include poetry by Walt Whitman and Emily Dickinson; plays by Suzan-lori Parks; and fiction by F. Scott Fitzgerald, Ray Bradbury, Walter Mosley, Jhumpa Lahiri, and Junot Diaz. WR, HU

* **AMST 484b / HSAR 493b / WGSS 462b, Visual Kinship, Families, and Photography** Laura Wexler
Exploration of the history and practice of family photography from an interdisciplinary perspective. Study of family photographs from the analog to the digital era, from snapshots to portraits, and from instrumental images to art exhibitions. Particular attention to the ways in which family photographs have helped establish gendered and racial hierarchies and examination of recent ways of reconceiving these images. HU

* **AMST 485a / MUSI 477a, The Question of Music: Music, Critique and Humanistic Theory** Michael Denning and Gary Tomlinson
The European project of the "human sciences" – broadly speaking, of an anthropology or critique of human sociality – took off in the eighteenth century and, from there, saw a continuous unfolding through the next two hundred years. From the first, this project was attached to a musical thinking that is evident in such foundational voices as Vico and Rousseau. But the role of music was not a static one. Instead we can trace the shift from an eighteenth-century view of music as a universal human activity to a nineteenth-century privileging of the European musical achievement (Hanslick, Wagner, Nietzsche), and then, in the twentieth century, to a struggle between Eurocentrism and the reassertion of the postcolonial, global view, in figures from Adorno and Suzanne Langer to Edward Said and Paul Gilroy. Throughout this history, the shifting roles of music posed a challenge to disciplines and modes of thought reliant first and foremost on language. This course will examine the dilemmas of music's position in the human sciences, at once foundational and marginal, and aim to point the way forward to a truly musical human science of the twenty-first century.
HU RP

Special Projects and Senior Project

* **AMST 471a and AMST 472b, Individual Reading and Research for Juniors and Seniors** Staff
Special projects intended to enable the student to cover material not otherwise offered by the program. The course may be used for research or for directed reading, but in either case a term paper or its equivalent is required as evidence of work done. It is expected that the student will meet regularly with the faculty adviser. To apply for admission, a student should submit a prospectus signed by the faculty adviser to the director of undergraduate studies.

* **AMST 491a or b, Senior Project** Staff
Independent research and proseminar on a one-term senior project. For requirements see under "Senior requirement" in the American Studies program description.

*** AMST 493a and AMST 494b, Senior Project for the Intensive Major** Staff

Independent research and proseminar on a two-term senior project. For requirements see under "Senior requirement" in the American Studies program description.

*** AMST 494b, Senior Project for the Intensive Major** Staff

Independent research and proseminar on a two-term senior project. For requirements see under "Senior requirement" in the American Studies program description.

Anthropology

Director of undergraduate studies: William Honeychurch, Rm. 305, 51 Hillhouse Avenue, 432-3676, william.honeychurch@yale.edu; anthropology.yale.edu

The major in Anthropology gives a firm grounding in this comparative discipline concerned with human cultural, social, and biological diversity. Anthropology deals not only with that small proportion of humankind in Europe and North America but with societies of the entire world, from the remotest past to the present day. It is thus an essential part of a sound liberal education, helping us to see our world from a perspective that challenges ethnocentric assumptions. The major in Anthropology covers the evolution of human and nonhuman primates and the evolutionary biology of living people; world prehistory and the emergence of civilization; diversity and commonality in social organization and culture; the importance of culture for understanding such topics as sickness and health, gender and sexuality, environment and development, media and visual culture, urban life and sport, economic organization and politics, law and society, migration, and religion; and language use as cultural behavior.

The subfields of anthropological inquiry—archaeology, biological anthropology, sociocultural anthropology, and linguistic anthropology—together offer a holistic perspective on humankind and its development.

REQUIREMENTS OF THE MAJOR

Students are required to present twelve course credits toward their major. At least eight term courses must be taught in the Yale Department of Anthropology. These eight must include an introductory or intermediate course (numbered ANTH 001–299) in each of at least three subfields of anthropology, three advanced courses (numbered ANTH 300–470 or 473–490, not including a senior essay seminar), and two electives. Additionally, all students must prepare a senior essay in ANTH 491 or another Anthropology seminar. Majors may take up to three cognate courses in departments other than Anthropology.

Three term courses related to anthropology may be selected from other departments, with approval by the director of undergraduate studies. Majors are not required to present such cognate courses, but those who do should choose courses that expand their knowledge in one of the subfields of anthropology or in an area of cross-disciplinary concentration. For example, cognate courses for biological anthropology can be found in Ecology and Evolutionary Biology (p. 261), Geology and Geophysics (p. 397), Psychology (p. 645), and Forestry & Environmental Studies (p. 384); cognates for sociocultural anthropology can be found in Sociology (p. 681), American Studies (p. 109), History (p. 434), Environmental Studies (p. 336), Religious Studies (p. 659), Global Affairs (p. 417), and international and area studies. Appropriate areas of cross-disciplinary concentrations include such topics as area studies (e.g., Africa); anthropological approaches to law, environment, business, the built environment, and health; gender and sexuality studies; evolutionary biology; and geology.

Areas of concentration The major does not have formal tracks, but majors may choose to concentrate in one of the subfields of anthropology. They may also draw on courses

in sociocultural and biological anthropology to pursue a concentration in medical anthropology. Those who concentrate in sociocultural anthropology are strongly encouraged to take a course in ethnographic methods and one in anthropological theory (e.g., ANTH 303 or 311). Those who concentrate in biological anthropology are strongly encouraged to take courses that give them hands-on experience working with material used in the study of human and nonhuman primate anatomy and evolution and that introduce them to laboratory methods.

Credit/D/Fail A maximum of one course taken Credit/D/Fail may be applied toward the Anthropology major.

SENIOR REQUIREMENT

All majors are required to complete a substantial paper during the senior year, either in a seminar or in ANTH 491. There are three options for completing the senior essay. First, students can write a paper for an advanced seminar. A seminar senior essay must be more substantial than a typical term paper and is expected to be 20–25 pages long. It is evaluated by the seminar instructor and a second reader drawn from the Yale faculty. Students must obtain written approval for this option from the seminar instructor no later than the third week of the term. Students fulfilling the requirements of two majors may not apply a single seminar essay toward the senior requirement for both majors. The deadline for a seminar senior essay is the senior essay deadline, not the term paper deadline. Students choosing this option must take the seminar for which they write their essay in addition to the three advanced courses required for the major.

The second option for the senior essay is an independent essay on a subject of the student's choice, completed in ANTH 491. A student pursuing this option must choose a topic and identify a faculty adviser by the end of the third week of the term in which the essay is to be written. By the same date, the adviser must approve a prospectus that outlines the topic, objectives, and methods of the essay, as well as a preliminary bibliography. The student should also inform the DUS of a preferred second reader by this time. The adviser must have a faculty appointment in Anthropology, and the second reader must have a faculty appointment at Yale.

The third option for the senior essay is a yearlong paper, begun in ANTH 471 or 472 and completed in ANTH 491. The yearlong essay is designed for students who wish to pursue more extensive independent projects than can be completed in a single term. Students must have their project approved by a faculty adviser who establishes the requirements for ANTH 471 or 472. Approval is required before the student registers for ANTH 471 or 472, typically in the fall term of the senior year.

ADVISING

With permission of the DUS, students may apply up to four courses taken outside Yale as electives or cognates toward the Anthropology major. Such courses must have been approved for Yale College credit and may include courses taken on a Year or Term Abroad (p. 64) or through summer study at another college or university.

Graduate courses Most graduate seminars in anthropology are open to qualified undergraduates. Descriptions are available in the departmental office, 10 Schem St. Permission of the instructor and of the director of graduate studies is required.

STUDY ABROAD

Study abroad courses that are approved for Yale College and Anthropology credit may be used to replace one elective. If more than one such study abroad course credit is to be used for the major, it will come at the expense of one or more of the three cognate courses which may be taken in any Yale department or program with the approval of the DUS in Anthropology.

REQUIREMENTS OF THE MAJOR

Prerequisites None

Number of courses 12 course credits (incl senior req)

Distribution of courses At least 1 intro survey or intermediate course in each of 3 subfields; 3 advanced courses (not incl senior essay sem); 2 electives; up to 3 cognate courses in other depts or programs with DUS approval

Substitution permitted 1 study abroad course for 1 ANTH elective

Senior requirement Senior essay in advanced sem or ANTH 491

FACULTY OF THE DEPARTMENT OF ANTHROPOLOGY

Professors †Claire Bowern, 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 (*Chair*), Claudia Valeggia, David Watts

Associate Professors Aimee Cox, Erik Harms, William Honeychurch, Douglas Rogers

Assistant Professors Oswaldo Chinchilla, Narges Erami (*Middle East Studies*), Louisa Lombard, Lisa Messeri

Senior Lecturer †Carol Carpenter

†A joint appointment with primary affiliation in another department or school.

Courses

ANTH 110a, An Introduction to Cultural Anthropology Louisa Lombard
Anthropological study of cosmology, tacit knowledge, and ways of knowing the world in specific social settings. Ways in which sociocultural specificity helps to explain human solutions to problems of cooperation and conflict, production and reproduction, expression, and belief. Introduction to anthropological ways of understanding cultural difference in approaches to sickness and healing, gender and sexuality, economics, religion, and communication. SO

ANTH 116a, Introduction to Biological Anthropology David Watts
Introduction to human and primate evolution, primate behavior, and human biology. Topics include a review of principles of evolutionary biology and basic molecular and population genetics; the behavior, ecology, and evolution of nonhuman primates; the fossil and archaeological record for human evolution; the origin of modern humans; biological variation in living humans; and the evolution of human behavior. SC, SO

ANTH 119b, Law as Culture Louisa Lombard

Introduction to anthropological understanding of what law is, how it holds its authority, and how it is shaped by cultural assumptions about justice, rights, and morality. Readings from classic and contemporary texts in legal and political anthropology. Cultural dimensions of law and its changing relationship to discipline, power, and governance. SO

ANTH 140a / SOCY 138a, The Corporation Douglas Rogers

Survey of the rise, diversity, and power of the capitalist corporation in global contexts, with a focus on the 20th and 21st centuries. Topics include: the corporation as legal entity and the social and cultural consequences of this status; corporations in the colonial era; relationships among corporations, states, and non-governmental organizations in Western and non-Western contexts; anti-corporate critique and response; corporate social responsibility; and race, gender, and indigeneity. HU, SO

ANTH 148Lb / NSCI 265b / PSYC 248b, Hormones and Behavior Claudia Valeggia and Eduardo Fernandez-Duque

Introductory laboratory focusing on the interaction between hormones and behavior from an evolutionary and developmental perspective. Students gain competency in basic laboratory techniques (pipetting, diluting, aliquoting, etc.) and develop a small, group research project. Additional study of the theoretical background on which any laboratory work is developed through reading and discussing primary scientific literature on both human and non-human primates. SC ½ Course cr

ANTH 171a / ARCG 171a, Great Civilizations of the Ancient World Staff

A survey of selected prehistoric and historical cultures through examination of archaeological sites and materials. Emphasis on the methodological and theoretical approaches by which archaeologists recover, analyze, and interpret the material remains of the past. SO

*** ANTH 230a / WGSS 230a, Evolutionary Biology of Women's Reproductive Lives**
Claudia Valeggia

Evolutionary and biosocial perspectives on female reproductive lives. Physiological, ecological, and social aspects of women's development from puberty through menopause and aging, with special attention to reproductive processes such as pregnancy, birth, and lactation. Variation in female life histories in a variety of cultural and ecological settings. Examples from both traditional and modern societies. SC

ANTH 232a / ARCG 232a / LAST 232a, Ancient Civilizations of the Andes Richard Burger

Survey of the archaeological cultures of Peru and Bolivia from the earliest settlement through the late Inca state. SO

ANTH 242b, Human Evolutionary Biology and Life History Claudia Valeggia

The range of human physiological adaptability across environments and ecologies. Effects of energetic constraints on growth, reproduction, and behavior within the context of evolution and life history theory, with special emphasis on traditional non-Western societies. SC, SO

ANTH 254a, Japan: Culture, Society, Modernity Sarah LeBaron von Baeyer
Introduction to Japanese society and culture. The historical development of Japanese society; family, work, and education in contemporary Japan; Japanese aesthetics; and psychological, sociological, and cultural interpretations of Japanese behavior. WR, SO

* **ANTH 255b / ARCG 255b / LAST 255b, Inca Culture and Society** Richard Burger
The history and organization of the Inca empire and its impact on the nations and cultures it conquered. The role of archaeology in understanding the transformation of Andean lifeways; the interplay between ethnohistoric and archaeological approaches to the subject. SO

ANTH 267b / ARCG 267b, Human Evolution David Watts
Examination of the fossil record of human evolution, including both paleontological and archaeological evidence for changes in hominid behavior during the Pleistocene. Prerequisite: Introductory course in biological anthropology or biology. SO

ANTH 300a / E&EB 300a / EVST 182a, Primate Behavior and Ecology Eduardo Fernandez-Duque
Socioecology of primates compared with that of other mammals, emphasizing both general principles and unique primate characteristics. Topics include life-history strategies, feeding ecology, mating systems, and ecological influences on social organization. SC, SO

* **ANTH 301b, Foundations of Modern Archaeology** Richard Burger
Discussion of how method, theory, and social policy have influenced the development of archaeology as a set of methods, an academic discipline, and a political tool. Background in the basics of archaeology equivalent to one introductory course is assumed. SO

* **ANTH 303a, Field Methods in Cultural Anthropology** Sarah LeBaron von Baeyer
The fundamentals of cultural anthropology methods. The foundations of fieldwork approaches, including methods, theories, and the problem of objectivity. WR, SO

ANTH 316La / ARCG 316La, Introduction to Archaeological Laboratory Sciences
Staff

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 322a / EVST 324a / SAST 306a, Environmental Justice in South Asia**
Kalyanakrishnan Sivaramakrishnan
Study of South Asia's nation building and economic development in the aftermath of war and decolonization in the 20th century. How it generated unprecedented stress on natural environments; increased social disparity; and exposure of the poor and minorities to environmental risks and loss of homes, livelihoods, and cultural resources. Discussion of the rise of environmental justice movements and policies in the region as the world comes to grips with living in the Anthropocene. SO

* **ANTH 335b / E&EB 342b, 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. Recommended preparation: ANTH 116 or BIOL 104. SC

* **ANTH 346b, Anthropological Approaches to Capitalism** Douglas Rogers

An introduction to the anthropological study of capitalism. Focus on how markets and commodities are embedded in social, cultural, and political contexts. Discussion of the many ways people have embraced, reinterpreted, and resisted capitalism worldwide. Consideration of the implications of this diversity for theories of capitalism as a whole. Enrollment limited to sophomores. SO

* **ANTH 362b, Unity and Diversity in Chinese Culture** Helen Siu

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

* **ANTH 375a or b / ARCG 375a or b / ARCG 379a or b, Anthropology of Mobile Societies** William Honeychurch

The social and cultural significance of the ways that hunter-gatherers, pastoral nomads, maritime traders, and members of our own society traverse space. The impact of mobility and transport technologies on subsistence, trade, interaction, and warfare from the first horse riders of five thousand years ago to jet-propulsion tourists of today. SO

ANTH 380a / LING 219a, The Evolution of Language and Culture Claire Bower

Introduction to cultural and linguistic evolution. How diversity evolves; how innovations proceed through a community; who within a community drives change; how changes can be “undone” to reconstruct the past. Methods originally developed for studying evolutionary biology are applied to language and culture. None WR, SO

ANTH 381b / WGSS 378b, Sex and Global Politics Graeme Reid

Global perspectives on the sexual politics of gender identity, sexual orientation, and human rights. Examination of historical, cultural, and political aspects of sexual orientation and gender identity in the context of globalization. SO

* **ANTH 385a / ARCG 385a, Archaeological Ceramics** Staff

Archaeological methods for analyzing and interpreting ceramics, arguably the most common type of object found in ancient sites. Focus on what different aspects of ceramic vessels reveal about the people who made them and used them. SO

* **ANTH 386a / GLBL 393a, Humanitarian Interventions: Ethics, Politics, and Health**
Catherine Panter-Brick

Analysis of humanitarian interventions from a variety of social science disciplinary perspectives. Issues related to policy, legal protection, health care, morality, and governance in relation to the moral imperative to save lives in conditions of extreme adversity. Promotion of dialogue between social scientists and humanitarian practitioners. WR, SO

* **ANTH 389b / MMES 376b / NELC 385b / PLSC 469b / SOCY 359b, Politics of Culture in Iran** Nahid Siamdoust

Examination of cultural production in post-revolutionary Iran (1979 to the present) through works of noteworthy cultural and sociopolitical content in cinema, music,

and newspaper journalism. Consideration of the policies the new Islamic Republic has put in place in order to regulate the field of cultural production, and the strategies that cultural producers have devised to navigate the given constraints.

HU

* **ANTH 397b / ARCG 397a or b, Archaeology of East Asia** Anne Underhill
Introduction to the findings and practice of archaeology in China, Japan, Korea, and southeast Asia. Methods used by archaeologists to interpret social organization, economic organization, and ritual life. Attention to major transformations such as the initial peopling of an area, establishment of farming villages, the development of cities, interregional interactions, and the nature of political authority. SO

ANTH 399b, The Anthropology of Outer Space Lisa Messeri
Examination of the extraterrestrial through consideration of ideas in anthropology and aligned disciplines. Students discuss, write, and think about outer space as anthropologists and find the value of exploring this topic scientifically, socially, and philosophically. SO

* **ANTH 406a / EVST 424a / PLSC 420a, Rivers: Nature and Politics** James Scott
The natural history of rivers and river systems and the politics surrounding the efforts of states to manage and engineer them. SO

* **ANTH 409a / ER&M 394a / EVST 422a / F&ES 422a, Climate and Society from Past to Present** Michael Dove
Discussion of the major traditions of thought – both historic and contemporary – regarding climate, climate change, and society; focusing on the politics of knowledge and belief vs disbelief; and drawing on the social sciences and anthropology in particular. SO

* **ANTH 414b / EAST 417b, Hubs, Mobilities, and World Cities** Helen Siu
Analysis of urban life in historical and contemporary societies. Topics include capitalist and postmodern transformations; class, gender, ethnicity, and migration; and global landscapes of power and citizenship. SO RP

* **ANTH 439a, Africa, Politics, Anthropology** Louisa Lombard
Historical-anthropological study of politics in Africa since the early nineteenth century. The creation and operation of African states; the negotiation of legitimacy, authority, and belonging by state agents and the people they govern; anthropological theories about the workings of African politics, including the involvement of both state and nonstate actors. SO

* **ANTH 454a / ARCG 454a, Statistics for Archaeological Analysis** William Honeychurch
An introduction to quantitative data collection, analysis, and argumentation for archaeologists. Emphasis on the exploration, visualization, and analysis of specifically archaeological data using simple statistical approaches. No prior knowledge of statistics required. QR

* **ANTH 455b / WGSS 459b, Masculinity and Men's Health** Staff
Ethnographic approaches to masculinity and men's health around the globe. Issues of ethnographic research design and methodology; interdisciplinary theories of masculinity; contributions of men's health studies from Western and non-Western sites to social theory, ethnographic scholarship, and health policy. SO RP

* **ANTH 462b, Ethnographic Perspectives on Global Health** Staff

Study of anthropological ethnographies on serious health problems facing populations in resource-poor societies. Poverty and structural violence; health as a human right; struggles with infectious disease; the health of women and children. Focus on health issues facing sub-Saharan Africa and Latin America. SO RP

ANTH 464b / ARCG 464b / E&EB 464b, 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. SC, SO

* **ANTH 471a or b and ANTH 472a or b, Readings in Anthropology** William Honeychurch

For students who wish to investigate an area of anthropology not covered by regular departmental offerings. The project must terminate with at least a term paper or its equivalent. No student may take more than two terms for credit. To apply for admission, a student should present a prospectus and bibliography to the director of undergraduate studies no later than the third week of the term. Written approval from the faculty member who will direct the student's reading and writing must accompany the prospectus.

* **ANTH 473b / ARCG 473b / EVST 473b / NELC 473b, Abrupt Climate Change and Societal Collapse** Harvey Weiss

The coincidence of societal collapses throughout history with decadal and century-scale drought events. Challenges to anthropological and historical paradigms of cultural adaptation and resilience. Examination of archaeological and historical records and high-resolution sets of paleoclimate proxies. HU, SO

* **ANTH 476a or b / ARCG 476a or b, GIS and Spatial Analysis for Archaeology** William Honeychurch

Introduction to the use of geographical information systems (GIS) in anthropology, with attention to archaeological applications. Examples from theoretical, analytical, and geographical contexts; introduction to current software. SO

* **ANTH 478a / ARCG 399a / EVST 399a / NELC 399a, 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. SO

* **ANTH 484b / WGSS 304b, Men, Manhood, and Masculinity** Andrew Dowe

Cultural and historic constructions of masculinity explored through an investigation of male bodies, sexualities, and social interactions. Multiple masculinities; the relationship between hegemonic, nonhegemonic, and subordinate masculinities. SO

* **ANTH 491a or b, The Senior Essay** William Honeychurch

Supervised investigation of some topic in depth. The course requirement is a long essay to be submitted as the student's senior essay. By the end of the third week of the term in which the essay is written, the student must present a prospectus and a preliminary bibliography to the director of undergraduate studies. Written approval

from an Anthropology faculty adviser and an indication of a preferred second reader must accompany the prospectus.

* **ANTH 492b / ARCG 492b / NELC 321b, *Imaging Ancient Worlds*** John Darnell, Roderick McIntosh, and Agnete Lassen

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 those sites. Use of new technologies in computer graphics, including 3D imaging, to support current research in archaeology and anthropology.

Applied Mathematics

Director of undergraduate studies: John Wettlaufer, Rm. 109 KGL, 432-0892, john.wettlaufer@ (john.wettlaufer@yale.edu)yale.edu (john.wettlaufer@yale.edu)

Mathematical models are widely used throughout science and engineering in fields as diverse as physics, bioinformatics, robotics, image processing, and economics. Despite the broad range of applications, there are a few essential techniques used in addressing most problems. The Applied Mathematics major provides a foundation in these mathematical techniques and trains the student to use them in a substantive field of application.

The interdisciplinary major permits a great deal of flexibility in design. It is intended to appeal to students who wish to study the more mathematical aspects of science or engineering, as well as those whose primary interest is in mathematics and statistics and who wish to become acquainted with applications. Core courses are drawn from Computer Science (p. 224), Mathematics (p. 521), Statistics and Data Science (p. 711), and Engineering and Applied Science (p. 310). Courses applying mathematics may be drawn from participating programs in Applied Physics (p. 134); Astronomy (p. 165); the biological sciences, including Ecology and Evolutionary Biology (p. 261), Molecular Biophysics and Biochemistry (p. 549), and Molecular, Cellular, and Developmental Biology (p. 558); Chemistry (p. 187); Economics (p. 272); the various programs in engineering, including Biomedical (p. 173), Chemical (p. 182), Electrical (p. 296), Environmental (p. 333), and Mechanical (p. 533) Engineering; Geology and Geophysics (p. 397); Physics (p. 613); and Political Science. (p. 626) The Applied Mathematics degree program requires a three-course concentration in a field in which mathematics is used.

Students may pursue a major in Applied Mathematics as one of two majors and can thereby equip themselves with mathematical modeling skills while being fully engaged in a field of application. In this case, the concentration requirement of the Applied Mathematics program is flexible in order to recognize the contribution of the other major. A two-course overlap is permitted in satisfying the requirements of the two majors.

PREREQUISITE AND INTRODUCTORY COURSES

Multivariable calculus and linear algebra are required and should be taken before or during the sophomore year. This requirement may be satisfied by MATH 120 or ENAS 151, and MATH 222 or 225 or equivalents. It may also be satisfied by MATH 230, 231. Computer programming skills are also required and may be acquired by taking ENAS 130, CPSC 100, or 112. Details of individual programs must be worked out in consultation with the director of undergraduate studies, whose signed permission is required.

REQUIREMENTS OF THE MAJOR

The B.A. degree program The program requires eleven term courses beyond the prerequisites, including the senior project, comprising a coherent program:

1. A course in differential equations (ENAS 194 or MATH 246)
2. A course in probability (S&DS 241 or S&DS 238)
3. A course in data analysis (S&DS 361 or S&DS 230)
4. A course in discrete mathematics (AMTH 244 or CPSC 202)
5. Courses in at least three of the following areas including, but not limited to: (a) optimization: AMTH 437; (b) probability and statistics: S&DS 242, S&DS 251, S&DS 312, S&DS 364, ECON 136, ENAS 496; (c) partial differential equations and analysis: MATH 247, 250, 260, 300, 301, 310; (d) algorithms and numerical methods: CPSC 365, 440, ENAS 440, 441; (e) graph theory: AMTH 462; (f) mathematical economics: ECON 350, 351; (g) electrical engineering: EENG 397, 436, 442, S&DS 364; (h) data mining and machine learning: S&DS 365, CPSC 445; (i) biological modeling and computation: CPSC 475, BENG 445, ENAS 391; (j) physical sciences: ASTR 320, 420, G&G 322, 323, 421, PHYS 344, 401, 402, 410, 420, 430, 440, 442, 460, APHY 439, 448; (k) engineering: MENG 280, 285, 361, 383, 463, 469, CENG 301, 315. Because departmental curricula from which the program draws regularly change, the DUS maintains a more exhaustive list of courses satisfying this particular requirement.
6. At least three advanced courses in a field of concentration involving the application of mathematics to that field. Programs in science, engineering, computer science, statistics, and economics are natural sources of concentration. Alternatively, when two majors are undertaken, if the second major is in a participating program, then, recognizing that there can be an overlap of two courses, the student may take for the remaining course an additional choice relevant to the Applied Mathematics major such as listed in point 5 above or for the B.S. degree below. Details of a student's program to satisfy the concentration requirement must be worked out in consultation with, and approved by, the director of undergraduate studies.

The B.S. degree program In addition to the courses indicated for the B.A. degree, the B.S. degree, which totals fourteen term courses beyond the prerequisites, must also include:

1. Topics in analysis (MATH 300) or introduction to analysis (MATH 301); the course selected may not be counted toward the area requirement for the major (see item 5 above)
2. An additional course selected from the list in item 5 above
3. Another course numbered 300 or higher from the list above, or a course numbered 300 or higher in mathematics, applied mathematics, statistics, or quantitative computer science or engineering, subject to the approval of the director of undergraduate studies

Alternatively, students may petition to receive a B.S. in Applied Mathematics by fulfilling the B.A. requirements in Applied Mathematics and the B.S. requirements in another program.

Credit/D/Fail A maximum of one course credit taken Credit/D/Fail may be counted toward the requirements of the major.

SENIOR REQUIREMENT

Both the B.A. and B.S. degree programs require Senior Seminar and Project (AMTH 490), or a special project completed during senior year (AMTH 491).

REQUIREMENTS OF THE MAJOR

Prerequisites MATH 120 or ENAS 151, and MATH 222 or 225, or equivalents; ENAS 130, CPSC 100 or 112

Number of courses *B.A.* – 11 term courses beyond prereqs (incl senior req); *B.S.* – 14 term courses beyond prereqs (incl senior req)

Specific courses required *B.A.* – ENAS 194 or MATH 246; S&DS 241 or S&DS 238; S&DS 361 or S&DS 230; AMTH 244 or CPSC 202; *B.S.* – same, plus MATH 300 or 301

Distribution of courses *B.A.* – at least 3 advanced courses in a field of concentration concerning the application of math to that field; 3 addtl courses as specified; *B.S.* – same, with 2 addtl courses as specified

Substitution permitted MATH 230, 231 for mathematics prerequisites

Senior requirement Senior sem (AMTH 490) or special project (AMTH 491)

FACULTY ASSOCIATED WITH THE PROGRAM OF APPLIED MATHEMATICS

Professors Andrew Barron (*Statistics*), Donald Brown (*Emeritus*) (*Economics, Mathematics*), Joseph Chang (*Statistics*), Ronald Coifman (*Mathematics*), Stanley Eisenstat (*Computer Science*), Michael Fischer (*Computer Science*), Igor Frenkel (*Mathematics*), Roger Howe (*Emeritus*) (*Mathematics*), Peter Jones (*Mathematics*), A. Stephen Morse (*Electrical Engineering*), David Pollard (*Statistics*), Nicholas Read (*Physics, Applied Physics*), Vladimir Rokhlin (*Computer Science, Mathematics*), Peter Schultheiss (*Emeritus*) (*Electrical Engineering*), Martin Schultz (*Emeritus*) (*Computer Science*), Mitchell Smooke (*Mechanical Engineering, Applied Physics*), Daniel Spielman (*Computer Science*), Mary-Louise Timmermans (*Geology & Geophysics*), Van Vu (*Mathematics*), Günter Wagner (*Ecology & Evolutionary Biology*), Xiao-Jing Wang (*Neurobiology*), John Wettlaufer (*Geology & Geophysics, Mathematics, Physics*), Huibin Zhou (*Statistics*), Steven Zucker (*Computer Science, Biomedical Engineering*)

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

J. W. Gibbs Assistant Professors Xiuyuan Cheng, Alexander Cloninger, Manas Rachh, Guy Wolf

Introductory Courses

AMTH 160b / MATH 160b / S&DS 160b, The Structure of Networks Staff
Network structures and network dynamics described through examples and applications ranging from marketing to epidemics and the world climate. Study of social and biological networks as well as networks in the humanities. Mathematical graphs provide a simple common language to describe the variety of networks and their properties. QR

AMTH 222a or b / MATH 222a or b, Linear Algebra with Applications Staff
 Matrix representation of linear equations. Gauss elimination. Vector spaces. Linear independence, basis, and dimension. Orthogonality, projection, least squares approximation; orthogonalization and orthogonal bases. Extension to function spaces. Determinants. Eigenvalues and eigenvectors. Diagonalization. Difference equations and matrix differential equations. Symmetric and Hermitian matrices. Orthogonal and unitary transformations; similarity transformations. After MATH 115 or equivalent. May not be taken after MATH 225. QR

Intermediate and Advanced Courses

AMTH 244a / MATH 244a, Discrete Mathematics Ross Berkowitz
 Basic concepts and results in discrete mathematics: graphs, trees, connectivity, Ramsey theorem, enumeration, binomial coefficients, Stirling numbers. Properties of finite set systems. Recommended preparation: MATH 115 or equivalent. QR

AMTH 247b / G&G 247b / MATH 247b, Partial Differential Equations Jeremy Hoskins
 Introduction to partial differential equations, wave equation, Laplace's equation, heat equation, method of characteristics, calculus of variations, series and transform methods, and numerical methods. Prerequisites: MATH 222 or 225, MATH 246, and ENAS 194, or equivalents. QR

AMTH 260a / MATH 260a, Basic Analysis in Function Spaces Staff
 Diagonalization of linear operators, with applications in physics and engineering; calculus of variations; data analysis. MATH 260 is a natural continuation of PHYS 301. Prerequisites: MATH 120, and 222 or 225. QR

AMTH 262a / CPSC 262a / S&DS 262a, Computational Tools for Data Science Staff
 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, programming. Prerequisites: after or concurrently with MATH 222, 225, or 231; after or concurrently with MATH 120, 230, or ENAS 151; after or concurrently with CPSC 100, 112, or ENAS 130. QR

* **AMTH 342a / EENG 442a, Linear Systems** A. Stephen Morse
 Introduction to finite-dimensional, continuous, and discrete-time linear dynamical systems. Exploration of the basic properties and mathematical structure of the linear systems used for modeling dynamical processes in robotics, signal and image processing, economics, statistics, environmental and biomedical engineering, and control theory. Prerequisite: MATH 222 or permission of instructor. QR

AMTH 361b / S&DS 361b, Data Analysis Staff
 Selected topics in statistics explored through analysis of data sets using the R statistical computing language. Topics include linear and nonlinear models, maximum likelihood, resampling methods, curve estimation, model selection, classification, and clustering. After S&DS 242 and MATH 222 or 225, or equivalents. QR

AMTH 364b / EENG 454b / S&DS 364b, Information Theory Andrew Barron

Foundations of information theory in communications, statistical inference, statistical mechanics, probability, and algorithmic complexity. Quantities of information and their properties: entropy, conditional entropy, divergence, redundancy, mutual information, channel capacity. Basic theorems of data compression, data summarization, and channel coding. Applications in statistics and finance. After STAT 241. QR

AMTH 428a / E&EB 428a / G&G 428a / PHYS 428a, 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. Prerequisite: PHYS 301, MATH 247, or equivalent. QR, SC

*** AMTH 437a / ECON 413a / EENG 437a / S&DS 430a, 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. Prerequisites: MATH 120 and 222, or equivalents. May not be taken after AMTH 237. QR

*** AMTH 480a or b, Directed Reading** John Wettlaufer

Individual study for qualified students who wish to investigate an area of applied mathematics not covered in regular courses. A student must be sponsored by a faculty member who sets the requirements and meets regularly with the student. Requires a written plan of study approved by the faculty adviser and the director of undergraduate studies.

*** AMTH 482a or b, Research Project** John Wettlaufer

Individual research. Requires a faculty supervisor and the permission of the director of undergraduate studies. The student must submit a written report about the results of the project. May be taken more than once for credit.

*** AMTH 490b, Senior Seminar and Project** John Wettlaufer

Under the supervision of a member of the faculty, each student works on an independent project. Students participate in seminar meetings at which they speak on the progress of their projects. Some meetings may be devoted to talks by visiting faculty members or applied mathematicians.

*** AMTH 491a or b, Senior Project** John Wettlaufer

Individual research that fulfills the senior requirement. Requires a faculty supervisor and the permission of the director of undergraduate studies. The student must submit a written report about the results of the project.

Applied Physics

Director of undergraduate studies: Daniel Prober, 417 BCT, 432-4280, daniel.prober@yale.edu; appliedphysics.yale.edu

Physics is the study of the fundamental laws of nature. Applied physics uses these laws to understand phenomena that have practical applications. Engineering in turn makes use of these phenomena for human purposes. Applied physics thus forms a link between the fundamental laws of nature and their applications. Students majoring in Applied Physics take courses in both physics and engineering, as well as courses specifically in applied physics. Students completing the program in Applied Physics are prepared for graduate study in applied physics, in physics, in nanoscience, or in engineering, and, with appropriate prerequisites, in medicine; or they may choose careers in a wide range of technical and commercial fields, or in fields such as technical writing or patent law that draw on interdisciplinary subjects.

Contemporary physical science and engineering are becoming increasingly interdisciplinary. Traditional boundaries between fields have blurred, and new areas are constantly emerging, e.g., nanotechnology. The Applied Physics major provides a flexible framework on which students can build a curriculum tailored to their own interests, in consultation with the director of undergraduate studies.

PREREQUISITES

During their first year, students interested in Applied Physics should start by taking courses in mathematics, and physics if possible, appropriate to their level of preparation. The choice between different starting points is generally made on the basis of performance on Advanced Placement tests; see the First-year Student Website for more information.

The multiplicity of choices facing students interested in this general area indicates the importance of informed advice for first-year students. Students should consult freely with directors of undergraduate studies and individual faculty members in their departments of interest to optimize choices and to ensure maximum flexibility at the time a major is selected.

The prerequisite requirements for the Class of 2021 and previous classes Students who declared their major under previous requirements, must follow the prerequisite requirements, as indicated when they declared.

The prerequisite requirements for the Class of 2022 and subsequent classes The required prerequisites for students interested in Applied Physics include two Physics courses and one Physics lab; APHY 151 or MATH 120; and PHYS 301 or APHY 194 with either MATH 222 or MATH 225.

The recommended starting courses in physics are PHYS 200 and 201. These courses should be taken in the first year by students who have a strong preparation in mathematics and physics. Students with a particularly strong background in physics and mathematics may take PHYS 260 and 261 instead. Students who are less well prepared in physics and mathematics may choose to take PHYS 180 and 181 during their first year, or PHYS 200 and 201 during their sophomore year after they have taken

more mathematics courses. One laboratory course, PHYS 166L or 206L should be taken at some time during the first or second year.

REQUIREMENTS OF THE MAJOR

The major in Applied Physics requires eight courses beyond the introductory sequence. Two of these must be APHY 471 and 472. All majors are also required to take APHY 322, 439, and APHY 420 or equivalents. The three remaining advanced courses should focus on a particular area of concentration. For example, a student interested in solid-state and/or quantum electronics might choose from APHY 321, 448, 449, EENG 320, and 325. A student interested in the physics of materials and/or nanoscience might choose from APHY 448, 449, CHEM 220, 450, and MENG 285. Many other concentrations are possible.

SENIOR REQUIREMENT

Seniors must complete an independent research project, taken as APHY 471 and 472. The independent research project is under the supervision of a faculty member in Applied Physics, Physics (p. 613), Engineering (p. 309), or related departments. The project may be started in the junior year and continued into the senior year. Students planning to do a research project should contact the director of undergraduate studies as early as possible to discuss available options and general requirements.

ADVISING

The Applied Physics major provides for various programs corresponding to a range of student interests. Substitutions of equivalent courses may be permitted. Students interested in an Applied Physics major should contact the director of undergraduate studies as early as possible, and in any case by the end of the sophomore year.

A well-prepared student interested in materials physics or quantum electronics who starts the senior research in the junior year might elect the following course sequence:

First-Year	Sophomore	Junior	Senior
APHY 151	APHY 322	APHY 471	APHY 448
PHYS 200	APHY 439	EENG 320	APHY 449
PHYS 201	PHYS 301	APHY 420	APHY 472
PHYS 206L			

A student interested in alternative energy who starts physics in the sophomore year and conducts research in the senior year might elect:

First-Year	Sophomore	Junior	Senior
MATH 120	PHYS 200	APHY 322	APHY 448
	PHYS 201	APHY 439	APHY 471
	PHYS 206L	EENG 320	APHY 472
	PHYS 301	APHY 420	EENG 406

REQUIREMENTS OF THE MAJOR

Prerequisites PHYS 180, 181, or 200, 201, with appropriate math coreqs and PHYS 166L or 206L; APHY 151 or MATH 120; PHYS 301 (or APHY 194 with either MATH 222 or MATH 225)

Number of courses 8 term courses beyond prereqs (incl senior req)

Distribution of courses 3 adv courses in physical or mathematical sciences or engineering in area of concentration, with DUS approval

Specific courses required APHY 322, 439, APHY 420, or equivalents

Substitution permitted Any relevant course approved by DUS

Senior requirement APHY 471 and 472

FACULTY OF THE DEPARTMENT OF APPLIED PHYSICS

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

Associate Professors Liang Jiang, Peter Rakich

Assistant Professors †Michael Choma, Owen Miller

†A joint appointment with primary affiliation in another department.

Courses

* **APHY 050a / PHYS 050a, Science of Modern Technology and Public Policy** Daniel Prober

Examination of the science behind selected advances in modern technology and implications for public policy, with focus on the scientific and contextual basis of each advance. Topics are developed by the participants with the instructor and with guest lecturers, and may include nanotechnology, quantum computation and cryptography, renewable energy technologies, optical systems for communication and medical diagnostics, transistors, satellite imaging and global positioning systems, large-scale immunization, and DNA made to order. Enrollment limited to first-year students. Preregistration required; see under First-Year Seminar Program. SC RP

* **APHY 100b / ENAS 100b / EVST 100b / G&G 105b / PHYS 100b, Energy Technology and Society** Daniel Prober, Michael Oristaglio, and Julie Paquette

The technology and use of energy. Impacts on the environment, climate, security, and economy. Application of scientific reasoning and quantitative analysis. Intended for non-science majors with strong backgrounds in math and science. QR, SC RP

APHY 110b / ENAS 110b, The Technological World Owen Miller

An exploration of modern technologies that play a role in everyday life, including the underlying science, current applications, and future prospects. Examples include solar cells, light-emitting diodes (LEDs), computer displays, the global positioning system, fiber-optic communication systems, and the application of technological advances to medicine. For students not committed to a major in science or engineering; no college-level science or mathematics required. Prerequisite: high school physics or chemistry.

QR, SC

APHY 151a or b / ENAS 151a or b / PHYS 151a or b, Multivariable Calculus for Engineers Staff

An introduction to multivariable calculus focusing on applications to engineering problems. Topics include vector-valued functions, vector analysis, partial

differentiation, multiple integrals, vector calculus, and the theorems of Green, Stokes, and Gauss. Prerequisite: MATH 115 or equivalent. QR RP

APHY 194a or b / ENAS 194a or b, Ordinary and Partial Differential Equations with Applications Staff

Basic theory of ordinary and partial differential equations useful in applications. First- and second-order equations, separation of variables, power series solutions, Fourier series, Laplace transforms. Prerequisites: ENAS 151 or equivalent, and knowledge of matrix-based operations. QR RP

APHY 321b / EENG 401b, Semiconductor Silicon Devices and Technology Tso-Ping Ma

Introduction to integrated circuit technology, theory of semiconductor 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, solar cells, MOS capacitors, MOSFETs, and integrated circuits. Prerequisite: EENG 320 or equivalent or permission of instructor. QR, SC

APHY 322b, Electromagnetic Waves and Devices Michel Devoret

Introduction to electrostatics and magnetostatics, time varying fields, and Maxwell's equations. Applications include electromagnetic wave propagation in lossless, lossy, and metallic media and propagation through coaxial transmission lines and rectangular waveguides, as well as radiation from single and array antennas. Occasional experiments and demonstrations are offered after classes. Prerequisites: PHYS 180, 181, or 200, 201. QR, SC

*** APHY 418b / EENG 418b, Heterojunction Devices** Mark Reed

The science and technology of semiconductor and semiconductor device physics, with emphasis on contemporary heterojunction devices. Compound semiconductor material properties and growth techniques; high speed and millimeter-wave devices; quantum well and superlattice devices; and device modeling. A laboratory component involves device fabrication and measurement. Prerequisite: APHY 439 or equivalent. QR, SC

*** APHY 420a / PHYS 420a, Thermodynamics and Statistical Mechanics** Nir Navon

An introduction to the laws of thermodynamics and their theoretical explanation by statistical mechanics. Applications to gases, solids, phase equilibrium, chemical equilibrium, and boson and fermion systems. Prerequisites: PHYS 301, 410, and 440 or permission of instructor. QR, SC

APHY 439a / PHYS 439a, Basic Quantum Mechanics Liang Jiang

The 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. Prerequisites: PHYS 181 or 201, PHYS 301, or equivalents, or permission of instructor. QR, SC

APHY 448a / PHYS 448a, Solid State Physics I Sohrab Ismail-Beigi

The first term of a two-term sequence covering the principles underlying the electrical, thermal, magnetic, and optical properties of solids, including crystal structure, phonons, energy bands, semiconductors, Fermi surfaces, magnetic resonances, phase transitions, dielectrics, magnetic materials, and superconductors. Prerequisites: APHY 322, 439, PHYS 420. QR, SC

APHY 449b / PHYS 449b, Solid State Physics II Vidvuds Ozolins

The second term of the sequence described under APHY 448. QR, SC

*** APHY 450b / ENAS 450b / MENG 450b, Advanced Synchrotron Techniques and Electron Spectroscopy of Materials** Charles Ahn

Introduction to concepts of advanced x-ray and electron-based techniques used for understanding the electronic, structural, and chemical behavior of materials. Students learn from world-leading experts on fundamentals and practical applications of various diffraction, spectroscopy, and microscopy methods. Course highlights the use of synchrotrons in practical experiments. Prerequisites: physics and quantum mechanics/physical chemistry courses for physical science and engineering majors, or by permission of instructor. QR, SC

APHY 458a / PHYS 458a, 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, and nanostructure physics. Topics include propagation of light, reflection and refraction, guiding light, polarization, interference, diffraction, scattering, Fourier optics, and optical coherence. Prerequisite: PHYS 430. QR, SC

*** APHY 470b, Statistical Methods with Applications in Science and Finance** Sohrab Ismail-Beigi

Introduction to key methods in statistical physics with examples drawn principally from the sciences (physics, chemistry, astronomy, statistics, biology) as well as added examples from finance. Students learn the fundamentals of Monte Carlo, stochastic random walks, and analysis of covariance analytically as well as via numerical exercises. Prerequisites: ENAS 194, MATH 222, and ENAS 130, or equivalents. QR, SC

*** APHY 471a or b and APHY 472a or b, Special Projects** Daniel Prober

Faculty-supervised individual or small-group projects with emphasis on research (laboratory or theory). Students are expected to consult the director of undergraduate studies and appropriate faculty members to discuss ideas and suggestions for suitable topics. These courses may be taken at any appropriate time in the student's career; they may be taken more than once. Permission of the faculty adviser and of the director of undergraduate studies is required.

Archaeological Studies

Director of undergraduate studies: William Honeychurch, 51 Hillhouse Ave., 432-3676, william.honeychurch@yale.edu; archaeology.yale.edu

This interdisciplinary major is supervised by the University's Council on Archaeological Studies. Inquiries about the major may be addressed to the chair of the council, Richard Burger, Department of Anthropology, 10 Sachem Street, or to the DUS.

The major in Archaeological Studies provides a program of interdepartmental offerings covering prehistoric, early historic, medieval, and other cultures and cultural developments in the Old and New Worlds, and introduces students to the analytic tools that facilitate archaeological studies. The major is designed to expose students to a variety of archaeological research perspectives: anthropological, historical, art historical, and scientific. Also emphasized are substantive studies including (1) study of such prehistoric–early historic transformations as the origins of agriculture, cities and states, and early empires, and (2) study of the material culture, art, and architecture of prehistoric, early historic, and medieval cultures, including the iconography of ancient cultures, the relationship between art and society, ancient writing systems, and American historical archaeology.

REQUIREMENTS OF THE MAJOR

The major consists of twelve courses, including the senior project. In addition, students must participate in a Yale-affiliated summer research project, or another archaeological field school approved in advance by the DUS. The following five courses are required: an introductory survey; the introductory laboratory course ARCG 316L; an advanced laboratory course; a theory course; and the senior research project ARCG 491. The remaining seven courses required for the major must be distributed among the six subject areas represented by the departments and programs offering courses multiple-titled with Archaeological Studies, with three of those seven courses falling in different departments and programs. The relevant departments and programs are Anthropology, Classics, Environmental Studies, Geology and Geophysics, History, History of Art, and Near Eastern Languages and Civilizations. Some courses may be applied to categories other than the ones in which they are listed in this bulletin upon approval by the DUS. For three of the seven archaeology electives students may, with permission of the DUS, substitute courses from other departments in areas related to their research.

Students majoring in Archaeological Studies are strongly encouraged, but are not required, to devote a second summer to archaeological research, either in the field or in a laboratory. Members of the Council faculty currently direct archaeological field projects in China, Egypt, Guatemala, Peru, Mongolia, Senegal, Syria, and Rome. Qualified majors are encouraged to apply for research positions with these projects.

Field research In addition to being the base for several faculty field projects around the globe, the Council on Archaeological Studies takes as its principal mission the encouragement of multiple field experiences. Our undergraduate majors are required to participate in at least one intensive summer field school. Approval is required, and costs are often subsidized by the Council. Students are encouraged to participate in each other's field projects, thereby learning about the greatest number of cultures and areas possible, while experiencing a diverse array of field situations.

SENIOR REQUIREMENT

The final requirement for the major is a senior research project (ARCG 491) in some field of archaeology, preferably one involving more than one area or discipline.

ADVISING

Students majoring in Archaeological Studies should consult with the DUS at the beginning of each term.

REQUIREMENTS OF THE MAJOR

Prerequisites None

Number of courses 12 term courses (incl senior project)

Specific course required ARCG 316L

Distribution of courses 1 intro survey; 1 advanced lab; 1 theory course; 7 electives, at least 1 in each of 3 areas, as specified

Field requirement 1 summer field techniques course or research project, as specified

Substitution permitted For 3 electives, 3 courses related to research, with DUS permission

Senior requirement Research project (ARCG 491)

COUNCIL ON ARCHAEOLOGICAL STUDIES

Anthropology Richard Burger (*Chair*), Oswaldo Chinchilla, Ellery Frahm, William Honeychurch, Roderick McIntosh, Eric Sargis, Anne Underhill, David Watts

Classics Andrew Johnston, Diana Kleiner

Geology & Geophysics Ronald Smith

History Joseph Manning

History of Art Edward Cooke, Jr., Milette Gaifman, Mary Miller

Near Eastern Languages & Civilizations John Darnell, Karen Foster, Eckart Frahm, Harvey Weiss

Religious Studies Stephen Davis

Courses

Anthropology

ARCG 171a / ANTH 171a, Great Civilizations of the Ancient World Staff

A survey of selected prehistoric and historical cultures through examination of archaeological sites and materials. Emphasis on the methodological and theoretical approaches by which archaeologists recover, analyze, and interpret the material remains of the past. SO

ARCG 232a / ANTH 232a / LAST 232a, Ancient Civilizations of the Andes Richard Burger

Survey of the archaeological cultures of Peru and Bolivia from the earliest settlement through the late Inca state. SO

*** ARCG 255b / ANTH 255b / LAST 255b, Inca Culture and Society** Richard Burger

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

ARCG 267b / ANTH 267b, Human Evolution David Watts

Examination of the fossil record of human evolution, including both paleontological and archaeological evidence for changes in hominid behavior during the Pleistocene. Prerequisite: Introductory course in biological anthropology or biology. SO

ARCG 316La / ANTH 316La, Introduction to Archaeological Laboratory Sciences
Staff

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 375a or b / ANTH 375a or b / ARCG 379a or b, Anthropology of Mobile Societies** William Honeychurch

The social and cultural significance of the ways that hunter-gatherers, pastoral nomads, maritime traders, and members of our own society traverse space. The impact of mobility and transport technologies on subsistence, trade, interaction, and warfare from the first horse riders of five thousand years ago to jet-propulsion tourists of today. SO

*** ARCG 379a or b / ANTH 375a or b / ARCG 375a or b, Anthropology of Mobile Societies** William Honeychurch

The social and cultural significance of the ways that hunter-gatherers, pastoral nomads, maritime traders, and members of our own society traverse space. The impact of mobility and transport technologies on subsistence, trade, interaction, and warfare from the first horse riders of five thousand years ago to jet-propulsion tourists of today. SO

*** ARCG 385a / ANTH 385a, Archaeological Ceramics** Staff

Archaeological methods for analyzing and interpreting ceramics, arguably the most common type of object found in ancient sites. Focus on what different aspects of ceramic vessels reveal about the people who made them and used them. SO

*** ARCG 397a or b / ANTH 397b, Archaeology of East Asia** Anne Underhill

Introduction to the findings and practice of archaeology in China, Japan, Korea, and southeast Asia. Methods used by archaeologists to interpret social organization, economic organization, and ritual life. Attention to major transformations such as the initial peopling of an area, establishment of farming villages, the development of cities, interregional interactions, and the nature of political authority. SO

*** ARCG 399a / ANTH 478a / EVST 399a / NELC 399a, 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. SO

*** ARCG 454a / ANTH 454a, Statistics for Archaeological Analysis** William Honeychurch

An introduction to quantitative data collection, analysis, and argumentation for archaeologists. Emphasis on the exploration, visualization, and analysis of specifically

archaeological data using simple statistical approaches. No prior knowledge of statistics required. QR

ARCG 464b / ANTH 464b / E&EB 464b, 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. SC, SO

*** ARCG 476a or b / ANTH 476a or b, GIS and Spatial Analysis for Archaeology**

William Honeychurch

Introduction to the use of geographical information systems (GIS) in anthropology, with attention to archaeological applications. Examples from theoretical, analytical, and geographical contexts; introduction to current software. SO

Classics

ARCG 161a / CLCV 161a / HSAR 247a, Art and Myth in Greek Antiquity Milette Gaifman

Visual exploration of Greek mythology through the study of ancient Greek art and architecture. Greek gods, heroes, and mythological scenes foundational to Western culture; the complex nature of Greek mythology; how art and architecture rendered myths ever present in ancient Greek daily experience; ways in which visual representations can articulate stories. Use of collections in the Yale University Art Gallery. WR, HU

ARCG 252a / CLCV 175a / HSAR 252a, Roman Architecture Diana Kleiner

The great buildings and engineering marvels of Rome and its empire. Study of city planning and individual monuments and their decoration, including mural painting. Emphasis on developments in Rome, Pompeii, and central Italy; survey of architecture in the provinces. HU

Environmental Studies

ARCG 226a / EVST 226a / NELC 268a, Global Environmental History Harvey Weiss

The dynamic relationship between environmental and social forces from the Pleistocene glaciations to the Anthropocene present. Pleistocene extinctions; transition from hunting and gathering to agriculture; origins of cities, states, and civilization; adaptations and collapses of Old and New World civilizations in the face of climate disasters; the destruction and reconstruction of the New World by the Old. Focus on issues of adaptation, resilience, and sustainability, including forces that caused long-term societal change. SO

*** ARCG 473b / ANTH 473b / EVST 473b / NELC 473b, Abrupt Climate Change and Societal Collapse** Harvey Weiss

The coincidence of societal collapses throughout history with decadal and century-scale drought events. Challenges to anthropological and historical paradigms of cultural adaptation and resilience. Examination of archaeological and historical records and high-resolution sets of paleoclimate proxies. HU, SO

Geology and Geophysics

* **ARCG 362b / EVST 362b / G&G 362b, 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. Prerequisites: college-level physics or chemistry, two courses in geology and natural science of the environment or equivalents, and computer literacy. QR, SC

History of Art

ARCG 161a / CLCV 161a / HSAR 247a, Art and Myth in Greek Antiquity Milette Gaifman

Visual exploration of Greek mythology through the study of ancient Greek art and architecture. Greek gods, heroes, and mythological scenes foundational to Western culture; the complex nature of Greek mythology; how art and architecture rendered myths ever present in ancient Greek daily experience; ways in which visual representations can articulate stories. Use of collections in the Yale University Art Gallery. WR, HU

ARCG 237a / HSAR 237a / NELC 108a, Ancient Painting and Mosaics Karen Foster
Developments in wall painting, vase painting, and mosaics as seen in ancient Egypt, the Aegean Bronze Age, and the Greek, Etruscan, and Roman world. HU

Near Eastern Languages and Civilizations

* **NELC 001b / AFST 001b / ARCG 001b, Egypt and Northeast Africa: A Multidisciplinary Approach** John Darnell

Examination of approximately 10,000 years of Nile Valley cultural history, with an introduction to the historical and archaeological study of Egypt and Nubia. Consideration of the Nile Valley as the meeting place of the cultures and societies of northeast Africa. Various written and visual sources are used, including the collections of the Peabody Museum and the Yale Art Gallery. Enrollment limited to first-year students. Preregistration required; see under First-Year Seminar Program. WR, HU

ARCG 218b / NELC 191b, Ancient Ships and Maritime Archaeology Karen Foster
Introduction to the world of the ancient mariners, with special attention to new discoveries and interpretations. HU, SO

ARCG 244a / NELC 109a / RLST 245a, The Age of Akhenaton John Darnell
Study of the period of the Egyptian pharaoh Akhenaton (reigned 1353–1336 B.C.E.), often termed the Amarna Revolution, from historical, literary, religious, artistic, and archaeological perspectives. Consideration of the wider Egyptian, ancient Near Eastern, African, and Mediterranean contexts. Examination of the international diplomacy, solar theology, and artistic developments of the period. Reading of primary source material in translation. HU

Advanced Research

*** ARCG 471a or b and ARCG 472a or b, Directed Reading and Research in Archaeology** William Honeychurch

Qualified students may pursue special reading or research under the guidance of an instructor. A written statement of the proposed research must be submitted to the director of undergraduate studies for approval.

*** ARCG 491a or b, Senior Research Project in Archaeology** Staff

Required of all students majoring in Archaeological Studies. Supervised investigation of some archaeological topic in depth. The course requirement is a long essay to be submitted as the student's senior essay. The student should present a prospectus and bibliography to the director of undergraduate studies no later than the third week of the term. Written approval from the faculty member who will direct the reading and writing for the course must accompany the prospectus.

*** ARCG 492b / ANTH 492b / NELC 321b, Imaging Ancient Worlds** John Darnell, Roderick McIntosh, and Agnete Lassen

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 those sites. Use of new technologies in computer graphics, including 3D imaging, to support current research in archaeology and anthropology.

Architecture

Director of undergraduate studies: Bimal Mendis, 328 RDH, 432-8325, bimal.mendis@yale.edu; architecture.yale.edu

Architecture is a humanistic endeavor. The purpose of the undergraduate major is to include the study of architecture within a comprehensive liberal arts education, drawing from the broader academic and professional environment of the Yale School of Architecture. The curriculum includes work in design; in history, theory, and criticism of architecture; and in urban studies, and leads to a bachelor of arts degree with a major in Architecture. As a liberal arts major in Yale College, it is not an accredited professional degree program. For accredited professional degree programs, refer to the requirements of the National Architectural Accrediting Board (NAAB).

INTRODUCTORY COURSES FOR NONMAJORS AND MAJORS

Introductory courses are ARCH 150, 200, and 280. They are open to all Yale College students and are required for those interested in the Architecture major prior to application. Interested students may also consider courses such as ARCH 260, 261, 262, or STCY 176.

PREREQUISITES

Three courses are prerequisite for all concentrations: ARCH 150, 200, and 280.

REQUIREMENTS OF THE MAJOR

The major for the Class of 2019 With DUS approval, the following changes to the requirements of the major may be fulfilled by students who declared their major under previous requirements.

The major for the Class of 2020 and subsequent classes Students majoring in Architecture are required to take fifteen course credits, including prerequisites and the senior requirement. Majors are expected to take the three prerequisites by the end of their sophomore year and to complete a core of four courses, for five course credits, by the end of their junior year. They must also base their studies in one of three areas of concentration: Design; History, Theory, and Criticism; or Urban Studies. Majors are also required to complete three orientation sessions: digital media orientation, library orientation, and shop orientation. Within the concentrations, electives are categorized under four broad subject areas: history and theory of architecture; urbanism and landscape; materials and design; and structures and computation.

Design concentration The Design concentration explores the role of architecture in shaping the world around us. It introduces complex processes involved in solving spatial and programmatic problems. Creative work is grounded in the study of history and culture, and in the analysis of social conditions influencing architecture. Design studios provide a forum for production and discourse. Studio projects address issues of architectural form, space, composition, site, tectonics, and programs within broader humanistic ideals.

For the Design concentration, the following additional courses are required:

1. A core of four courses: the studio courses ARCH 250 and 251 taken during the junior year after the student is accepted into the major; and the history of

architecture surveys ARCH 260 and 261 or 262, to be completed by the end of the junior year

2. One elective in history and theory of architecture chosen from ARCH 341, 348, 431, or other relevant course in History of Art (p. 451) approved by the DUS
3. One elective in urbanism and landscape chosen from ARCH 344, 345, 347, 348, 385, STCY 176, or other relevant course in American Studies (p. 109); Ethics, Politics, and Economics (p. 347); Environmental Studies (p. 336); or Political Science (p. 626) approved by the DUS
4. One elective in materials and design chosen from ARCH 162 or another relevant course in Environmental Studies (p. 336) approved by the DUS
5. One elective in structures and computation chosen from ARCH 161, an approved calculus or physics course, or other relevant course approved by the DUS (Elementary calculus is strongly recommended as preparation for graduate studies in Architecture.)
6. The senior requirement, ARCH 450 and 494

History, Theory, and Criticism concentration The History, Theory, and Criticism concentration is intended to establish a broad historical and intellectual framework for the study of architecture. An interdisciplinary approach is encouraged through additional courses taken in various fields of humanities and social sciences. Normally these interdisciplinary courses address subjects closely linked to architectural history, theory, and criticism. Such courses may include archaeology, history of religion, aesthetics, philosophy, or visual culture. Permission of the DUS is required if the courses fall outside the specified course of studies. During their senior year students complete a written senior essay on a topic approved by the faculty.

For the History, Theory, and Criticism concentration, the following additional courses are required:

1. A core of four courses: the urban laboratory, ARCH 360 taken during the fall term of junior year; ARCH 362 or an elective taken during the spring term of junior year; and the history of architecture surveys ARCH 260 and 261 or 262 to be completed by the end of junior year
2. Four electives in history and theory of architecture, chosen from ARCH 341, 348, 431, or other relevant courses in History of Art (p. 451) approved by the DUS
3. One elective in urbanism and landscape chosen from ARCH 344, 345, 347, 348, 385, STCY 176, or other relevant course in American Studies (p. 109); Ethics, Politics, and Economics (p. 347); Environmental Studies (p. 336); or Political Science (p. 626) approved by the DUS
4. The senior requirement ARCH 490 and 491

Urban Studies concentration The Urban Studies concentration encourages a broad, interdisciplinary investigation of the complex forces that shape the urban physical environment. The sequence of courses culminates in a senior essay that builds on course work, and either develops analysis and planning proposals for a specific site or furthers an individual research agenda.

For the Urban Studies concentration, the following additional courses are required:

1. A core of four courses: ARCH 360 and 362 taken during the junior year; and ARCH 341 and 345, to be completed by the end of the junior year
2. Four electives in urbanism and landscape chosen from ARCH 344, 345, 347, 348, 385, STCY 176, or other relevant courses in American Studies (p. 109); Ethics, Politics, and Economics (p. 347); Environmental Studies (p. 336); or Political Science (p. 626) approved by the DUS
3. One elective in history and theory of architecture chosen from ARCH 341, 348, 431, or other relevant course in History of Art (p. 451) approved by the DUS
4. The senior requirement, ARCH 490 and 491

Digital media orientation All Architecture students are required to complete orientation sessions in digital media workshop and materials laboratory. Students enrolled in ARCH 200 are required to complete these sessions at the beginning of the spring term of the sophomore year. Access to digital media equipment will not be allowed until the required orientation sessions have been completed. Questions should be addressed to the DUS or the manager of digital media, Vincent Guerrero (432-7552, vincent.guerrero@yale.edu (john.eberhart@yale.edu)).

Library orientation The Architecture program requires all students to complete a ninety-minute introductory library research session. Students enrolled in ARCH 200 must take this session at the beginning of the spring term of the sophomore year. Failure to complete the required orientation will preclude completion of the major. Students may offer no substitutions for this orientation. Students should register with the Haas Family Arts Library Public Services Librarian, Lindsay King (436-8052, lindsay.king@yale.edu). Questions should be addressed to the DUS.

Shop orientation The Architecture program requires all majors to complete several woodshop and materials lab orientation sessions. Students enrolled in ARCH 200, and are interested in using the shop, must take these sessions during the first weeks of the spring term of the sophomore year. Access to the woodshop and materials lab will not be allowed until the required orientation sessions have been completed. Questions should be addressed to the DUS or to the shop coordinator, Timothy Newton (432-7234, timothy.newton@yale.edu).

SENIOR REQUIREMENT

Seniors in the Design track take ARCH 450 in the fall term and 494 in the spring term. Seniors in the History, Theory, and Criticism track and in the Urban Studies track take ARCH 490 in the fall term and 491 in the spring term. Proposals for senior projects and essays are submitted in the fall term for review and approval by the senior project coordinator; they are then distributed to faculty members for review. Upon successful review, students may ask faculty members to act as senior advisers. Senior essays and projects for ARCH 491 are due in the office of the DUS by Friday, April 12, 2019. Design projects for ARCH 494 are due as specified by the course instructor. All seniors must submit a portfolio of their work to the office of the DUS by Friday, May 3, 2019. For all architecture majors, this portfolio must be representative of the student's design work including prerequisites and the senior project. History, Theory, and Criticism majors and Urban Studies majors must also include a copy of the senior essay and other appropriate texts.

ADVISING AND APPLICATION TO THE MAJOR

Yale College students interested in the Design concentration must apply to enter the major during the spring term of their sophomore year, after taking ARCH 150, 200, and 280. An application to the major must be submitted to the office of the DUS no later than 4 p.m. on March 29, 2019, in 328 Rudolph (third floor). All applications are reviewed by a faculty committee. Applications must include the following information: name, address, telephone number, courses related to architecture already taken, a statement of purpose, and a writing sample from Yale College. Portfolios representative of course work for ARCH 150, 200, and 280 must also be submitted for review as part of the application process by May 1, 2019. Applicants will be notified in writing regarding acceptance to the major by May 31, 2019.

Students interested in the History, Theory, and Criticism and Urban Studies concentrations do not have to apply to the major, but must submit a statement of interest by the end of their sophomore year. Students have an opportunity to petition the DUS at the end of either the fall or spring term of their junior year if they wish to change concentrations. The DUS will notify students of the result of such a petition. Based on a student's performance in required courses, the DUS may also recommend a change in concentration.

Courses in the School of Architecture Unless otherwise indicated in the course descriptions, all courses in the School of Architecture are open to majors and nonmajors with permission of the instructor and the graduate registrar. They are not available for the Credit/D/Fail option. Students are admitted on the basis of their previous course work and previous performance.

REQUIREMENTS OF THE MAJOR

Prerequisites ARCH 150, 200, and 280

Number of courses 15 course credits (incl prereqs and senior req)

Specific courses required *Design*—ARCH 250, 251, 260, and 261 or 262; *History, Theory, and Criticism*—ARCH 360, 362 or elective, ARCH 260 and 261 or 262; *Urban Studies*—ARCH 360, 362, 341, 345

Distribution of courses *Design*—1 elective in history and theory of arch, 1 in urbanism and landscape, 1 in materials and design, 1 in structures and computation, all approved by DUS; *History, Theory, and Criticism*—4 electives in history and theory of arch, 1 in urbanism and landscape, all approved by DUS; *Urban Studies*—4 electives in urbanism and landscape, 1 in history and theory of arch, all approved by DUS

Other Orientation sessions in digital media, library, and shop

Senior requirement *All concentrations*—portfolio representative of design work, including prereqs and senior req; *Design*—ARCH 450 and 494; *History, Theory, and Criticism and Urban Studies*—ARCH 490 and 491

MEMBERS OF THE SCHOOL OF ARCHITECTURE TEACHING IN YALE COLLEGE

Professors Turner Brooks (*Adjunct*), Keller Easterling, Alexander Garvin (*Adjunct*), Steven Harris (*Adjunct*), Alan Plattus, Alexander Purves (*Emeritus*)

Associate Professor Eeva-Liisa Pelkonen

Assistant Professors Sunil Bald (*Adjunct*), Jesse LeCavalier (*Visiting*), Bimal Mendis (*Adjunct*), Kyoung Sun Moon, Elihu Rubin

Lecturers Victor Agran, Erleen Hatfield

Critics Marta Justo Caldeira, Kyle Dugdale, Andrei Harwell, Adam Hopfner, Joyce Hsiang, Timothy Newton, Rosalyne Shieh

Courses

ARCH 150a, Introduction to Architecture Alexander Purves

Lectures and readings in the language of architecture. Architectural vocabulary, elements, functions, and ideals. Notebooks and projects required. Not open to freshmen. Required for all Architecture majors. HU

* **ARCH 154b, Drawing Architecture** Victor Agran

Introduction to the visual and analytical skills necessary to communicate architectural ideas. Observation and documentation of architectural space on the Yale campus. Drawing exercises introduce the conventions of architectural representation: plan, section, elevation, and isometric drawings, as well as freehand perceptual drawings of architectural space. Open to first and second year students.

* **ARCH 161a, Introduction to Structures** Staff

Basic principles governing the behavior of building structures. Developments in structural form combined with the study of force systems, laws of statics, and mechanics of materials and members and their application to a variety of structural systems. Prerequisites: trigonometry and some knowledge of calculus. Enrollment limited to 20. QR, SC

* **ARCH 162b, Materials in Architecture** Timothy Newton

Science and technology of basic building materials studied together with historic and current design applications. Skills and processes required to create, shape, and connect materials experienced through hands-on projects. Technical notebooks, drawings, design and build exercises, and projects required. Enrollment limited to 20.

ARCH 200b, Scales of Design Bimal Mendis

Exploration of architecture at multiple scales from the human to the world. Consideration of how design influences and shapes the material and conceptual spheres through four distinct subjects: the human, the building, the city, and the world. Examination of the role of architects, as designers, in constructing and shaping the inhabited world. Lectures, readings, reviews and four assignments that address the spatial and visual ramifications of design. Not open to first-year students. Required for all Architecture majors.. HU

* **ARCH 230b / STCY 176b, Introduction to the Study of the City** Alexander Garvin

An examination of forces shaping American cities and strategies for dealing with them. Topics include housing, commercial development, parks, zoning, urban renewal, landmark preservation, new towns, and suburbs. The course includes games, simulated problems, fieldwork, lectures, and discussion. SO

* **ARCH 250a, Methods and Form in Architecture I** Staff

Analysis of architectural design of specific places and structures. Analysis is governed by principles of form in landscape, program, ornament, and space, and includes design

methods and techniques. Readings and studio exercises required. Enrollment limited to 25. Open only to Architecture majors. 1½ Course cr

*** ARCH 251b, Methods and Form in Architecture II** Staff

Continuation of ARCH 250. Analysis of architectural design of specific places and structures. Analysis is governed by principles of form in landscape, program, ornament, and space, and includes design methods and techniques. Readings and studio exercises required. 1½ Course cr

ARCH 260a / HSAR 326a, History of Architecture I: Antiquity to the Baroque Kyle Dugdale

The first half of a two-term sequence in the history of architecture. Architecture and urbanism from ancient Egypt through Greek and Roman classical traditions to the Enlightenment. The formal expression – organizational, structural, and ornamental – and social context of specific buildings and urban areas. Architecture as a form of social expression that builds on its own stylistic development, articulating a response to changes in history and culture. Emphasis on Western architecture, with selections from other parts of the world. HU

*** ARCH 271a / HSAR 266a / MMES 126a / SAST 266a, Introduction to Islamic Architecture** Kishwar Rizvi

Introduction to the architecture of the Islamic world from the seventh century to the present, encompassing regions of Asia, North Africa, and Europe. A variety of sources and media, from architecture to urbanism and from travelogues to paintings, are used in an attempt to understand the diversity and richness of Islamic architecture. Field trip to the Metropolitan Museum of Art in New York. HU

ARCH 280b / AMST 197b / HSAR 219b, American Architecture and Urbanism Elihu Rubin

Introduction to the study of buildings, architects, architectural styles, and urban landscapes, viewed in their economic, political, social, and cultural contexts, from precolonial times to the present. Topics include: public and private investment in the built environment; the history of housing in America; the organization of architectural practice; race, gender, ethnicity and the right to the city; the social and political nature of city building; and the transnational nature of American architecture. HU

*** ARCH 341b / GLBL 253b / LAST 318b, Globalization Space** Keller Easterling

Infrastructure space as a primary medium of change in global polity. Networks of trade, energy, communication, transportation, spatial products, finance, management, and labor, as well as new strains of political opportunity that reside within their spatial disposition. Case studies include free zones and automated ports around the world, satellite urbanism in South Asia, high-speed rail in Japan and the Middle East, agripoles in southern Spain, fiber optic submarine cable in East Africa, spatial products of tourism in North Korea, and management platforms of the International Organization for Standardization. HU

ARCH 345a, Civic Art: Introduction to Urban Design Alan Plattus

Introduction to the history, analysis, and design of the urban landscape. Principles, processes, and contemporary theories of urban design; relationships between individual buildings, groups of buildings, and their larger physical and cultural contexts. Case studies from New Haven and other world cities. HU

*** ARCH 360a, Urban Lab I: An Urban World** Staff

Understanding the urban environment through methods of research, spatial analysis, and diverse means of representation that address historical, social, political, and environmental issues that consider design at the scale of the entire world. Through timelines, maps, diagrams, collages and film, students frame a unique spatial problem and speculate on urbanization at the global scale. Prerequisites: For non-majors: permission of the instructor is required. For ARCH majors: ARCH 150, 200, and 280. HU 1½ Course cr

*** ARCH 362b, Urban Lab II: City Making** Staff

How architects represent, analyze, construct, and speculate on critical urban conditions as distinct approaches to city making. Investigation of a case study analyzing urban morphologies and the spatial systems of a city through diverse means of representation that address historical, social, political, and environmental issues. Through maps, diagrams, collages and text, students learn to understand spatial problems and project urban interventions. Prerequisites: For non-majors: permission of the instructor is required. For ARCH majors: ARCH 150, 200, 280, and 360. 1½ Course cr

*** ARCH 390a / ENAS 410a, Making Spaces** Joseph Zinter

A project based course. Borrowing from practices of adaptive reuse and spatial design, students use design thinking methodologies to carefully research an existing place or site and develop possible interventions that consider not only the physical space but also its function and purpose within a community.

*** ARCH 450a, Senior Studio** Turner Brooks

Advanced problems with emphasis on architectural implications of contemporary cultural issues. The complex relationship among space, materials, and program. Emphasis on the development of representations – drawings and models – that effectively communicate architectural ideas. To be taken before ARCH 494. Enrollment limited to Architecture majors. 1½ Course cr

*** ARCH 471b, Individual Tutorial** Staff

Special courses may be established with individual members of the department only. The following conditions apply: (1) a prospectus describing the nature of the studio program and the readings to be covered must be approved by both the instructor and the director of undergraduate studies; (2) regular meetings must take place between student and instructor; (3) midterm and final reviews are required.

*** ARCH 472La, Individual Tutorial Laboratory** Staff

An independent tutorial focusing on methods and techniques of representation in architecture, including the synthesis of studio work using a variety of visual media. Concurrently with ARCH 471 or after a spring term abroad. RP ½ Course cr

*** ARCH 490a, Senior Research Colloquium** Marta Caldeira

Research and writing colloquium for seniors in the Urban Studies and History, Theory, and Criticism tracks. Under guidance of the instructor and members of the Architecture faculty, students define their research proposals, shape a bibliography, improve research skills, and seek criticism of individual research agendas. Requirements include proposal drafts, comparative case study analyses, presentations to faculty, and the formation of a visual argument. Guest speakers and class trips to exhibitions, lectures, and special collections encourage use of Yale's resources.

*** ARCH 491b, Senior Project** Staff

An essay or project in the student's area of concentration. Students in the history, theory, and criticism track or in the urban studies track pursue independent research with an adviser; this project must terminate in a senior essay.

*** ARCH 494b, Senior Project Design Studio** Staff

Individual design investigations, focusing on independence and precision in the deployment of design ideas. Reliance on visual and nonverbal presentations. Development of a three-dimensional component, such as large-scale mock details, or other visual means of presentation, which might include photography, film, video, or interactive media. Examination of the skills, topics, and preparation to support design research. 1½ Course cr

Art

(Drawing, Filmmaking, Graphic Design, Painting, Photography, Printmaking, and Sculpture)

Director of undergraduate studies: Lisa Kereszi, 122 GRN, 432-2600, art.dus@yale.edu; art.yale.edu

Students in the Art major develop an understanding of the visual arts through a studio-based curriculum, apply fundamentals of art across a variety of media and disciplines, relate the practice of making art to the fields of art history and theory, and gain a high level of mastery of at least one artistic discipline. Students may concentrate on a medium such as painting/printmaking, sculpture, graphic design, photography, or filmmaking.

COURSES FOR NONMAJORS AND MAJORS

Courses in Art are open to all undergraduate students. In cases where student demand for entry into a course is greater than can be accommodated, priority will be given to School of Art students and declared Art majors. The director of undergraduate studies and members of the Art faculty will be present for counseling on Tuesday, August 28, 2018 from 10:30 a.m. to 1:30 p.m. adjacent to the School of Art Gallery at Holcombe T. Green, Jr., Hall, 1156 Chapel Street. Students seeking advice about course selection or the program in Art should come at that time. Others wishing to elect Art courses should go to the first meeting of the class, where each instructor will determine the class enrollment. Classes begin on Wednesday, August 29. For courses beginning in the spring term, counseling will be held on Monday, January 14, 2019, from 12 noon to 1:30 p.m. adjacent to the School of Art Gallery; art classes begin on Tuesday, January 15, 2019. All Art majors are required to register with the director of undergraduate studies at the beginning of each term at the time and place listed above in order to be enrolled or to continue in the major.

PREREQUISITES

The prerequisites for acceptance into the major are a sophomore review, which is an evaluation of work from studio courses taken at the Yale School of Art, and five introductory (100-level) term courses. Four of the introductory courses must have been completed at the time of the sophomore review. Visual Thinking (ART 111) and Basic Drawing (ART 114) are mandatory. At the time of the review, the student should be enrolled in the fifth 100-level prerequisite course. In exceptional cases, arrangements for a special review during the junior year may be made with the director of undergraduate studies.

REQUIREMENTS OF THE MAJOR

The Art major requires fourteen term courses, including the following: (1) five prerequisite courses at the 100 level (including Basic Drawing and Visual Thinking); (2) four courses at the 200 level or above; (3) the Junior Seminar (ART 395) or Critical Theory in the Studio (ART 301); (4) the yearlong Senior Project (ART 495 and ART 496); and (5) two term courses in the history of art. Program guidelines and specific requirements for the various areas of concentration are described below.

Areas of concentration Each Art major selects an area of concentration from five possible choices: (1) graphic design, (2) painting/printmaking, (3) photography, (4) sculpture, and (5) filmmaking. Required courses for the *graphic design concentration* include ART 132; ART 264 and 265; ART 368 or ART 369; and ART 468 and 469. The *painting/printmaking concentration* requires ART 116; ART 130 or ART 230 or 231; ART 330 and 331; ART 224 or ART 356; and ART 430. Students in the *photography concentration* take ART 136 or ART 138; ART 237; ART 338 or ART 339; ART 379; and ART 401. The *sculpture concentration* requires ART 110; ART 120 or 121; ART 345 and 346; and ART 445. Required courses for the *filmmaking concentration* include ART 241 and 142; ART 341; ART 342; and ART 442 and 443. Students in the filmmaking concentration may substitute courses in film and media studies for the history of art requirement.

UNIQUE TO THE MAJOR

Summer fellowship Art majors are eligible for the Ellen Battell Stoeckel Fellowship for study at the Yale University Summer School of Music and Art at Norfolk, Connecticut. Applicants for the program must be officially classified as junior Art majors and be returning to Yale for two terms of their senior year. The program awards up to four course credits for work successfully completed. These credits cannot be used toward the requirements of the Art major; however, they may be counted toward the 36-course-credit graduation requirement.

Repeated and outside courses Some Art courses may be repeated for credit, with permission of both the instructor and the director of undergraduate studies. Course credits in studio art earned at other institutions may be applied toward the requirements of the major, at the discretion of the director of undergraduate studies and subject to a faculty review process.

Facilities fees All Art majors are charged a facilities access and user fee of \$200 per term. Additional lab/materials fees are levied in individual courses, as specified at the end of the course description. Lab/materials fees cannot be refunded after the second week of classes.

REQUIREMENTS OF THE MAJOR

Prerequisites Favorable faculty review of work done in studio courses before end of sophomore year; ART 111 and 114; 3 addtl 100-level courses

Number of courses 14 term courses (incl prereqs and yearlong senior project)

Specific course required *All concentrations*—ART 395 or ART 301; *Graphic design*—ART 132, 264, 265; ART 368 or 369; ART 468, 469; *Painting/printmaking*—ART 116; ART 130, 230, or 231; ART 330, 331; ART 224 or 356; ART 430; *Photography*—ART 136 or 138; ART 237; ART 338 or 339, 379, 401; *Sculpture*—ART 110; ART 120 or 121; 345, 346; ART 445; *Filmmaking*—ART 241, 142, 341, 342, 442, 443

Distribution of courses 5 courses at 100 level (incl prereqs); 4 courses at 200 level or above; 2 courses in hist of art

Senior requirement Two-term senior project (ART 495, ART 496)

Substitution permitted *Filmmaking concentration*—2 courses in film & media studies for hist of art req

MEMBERS OF THE SCHOOL OF ART TEACHING IN YALE COLLEGE

Professors Anoka Faruqee, Samuel Messer (*Adjunct*), Robert Storr

Senior Critics Julian Bittiner, Alice Chung, Johannes DeYoung, John Gambell, Barbara Glauber, Jessica Helfand, Pamela Hovland, Christopher Pullman, Douglass Scott, Henk van Assen

Critics Mark Aronson, Yeju Choi, Benjamin Donaldson, Lisa Kereszi, Sandra Luckow, Richard Rose, Laurel Schwulst, Sarah Stevens-Morling, Scott Stowell, Jonathan Weinberg

Lecturers Jonathan Andrews, Sandra Burns, Brent Howard, Sophy Naess, Ted Partin, Elizabeth Tubergen, Alex Valentine, Anahita Vossoughi, Molly Zuckerman-Hartung

Unless otherwise indicated, spring-term classes in Art begin on Tuesday, January 15, 2019.

Introductory Courses

* **ART 004b, Words and Pictures** Halsey Rodman

Introduction to visual narration, the combination of words and pictures to tell a story. Narrative point of view, counternarrative and counterculture, visual satire, personal history, depictions of space and time, and strategies and politics of representation. Sources include illuminated manuscripts, biblical paintings, picture-stories, comic strips, and graphic novels. Enrollment limited to first-year students. Preregistration required; see under First-Year Seminar Program. HU RP

* **ART 006b, Art of the Printed Word** Richard Rose

Introduction to the art and historical development of letterpress printing and to the evolution of private presses. Survey of hand printing; practical study of press operations using antique platen presses and the cylinder proof press. Material qualities of printed matter, connections between content and typographic form, and word/image relationships. Enrollment limited to first-year students. Preregistration required; see under First-Year Seminar Program. HU

* **ART 007b, Art of the Game** Sarah Stevens-Morling

Introduction to interactive narrative through video game programming, computer animation, and virtual filmmaking. Topics include interactive storytelling, video game development and modification, animation, and virtual film production. Students produce a variety of works including web-based interactive narratives, collaboratively built video games, and short game-animated film production (machinima). Enrollment limited to first-year students. Preregistration required; see under First-Year Seminar Program.

* **ART 110a or b, Sculpture Basics** Sandra Burns

Concepts of space, form, weight, mass, and design in sculpture are explored and applied through basic techniques of construction and material, including gluing and fastening, mass/weight distribution, hanging/mounting, and surface/finishing. Hands-on application of sculptural techniques and review of sculptural ideas, from sculpture as a unified object to sculpture as a fragmentary process. The shops and classroom studio are available during days and evenings throughout the week.

Materials fee: \$150. Enrollment limited to 12. Recommended to be taken before ART 120–125. HU RP

*** ART 011a, New Voices in Photography** Matthew Leifheit

An introduction to the landscape of emerging and contemporary voices in the field of photography as contemporary art. Students are exposed to relevant conversations through visits by new and emerging curators, writers, publishers, and dealers as well as rising artists. The program of guests and visits to exhibitions is interlaced with a series of focused discussions and short lectures in the classroom, based on a schedule of assigned and recommended readings by new voices in art criticism and theory. Students read critical responses to photographs in publications both online and in print, and bring sources to share with the class. The course concludes with the production and circulation of a publication on a topic chosen by the class for the community at Yale and perhaps beyond. Enrollment limited to first-year students. Preregistration required; see under First-Year Seminar Program. HU RP

*** ART 012b, On Activism: The Visual Representation of Protest and Disruption**

Pamela Hovland

An introduction to the visual representations of protest, struggle, and revolution in this country from the Vietnam War to the present moment. The course explores a range of historically significant social and political movements, visual (communication) and dissemination strategies, and working methods. The primary goal of this studio-based course is to investigate and expand the designer/artist's ability to express a point of view, transform contemporary understanding of local and national issues through a series of exercises, iterative making and experiments in distribution methods via solo and collaborative work. The students' practice is supported by close readings, independent research, case studies, field trips, and presentations from a diverse collection of people directly involved in activism. Enrollment limited to first-year students. Preregistration required; see under First-Year Seminar Program. HU

*** ART 013a, Temperamental Spaces** Staff

Spaces can sometimes appear as idiosyncratic as the people within them, taking on characteristics we usually ascribe to ourselves. They can appear erratic, comforting, uncanny—even threatening. Working like a therapy session for architecture, the body, and the objects around us, this seminar analyzes a diverse collection of readings and works, ranging from Renaissance mysticism to conceptual art and film, to explore how the visual arts have utilized a productive, but skeptical, relationship with space. Enrollment limited to first-year students. Preregistration required; see under First-Year Seminar Program. HU

*** ART 111a or b, Visual Thinking** Staff

An introduction to the language of visual expression, using studio projects to explore the fundamental principles of visual art. Students acquire a working knowledge of visual syntax applicable to the study of art history, popular culture, and art. Projects address all four major concentrations (graphic design, printing/printmaking, photography, and sculpture). Materials fee: \$25. No prior drawing experience necessary. Open to all undergraduates. Required for Art majors. HU RP

*** ART 114a or b, Basic Drawing** Staff

An introduction to drawing, emphasizing articulation of space and pictorial syntax. Class work is based on observational study. Assigned projects address fundamental

technical and conceptual problems suggested by historical and recent artistic practice. No prior drawing experience required. Materials fee: \$25. Open to all undergraduates. Required for Art majors. HU RP

*** ART 116b, Color Practice** Anna Betbeze

Study of the interactions of color, ranging from fundamental problem solving to individually initiated expression. The collage process is used for most class assignments. Materials fee: \$75. HU RP

ART 120b, Introduction to Sculpture: Wood Elizabeth Tubergen

Introduction to wood and woodworking technology through the use of hand tools and woodworking machines. The construction of singular objects; strategies for installing those objects in order to heighten the aesthetic properties of each work. How an object works in space and how space works upon an object. Materials fee: \$75.00. Prerequisite: ART 110. HU

ART 121a, Introduction to Sculpture: Metal Brent Howard

Introduction to working with metal through examination of the framework of cultural and architectural forms. Focus on the comprehensive application of construction in relation to concept. Instruction in welding and general metal fabrication. Ways in which the meaning of work derives from materials and the form those materials take. Materials fee: \$75.00. Prerequisite: ART 110. HU

*** ART 130a or b, Painting Basics** Staff

A broad formal introduction to basic painting issues, including the study of composition, value, color, and pictorial space. Emphasis on observational study. Course work introduces students to technical and historical issues central to the language of painting. Materials fee: \$75. Recommended for non-majors and art majors. HU RP

*** ART 132a or b, Introduction to Graphic Design** Staff

A studio introduction to visual communication, with emphasis on the visual organization of design elements as a means to transmit meaning and values. Topics include shape, color, visual hierarchy, word-image relationships, and typography. Development of a verbal and visual vocabulary to discuss and critique the designed world. Materials fee: \$150. HU RP

*** ART 136a or b, Capturing Light with Black and White Photography** Staff

An introductory course in black-and-white photography concentrating on the use of 35mm cameras. Topics include the lensless techniques of photograms and pinhole photography; fundamental printing procedures; and the principles of film exposure and development. Assignments encourage the variety of picture-forms that 35mm cameras can uniquely generate. Student work is discussed in regular critiques. Readings examine the invention of photography and the flâneur tradition of small-camera photography as exemplified in the work of artists such as Henri Cartier-Bresson, Helen Levitt, Robert Frank, and Garry Winogrand. Materials fee: \$150. HU RP

*** ART 138a or b, Seeing in Color With Digital Photography** Staff

An introductory exploration of the transition of photographic processes and techniques into digital formats. Students produce original work using a digital camera. Introduction to a range of tools including color correction, layers, making selections, and inkjet printing. Assignments include weekly critiques and a final project. Materials fee: \$150. HU RP

* **ART 142a or b / FILM 162a or b, Introductory Documentary Filmmaking** Sandra Luckow

The art and craft of documentary filmmaking. Basic technological and creative tools for capturing and editing moving images. The processes of research, planning, interviewing, writing, and gathering of visual elements to tell a compelling story with integrity and responsibility toward the subject. The creation of nonfiction narratives. Issues include creative discipline, ethical questions, space, the recreation of time, and how to represent "the truth." Materials fee: \$150. RP

* **ART 145a or b, Introduction to Digital Video** Staff

Introduction to the formal principles and basic tools of digital video production. Experimental techniques taught alongside traditional HD camera operation and sound capture, using the Adobe production suite for editing and manipulation. Individual and collaborative assignments explore the visual language and conceptual framework for digital video. Emphasis on the spatial and visual aspects of the medium rather than the narrative. Screenings from video art, experimental film, and traditional cinema. Materials fee: \$150. RP

* **ART 184b, 3D Modeling for Creative Practice** Justin Berry

Through creation of artwork, using the technology of 3D modeling and virtual representation, students develop a framework for understanding how experiences are shaped by emerging technologies. Students create forms, add texture, and illuminate with realistic lights; they then use the models to create interactive and navigable spaces in the context of video games and virtual reality, or to integrate with photographic images. Focus on individual project development and creative exploration. Frequent visits to Yale University art galleries. Materials fee: \$150. RP

ART 185a, Principles of Animation Johannes DeYoung

The physics of movement in animated moving-image production. Focus on historical and theoretical developments in animation of the twentieth and twenty-first centuries as frameworks for the production of animated film and visual art. Classical animation and digital stop-motion; fundamental principles of animation and their relation to traditional and digital technologies. Materials fee: \$150. RP

Intermediate Courses

[**ART 202, Feminist Theory and Feminist Art**]

[**ART 210, Sculpture as Object**]

* **ART 223a and ART 224b, Figure Drawing** Mark Gibson

A study of the human figure, using a range of approaches. Emphasis on observation, anatomy, and spatial structure. Historical examples from cave painting to contemporary art. Materials fee: \$75 per term. RP

* **ART 224b, Figure Drawing** Samuel Messer

A study of the human figure, using a range of approaches. Emphasis on observation, anatomy, and spatial structure. Historical examples from cave painting to contemporary art. Materials fee: \$75 per term. ART 114 or equivalent. RP

* **ART 235b / THST 235b, Dance Theater** Irene Hultman Monti

A practical and theoretical survey of dance theater history. Introduction to movement vocabularies, physical techniques, and repertoire from post-1950 modern and postmodern dance theater. Open to students of all levels and majors. HU

* **ART 237a, Visual Voice in Analog Photography** Lisa Kereszi

A class in black-and-white photography extending the concerns of ART 136. Introduction to the use of medium-format cameras. Specialized topics include night photography, the use of flash, developing roll film, basic digital scanning, and grayscale printing techniques. Survey of the rich tradition of handheld photography and the production of artists such as Lartigue, Brassai, Diane Arbus, Lee Friedlander, and Robert Adams. Materials fee: \$150. Prerequisite: ART 136 or equivalent. HU RP

* **ART 241b / FILM 161b, Introductory Film Writing and Directing** Sandra Luckow

Problems and aesthetics of film studied in practice as well as in theory. In addition to exploring movement, image, montage, point of view, and narrative structure, students photograph and edit their own short videotapes. Emphasis on the writing and production of short dramatic scenes. Priority to majors in Art and in Film & Media Studies. Materials fee: \$150. Prerequisite for all majors: ART 142; additional prerequisite for Film & Media Studies majors: FILM 150. RP

* **ART 264a, Typography: Shape, Hierarchy, and Organization** Alice Chung

An intermediate graphic-design course in the fundamentals of typography, with emphasis on ways in which typographic form and visual arrangement create and support content. Focus on designing and making books, employing handwork, and computer technology. Typographic history and theory discussed in relation to course projects. Materials fee: \$150. Prerequisite: ART 132. RP

* **ART 265b, Typography: Expression, Structure, and Sequence** Henk Van Assen

Continued studies in typography, incorporating more advanced and complex problems. Exploration of grid structures, sequentiality, and typographic translation, particularly in the design of contemporary books, and screen-based kinetic typography. Relevant issues of design history and theory discussed in conjunction with studio assignments. Materials fee: \$150. Prerequisite: ART 264. RP

* **ART 285b, Digital Animation** Johannes DeYoung

Introduction to the principles, history, and practice of animation in visual art and film. Historical and theoretical developments in twentieth- and twenty-first-century animation used as a framework for making digital animation. Production focuses on digital stop-motion and compositing, as well as 2-D and 3-D computer-generated animation. Workshops in relevant software. Materials fee: \$150. Prerequisites: ART 111, 114, or 145, and familiarity with Macintosh-based platforms. RP

* **ART 301b, Critical Theory in the Studio** Jonathan Weinberg

Key concepts in modern critical theory as they aid in the analysis of creative work in the studio. Psychoanalysis, Marxism, feminism, structuralism, and poststructuralism examined in relation to modern and contemporary movements in the visual arts, including cubism, surrealism, Arte Povera, pop, minimalism, conceptual art, performance art, the Pictures group, and the current relational aesthetics movement. Materials fee: \$25. HU RP

*** ART 324b, Painting Materials and Methods** Staff

An introduction to historical materials and methods of painting. Students examine masterworks in the Yale Art Gallery and the Center for British Art, and explore observed techniques in their own painting. Techniques include quick-drying indirect tempera, slow-drying and layered oil painting, and the modernist direct application of paint; supports include wood, canvas, paper, and metal. Materials fee \$75. Prerequisite: ART 114 or 130 or permission of instructor. RP

*** ART 331b, Intermediate Painting** Sophia Naess

Further exploration of concepts and techniques in painting, emphasizing the individuation of students' pictorial language. Various approaches to representational and abstract painting. Studio work is complemented by in-depth discussion of issues in historical and contemporary painting. Materials fee: \$150 per term. Prerequisite: ART 130, 230, 231, or permission of instructor. RP

ART 332a, Painting Time Samuel Messer

Painting techniques paired with conceptual ideas that explore how painting holds time both metaphorically and within the process of creating a work. Use of different Yale locations as subjects for observational on-site paintings. Materials fee: \$75. Prerequisite: ART 130, 230, or 231, or with permission of instructor. HU RP

*** ART 337a, Visualizing Identities in Race, Gender, Class, and Queerness** Ka-Man Tse

Photographic investigation of the politics of visibility and intersectionality, the social processes in which identities are formed and revised. Exploration of the constructions of race, gender, sexual orientation, nationality, citizenship, ethnicity, religion, and class. Students study problems through photography, including concepts of identity and the construction of identities; how some identities appear invisible, visible, or super-visible; and which identities speak authentically and also universally. Materials fee: \$150. Prerequisites: ART 136, ART 138, or equivalent. HU RP

ART 338b, Contemporary Problems in Color with Digital Photography Ka-Man Tse

Exploration of both the technical and conceptual aspects of digital photography. Range of tools includes advanced film scanning, working with RAW files, masks, compositing and grayscale, and color inkjet printing. Students produce original work, with special attention to ways in which their technical decisions can clarify their artistic intentions. Materials fee: \$150. Prerequisite: ART 138. RP

ART 341b / FILM 355b, Intermediate Film Writing and Directing Jonathan Andrews

In the first half of the term, students write three-scene short films and learn the tools and techniques of staging, lighting, and capturing and editing the dramatic scene. In the second half of the term, students work collaboratively to produce their films. Focus on using the tools of cinema to tell meaningful dramatic stories. Materials fee: \$150. Enrollment limited to 8. Priority to majors in Art and in Film & Media Studies. Prerequisites: ART 241. RP

ART 342a / FILM 356a, Intermediate Documentary Filmmaking Sandra Luckow

Students explore the storytelling potential of the film medium by making documentary art. The class concentrates on finding and capturing intriguing, complex scenarios in the world and then adapting them to the film form. Questions of truth, objectivity, style, and the filmmaker's ethics are considered using examples of students' work. Exercises in storytelling principles. Materials fee: \$150. Limited enrollment. Priority to

majors in Art and in Film & Media Studies. Prerequisites: ART 141 or 142, and FILM 150. HU RP

ART 346a, Dematerial/Material Elizabeth Tubergen

Exploration of questions and topics pertinent to contemporary sculpture through making, writing, reading, looking, critique, discussions, and field trips. Projects become increasingly self-directed as students develop relationships to materials, techniques, and ideas both familiar and new. Limited enrollment. Materials fee: \$75. Prerequisite: ART 120, 121, 122, or equivalent; or with permission of instructor. RP

[ART 348, Body, Space, and Time]

[ART 355, Silkscreen Printing]

ART 356a, Printmaking I Staff

An introduction to intaglio (dry point and etching), relief (woodcut), and screen printing (stencil), as well as to the digital equivalents of each technique, including photo screen printing, laser etching, and CNC milling. How the analog and digital techniques inform the outcome of the printed image, and ways in which they can be combined to create more complex narratives. Materials fee: \$150. Prerequisite: ART 114 or equivalent. RP

[ART 359, Lithography]

* **ART 368a or b, Graphic Design Methodologies** Staff

Various ways that design functions; how visual communication takes form and is recognized by an audience. Core issues inherent in design: word and image, structure, and sequence. Analysis and refinement of an individual design methodology. Attention to systematic procedures, techniques, and modes of inquiry that lead to a particular result. Materials fee: \$150. Prerequisites: ART 132 and 264, or permission of instructor. RP

* **ART 369b, Interactive Design and the Internet** Laurel Schwulst

In this studio course, students create work within the web browser to explore where the internet comes from, where it is today, and where it's going—recognizing that there is no singular history, present, or future, but many happening in parallel. The course in particular focuses on the internet's impact on art—and vice versa—and how technological advance often coincides with artistic development. Students will learn foundational, front-end languages HTML, CSS, and JavaScript in order to develop unique graphic forms for the web that are considered alongside navigation, pacing, and adapting to variable screen sizes and devices. Open to Art majors. No prior programming experience required. Materials fee: \$150. Prerequisite: ART 132 or permission of instructor. RP

ART 370a, Communicating with Time, Motion, and Sound Christopher Pullman

A studio class that explores how the graphic designer's conventions of print typography and the dynamics of word-image relationship change with the introduction of time, motion, and sound. Projects focus on the controlled interaction of words and images to express an idea or tell a story. The extra dimensions of time-based communications; choreography of aural and visual images through selection, editing, and juxtaposition. Materials fee: \$150. Prerequisite: ART 265; ART 368 recommended. RP

* **ART 379b, Form For Content With the View Camera** Benjamin Donaldson
An opportunity for experienced photography students to become involved with the technical aspects of the medium. Concentrated study of view camera operations; techniques in added lighting and advanced printing; scanning and printing of negatives; discussion of historic photographic traditions. Student work is discussed in regular critiques. Previous digital training may be employed, but focus is primarily analog. Materials fee: \$150. Prerequisite: ART 237 or permission of instructor. RP

* **ART 386a / THST 402a, Experimental Writing and Performance** Emily Coates and Elise Morrison

A practical and theoretical exploration of formal experiments in writing as means of creating and analyzing contemporary performance. The course considers a broad range of written forms, including the artist-essayist, performative writing, writing for virtual and blended reality scenarios, and ethnographic and experimental writing for performance. Guest artists and field trips to see performances augment class time. Admission is by application, with a writing sample included. WR, HU

* **ART 395a, Junior Seminar** Jonathan Weinberg

Ongoing visual projects addressed in relation to historical and contemporary issues. Readings, slide presentations, critiques by School of Art faculty, and gallery and museum visits. Critiques address all four areas of study in the Art major. Prerequisite: at least four courses in Art. HU RP

Advanced Courses

* **ART 401a or b, Advanced Project in Photography** Staff

An exploration of the practice of photography, either analog or digital. Student work is discussed in regular critiques, and lectures are framed around the aesthetic concerns that the work provokes. Materials fee: \$150. Prerequisites: ART 379 and, for those working digitally, ART 138. Required for Art majors concentrating in photography. RP

[ART 430, Advanced Painting Studio]

ART 433b, Painting Studio: Space and Abstraction Molly Zuckerman-Hartung
A course for intermediate and advanced painting students, exploring historical and contemporary issues in abstract painting including geometric, optical, material, and gestural abstraction. Studio work is complemented by in-depth study of flatness, depth, color, authorship and expression. After guided assignments, ultimate emphasis will be on self-directed projects. May be taken more than once. Materials fee: \$75 per term. Prerequisites: ART 230 and one course from ART 331, 332, or 342, or with permission of instructor. HU RP

ART 434a / ART 432, Drawing Studio: Art of the Graphic Novel Mark Gibson
A course for intermediate and advanced drawing students exploring historical and contemporary issues in drawing through the narrative of the graphic novel. Studio work is complemented by in-depth study of illustration, subjectivity, memory, and imagination. After guided assignments, ultimate emphasis is on self-directed projects that will be combined into a graphic novel. May be taken more than once. Materials fee: \$75 per term Prerequisite: ART 230 and ART 223 or ART 114, or permission of instructor. RP

*** ART 442a and ART 443b / FILM 483a and FILM 484b, Advanced Film Writing and Directing** Jonathan Andrews

A yearlong workshop designed primarily for majors in Art and in Film & Media Studies making senior projects. Each student writes and directs a short fiction film. The first term focuses on the screenplay, production schedule, storyboards, casting, budget, and locations. In the second term students rehearse, shoot, edit, and screen the film. Materials fee: \$150. Enrollment limited to 8. Priority to majors in Art and in Film & Media Studies. Prerequisite: ART 341.

ART 443b / FILM 484b, Advanced Film Writing and Directing Jonathan Andrews
A yearlong workshop designed primarily for majors in Art and in Film & Media Studies making senior projects. Each student writes and directs a short fiction film. The first term focuses on the screenplay, production schedule, storyboards, casting, budget, and locations. In the second term students rehearse, shoot, edit, and screen the film. Materials fee: \$150. Enrollment limited to 8. Priority to majors in Art and in Film & Media Studies. Prerequisite: ART 341.

*** ART 450a / ART 449, Interiors as Cinema** Corey McCorkle

This class is an extension of 'Landscape as Cinema' and reconsiders both the 'studio' in the history of the moving image and our understanding of 'interiors' as described by film. The Black Maria, the first motion picture studio in the United States, was invented by Thomas Edison in 1893. This tar-papered 'studio' looked like a small house, and would be rotated by horse to catch the best light of the day for filming therein. This unfixed interior at the origin of the moving image is our chimerical inspiration throughout the semester. After a semester long investigation involving the intense analysis of the moving image in general, our final collective project involves reconstructing this particular site (the studio) and shooting something therein. Students should be somewhat fluent in visual and narrative history; film expertise is not required.

*** ART 457b, Interdisciplinary Printmaking** Alexander Valentine

An in-depth examination of planographic techniques, including screen printing, lithography, and digital pigment printing. Relationships to more dimensional forms of printing such as collography, embossment, vacuum bag molding, and 3D printing. Creation of editions as well as unique objects, focusing on both individual techniques and creating hybrid forms. Materials fee: \$150. Recommended for Art majors to be taken concurrently with ART 324 or 433. at least one term of printmaking. RP

ART 468a, Advanced Graphic Design: Series and Systems Henk Van Assen

A probe into questions such as how an artist can be present as an idiosyncratic individual in his or her work, and how that work can still communicate on its own to a broad audience. Concentration on making graffiti, i.e., the design of a set of outdoor marks and tours for New Haven. A technological component is included, both in the metaphor of designing outdoor interaction as a way to learn about screen-based interaction and in the final project to design an interface for a handheld computer. Materials fee: \$150 per term. Prerequisites: ART 264 or 265, and 367 or 368, or permission of instructor. RP

* **ART 469b, Advanced Graphic Design: History, Editing, and Interpretation** Julian Bittiner

A probe into questions such as how an artist can be present as an idiosyncratic individual in his or her work, and how that work can still communicate on its own to a broad audience. Concentration on making graffiti, i.e., the design of a set of outdoor marks and tours for New Haven. A technological component is included, both in the metaphor of designing outdoor interaction as a way to learn about screen-based interaction and in the final project to design an interface for a handheld computer. Materials fee: \$150 per term. Prerequisites: ART 264 or 265, and 367 or 368, or permission of instructor. RP

* **ART 471a and ART 472b, Independent Projects** Staff

Independent work that would not ordinarily be accomplished within existing courses, designed by the student in conjunction with a School of Art faculty member. A course proposal must be submitted on the appropriate form for approval by the director of undergraduate studies and the faculty adviser. Expectations of the course include regular meetings, end-of-term critiques, and a graded evaluation. RP

* **ART 495a, Senior Project I** Henk Van Assen

A project of creative work formulated and executed by the student under the supervision of an adviser designated in accordance with the direction of the student's interest. Proposals for senior projects are submitted on the appropriate form to the School of Art Undergraduate Studies Committee (USC) for review and approval at the end of the term preceding the last resident term. Projects are reviewed and graded by an interdisciplinary faculty committee made up of members of the School of Art faculty. An exhibition of selected work done in the project is expected of each student. RP

* **ART 496b, Senior Project II** Lisa Kereszi

A project of creative work formulated and executed by the student under the supervision of an adviser designated in accordance with the direction of the student's interest. Proposals for senior projects are submitted on the appropriate form to the School of Art Undergraduate Studies Committee (USC) for review and approval at the end of the term preceding the last resident term. Projects are reviewed and graded by an interdisciplinary faculty committee made up of members of the School of Art faculty. An exhibition of selected work done in the project is expected of each student.

Astronomy

Director of undergraduate studies: Greg Laughlin, 46 HLH 208, 436-9405, astro.dus@yale.edu (greg.laughlin@yale.edu); astronomy.yale.edu

Astronomy is a quantitative physical science that applies physics, mathematics, and statistical analysis to observing, describing, and modeling the universe. The undergraduate courses and degree programs offered by the Department of Astronomy train students in research techniques and quantitative reasoning and develop creative problem solvers. Students who complete the major continue on to top-tier graduate programs in astrophysics or related science fields, and they are sought after by employers in a range of fields from health care management to the banking and investment industry. The department offers a B.A. degree in Astronomy and a B.S. degree in Astrophysics.

INTRODUCTORY COURSES

Introductory courses with no prerequisites The department offers a variety of courses without prerequisites that provide an introduction to astronomy with particular attention to recent discoveries and theories. Courses numbered below 150 are intended for students who desire a broad, nontechnical introduction to astronomy. These courses fulfill the science distributional requirement, and some also fulfill the quantitative reasoning distributional requirement.

Courses with numbers from 150 to 199 are topical rather than survey courses. Most of these offerings fulfill both the science and the quantitative reasoning requirements. ASTR 155 is a laboratory course that provides a hands-on introduction to astronomical observing. ASTR 160 and 170 provide an introduction to frontier topics in modern astrophysics and cosmology.

Introductory courses with high school calculus and physics prerequisites Students who have taken calculus and physics in high school may enroll in quantitative introductory courses. ASTR 210 and ASTR 220 focus on fundamental measurements and tools used in astronomy and include an in-depth study of stellar astrophysics (ASTR 210) or galaxies and cosmology (ASTR 220). These courses overlap in content, so students should take either ASTR 210 or 220 but not both. ASTR 255 provides training in data analysis and research techniques, including computer programming and numerical and statistical analysis.

PREREQUISITES

B.A. degree program The prerequisites for the B.A. degree are PHYS 170 and 171, or 180 and 181, or 200 and 201, and MATH 112 and 115.

B.S. degree program Prerequisites for the B.S. degree include an introductory physics sequence (PHYS 180 and 181, or 200 and 201, or 260 and 261); a physics laboratory sequence (PHYS 165L and 166L, or 205L and 206L); and the mathematics sequence MATH 112, 115, and either MATH 120 or ENAS 151. ASTR 155 may be substituted for one term of the physics laboratory sequence. All prerequisites should be completed by the end of the sophomore year.

Prerequisites for advanced electives Courses numbered 300 and above are more specialized and intensive. The prerequisites for these courses include ASTR 210 or 220, multivariable calculus, and two terms of introductory college physics.

REQUIREMENTS OF THE MAJOR

B.A. degree program The B.A. degree program in Astronomy is designed for students who do not plan to continue in a graduate program in astronomy, but who are interested in the subject as a basis for a liberal arts education or as a physical science background to careers such as medicine, teaching, journalism, business, law, or government. It allows greater flexibility in course selection than the B.S. program because the emphasis is on breadth of knowledge rather than on specialization.

Ten courses are required beyond these prerequisites, including either ASTR 210 or 220, ASTR 255, 310, one additional Astronomy elective numbered 150 or above, and the senior requirement (ASTR 492). Two of the ten courses must be advanced courses in mathematics, such as MATH 120 or ENAS 151, or courses in mathematical methods, including statistics or computer science, such as CPSC 112, MATH 200 or above, or ASTR 356. Three electives can be drawn from any of the natural, applied, or mathematical sciences (including additional astronomy courses); at least two of these must be advanced enough to have college-level prerequisites.

B.S. degree program The B.S. degree program in Astrophysics is designed to provide a strong foundation in astrophysics for students interested in graduate study or a career in astronomy, physics, or a related science.

Beyond the prerequisites, twelve term courses are required in astronomy, physics, and mathematics. Students complete at least six courses in astronomy, including either ASTR 210 or 220, 255, 310, 320, and a two-term senior project (ASTR 490 and 491). Students also complete three Physics courses numbered 400 or above, normally PHYS 401, 402, and 439. In addition, majors choose either one additional 400-level course in Physics or an Astronomy elective numbered 300 or higher. In mathematics, students complete a course in differential equations selected from MATH 246, PHYS 301, or ENAS 194, and either an additional mathematics course numbered 200 or above or a course in statistics or computing such as CPSC 112, 201, or ASTR 356.

Credit/D/Fail Courses taken Credit/D/Fail may not be counted toward the requirements of either degree program.

SENIOR REQUIREMENT

B.A. degree program The senior requirement consists of a senior essay or independent research project carried out for one term in ASTR 492 under the supervision of a faculty member.

B.S. degree program The senior requirement consists of an independent research project in astronomy carried out for two terms in ASTR 490 and 491 under the supervision of a faculty member.

ADVISING

Before entering the junior year, students must obtain approval of a course of study from the director of undergraduate studies.

Graduate work Graduate courses in astronomy are open to qualified undergraduates who already have a strong preparation in mathematics, physics, and astronomy. Students wishing to take a graduate course must first obtain the permission of the instructor and of the director of graduate studies.

REQUIREMENTS OF THE MAJOR

ASTRONOMY, B.A.

Prerequisites PHYS 170, 171, or 180, 181, or 200, 201; MATH 112, 115

Number of courses 10 courses beyond prereqs, incl senior req

Specific courses required ASTR 210 or 220; ASTR 255, 310

Distribution of courses 1 astronomy elective numbered 150 or above; 2 advanced math courses; 3 science electives (may include addtl astronomy courses), at least 2 with college-level prereqs

Senior requirement Senior essay or senior research project (ASTR 492)

ASTROPHYSICS, B.S.

Prerequisites PHYS 180, 181, or 200, 201, or 260, 261; PHYS 165L, 166L, or 205L, 206L; MATH 112, 115; MATH 120 or ENAS 151

Number of courses 12 courses beyond prereqs, incl senior req

Specific courses required ASTR 210 or 220; 255, 310, 320

Distribution of courses 3 courses in physics numbered 400 or above; 1 addtl upper-level course in astronomy or physics; 2 courses in math or mathematical methods, as specified

Substitution permitted ASTR 155 for 1 term of physics lab prereq

Senior requirement Senior independent research project (ASTR 490 and 491)

FACULTY OF THE DEPARTMENT OF ASTRONOMY

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

Associate Professors Hector Arce, †Daisuke Nagai, †Nikhil Padmanabhan, Frank van den Bosch

Lecturer Michael Faison

†A joint appointment with primary affiliation in another department.

Courses

* **ASTR 030b, Search for Extraterrestrial Life** Michael Faison

Introduction to the search for extraterrestrial life. Review of current knowledge on the origins and evolution of life on Earth; applications to the search for life elsewhere in the universe. Discussion of what makes a planet habitable, how common these worlds are in the universe, and how we might search for them. Survey of past, current, and future searches for extraterrestrial intelligence. Enrollment limited to first-year students. Preregistration required; see under First-Year Seminar Program. WR, SC

ASTR 105a, The Earth in its Cosmic Context Gregory Laughlin

Study of the formation, evolution, and history of Earth, its solar system, and its role in a larger cosmic context. Consideration of thousands of other recently discovered

planetary systems; the role of life in shaping the Earth and its environment; and the consequences of human activity from a systems perspective. SC

ASTR 110a, Planets and Stars Robert Zinn

An introduction to stars and planetary systems. Topics include the solar system and extrasolar planets, planet and stellar formation, and the evolution of stars from birth to death. No prerequisite other than a working knowledge of elementary algebra. QR, SC

ASTR 120b, Galaxies and the Universe Jeffrey Kenney

An introduction to stars and stellar evolution; the structure and evolution of the Milky Way galaxy and other galaxies; quasars, active galactic nuclei, and supermassive black holes; cosmology and the expanding universe. No prerequisite other than a working knowledge of elementary algebra. QR, SC

ASTR 130a, Origins and the Search for Life in the Universe Debra Fischer

Origins of the universe, stars, and planets; evolution of conditions that were conducive to the emergence of life on Earth; leading theories for the origin of life; the discovery of exoplanets; comparison of Earth's solar system with other systems that have been discovered; the possibility of habitable conditions where life might have arisen on other worlds; methods of searching for life elsewhere. No prerequisite other than a working knowledge of elementary algebra. SC

[**ASTR 135, Archaeoastronomy**]

ASTR 156b / ENAS 156b, Introduction to Digital Dome Media Staff

The design and production of planetarium shows, art projects, or other immersive or interactive projects with a digital dome projection system, including the ScidomeHD digital system and the stereo projector system, both located at the Leitner Family Observatory and Planetarium (LFOP) and with the portable Starlab dome. Topics include real-time and scripted control of 3D graphics engines; mapping of images and video onto a spherical dome; 3D rendering using Blender, Processing, and vpython; audio and video editing for dome content; interactive projects; and basic design principles for narrative and interactive educational shows. Some programming or digital media experience is recommended. SC ½ Course cr

ASTR 160b, Frontiers and Controversies in Astrophysics Debra Fischer

A detailed study of three fundamental areas in astrophysics that are currently subjects of intense research and debate: planetary systems around stars other than the sun; pulsars, black holes, and the relativistic effects associated with them; and the age and ultimate fate of the universe. No prerequisite other than a working knowledge of elementary algebra. QR, SC

[**ASTR 170, Introduction to Cosmology**]

ASTR 180b, Introduction to Relativity Charles Bailyn

Introduction to the theories of special and general relativity, and to relativistic astrophysics. Topics include time dilation and length contraction; mass-energy equivalence; space-time curvature; black holes; wormholes; pulsars; quasars; gravitational waves; Hawking radiation. For students not majoring in the physical sciences; some previous acquaintance with high-school physics and/or calculus may be helpful, but is not required. QR, SC

ASTR 210b, Stars and Their Evolution Robert Zinn

Foundations of astrophysics, focusing on an intensive introduction to stars. Nuclear processes and element production, stellar evolution, stellar deaths and supernova explosions, and stellar remnants including white dwarfs, neutron stars, and black holes. A close look at our nearest star, the sun. How extrasolar planets are studied; the results of such studies. Prerequisite: a strong background in high school calculus and physics. May not be taken after ASTR 220. QR, SC

[ASTR 220, Galaxies and Cosmology]**ASTR 255b / PHYS 295b, Research Methods in Astrophysics** Marla Geha

The acquisition and analysis of astrophysical data, including the design and use of ground- and space-based telescopes, computational manipulation of digitized images and spectra, and confrontation of data with theoretical models. Examples taken from current research at Yale and elsewhere. Use of the Python programming language. A background in high school calculus and physics. No previous programming experience required. QR, SC RP

ASTR 310a, Galactic and Extragalactic Astronomy Jeffrey Kenney

Structure of the Milky Way galaxy and other galaxies; stellar populations and star clusters in galaxies; gas and star formation in galaxies; the evolution of galaxies; galaxies and their large-scale environment; galaxy mergers and interactions; supermassive black holes and active galactic nuclei. Prerequisites: MATH 115, PHYS 201, and ASTR 210 or 220, or equivalents, or with permission of instructor. QR, SC

ASTR 320b, Physical Processes in Astronomy Franciscus van den Bosch

Introduction to the physics required for understanding current astronomical problems. Topics include basic equations of stellar structure, stellar and cosmic nucleosynthesis, radiative transfer, gas dynamics, and stellar dynamics. Numerical methods for solving these equations. Prerequisites: MATH 120 and PHYS 201 or equivalents, or permission of instructor. Previous experience with computer programming recommended. Taught in alternate years. QR, SC

[ASTR 343, Gravity, Astrophysics, and Cosmology]**[ASTR 355, Observational Astronomy]***** ASTR 356a / PHYS 356a, Astrostatistics and Data Mining** Hector Arce

Introduction to the statistical tools used to analyze and interpret astrophysical data, including common data mining techniques for finding patterns in large data sets and data-based prediction methods. Use of publicly available high-quality astronomical data from large surveys such as SDSS and 2MASS, and from space-based observatories such as Spitzer, Herschel, and WISE. Coding with the Python programming language. Prerequisite: ASTR 255 or equivalent. QR, SC

ASTR 360b, Interstellar Matter and Star Formation Hector Arce

The composition, extent, temperature, and density structure of the interstellar medium (ISM). Excitation and radiative processes; the properties of dust; the cold and hot ISM in the Milky Way and other galaxies. Dynamics and evolution of the ISM, including interactions between stars and interstellar matter. Physics and chemistry of molecular clouds and the process of star formation. Prerequisites: MATH 120 and PHYS 201 or equivalents. Taught in alternate years. QR, SC RP

[**ASTR 375, Exoplanets**][**ASTR 380, Stellar Populations**][**ASTR 385, Introduction to Radio Astronomy**][**ASTR 418, Stellar Dynamics**]**ASTR 420a, Computational Methods for Astrophysics** Paolo Coppi

The analytic, numerical, and computational tools necessary for effective research in astrophysics and related disciplines. Topics include numerical solutions to differential equations, spectral methods, and Monte Carlo simulations. Applications to common astrophysical problems including fluids and N-body simulations. Prerequisites: ASTR 320, MATH 120, 222 or 225, and 246. QR RP

[**ASTR 430, Galaxies**]**ASTR 450a, Stellar Astrophysics** Sarbani Basu

The physics of stellar atmospheres and interiors. Topics include the basic equations of stellar structure, nuclear processes, stellar evolution, white dwarfs, and neutron stars. Prerequisites: PHYS 201 and MATH 120. Taught in alternate years. QR, SC

ASTR 465b, 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. Prerequisites: MATH 120, PHYS 201, and one astronomy course numbered above 200. Taught in alternate years. QR, SC RP

* **ASTR 471a and ASTR 472b, Independent Project in Astronomy** Gregory Laughlin

Independent project supervised by a member of the department with whom the student meets regularly. The project must be approved by the instructor and by the director of undergraduate studies; the student is required to submit a complete written report on the project at the end of the term.

* **ASTR 490a and ASTR 491b, The Two-Term Senior Project** Gregory Laughlin

A two-term independent research project to fulfill the senior requirement for the B.S. degree. The project must be supervised by a member of the department and approved by the director of undergraduate studies.

* **ASTR 492a or b, The One-Term Senior Project** Gregory Laughlin

A one-term independent research project or essay to fulfill the senior requirement for the B.A. degree. The project must be supervised by a member of the department and approved by the director of undergraduate studies.

Biology

Program coordinators: Samantha Lin (samantha.lin@yale.edu) and Julie Park (julie.park@yale.edu)

Yale offers four different biological science majors: Ecology and Evolutionary Biology (E&EB); Molecular Biophysics and Biochemistry (MB&B); Molecular, Cellular, and Developmental Biology (MCDB); and Neuroscience (NSCI). The distinctions between these majors reflect the types of biological systems analysis each represents: the analysis of whole organisms, populations, and ecosystems (E&EB); the analysis of life at the molecular level using tools of chemistry and physics (MB&B); the analysis of molecular, cellular, and developmental biology, genetics, neurobiology, and quantitative biology (MCDB); and the analysis of neurons, neural circuits, brains, and behavior, using a wide range of approaches (NSCI).

Altogether, these approaches cover the vast breadth of disciplines in the biological sciences. The courses BIOL 101–104 are designed as entry points to all four programs in the biological sciences. The prerequisites for the four majors are similar, so students need not commit to a specific major in their first year. Students who wish to major in any of the four bioscience tracks (E&EB, MB&B, MCDB, and NSCI) must complete all four modules.

For information on the major requirements, course offerings, and departmental faculty of the biological sciences programs, see under Ecology and Evolutionary Biology (p. 261), Molecular Biophysics and Biochemistry (p. 549), Molecular, Cellular, and Developmental Biology (p. 558), and Neuroscience.

Courses

BIOL 101a or b, Biochemistry and Biophysics Staff

The study of life at the molecular level. Topics include the three-dimensional structures and function of large biological molecules, the human genome, and the design of antiviral drugs to treat HIV/AIDS. The first of four modules in a yearlong foundational biology sequence; meets for the first half of the term. SC ½ Course cr

BIOL 102a or b, Principles of Cell Biology and Membrane Physiology Staff

The study of cell biology and membrane physiology. Topics include organization and functional properties of biological membranes, membrane physiology and signaling, rough endoplasmic reticulum and synthesis of membrane/secretory membrane proteins, endocytosis, the cytoskeleton, and cell division. The second of four modules in a yearlong foundational biology sequence; meets for the second half of the term. Prerequisite: BIOL 101. SC ½ Course cr

BIOL 103a or b, Genetics and Development Staff

Foundation principles for the study of genetics and developmental biology. How genes control development and disease; Mendel's rules; examples of organ physiology. The third of four modules in a yearlong foundational biology sequence; meets for the first half of the term. Prerequisites: BIOL 101 and 102. SC ½ Course cr

BIOL 104a or b, Principles of Ecology and Evolutionary Biology Staff

The study of evolutionary biology, animal behavior, and the history of life. Evolutionary transitions and natural selection. Adaptation at genic, chromosomal,

cellular, organismal, and supra-organismal levels. Distributional and social consequences of particular suites of organismal adaptations. The fourth of four modules in a yearlong foundational biology sequence; meets for the second half of the term. Prerequisites: BIOL 101, 102, and 103. SC ½ Course cr

Biomedical Engineering

Director of undergraduate studies: James Duncan, N309 D TAC, 785-2427, 313 MEC, 432-9917, james.duncan@yale.edu; seas.yale.edu/departments/biomedical-engineering

Engineering methods and strategies are used to address biomedical problems ranging from studies of physiological function using images to the development of artificial organs and new biomaterials. The B.S. degree in Biomedical Engineering is designed to provide students with an understanding of common fundamental methodologies and the ability to develop quantitative approaches to one of four biomedical engineering tracks: Bioimaging, Biomechanics and Mechanobiology, Biomolecular Engineering, and Systems Biology. The flexible course structure of the major permits students to bridge basic concepts in the life sciences and traditional areas of engineering, while also gaining a comprehensive understanding of biomedical engineering as a field of study.

PREREQUISITES

The following prerequisites are common to all tracks in the major: BIOL 101 and 102 (or a higher-level course in MCDB or MB&B, with permission of the director of undergraduate studies); a lecture course in chemistry numbered CHEM 161 or higher; ENAS 194; MATH 115; MATH 120 or ENAS 151; PHYS 180, 181, 205L, and 206L (or 165L and 166L, with DUS permission).

REQUIREMENTS OF THE MAJOR

The major for the Class of 2019 With DUS approval, the following changes to the requirements of the major may be fulfilled by students who declared their major under previous requirements.

The major for the Class of 2020 and subsequent classes Students must complete twelve term courses, totaling at least eleven course credits, beyond the prerequisites, including at least three required courses in the chosen track; two terms of a biomedical engineering laboratory (BENG 355L, 356L); BENG 280, a half-credit course taken sophomore year as part of the senior requirement; and the senior requirement (see below). During the first year, students study basic mathematics, chemistry, and biology. By the end of the sophomore year, they have taken physics, ENAS 194, BENG 249, and BENG 350. In the junior year, students gain a comprehensive grounding in the field through BENG 351, BENG 352, BENG 353, BENG 355L, and BENG 356L. During the junior and senior years students also acquire depth by taking electives in one of the four areas of concentration. A senior seminar and a senior project give students practical, detailed information about their chosen area of concentration. By the end of senior year, two term courses in the life sciences must have been included among the prerequisite and required courses for the major. One relevant course (e.g., MB&B 300) may be substituted with the permission of the DUS.

Students in all tracks are required to take the following seven term courses: BENG 249, 280, 350, 351, 352, 353, 355L, and 356L.

Students in the *Bioimaging track* must also take three courses chosen from BENG 404, 406, 410, 444, 445, 475, 476, or 485.

Students in the *Biomechanics and Mechanobiology track* must also take three courses chosen from MENG 185, 280, 361, BENG 404, 410, 434, 453, 455, 456, 457, or 458.

Students in the *Biomolecular Engineering track* must also take three courses chosen from BENG 404, BENG 410, 411, 434, 435, 463, 464, 465, 467, or MENG 361.

Students in the *Systems Biology track* must also take three courses chosen from BENG 404, 410, 411, 434, 435, 463, 464, 465, 467, or MENG 361.

Research Courses Students are permitted, and encouraged, to engage in research before the senior year by enrolling in BENG 471 and/or BENG 472. These courses, offered Pass/Fail, may be taken more than once for credit, but repeated courses do not count toward the major. See Course Credits and Course Loads (p. 44) in the Academic Regulations.

Credit/D/Fail No course taken Credit/D/Fail may count toward the major, including prerequisites.

Roadmap See visual roadmap of the requirements.

SENIOR REQUIREMENT

In their senior year, all students must enroll in BENG 480 (for the Class of 2020 and beyond, this is a half-credit course). They must also complete a one-term senior project in their final term of enrollment (BENG 474) or a two-term, yearlong project (BENG 473, 474).

ADVISING

Preparation for graduate study The Biomedical Engineering curriculum is excellent preparation for graduate study in engineering, science, and medicine. In some cases, organic chemistry and/or certain biology courses may be substituted for one course in the major after consultation with the director of undergraduate studies.

REQUIREMENTS OF THE MAJOR

Prerequisites BIOL 101 and 102, or higher-level course in MCDB or MB&B with

DUS permission; 1 lecture course in chemistry numbered CHEM 161 or higher; ENAS 194; MATH 115; MATH 120 or ENAS 151; PHYS 180, 181, and 205L, 206L (or 165L, 166L with DUS permission)

Number of courses 12 term courses, totaling at least 11 course credits, beyond prereqs (incl senior req)

Specific courses required *All tracks*—BENG 249, 280, 350, 351, 352, 353, 355L, 356L; *Bioimaging track*—3 from BENG 404, 406, 410, 404, 445, 475, 476, 485; *Biomechanics and Mechanobiology track*—3 from MENG 185, 280, 361, BENG 404, 410, 434, 453, 455, 456, 457, 458; *Biomolecular Engineering track*—3 from BENG 404, 410, 411, 434, 435, 463, 464, 465, 467, MENG 361; *Systems Biology track*—3 from BENG 404, 410, 411, 434, 435, 463, 464, 465, 467, MENG 361

Distribution of courses 2 term courses in life sciences among prereq and req courses

Substitution permitted Relevant course with DUS permission

Senior requirement BENG 480 and a one-term senior project in final term of enrollment (BENG 474), or yearlong senior project (BENG 473 and 474)

FACULTY OF THE DEPARTMENT OF BIOMEDICAL ENGINEERING

Professors Richard Carson, †Nicholas Christakis, James Duncan, Jay Humphrey, Fahmeed Hyder, Andre Levchenko, †Laura Niklason, Douglas Rothman, Mark Saltzman, †Martin Schwartz, †Frederick Sigworth, †Brian Smith, Lawrence Staib, †Hemant Tagare, †Paul Van Tassel, Steven Zucker, †Robin de Graaf, Themis Kyriakides, †Evan Morris, †Xenophon Papademetris,

Associate Professors Tarek Fahmy, †Corey Wilson, †Joerg Bewersdorf, Stuart Campbell, †Michael Choma, Rong Fan, Anjelica Gonzalez, †Chi Liu,

Assistant Professors Michael Mak, Kathryn Miller-Jensen, Michael Murrell, †Steven Tommasini, †Jiangbing Zhou

Lecturers †Liqiong Gui, †Jing Zhou

†A joint appointment with primary affiliation in another department or school.

Courses

* **BENG 205a, Discovery and Design in Biomedical Research** Jay Humphrey
Multi-disciplinary and team-based research approach to the study of clinical dilemma. Focus on an important health care problem, bringing to bear concepts and principles from diverse areas to identify possible solutions. Study of precision regenerative medicine as it involves aspects of bioengineering, materials science, immunobiology, mechanobiology, computational modeling, and experimental design, as well as hands-on fabrication and materials testing (i.e., data collection and analysis). Prerequisites: MATH 115 and MATH 120 or ENAS 151. SC

BENG 249b, Introduction to Biomedical Computation Michael Mak
Computational and mathematical tools used in biomedical engineering for the simulation of biological systems and the analysis of biomedical data. Basics of computational programming in MATLAB; applications to modeling, design, and statistical and data analysis. Prerequisite: MATH 120 or ENAS 151. QR

* **BENG 280a, Sophomore Seminar in Biomedical Engineering** Kathryn Miller-Jensen
Study of past successes and future needs of the multidisciplinary field of biomedical engineering. Areas of focus include: biomolecular engineering, including drug delivery and regenerative medicine; biomechanics, including mechanobiology and multiscale modeling; biomedical imaging and sensing, including image construction and analysis; and systems biology. ½ Course cr

* **BENG 350a / MCDB 310a, Physiological Systems** Mark Saltzman and Stuart Campbell
Regulation and control in biological systems, emphasizing human physiology and principles of feedback. Biomechanical properties of tissues emphasizing the structural basis of physiological control. Conversion of chemical energy into work in light of metabolic control and temperature regulation. Prerequisites: CHEM 165 or 167 (or CHEM 113 or 115), or PHYS 180 and 181; MCDB 120, or BIOL 101 and 102. SC

BENG 351b / CENG 351b, Biotransport and Kinetics Kathryn Miller-Jensen
Creation and critical analysis of models of biological transport and reaction processes. Topics include mass and heat transport, biochemical interactions and reactions,

and thermodynamics. Examples from diverse applications, including drug delivery, biomedical imaging, and tissue engineering. Prerequisites: MATH 115, ENAS 194; BIOL 101 and 102; CHEM 161, 163, or 167; BENG 249. QR

BENG 352b, Biomedical Signals and Images James Duncan and Lawrence Staib
Principles and methods used to represent, model, and process signals and images arising from biomedical sources. Topics include continuous and discrete linear systems analysis, Fourier analysis and frequency response, metrics for signal similarity, and noise filtering. Biomedical examples range from one-dimensional electrical signals in nerves and muscles to two-dimensional images of organs and cells. Prerequisite: MATH 120 or ENAS 151. BENG 249, 350, and ENAS 194 strongly recommended. QR

BENG 353a / PHYS 353, 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 the design of novel biomaterials, medical devices, and surgical interventions. Prerequisites: PHYS 180, 181, MATH 115, and ENAS 194. QR

* **BENG 355La or b, Physiological Systems Laboratory** Staff
Introduction to laboratory techniques and tools used in biomedical engineering for physiological measurement. Topics include bioelectric measurement, signal processing, and dialysis. Enrollment limited to majors in Biomedical Engineering, except by permission of the director of undergraduate studies. SC ½ Course cr

BENG 404a / MENG 404a, Medical Device Design and Innovation Joseph Zinter
The engineering design, project planning, prototype creation, and fabrication processes for medical devices that improve patient conditions, experiences, and outcomes. Students develop viable solutions and professional-level working prototypes to address clinical needs identified by practicing physicians. Some attention to topics such as intellectual property, the history of medical devices, documentation and reporting, and regulatory affairs.

* **BENG 405b / EVST 415b, Biotechnology and the Developing World** Anjelica Gonzalez
Study of technological advances that have global health applications. Ways in which biotechnology has enhanced quality of life in the developing world. The challenges of implementing relevant technologies in resource-limited environments, including technical, practical, social, and ethical aspects. Prerequisite: MCDB 120, or BIOL 101 and 102.

* **BENG 406b, Medical Software Design** Xenophon Papademetris
Software design and implementation for medical applications, with emphasis on how new ideas can be developed within today's healthcare regulatory environment. This project-based course focuses on the interaction of medical imaging and 3D printing. Topics include the methods and design principles to take 3D medical images, and how to image analysis algorithms to create 3D models to guide diagnosis and interventional procedures or build patient-specific medical devices. Permission of the instructor. Strong programming background in at least one programming language. SC

*** BENG 410a, Physical and Chemical Basis of Bioimaging and Biosensing** Douglas Rothman

Basic principles and technologies for sensing the chemical, electrical, and structural properties of living tissues and of biological macromolecules. Topics include magnetic resonance spectroscopy, microelectrodes, fluorescent probes, chip-based biosensors, X-ray and electron tomography, and MRI. Prerequisites: BENG 351 and 352 or permission of instructor. QR, SC

BENG 411b, BioMEMS and Biomedical Microdevices Rong Fan

Principles and applications of micro- and nanotechnologies for biomedicine. Approaches to fabricating micro- and nanostructures. Fluid mechanics, electrokinetics, and molecular transport in microfluidic systems. Integrated biosensors and microTAS for laboratory medicine and point-of-care uses. High-content technologies, including DNA, protein microarrays, and cell-based assays for differential diagnosis and disease stratification. Emerging nanobiotechnology for systems medicine. Prerequisites: CHEM 161, 165, or 167 (or CHEM 112, 114, or 118), and ENAS 194. SC

BENG 434a, Biomaterials Anjelica Gonzalez

Introduction to the major classes of biomedical materials: ceramics, metals, and polymers. Their structure, properties, and fabrication connected to biological applications, from implants to tissue-engineered devices and drug delivery systems. Prerequisite: CHEM 165 (or CHEM 113 or 115); organic chemistry recommended. SC

*** BENG 435b, Biomaterial-Tissue Interactions** Themis Kyriakides

Study of the interactions between tissues and biomaterials, with an emphasis on the importance of molecular- and cellular-level events in dictating the performance and longevity of clinically relevant devices. Attention to specific areas such as biomaterials for tissue engineering and the importance of stem/progenitor cells, as well as biomaterial-mediated gene and drug delivery. Prerequisites: CHEM 161, 165, or 167 (or CHEM 112, 114, or 118); MCDB 120, or BIOL 101 and 102; or equivalents. SC

BENG 444a or b, Fundamentals of Medical Imaging Chi Liu, Dana Peters, and Gigi Galiana

Review of basic engineering and physical principles of common medical imaging modalities including X-ray, CT, PET, SPECT, MRI, and echo modalities (ultrasound and optical coherence tomography). Additional focus on clinical applications and cutting-edge technology development. BENG 352 or similar background. QR, SC

BENG 445a / EENG 445a, Biomedical Image Processing and Analysis James Duncan and Lawrence Staib

A study of the basic computational principles related to processing and analysis of biomedical images (e.g., magnetic resonance, computed X-ray tomography, fluorescence microscopy). Basic concepts and techniques related to discrete image representation, multidimensional frequency transforms, image enhancement, motion analysis, image segmentation, and image registration. Prerequisite: BENG 352 or EENG 310 or permission of instructors. Recommended preparation: familiarity with probability theory.

BENG 449b, Biomedical Data Analysis Richard Carson

Study of biological and medical data analysis associated with applications of biomedical engineering. Provides basics of probability and statistics, as well as analytical approaches for determination of quantitative biological parameters from experimental

data. Includes substantial programming in MATLAB. Prerequisite: MATH 120 or ENAS 151. After or concurrently with ENAS 194. QR

BENG 455b, Vascular Mechanics Jay Humphrey

Methods of continuum biomechanics used to study diverse vascular conditions and treatments from an engineering perspective. Topics include hypertension, atherosclerosis, aneurysms, vein grafts, and tissue engineered constructs. Emphasis on mechanics driven by advances in vascular mechanobiology. Prerequisite: BENG 353.

QR

* **BENG 456b, Molecular and Cellular Biomechanics** Michael Murrell

The basic mechanical principles at the molecular and cellular level that underlie the major physical behaviors of the cell, from cell division to cell migration. Basic cellular physiology, methodology for studying cell mechanical behaviors, models for understanding the cellular response under mechanical stimulation, and the mechanical impact on cell differentiation and proliferation. Prerequisites: MENG 211 and 280 or equivalents, and experience with MATLAB. Recommended preparation: BENG 353 and MCDB 205. QR, SC

BENG 459a / MENG 459a, Neuromuscular Biomechanics Madhusudhan Venkadesan
Mechanics and control of animal movement, including skeletal muscle mechanics, systems-level neural and sensory physiology, elements of feedback control, and optimal control. Deriving equations of motion for multibody mechanical systems that are actuated by muscles or muscle-like motors; incorporating sensory feedback; analyzing system properties such as stability and energetics. Prerequisites: MENG 383 and MATH 222 or equivalents, and familiarity with MATLAB or a similar scientific computing environment. QR RP

BENG 463a / CENG 320a, Immunoengineering Tarek Fahmy

Introduction to immunoengineering, a field combining immunology with the physical sciences and engineering. Focus on biophysical principles and biomaterial applications for understanding and engineering immunity. SC

BENG 465b / MB&B 361b / MCDB 361b / NSCI 325b, Dynamical Systems in Biology

Thierry Emonet and Jonathon Howard

Advanced topics related to dynamical processes in biological systems. Processes by which cells compute, count, tell time, oscillate, and generate spatial patterns. Time-dependent dynamics in regulatory, signal-transduction, and neuronal networks; fluctuations, growth, and form. Comparisons between models and experimental data. Dynamical models applied to neurons, neural systems, and cellular biophysical processes. Use of MATLAB to create models. Prerequisite: MCDB 330 or equivalent, or a 200-level biology course, or with permission of instructor. QR

BENG 467a or b, Systems Biology of Cell Signaling Andre Levchenko

Approaches from systems biology to the fundamental processes underlying both the sensory capability of individual cells and cell-to-cell communication in health and disease. Prerequisites: BENG 249 and ENAS 194, or equivalents. QR, SC

* **BENG 471a and BENG 472b, Special Projects** James Duncan

Faculty-supervised individual or small-group projects with emphasis on research (laboratory or theory), engineering design, or tutorial study. Students are expected to consult the director of undergraduate studies and appropriate faculty members about ideas and suggestions for suitable topics. This course, offered Pass/Fail, can be

taken at any time during a student's career, and may be taken more than once. For the Senior Project, see BENG 473, 474. Permission of both the instructor and the director of undergraduate studies is required.

*** BENG 473a and BENG 474b, Senior Project** James Duncan

Faculty-supervised biomedical engineering projects focused on research (laboratory or theory) or engineering design. Students should consult with the director of undergraduate studies and appropriate faculty mentors for suitable projects. BENG 473 is taken during the fall term of the senior year and BENG 474 is taken during the spring term of the senior year. Permission of both the faculty mentor and the director of undergraduate studies is required.

BENG 475a / CPSC 475a / EENG 475a, 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. Prerequisite: CPSC 112 and MATH 120, or with permission of instructor. QR, SC RP

BENG 476b / CPSC 476b, 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 analysis, and shape description and representation. After CPSC 475. QR, SC

*** BENG 480a, Seminar in Biomedical Engineering** Hemant Tagare

Oral presentations and written reports by students analyzing papers from scientific journals on topics of interest in biomedical engineering, including discussions and advanced seminars from faculty on selected subjects. (For Class of 2020 and beyond this course is worth .5 credit.)

*** BENG 485b, Fundamentals of Neuroimaging** Fahmeed Hyder and Douglas Rothman

The neuroenergetic and neurochemical basis of several dominant neuroimaging methods, including fMRI. Technical aspects of different methods, interpretation of results, and controversies or challenges regarding the application of fMRI and related methods in medicine. WR, SC

British Studies

(Courses at the Paul Mellon Centre in London)

During the spring term, the Yale-in-London program at the Paul Mellon Centre for Studies in British Art, located in central London, offers four courses in British studies generally including British history, history of art or architecture, literature, and drama. Students take all four courses offered, and courses taught at the Paul Mellon Centre must be taken for a letter grade. Further information is available on the program's website. Inquiries may also be directed to yaleinlondon@yale.edu. The application deadline for spring term 2019 is Friday, October 5, 2018. Students will be notified of acceptance within one month of the application deadline. Inquiries about the summer program, described in the Undergraduate Curriculum section (p. 24), should be directed to the same address. Applications for summer 2019 are due Friday, February 15, 2019.

*** BRST 157b, Monuments and Memory: Ways of Remembering in Post-Medieval England 1600-2018** Roger Bowdler

This course looks at the rise of the public statue, the face of royal commemoration, the ways of honoring military and naval losses, and the rise of private memorials. Concentrating on the post-medieval period, it looks backwards to the ancient traditions of remembering, and ahead to the current revival of interest in public monuments. Visits range from ancient places of sepulture in Wessex to the great shrines of Westminster Abbey and St Paul's Cathedral, the finest depositories of sculpture in Britain. We look at the cult of the churchyards, and visit Stoke Poges, scene of Thomas Gray's *Elegy in a Country Churchyard* (1750). Looking at memorials takes you to many of England's leading designers and sculptors, from Wren to Lutyens, Grinling Gibbons to C.S. Jagger. Through a combination of site visits and classes, including field trips across Southern England, students study a full range of monuments and explore the English way of death—with life, loyalty, and love never far from center-stage. In so doing, students consider the relationship between the past and present, between heritage and contemporary values, and the negotiation of these sometimes competing concepts. HU

*** BRST 182b, The Tudors and the English Renaissance, 1509–1603** Staff

English history between the accession of Henry VIII in 1509 and the death of Elizabeth I in 1603. Political culture and the Reformation; personalities, political and religious structures, and ideas as disseminated in print, literature, and art; the conceptualization of politics, including its expression in public ceremonial and the image of the ruler; the political significance of royal buildings, ceremonies, and iconography. HU

*** BRST 207b / THST 209b, Shakespeare In London Today** Cynthia Zarin

This course focuses on contemporary theatre productions in London, with emphasis on Shakespeare-on-the-stage. Students attend the theatre each week of the term, attending both traditional productions of Shakespeare, re-interpretations, new plays, and revivals; travel to Stratford and to other venues; read and discuss the plays both before and after the performances; and meet with actors and directors to discuss some of the visited productions. Questions to be considered include: What does the theatre mean to us, today? How has the theatre—and theatre going—changed over time? How are decisions made about what plays to produce? How do current productions—of

Shakespeare and other contemporary plays – address political questions, including questions about race, nationalism, gender identity, and class divisions? Students write six essays during the term and each student is responsible for a presentation on one play. Our 'text books' are the Arden Shakespeare series and editions of contemporary plays. Once the current roster 2019 of spring productions are announced, concomitant reading is assigned and the schedule set. WR, HU

* **BRST 208b, Discovering Literary London** Cynthia Zarin

Students explore London and write a series of guided themes, four days a week, of about 350-400 words. The prompts include visits to historical and architectural sites, among them Shakespeare's Globe, The Tower of London, The Imperial War Museum, Bloomsbury, and The National Portrait Gallery, as well as streets and places referred to in British literature, such as The Old Curiosity Shop, Baker Street, Charing Cross and Kings' Cross Stations, and Brick Lane. Readings are drawn from diverse sources and include poetry, novels, plays, and works of non-fiction: the exemplary readings encourage students to experiment with and engage with tone, style, and subject matter. Writers considered include John Keats, Charles Dickens, Conan Doyle, Henry James, Virginia Woolf, P.L Travers, Monica Ali, Zadie Smith, and Hanif Kureishi. When possible there will be visits from British writers, who will discuss how the city figures in their work. WR, HU

Chemical Engineering

Director of undergraduate studies: Michael Loewenberg, 303 ML, 432-4334, michael.loewenberg@yale.edu; seas.yale.edu/departments/chemical-and-environmental-engineering

Energy, the environment, and health care are key challenges facing humanity in the twenty-first century. Chemical engineering is a discipline well placed to confront these challenges. Chemical engineering is rooted in the basic sciences of mathematics, chemistry, physics, and biology; a traditional engineering science core of thermodynamics, transport phenomena, and chemical kinetics; a rigorous design component; and an expanding focus on emerging topics in materials, nanotechnology, and life sciences. The discipline has grown from its petrochemical origins to become central to state-of-the-art technologies in microelectronics, alternative energy, biomedicine, and pharmaceuticals.

The Chemical Engineering program is principally focused on basic and engineering sciences and on problem solving. Additional emphasis is on communication, analysis of experiments, and chemical process design. A special feature of the program is the accessibility of laboratory research – most Chemical Engineering majors participate in faculty-led research projects, often resulting in publication and/or presentation at national meetings.

Chemical Engineering graduates find a wide range of professional opportunities in academia, industry, government, business, and the nonprofit sector. Many majors go on to graduate programs in chemical, biomedical, or environmental engineering, or to medical, law, or business schools.

The educational objectives of the Chemical Engineering program are the following. Graduating students will achieve positions of leadership within academia, industry, and government; excel in top graduate programs in chemical, biomedical, environmental, and related engineering fields; excel in top professional schools in fields such as law, medicine, or management; join and rise in the ranks of large and small corporations; become successful entrepreneurs; practice engineering toward the benefit of humankind.

PREREQUISITES

Students considering a Chemical Engineering major are encouraged to take two terms of chemistry and mathematics during the first year, and to contact the DUS.

Students in both degree programs (see below) take the following prerequisite courses: MATH 112, 115, and ENAS 151 or MATH 120; CHEM 161 and 165, or CHEM 163 and 167; CHEM 134L and 136L; ENAS 130; PHYS 180, 181. Students with advanced high school preparation may reduce the number of prerequisites by placing out of certain courses.

REQUIREMENTS OF THE MAJOR

The major for the Class of 2019 With DUS approval, the following changes to the requirements of the major may be fulfilled by students who declared their major under previous requirements.

The major for the Class of 2020 and subsequent classes All students majoring in Chemical Engineering and Engineering Sciences (Chemical) must follow the requirements listed below as approved by the program's faculty. Two degree programs are offered: a B.S. in Chemical Engineering accredited by the Engineering Accreditation Commission of ABET, Inc., and a B.S. in Engineering Sciences (Chemical).

B.S. degree program in Chemical Engineering The curriculum for the ABET-accredited B.S. degree in Chemical Engineering requires eighteen term courses, including the senior requirement, CENG 416, and the following courses beyond the prerequisites:

1. Mathematics: ENAS 194
2. Chemistry: CHEM 174 and 175 or CHEM 220 and 221; CHEM 222L and 223L; CHEM 332 and 333
3. Engineering science: MENG 361 and three term courses chosen from engineering electives
4. Chemical engineering: CENG 150 or CENG 210; 300, 301, 315, 411, 412L, 480

B.S. degree program in Engineering Sciences (Chemical) The B.S. degree in Engineering Sciences (Chemical) requires eleven term courses, including the senior requirement, CENG 416, and the following courses beyond the prerequisites, chosen in consultation with the DUS:

1. Mathematics: ENAS 194
2. Chemistry: 3 advanced chemistry courses: *option 1*: CHEM 174 and 175 or CHEM 220 and 221; and CHEM 332; or *option 2*: CHEM 174 or 220; CHEM 332 and 333
3. Engineering science: MENG 361
4. Chemical engineering: CENG 150 or CENG 210; 300, 301, 315, 411

SENIOR REQUIREMENT

B.S. degree program in Chemical Engineering In their senior year students must complete a senior research project in CENG 416.

B.S. degree program in Engineering Sciences (Chemical) In their senior year students must complete a senior research project in CENG 416.

REQUIREMENTS OF THE MAJOR

CHEMICAL ENGINEERING, B.S.

Prerequisites MATH 112, 115, ENAS 151 or MATH 120; CHEM 161 and 165, or CHEM 163 and 167; CHEM 134L and 136L; PHYS 180, 181; ENAS 130

Number of courses 18 term courses beyond prereqs (incl senior req)

Specific courses required ENAS 194 or equivalent; CHEM 174 and 175 or CHEM 220 and 221; CHEM 222L and 223L; CHEM 332, 333; MENG 361; CENG 150 or CENG 210; 300, 301, 315, 411, 412L, 480

Distribution of courses 3 addtl electives in engineering

Senior requirement CENG 416

ENGINEERING SCIENCES (CHEMICAL), B.S.

Prerequisites MATH 112, 115, ENAS 151 or MATH 120; CHEM 161 and 165 or CHEM 163 and 167; CHEM 134L and 136L; PHYS 180, 181; ENAS 130

Number of courses 11 term courses beyond prereqs (incl senior req)

Specific courses required ENAS 194 or equivalent; 3 adv chem courses, as specified;
MENG 361; CENG 150 or CENG 210; 300, 301, 315, 411

Senior requirement CENG 416

FACULTY OF THE DEPARTMENT OF CHEMICAL AND ENVIRONMENTAL ENGINEERING

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*), †Mark Saltzman, †Udo Schwarz, T. Kyle Vanderlick, Paul Van Tassel, Julie Zimmerman

Associate Professors

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

Lecturers †Anikò Bezur, †Paul Whitmore

†A joint appointment with primary affiliation in another department or school.

Courses

CENG 150b, Engineering Improv: An Introduction to Engineering Analysis Michael Loewenberg

This is a general introduction to engineering analysis and to chemical engineering principles. Material includes the derivation of governing equations from first principles and the analysis of these equations, including underlying assumptions, degrees of freedom, dimensional analysis, scaling arguments, and approximation techniques. Students obtain the necessary skills for improvising mathematical models for a broad range of problems that arise in engineering, science, and everyday life. Students from all majors are welcome. Prerequisite: MATH 115. QR, SC

CENG 300a, Chemical Engineering Thermodynamics Shu Hu

Analysis of equilibrium systems. Topics include energy conservation, entropy, heat engines, Legendre transforms, derived thermodynamic potentials and equilibrium criteria, multicomponent systems, chemical reaction and phase equilibria, systematic derivation of thermodynamic identities, criteria for thermodynamic stability, and introduction to statistical thermodynamics. Prerequisite: MATH 120 or ENAS 151 or permission of instructor. QR, SC RP

CENG 301b, Chemical Kinetics and Chemical Reactors Mingjiang Zhong

Physical-chemical principles and mathematical modeling of chemical reactors. Topics include homogeneous and heterogeneous reaction kinetics, catalytic reactions, systems of coupled reactions, selectivity and yield, chemical reactions with coupled mass transport, nonisothermal systems, and reactor design. Applications from problems in environmental, biomedical, and materials engineering. Prerequisite: ENAS 194 or permission of instructor. QR, SC RP

CENG 315b / ENVE 315b, Transport Phenomena Amir Haji Akbari Balou

Unified treatment of momentum, energy, and chemical species transport including conservation laws, flux relations, and boundary conditions. Topics include convective

and diffusive transport, transport with homogeneous and heterogeneous chemical reactions and/or phase change, and interfacial transport phenomena. Emphasis on problem analysis and mathematical modeling, including problem formulation, scaling arguments, analytical methods, approximation techniques, and numerical solutions.

Prerequisite: ENAS 194 or permission of instructor. QR, SC RP

CENG 320a / BENG 463a, Immunoengineering Tarek Fahmy

Introduction to immunoengineering, a field combining immunology with the physical sciences and engineering. Focus on biophysical principles and biomaterial applications for understanding and engineering immunity. SC

CENG 351b / BENG 351b, Biotransport and Kinetics Kathryn Miller-Jensen

Creation and critical analysis of models of biological transport and reaction processes.

Topics include mass and heat transport, biochemical interactions and reactions, and thermodynamics. Examples from diverse applications, including drug delivery, biomedical imaging, and tissue engineering. Prerequisites: MATH 115, ENAS 194; BIOL 101 and 102; CHEM 161, 163, or 167; BENG 249. QR

CENG 373a / ENVE 373a, Air Pollution Control Drew Gentner

An overview of air quality problems worldwide with a focus on emissions, chemistry, transport, and other processes that govern dynamic behavior in the atmosphere.

Quantitative assessment of the determining factors of air pollution (e.g., transportation and other combustion-related sources, chemical transformations), climate change, photochemical “smog,” pollutant measurement techniques, and air quality management strategies. Prerequisite: ENVE 120. QR, SC RP

* **CENG 377a / ENVE 377a, Water Quality Control** Jaehong Kim

Study of the preparation of water for domestic and other uses and treatment of wastewater for recycling or discharge to the environment. Topics include processes for removal of organics and inorganics, regulation of dissolved oxygen, and techniques such as ion exchange, electro dialysis, reverse osmosis, activated carbon adsorption, and biological methods. Prerequisite: ENVE 120 or permission of instructor. SC RP

CENG 411a, Separation and Purification Processes Paul Van Tassel

Theory and design of separation processes for multicomponent and/or multiphase mixtures via equilibrium and rate phenomena. Topics include single-stage and cascaded absorption, adsorption, extraction, distillation, partial condensation, filtration, and crystallization processes. Applications to environmental engineering (air and water pollution control), biomedical-chemical engineering (artificial organs, drug purification), food processing, and semiconductor processing. Prerequisite: CENG 300 or 315 or permission of instructor. QR, SC RP

CENG 412Lb / CENG 412, Chemical Engineering Laboratory and Design Paul Van Tassel

An introduction to design as practiced by chemical and environmental engineers. Engineering fundamentals, laboratory experiments, and design principles are applied toward a contemporary chemical process challenge. Sustainability and economic considerations are emphasized. SC

CENG 416b / ENVE 416b, Chemical Engineering Process Design Eric Altman

Study of the techniques for and the design of chemical processes and plants, applying the principles of chemical engineering and economics. Emphasis on flowsheet development and equipment selection, cost estimation and economic analysis, design

strategy and optimization, safety and hazards analysis, and environmental and ethical considerations. Enrollment limited to seniors majoring in Chemical Engineering or Environmental Engineering. QR, SC RP

CENG 471a or b, Independent Research Michael Loewenberg

Faculty-supervised individual student research and design projects. Emphasis on the integration of mathematics with basic and engineering sciences in the solution of a theoretical, experimental, and/or design problem. May be taken more than once for credit.

CENG 480a, Chemical Engineering Process Control Eric Altman

Transient regime modeling and simulations of chemical processes. Conventional and state-space methods of analysis and control design. Applications of modern control methods in chemical engineering. Course work includes a design project. Prerequisite: ENAS 194 or permission of instructor. QR, SC RP

*** CENG 490a or b, Senior Research Project** Michael Loewenberg

Individual research and/or design project supervised by a faculty member in Chemical Engineering, or in a related field with permission of the director of undergraduate studies.

RELATED COURSE THAT COUNTS TOWARD THE MAJOR

MENG 361a, Mechanical Engineering II: Fluid Mechanics Alessandro Gomez

Mechanical properties of fluids, kinematics, Navier-Stokes equations, boundary conditions, hydrostatics, Euler's equations, Bernoulli's equation and applications, momentum theorems and control volume analysis, dimensional analysis and similitude, pipe flow, turbulence, concepts from boundary layer theory, elements of potential flow. Prerequisites: ENAS 194 or equivalent, and physics at least at the level of PHYS 180.

QR, SC RP

Chemistry

Director of undergraduate studies: Nilay Hazari, 210 KCL, 432-0885, nilay.hazari@yale.edu [F]; Patrick Vaccaro, 240 SCL, 432-3975, patrick.vaccaro@yale.edu [Sp]; chem.yale.edu

The wide range of courses offered by the Department of Chemistry reflects the position of chemistry as the foundation of all the molecular sciences. In addition to graduate work in chemistry, biochemistry, or health-related disciplines, the department's graduates find their broad scientific training useful in fields such as technology policy, business management, and law. Chemistry is an especially appropriate major for students interested in energy research or policy and the environment.

COURSES FOR NONMAJORS WITHOUT PREREQUISITES

The Chemistry department offers one-term courses with no prerequisites, which are intended for non-science majors. These courses do not satisfy medical-school requirements or the general-chemistry requirement for any science major. Courses for nonmajors are numbered CHEM 100–109.

PREREQUISITES AND INTRODUCTORY COURSES

Prerequisite courses Prerequisites common to all Chemistry degree programs include two terms of general chemistry and laboratory, single-variable calculus at the level of MATH 115, and one term of introductory physics numbered 170 or higher, or the equivalents in advanced placement, are prerequisite to all four degree programs. Students also are encouraged to complete a course in multivariable calculus (MATH 120 or ENAS 151).

Introductory courses The majority of students begin with a general chemistry sequence: either CHEM 161 and 165, or CHEM 163 and 167. Any of these courses fulfill the prerequisite for general chemistry in the Chemistry major. Students taking CHEM 161 may be taking chemistry for the first time, perhaps took chemistry as a high school sophomore, or may even have taken AP chemistry but did not fully master the subject at that level. Students in CHEM 163 will have more recently completed a year or two of chemistry in high school, although motivated students may have last taken chemistry as a high school sophomore if they have a strong math and physics background. Students who have done well in an advanced placement chemistry course or show other evidence of high achievement in science and mathematics may be given permission to start in CHEM 167. The introductory laboratory sequence is CHEM 134L and 136L; each laboratory course earns one-half course credit.

Students with a sufficiently strong background in chemistry may initiate their studies with courses in organic or physical chemistry after demonstrating proficiency on the department's placement examination. CHEM 174 and 175 are offered expressly for first-year students. Other courses in organic chemistry, including CHEM 220 and 221, also are available to qualified first-year students. Students with a strong background in physics and calculus may be eligible for the physical-chemistry courses CHEM 332 and 333.

PLACEMENT PROCEDURES

For first-year students The Chemistry department reviews the preparation of all first-year students prior to the beginning of the fall term, using test scores, admission records, and information supplied by students. Incoming students should see the First-Year Handbook or the Chemistry department website for details on information to submit during the summer before matriculation. The department determines the appropriate general chemistry course for every entering first-year student, either CHEM 161, 163, or 167. Instructions for viewing initial placement are available on the Chemistry department website. Placements will be posted on Canvas@Yale.edu in late August.

First-year students wishing to take CHEM 174, 220, or 332, or those wishing to take a higher-level course than initially assigned, are required to take a placement examination on the first day of registration week in the fall term. Students who feel they have been placed incorrectly at too high a level may discuss changing their placement with a chemistry placement adviser and do not need to take the examination. Students uncertain about their placement are encouraged to sit for the examination, as it provides the best measure of a student's readiness to enter the wide variety of courses offered to first-year students.

Students with placement questions, or those wishing to change their course preference indicated during preregistration, should attend the department's orientation meeting prior to the placement examination. Additional sessions with placement advisers are scheduled throughout the first week of the fall term in 248 SCL at times listed in the *Calendar for the Opening Days of College*. Students wishing to change their placement should consult an adviser as soon as possible.

Students are advised to review general chemistry before taking the placement examination. They must bring a nonprogrammable, nongraphing calculator and a #2 pencil with them to the examination; cell phones may not be used. Times and places for the examination are published in the *Calendar for the Opening Days of College*. Shortly after the examination, students will be informed of their revised placement. For further information about placement and the examination, consult the *Calendar for the Opening Days of College* and the First-Year Handbook.

Permission keys Enrollment in any introductory chemistry course requires an electronic permission key. Keys are issued automatically by the department for entering first-year students and are displayed as green key-shaped icons next to the appropriate courses on the online registration page. Students are blocked from enrolling in any chemistry course for which they do not possess a permission key. Students experiencing problems with permission keys should inquire in person at the department office, 248 SCL.

For upper level students Upper level students wishing to take CHEM 161, 163, 165, or 167 should confirm their placement on Canvas@Yale by accessing the Chemistry Placement site that corresponds to their year of matriculation. If permission keys are needed, upper level students should obtain them by inquiring at the department office, 248 SCL. Those wishing to enroll in CHEM 220 may do so as long as they have satisfied the general chemistry prerequisite.

Section registration in laboratory and lecture courses Information about online registration for laboratory and discussion sections can be found in the description for each laboratory or lecture course in Yale Course Search. Due to the nature of laboratory exercises, it is impractical to preview laboratory courses during the course selection period.

Advanced courses For the purpose of degree requirements, all DUS-approved undergraduate Chemistry courses numbered 410 or higher count as advanced lecture or laboratory courses, as do CHEM 226L, 251L, 331L, and 335L. Because most advanced courses are offered either in the fall term or have a fall-term course as a prerequisite, students should not plan to take an isolated spring-term advanced course in any given year without first consulting the DUS. Many graduate-level Chemistry courses also may count toward the advanced-course requirement; consult the DUS for information about eligible courses.

For premedical students Medical schools currently require one year of organic chemistry and laboratory as well as one year of general chemistry and laboratory. The general-chemistry requirement may be satisfied by completing CHEM 161 and 165, or CHEM 163 and 167, or two terms of physical chemistry. In most instances students with advanced placement taking only CHEM 167 may complete this requirement by taking a course in biochemistry, inorganic chemistry, or physical chemistry. Students should consult with the Office of Career Strategy for the most up-to-date premedical course advice.

REQUIREMENTS OF THE MAJOR

Four degree programs are offered: a B.A., a B.S., an intensive major leading to a B.S., and a combined B.S./M.S. The B.A. degree is intended for students who want solid training in the chemical sciences and who also intend to study other subjects in which chemical training would be an asset, such as technology policy, economics, the environment, or medicine. The B.S. degree is intended to prepare students for graduate study while permitting extensive exploration of other disciplines. The B.S. degree with an intensive major provides more focused preparation for a career in chemical research, and requires greater breadth in laboratory courses and electives. Students electing this major program also can satisfy the requirements for a certified degree in chemistry as set forth by the American Chemical Society. The combined B.S./M.S. is designed for students whose advanced preparation qualifies them for graduate-level work in their third and fourth years of college.

The major requires a group of prerequisites or their equivalent in advanced placement, a core of courses common to all four degree programs, advanced courses specific to each degree program, and a senior requirement.

Course requirements common to all Chemistry degree programs All degrees require two terms of organic chemistry (CHEM 174 or 220, and CHEM 175, 221, or 230) with laboratory (CHEM 222L and 223L), one term of physical chemistry (CHEM 332 or 328), and one term of inorganic chemistry (CHEM 252).

B.A. degree program The B.A. degree program requires 11 term courses, totaling 10 course credits, beyond the prerequisites. In addition to the common degree requirements and one-term senior requirement, the B.A. degree requires four additional course credits of advanced chemistry lecture or laboratory courses. At least one of the

advanced courses must be a lecture course in the Chemistry department and at least one must be a Chemistry laboratory course. CHEM 333 may be counted toward the advanced-course requirement, although not as the sole lecture course.

B.S. degree program The B.S. degree program requires 14 term courses, totaling 13 course credits, beyond the prerequisites. In addition to the common degree requirements and two-term senior requirement, the B.S. degree requires completion of a second term of physical chemistry (CHEM 333), one term of physical chemistry laboratory (CHEM 330L), and four additional course credits of advanced chemistry lecture or laboratory courses. At least one of the advanced courses must be a lecture course in the Chemistry department and at least one must be a Chemistry laboratory course.

B.S. degree program, intensive major The B.S. degree program, intensive major requires 16 term courses, totaling 15 course credits, beyond the prerequisites. In addition to the common degree requirements and two-term senior requirement, the B.S. degree with an intensive major requires completion of a second term of introductory physics numbered 171 or higher, a second term of physical chemistry (CHEM 333), one term of physical chemistry laboratory (CHEM 330L), and five additional course credits of advanced chemistry lecture or laboratory courses. At least two of the advanced courses must be lecture courses in the Chemistry department and at least one must be a Chemistry laboratory course.

Combined B.S./M.S. degree Exceptionally well-prepared students may complete a course of study leading to the simultaneous award of the B.S. and M.S. degrees after eight terms of enrollment. Formal application for admission to this program must be made no later than the last day of classes in the fifth term of enrollment. To be considered for admission, by the end of their fifth term applicants must have achieved at least two-thirds A or A– grades in all of their course credits as well as in all of the course credits directly relating to the major, including prerequisites. Two terms of CHEM 490 must be taken in the fifth and sixth terms with earned grades of A or A– to continue in the program. The B.S./M.S. degree program requires completion of the intensive major requirements, including the senior requirement, which is typically completed in the fifth and sixth terms. The introductory physics requirement must be fulfilled with PHYS 200, 201 or 260, 261; a term course in physics numbered 400 or higher and approved by the Chemistry DUS may be substituted for the introductory sequence. In addition, eight graduate courses in chemistry (four of which count toward the B.S.) are required. Four terms of research are required, including two terms of research taken in CHEM 990. Students in the program must earn grades of A in at least two of their graduate-level term courses (or in one yearlong course) and have at least a B average in other graduate-level courses. B.S./M.S. candidates also are expected to continue their independent research in a summer internship between their junior and senior years. At the end of their eighth semester students are required to write a thesis summarizing their research activities. The thesis must be written under the guidance of the faculty member who supervises the student's research and it must be submitted on the final day of classes of the student's eighth semester to their research adviser. The thesis should be no shorter than 25 pages (double-spaced, twelve-point font, excluding figures, tables, and bibliography) and should normally contain the following sections: Introduction, Results and Discussion, Summary and Conclusions, Research Methods, and Bibliography. Students in the B.S./M.S. program also must present their research

in the form of a poster presentation at the end of their sixth semester (to fulfill the requirements of the B.S. degree) and an oral presentation at the end of their eighth semester (to fulfill the requirements of the M.S. degree). Both the poster and oral presentation are coordinated by the instructor of CHEM 490. For more information, see “Simultaneous Award of the Bachelor's and Master's Degrees” in section K (p. 64) of the Academic Regulations (p. 33).

Credit/D/Fail No chemistry courses taken Credit/D/Fail may be counted toward the major (including substitutions for advanced courses).

Roadmap See visual roadmap of the requirements.

SENIOR REQUIREMENT

For the B.A. degree program Students in the B.A. degree program must complete the senior seminar CHEM 400, in which they prepare a capstone essay on a chemistry-related topic. The paper is expected to be fifteen to twenty-five pages in length (double-spaced, twelve-point font, exclusive of figures, tables, and bibliography).

For the B.S. degree program Students in the B.S. degree program may fulfill the senior requirement by completing two terms of the independent research course CHEM 490 and writing a capstone report under the guidance of a faculty member that describes their research activities. Alternatively, they may complete the senior seminar CHEM 400, in which they prepare a capstone essay on a chemistry-related topic, and complete one additional course credit of advanced chemistry lecture or laboratory courses. One term of CHEM 490 may be counted as the additional advanced course. The capstone report or essay is expected to be fifteen to twenty-five pages in length (double-spaced, twelve-point font, exclusive of figures, tables, and bibliography). All students performing research also must present their work in the form of an oral or poster presentation as coordinated by the instructor of CHEM 490.

For the B.S. degree program with an intensive major Students in the B.S. degree program with an intensive major fulfill the senior requirement by completing two terms of the independent research course CHEM 490 and writing a capstone report of fifteen to twenty-five pages (double-spaced, twelve-point font, exclusive of figures, tables, and bibliography) under the guidance of a faculty member that describes their research activities. Students in the intensive major program also must present their work in the form of an oral or poster presentation as coordinated by the instructor of CHEM 490.

ADVISING

Majors are encouraged to begin their programs in the first year to provide the greatest flexibility in scheduling. It is possible, however, to complete the B.S. in as little as six terms if a student has advanced placement. One sample B.S. program follows, but many others are possible:

First-Year	Sophomore	Junior	Senior
CHEM 161, 165, 134L, 136L, math prereq	CHEM 220, 221, 252, 222L, 223L, physics prereq	CHEM 332, 333, 330L, 251L, 1 elective	2 terms of CHEM 490, 2 electives

Substitutions for required courses Up to two terms of advanced science courses outside Chemistry may be counted as electives, with the written approval of the DUS. CHEM 490 may not in any circumstance be substituted for any of the laboratory

requirements. The graduate courses CHEM 562L, 564L, and 565L may not be counted toward any requirement of the major.

Programs of study with special emphasis The flexibility of the degree requirements makes it possible for a student's program of study to emphasize a particular area of specialization in chemistry. For example, a program specializing in chemical biology includes CHEM 421 and two biochemistry electives chosen from MCDB 300, MB&B 300, 301, or selected graduate courses. An inorganic chemistry specialization could include CHEM 450, 452, and 457. A program with emphasis in physical chemistry and chemical physics would have three electives chosen from CHEM 430, 440, 442, 470, or a graduate course in quantum mechanics. Students interested in synthetic organic chemistry complete three electives chosen from CHEM 418, 423, 425, or selected graduate courses. An emphasis in biophysical chemistry includes a course in either chemical biology or biochemistry, as well as two electives chosen from graduate courses in biophysics or biochemistry. Students may design programs with other areas of emphasis in consultation with the DUS. For a list of graduate courses appropriate for a particular specialization, consult the DUS.

Approval of major programs of study All Chemistry majors in the sophomore, junior, and senior years must have their programs approved by the DUS. A program tailored to each student's goals is created and recorded on a Chemistry Course of Study form kept on file in the department office. Majors who have a current course of study form on file may have their schedules signed by the DUS or by any of the advisers to the major. A current list of advisers to the major may be obtained in the department office.

STUDY ABROAD

In most instances, Chemistry majors find their course of study easier to schedule if they choose to study abroad in a spring term. Students studying abroad in the spring term of their junior year are required to obtain approval for the project that will fulfill their senior requirement before the end of the prior term. For general information on the Year or Term Abroad, see section K (p. 64) of the Academic Regulations.

UNIQUE TO THE MAJOR

Special restrictions on lecture courses Completion of the first term of the general, organic, or physical chemistry sequences CHEM 161 and 165; CHEM 174 or 220 and 175, 221, or 230; and CHEM 332 or CHEM 328 and CHEM 333 with a passing grade is a prerequisite for registration in the subsequent term. Completion of CHEM 163 with a passing grade is a prerequisite for registration in CHEM 167 unless the student's assigned placement is in CHEM 167.

Students receive credit for only one chemistry sequence of any given type. For example, a student who has completed CHEM 161 and 165 may not subsequently enroll in CHEM 163 or 167; a student who has completed CHEM 174 and 175 may not subsequently enroll in CHEM 220, 221, or 230. Similarly, students may not enroll in a course (typically of lower number) that is a prerequisite to a course they already have taken. Thus, for example, a student who has completed an organic chemistry laboratory cannot subsequently enroll in a general chemistry laboratory.

Special restrictions on laboratory courses Chemistry courses may be taken without the accompanying laboratory, although the department does not recommend it. However, the appropriate lecture course is a prerequisite or corequisite for each laboratory course.

This restriction can be waived only by the DUS. Students dropping the lecture course corequisite with a laboratory also must drop the laboratory course.

REQUIREMENTS OF THE MAJOR

Prerequisites CHEM 161 and 165, or 163 and 167; CHEM 134L and 136L (or CHEM 116L, 117L); MATH 115 (MATH 120 or ENAS 151 suggested); PHYS 170, 180, 200, or 260; or equivalents in advanced placement

Number of courses *B.A.* – at least 11 term courses, totaling 10 course credits, beyond prereqs (incl senior req); *B.S.* – at least 14 term courses, totaling 13 course credits, beyond prereqs (incl senior req); *B.S., intensive major* – at least 16 term courses, totaling 15 course credits, beyond prereqs (incl senior req)

Specific courses required *All degrees* – 2 terms of organic chem (CHEM 174 or 220, and CHEM 175, 221, or 230); 2 terms of organic chem lab (CHEM 222L and 223L); 1 term of physical chem (CHEM 332 or 328); 1 term of inorganic chem (CHEM 252); *B.S.* – CHEM 330L, 333; *B.S., intensive major* – CHEM 330L, 333; PHYS 171, 181, 201, or 261

Distribution of courses *B.A. and B.S.* – 4 addtl course credits in advanced lectures or labs, incl at least 1 lecture and 1 lab; *B.S., intensive major* – 5 addtl course credits in advanced lectures or labs, incl at least 2 lectures and 1 lab

Substitution permitted Up to 2 relevant advanced science courses in other depts for advanced chem courses with DUS permission

Senior requirement *B.A.* – CHEM 400; *B.S.* – 2 terms of CHEM 490, or CHEM 400 and 1 addtl course credit in advanced lecture or lab; *B.S., intensive major* – 2 terms of CHEM 490

FACULTY OF THE DEPARTMENT OF CHEMISTRY

Professors †Sidney Altman, Victor Batista, Gary Brudvig, Robert Crabtree, †Craig Crews, R. James Cross, Jr. (*Emeritus*), Jonathan Ellman, John Faller (*Emeritus*), †Gary Haller, Sharon Hammes-Schiffer, 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 Schmittenmaer, †Dieter Söll, David Spiegel, †Thomas Steitz, †Scott Strobel, John Tully (*Emeritus*), Patrick Vaccaro, Kenneth Wiberg (*Emeritus*), Elsa Yan, Frederick Ziegler (*Emeritus*), Kurt Zilm

Associate Professors Jason Crawford, Timothy Newhouse

Assistant Professors Ziad Ganim, †Stavroula Hatzios, Sarah Slavoff, Hailiang Wang

Lecturers Paul Anastas, Christine DiMeglio, N. Ganapathi, Mioy Huynh, Jenny Martinez, Jonathan Parr

†A joint appointment with primary affiliation in another department.

Courses

For Nonmajors without Prerequisites

[CHEM 101, Chemistry in the Modern World]

CHEM 104b, Chemistry of Food and Cooking Elsa Yan

Fundamental principles for understanding chemical structures and interactions as well as energy and speed of chemical processes. Application of these principles to food and cooking, including demonstrations. This course is designed for non-STEM majors.

Prerequisite: preference given to students who have not taken AP or college-level chemistry. SC

Introductory Courses

First-year students planning to take an introductory Chemistry course during their first term are required to preregister over the summer. Those planning to elect CHEM 174, 220, or 332 also must register in person by taking a placement examination as described in the Chemistry department program description and on the Chemistry website. Placement in other introductory Chemistry courses is made on the basis of test scores and other admissions data, as discussed in the Chemistry department program description. The time and place for the orientation meeting, registration, and placement examination are listed in the *Calendar for the Opening Days of College*. For further information on placement see the Chemistry website.

[CHEM 119L, Laboratory for Quantitative Foundations of General Chemistry]

CHEM 134La, General Chemistry Laboratory I Narasimhan Ganapathi

An introduction to basic chemistry laboratory methods. Techniques required for quantitative analysis of thermodynamic processes and the properties of gases. To accompany or follow CHEM 161 or 163. May not be taken after a higher-numbered laboratory course. SC RP ½ Course cr

CHEM 136La or b, General Chemistry Laboratory II Narasimhan Ganapathi

Introduction to rate and equilibrium measurements, acid-base chemistry, synthesis of inorganic compounds, and qualitative/quantitative analysis. After CHEM 134L or the equivalent in advanced placement. To accompany or follow CHEM 165 or 167. May not be taken after a higher-numbered laboratory course. SC RP ½ Course cr

* **CHEM 161a, General Chemistry I** Patrick Holland

A comprehensive survey of modern descriptive, inorganic, and physical chemistry. Atomic theory, stoichiometry, thermochemistry, chemical periodicity, concepts in chemical bonding, and the shapes of molecules. Appropriate either as a first chemistry course or for students with one year of high school chemistry. Attendance at a weekly discussion section required. Normally accompanied by CHEM 134L. Enrollment by placement only. QR, SC RP

* **CHEM 163a, Comprehensive University Chemistry I** James Mayer

An in-depth examination of the principles of atomic, molecular, and solid state chemistry, including structures, periodicity, and chemical reactivity. Topics include the quantum mechanics of atoms and chemical bonding, and inorganic, organic, and solid state molecules and materials. For students with strong secondary school exposure

to general chemistry. Attendance at a weekly discussion section required. Normally accompanied by CHEM 134L. Enrollment by placement only. QR, SC RP

* **CHEM 165b, General Chemistry II** Jonathan Parr

Topics include kinetics, chemical equilibrium, acid-base chemistry, free energy and entropy, electrochemistry, and nuclear chemistry. Attendance at a weekly discussion section required. Prerequisite: CHEM 161. Normally accompanied by CHEM 136L. Enrollment by placement only. QR, SC RP

* **CHEM 167b, Comprehensive University Chemistry II** Hailiang Wang

Topics include kinetics, chemical equilibrium, acid-base chemistry, free energy and entropy, electrochemistry, and nuclear chemistry. Attendance at a weekly discussion section required. Prerequisite: CHEM 163, or with equivalent placement. Normally accompanied by CHEM 136L. Enrollment by placement only. QR, SC RP

* **CHEM 174a, Organic Chemistry for First-Year Students I** Scott Miller

An introductory course focused on current theories of structure and mechanism in organic chemistry, their development, and their basis in experimental observation. Open to freshmen with excellent preparation in chemistry, mathematics, and physics who have taken the department's advanced chemistry placement examination. Attendance at a weekly discussion section required. Normally accompanied by CHEM 222L. Enrollment by placement only. SC RP

* **CHEM 175b, Organic Chemistry for First Year Students II** Jonathan Ellman and Scott Miller

Continuation of CHEM 174. Survey of simple and complex reaction mechanisms, spectroscopy, organic synthesis, and the molecules of nature. Attendance at a weekly discussion section required. After CHEM 174. Normally accompanied by CHEM 223L. Enrollment by placement only. SC RP

Intermediate Courses

* **CHEM 220a or b, Organic Chemistry** Staff

An introductory course covering the fundamental principles of organic chemistry. The laboratory for this course is CHEM 222L. After college-level general chemistry. Students who have earned a grade lower than C in general chemistry are cautioned that they may not be sufficiently prepared for this course. Usually followed by CHEM 221 or 230. SC RP

CHEM 221a or b, The Organic Chemistry of Life Processes Staff

The principles of organic reactivity and how they form the basis for biological processes. The laboratory for this course is CHEM 223L. After CHEM 220. Students who have earned a grade lower than C in general chemistry are cautioned that they may not be sufficiently prepared for this course. SC RP

CHEM 222La or b, Laboratory for Organic Chemistry I Christine DiMeglio

First term of an introductory laboratory sequence covering basic synthetic and analytic techniques in organic chemistry. Prerequisite: CHEM 136L or equivalent. After or concurrently with CHEM 174 or 220. SC ½ Course cr

CHEM 223La or b, Laboratory for Organic Chemistry II Christine DiMeglio
Second term of an introductory laboratory sequence covering basic synthetic and analytic techniques in organic chemistry. Prerequisite: CHEM 222L. After or concurrently with CHEM 175, 221, or 230. SC ½ Course cr

* **CHEM 226La, Intensive Advanced Chemistry Laboratory** Jonathan Parr
An intensive course in advanced chemistry laboratory technique intended to bring the student closer to independent research. Included are an independent laboratory project and presentation, introduction to library research, and training in the use of various analytical techniques. Offered subject to available laboratory space and sufficient enrollment. After CHEM 223L. Enrollment is limited; e-mail course instructor for enrollment procedure. WR, SC RP

[**CHEM 230, Organic Chemistry of Biological Pathways**]

CHEM 251Lb, Inorganic Chemistry Laboratory Jonathan Parr
Introductory laboratory course covering synthetic and physical characterization techniques in inorganic chemistry. Prerequisite: CHEM 119L or 222L; concurrently with or after CHEM 252. SC

CHEM 252b, Introductory Inorganic Chemistry Robert Crabtree
Principles and applications of modern inorganic chemistry. Introduction to some of the fundamental concepts of solid-state chemistry, coordination chemistry, bioinorganic chemistry, and organometallic chemistry. Prerequisite: college-level general chemistry. After or concurrently with CHEM 220 or by permission of instructor. May not be taken after CHEM 450, 452, or 457. SC RP

CHEM 328a, Physical Chemistry with Applications in the Biological Sciences Ziad Ganim

Physical chemical principles and their application to the chemical and life sciences. Thermodynamics, chemical and biochemical kinetics, solution physical chemistry, electrochemistry, and membrane equilibria. CHEM 332 is preferred for Chemistry majors. Prerequisites: introductory physics, college-level general chemistry, and single-variable calculus, or permission of instructor; MATH 120 or ENAS 151 suggested. May not be taken after CHEM 332. QR, SC RP

CHEM 330La, Laboratory for Physical Chemistry I Patrick Vaccaro
Introduction to the tools and techniques of modern experimental physical chemistry, including analog/digital electronics, quantitative measurements of basic thermodynamic properties, and nuclear magnetic resonance spectrometry. After or concurrently with CHEM 328 or 332. Meets on Wednesday, Thursday, and Friday from 1:30 to 2:20 for the first week of the term. SC RP

[**CHEM 331L, Laboratory for Physical Chemistry II**]

* **CHEM 332a, Physical Chemistry with Applications in the Physical Sciences I**
Charles Schmuttenmaer

A comprehensive survey of modern physical and theoretical chemistry, including topics drawn from thermodynamics, chemical equilibrium, electrochemistry, and kinetics. Prerequisites: introductory physics, college-level general chemistry, and single-variable calculus, or permission of instructor; MATH 120 or ENAS 151 suggested. May not be taken after CHEM 328. QR, SC RP

*** CHEM 333b, Physical Chemistry with Applications in the Physical Sciences II**

Patrick Vaccaro

Continuation of CHEM 332, including topics drawn from quantum mechanics, atomic/molecular structure, spectroscopy, and statistical thermodynamics. Prerequisite: CHEM 328 or 332, or permission of instructor. Recommended preparation: familiarity with differential equations. QR, SC RP

*** CHEM 335Lb, Materials and Biophysical Chemistry Laboratory** Ziad Ganim and

Jonathan Parr

A laboratory course covering physical methods and chemical synthesis in materials and biophysical chemistry. Techniques include solution phase synthesis, solid state synthesis, UV-Vis, fluorescence, optical microscopy, SEM, STM, single molecule fluorescence, and optical trapping methods. After two terms of general chemistry with laboratory, or concurrently with CHEM 333. SC

Advanced Courses

*** CHEM 400a, Current Chemistry Seminar** Jonathan Parr

Designed to engage students in the Chemistry research-seminar program by providing requisite scientific guidance and a forum for directed discussion. Participants explore current avenues of chemical research as presented orally by the prime movers in the field, thereby exploring the frontiers of current knowledge while still retaining the structured environment of a classroom. May fulfill all or part of the senior requirement for the Chemistry major, as detailed in the program description in the YCPS.

*** CHEM 418a, Advanced Organic Chemistry I** William Jorgensen

Concise overview of structure, properties, thermodynamics, kinetics, reactions, and intermolecular interactions for organic molecular systems. Prerequisites: two terms of organic chemistry, CHEM 328 or 332, and CHEM 333. SC RP

CHEM 421a, Chemical Biology Sarah Slavoff

A one-term introduction to the origins and emerging frontiers of chemical biology. Discussion of the key molecular building blocks of biological systems and the history of macromolecular research in chemistry. Prerequisites: two terms of organic chemistry, and BIOL 101 or equivalent; BIOL 102 recommended. SC

[CHEM 423, Synthetic Methods in Organic Chemistry]

CHEM 425b, Spectroscopic Methods of Structure Determination Martin Saunders
Applications of NMR, ESR, infrared, UV, visible, and mass spectroscopy to chemical problems concerning structures and reactions. X-ray crystallography. Computer simulation of NMR spectra. Prerequisites: two terms of organic chemistry and CHEM 333. SC RP

CHEM 426b, Computational Chemistry and Biochemistry Sharon Hammes-Schiffer and William Jorgensen

An introduction to modern computational methods employed for the study of chemistry and biochemistry, including molecular mechanics, quantum mechanics, statistical mechanics, and molecular dynamics. Special emphasis on the hands-on use of computational packages for current applications ranging from organic reactions to protein-ligand binding and dynamics. After organic chemistry and physical chemistry. QR, SC RP

CHEM 430a, Statistical Mechanics 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; and Monte Carlo and molecular dynamics simulations. Prerequisites: CHEM 328 or 332, and CHEM 333, or permission of instructor. QR, SC RP

CHEM 437a, 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. RP

CHEM 440a, 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, Bloch equations, and NMR spectroscopy. Prerequisite: CHEM 333 or permission of instructor. QR, SC RP

CHEM 442b, Molecules and Radiation II Mark Johnson

An extension of the material covered in CHEM 440 to atomic and molecular spectroscopy, including rotational, vibrational, and electronic spectroscopy, as well as an introduction to laser spectroscopy. Prerequisite: CHEM 440 or permission of instructor. QR, SC RP

CHEM 450b, Physical Methods in Inorganic Chemistry Patrick Holland

Elementary group theory, molecular orbitals, states arising from molecular orbitals containing several electrons, ligand field theory, and electronic structure of metal complexes. Introduction to physical methods used in the determination of molecular structure and the bonding of polyatomic molecules. May be taken independently of CHEM 452. Prerequisites: CHEM 328 or 332 and CHEM 333; CHEM 457 or equivalent. SC RP

CHEM 452a, Organometallic Chemistry Robert Crabtree

A survey of the organometallic chemistry of the transition elements and of homogeneous catalysis. May be taken independently of CHEM 450. Prerequisites: two terms of organic chemistry and CHEM 252. SC RP

CHEM 457a, Modern Coordination Chemistry Nilay Hazari

The principles of modern inorganic chemistry. Main group and transition element chemistry: reactions, bonding, structure, and spectra. Prerequisite: CHEM 252 or permission of instructor. SC RP

CHEM 470a, Quantum Chemistry Sharon Hammes-Schiffer

The elements of quantum mechanics developed and illustrated with applications in chemistry and chemical physics. Prerequisites: CHEM 333, and MATH 120 or ENAS 151. QR, SC RP

*** CHEM 480a or b, Introduction to Independent Research in Chemistry** Staff

After consultation with the DUS, students engage individual experimental and/or theoretical research problems in the laboratories of a selected faculty member within

the Chemistry department. At the end of the term, students submit a brief report summarizing goals, methods, and accomplishments. For each term of enrollment, students must complete the CHEM 480 registration form, available in the DUS office, and have it signed by their faculty research mentor. It must be submitted to the Chemistry DUS for final approval no later than the last week of classes in the immediately preceding academic term. Individuals wishing to perform independent research must have demonstrated proficiency in the aspects of chemistry required for the planned project, as ascertained by the supervising faculty member, and must meet basic safety requirements prior to undertaking any activities, including certified completion of the online courses entitled *Laboratory Chemical Training* and *Hazardous Chemical Waste Training* administered by the Office of Environmental Health and Safety (EHS) at <http://ehs.yale.edu/training>. At least ten hours per week of research are required (including time spent on requisite safety training), with the faculty mentor affirming this level of student commitment by midterm. This course may be taken multiple times for Pass/Fail credit, subject to restrictions imposed by Yale College. RP

* **CHEM 490a or b, Independent Research in Chemistry** Jonathan Parr

Senior Chemistry majors engage individual experimental and/or theoretical research problems in the laboratories of a selected faculty member in the Chemistry department or in a closely related field of molecular science. CHEM 490 registration forms, found in the DUS office, must be signed by the student's faculty research mentor and submitted to the Chemistry DUS for final approval no later than the last week of classes in the immediately preceding academic term. Mandatory class meetings address issues of essential laboratory safety and ethics in science, with other class sessions focusing on core topics of broad interest to Chemistry students, including online literary research, oral presentation skills, and effective scientific writing. At least ten hours of research are required per week. Students are assigned letter grades, subject to restrictions imposed by Yale College. In special cases and with DUS approval, juniors may take this course. RP

GRADUATE COURSES OF INTEREST TO UNDERGRADUATES

Graduate courses in chemistry that may be of particular interest to undergraduates are listed in the online bulletin of the Graduate School. Information about them is available in the office of the director of undergraduate studies. Enrollment requires permission of both the director of graduate studies and the instructor, with pre-approval by the director of undergraduate studies if credit towards the requirements of the major is being sought.

Child Study Center

The Yale Child Study Center is an interdisciplinary department at the School of Medicine that furthers understanding of the problems of children and families. Among the coordinated disciplines are child psychiatry, pediatrics, genetics, neurobiology, epidemiology, psychology, nursing, social work, and social policy. The mission of the Child Study Center is to improve the mental health of children and families, advance understanding of their psychological and developmental needs, and treat and prevent childhood mental illness through the integration of research, clinical practice, and professional training. The Child Study Center is unique in its scope of local, state, national, and international collaborations in research, clinical services, training programs, and policy work. More information is available on the Child Study Center's Website.

Courses

* **CHLD 125a / EDST 125a / PSYC 125a, Child Development** Nancy Close and Carla Horwitz

The reading of selected material with supervised participant-observer experience in infant programs, a day-care and kindergarten center, or a family day-care program. Regularly scheduled seminar discussions emphasize both theory and practice. An assumption of the course is that it is not possible to understand children – their behavior and development – without understanding their parents and the relationship between child and parents. The focus is on infancy as well as early childhood. Enrollment limited to juniors and seniors. WR, SO

* **CHLD 126b / EDST 191b, Clinical Child Development and Assessment of Young Children** Nancy Close

Exposure to both conceptual material and clinical observations on the complexity of assessing young children and their families. Prerequisites: CHLD 125 or CHLD 128. SO
½ Course cr

* **CHLD 127a or b / EDST 127a or b / PSYC 127a or b, Theory and Practice of Early Childhood Education** Carla Horwitz

Development of curricula for preschool children – infants through six-year-olds – in light of current research and child development theory. Regularly scheduled seminar sessions emphasize both theory and practice. Workshop exploration of early childhood curriculum materials. Weekly observation practicum in a preschool or kindergarten classroom. Priority for juniors, seniors, and Education Study students. WR, SO RP

* **CHLD 128b / EDST 128b / PSYC 128b, Language, Literacy, and Play** Nancy Close and Carla Horwitz

The complicated role of play in the development of language and literacy skills among preschool-aged children. Topics include social-emotional, cross-cultural, cognitive, and communicative aspects of play. WR, SO RP

* **CHLD 334a / PSYC 334a, Developmental Psychopathology** Fred Volkmar, Eli Lebowitz, and Denis Sukhodolsky

Study of developmental psychopathology during childhood and adolescence, team taught by a child psychiatrist and three psychologists. Topics include: aspects of normal development, assessment methods, clinical disorders, treatment, and legal

and social policy issues. Review of normative development, followed by discussion of theoretical approaches to understanding developmental aspects of common mental health conditions in childhood. Attention to treatment models as well as relevant issues of culture and ethnicity in the expression of psychopathology. PSYC 130, 140, 180, or equivalent, or with permission of instructor.

*** CHLD 350b / EDST 350b / PSYC 350b, Autism and Related Disorders** Fred

Volkmar and James McPartland

Weekly seminar focusing on autism and related disorders of socialization. A series of lectures on topics in etiology, diagnosis and assessment, treatment and advocacy, and social neuroscience methods; topics cover infancy through adulthood. Supervised experience in the form of placement in a school, residence, or treatment setting for individuals with autism spectrum disorders. Details about admission to the course are explained at the first course meeting. Prerequisite: an introductory psychology course.

SO

Classics

Director of undergraduate studies: Pauline LeVen, 305 Phelps Hall,
pauline.leven@yale.edu; classics.yale.edu

The Department of Classics offers a major in Classics, concentrating in either Greek or Latin literature, or in both literatures; a major in Classical Civilization; and, in conjunction with the Hellenic Studies program, a major in Ancient and Modern Greek. The diversity of subject matter covered by these majors makes Classics an excellent partner in interdepartmental major programs. Programs for all majors must be approved by the director of undergraduate studies.

PLACEMENT PROCEDURES

Students are encouraged to take courses as advanced as they can handle with profit and pleasure. The department, recognizing the great variety of preparation in ancient languages, wishes to accommodate incoming students in as flexible a manner as possible. Students who plan either to begin or to continue the study of Greek or Latin should consult members of the departmental faculty as soon as practicable.

Students who have had the equivalent of two years of college-level instruction may try a 400-level course. It is possible to take GREK 141 or LATN 141 after a 400-level course, or to be admitted to a 400-level course after completion of GREK 131 or LATN 131. First-year students are encouraged to take advantage of the initial course selection period before course schedules are due to find the most appropriate course.

REQUIREMENTS OF THE MAJOR IN CLASSICS

The major in Classics is primarily a liberal arts major. It provides a rigorous interdisciplinary education in the literature, material culture, and history that underlie Western civilization and other humanities disciplines; it can also provide foundational disciplinary expertise for students who wish to do professional graduate work. Students develop a mastery of the classical languages, become acquainted with important periods and major authors in Greek and Roman literature, and develop the linguistic, historical, and theoretical interpretative tools to analyze classical antiquity and its relevance in the modern world. All courses in the department emphasize a combination of precise analysis, original thought, creativity, and breadth of historical inquiry. Courses in other literatures, in history, and in philosophy are strongly recommended for students enrolled in the Classics major.

The candidate for the Classics major may elect either the standard or the intensive major. In both of these majors the department recognizes two kinds of concentration, one aiming at knowledge of both ancient literatures, the other concentrating on either Greek or Latin literature.

The standard major A standard major in two literatures requires no fewer than ten term courses. These include six term courses in Greek and Latin at the level of 390 or above, a survey of the literature and culture of ancient Athens (CLCV 256, which can be substituted with another course in Greek history or culture if CLCV 256 is not offered a particular year), a survey of the literature and culture of ancient Rome (CLCV 257, which can be substituted with another course in Roman history or culture if CLCV 257 is not offered a particular year), and two additional courses in related areas of history

and art. The language courses must include GREK 390 or LATN 390 and five term courses at the level of 400 or above. One of the additional courses in a related field must be a term course in ancient history, and the other must be a term course in ancient history, classical art and archaeology, or classical civilization.

Students majoring in one literature (Greek or Latin) are required to take no fewer than ten term courses. These include six term courses in that literature at the level of 390 or above, a survey of the literature and culture of ancient Athens (CLCV 256, which can be substituted with another course in Greek history or culture if CLCV 256 is not offered a particular year), a survey of the literature and culture of ancient Rome (CLCV 257, which can be substituted with another course in Roman history or culture if CLCV 257 is not offered a particular year), a term course in ancient history related to the chosen literature, and an additional term course in ancient history, classical art and archaeology, or classical civilization. The language courses must include GREK 390 or LATN 390 and at least five term courses at the level of 400 or above. Students are encouraged to do some work in the second language and may substitute two terms at the intermediate level (131 and 141) or higher in the second language for two 400-level courses in the major literature. One of the additional courses in a related field must be a term course in ancient history, and the other must be a term course in ancient history, classical art and archaeology, or classical civilization.

The intensive major Students who desire a larger measure of independence than the standard major offers may elect the intensive major. In addition to fulfilling the requirements of the standard major (in both literatures, in Greek, or in Latin), students in the intensive major write a senior essay under the regular guidance of a faculty adviser.

Combined B.A./M.A. degree Exceptionally able and well-prepared students may complete a course of study leading to the simultaneous award of the B.A. and M.A. degrees after eight terms of enrollment. See "Simultaneous Award of the Bachelor's and Master's Degrees" under section K, Special Arrangements (p. 64), in the Academic Regulations. Interested students should consult the director of undergraduate studies prior to the sixth term of enrollment for specific requirements in Classics.

Credit/D/Fail Courses taken Credit/D/Fail may not be counted toward the requirements of the major.

SENIOR REQUIREMENT

For the standard major At the end of the senior year the student majoring in both Greek and Latin takes a comprehensive examination in the history of Greek and Latin literature and culture and in translation of both languages; the student majoring in either Greek or Latin takes a senior departmental examination in the history of the literature of the major and in translation of that literature.

For the intensive major Students may write a one-term essay in either the fall or spring (CLSS 492), or they may write a two-term essay (CLSS 490 and 491) starting in the fall of their senior year. A brief prospectus of the essay must be submitted, preferably at the end of the junior year and in no case later than the end of September of the senior year. The candidate must submit two copies of the senior essay to the

director of undergraduate studies no later than December 7 (CLSS 492) or April 19 (CLSS 490, 491 or 492) of the senior year.

REQUIREMENTS OF THE MAJOR

Prerequisites None

Number of courses 10 term courses

Specific courses required GREK 390 or LATN 390; CLCV 256 and 257

Distribution of courses *Two literatures*—6 courses in both langs at level 390 or above, with at least 5 at 400 level or above; 1 course in ancient hist; 1 addtl course in ancient hist, classical art and archaeology, or classical civ; *One literature*—6 courses in lit at level 390 or above, with at least 5 at 400 level or above; 1 course in ancient hist related to lit of major; 1 addtl course in ancient hist, classical art and archaeology, or classical civ

Substitution permitted *One literature*—2 courses in the other lit numbered 131 or higher for 2 courses in major lit at 400 level; *All majors*—a course in Greek history or culture for CLCV 256 and/or a course in Roman history or culture for CLCV 257, if they are not offered in a particular year

Senior requirement *Two literatures*—senior dept exam in hist and translation of Greek and Latin lit; *One literature*—senior dept exam in hist and translation of major lit

Intensive major Senior essay (CLSS 490, 491 or CLSS 492) in addition to above

REQUIREMENTS OF THE MAJOR IN CLASSICAL CIVILIZATION

The major in Classical Civilization is designed to offer students an opportunity to study an entire Western civilization in its many diverse but related aspects. The literature, history, philosophy, religion, art, archaeology, and other aspects of Greek and Roman antiquity from the earliest beginnings in Greece to the Middle Ages are studied for their intrinsic artistic value, their historical significance, and their power to illuminate problems confronting contemporary societies. Each year, the department offers courses that focus on ways that subsequent ages have used and made sense of classical antiquity. Ancient texts are studied primarily in translation, though under the guidance of instructors who have expertise in Greek and Latin.

Candidates for the major complete at least twelve term courses (including the senior essay) in Classics and related departments. Of these, two must be in ancient history and/or classical art and archaeology; and two must be in Greek or Latin, or both, numbered 131 or higher (the latter courses should be completed by the end of the junior year). Students must also take a survey of the literature and culture of ancient Athens (CLCV 256, which can be substituted with another course in Greek history or culture if CLCV 256 is not offered a particular year) and a survey of the literature and culture of ancient Rome (CLCV 257, which can be substituted with another course in Roman history or culture if CLCV 257 is not offered a particular year). It is strongly recommended that candidates elect one course each in the general areas of ancient epic, drama, philosophy, Roman civilization, and the classical tradition. Candidates for the major are encouraged to take related courses in other departments.

Credit/D/Fail Courses taken Credit/D/Fail may not be counted toward the requirements of the major.

SENIOR REQUIREMENT

Students research and complete an original research project, usually an essay, under the guidance of a faculty adviser. Students choose either a two-term senior project for two course credits (CLCV 450, 451) or a one-term senior project for one course credit (CLCV 452). Students who elect the one-term senior project need to take one additional course towards the major. A brief prospectus of the project must be submitted to the director of undergraduate studies, preferably at the end of the junior year and in no case later than the end of September of the senior year. The completed project must be submitted to the department no later than December 7 (CLCV 452) or April 19 (CLCV 450, 451 or CLCV 452) of the senior year.

REQUIREMENTS OF THE MAJOR

Prerequisites None

Number of courses 12 term courses (incl a two-term senior essay, or a one-term senior essay and an additional course)

Specific courses required CLCV 256 and 257

Distribution of courses 2 courses in ancient hist and/or classical art and archaeology; 2 courses in Greek or Latin (or both) numbered 131 or higher

Substitution permitted a course in Greek history or culture for CLCV 256, and/or a course in Roman history or culture for CLCV 257, if they are not offered in a particular year

Senior requirement Senior project (CLCV 450, 451 or CLCV 452 and an additional course)

REQUIREMENTS FOR THE MAJOR IN ANCIENT AND MODERN GREEK

The major in Ancient and Modern Greek offers students an opportunity to integrate the study of postclassical Greek language, history, and culture with the departmental program in ancient Greek and classical civilization. The major covers Hellenic civilization from the Bronze Age to the modern day, and traces the development of the language and the culture across traditionally drawn boundaries. The study of both ancient and modern Greek allows the student to appreciate how familiarity with one enriches understanding of the other, and to chart the development of a language which has one of the oldest continuous written traditions in the world. The literature, history, philosophy, religion, and art of the ancient Greek and Greco-Roman worlds are studied both as ends in themselves and also as a foundation for appreciating later (medieval, Ottoman, and modern) developments in these areas. Students are encouraged to develop a sense of the continuity of Greek language and culture, and an understanding of how Byzantine and modern forms relate to their ancient forebears.

The standard major The major in Ancient and Modern Greek requires at least ten term courses. These include four term courses at the level of 390 or above in ancient Greek, a survey of the literature and culture of ancient Athens (CLCV 256, which can be substituted with another course in Greek history or culture if CLCV 256 is not offered a particular year), a survey of the literature and culture of ancient Rome (CLCV 257, which can be substituted with another course in Roman history or culture if CLCV 257 is not offered a particular year) and one term course in ancient Greek history. The language courses should include GREK 390. Candidates are encouraged to take a wide

range of courses in the areas of ancient philosophy, religion, art, and architecture. In addition, no fewer than two term courses in modern Greek must be elected at the intermediate level (MGRK 130, 140) or above, as well as at least one additional term course in the history, art history, literature, or culture of the Greek-speaking Balkans or the Hellenic diaspora in the medieval, Ottoman, or modern period.

The intensive major Students who desire a larger measure of independence than the standard major offers may elect the intensive major. In addition to fulfilling the requirements of the standard major, students in the intensive major write a senior essay under the regular guidance of a faculty adviser.

Credit/D/Fail Courses taken Credit/D/Fail may not be counted toward the requirements of the major.

SENIOR REQUIREMENT

The standard major At the end of the senior year the student takes a comprehensive examination in the history of Greek literature and culture.

The intensive major Students may write a one-term essay in the fall or spring (CLSS 492), or they may write a two-term essay starting in the fall of their senior year (CLSS 490 and 491). A brief prospectus of the essay must be submitted, preferably at the end of the junior year and in no case later than the end of September of the senior year. The candidate must submit two copies of the senior essay to the director of undergraduate studies no later than December 7 (CLSS 492) or April 19 (CLSS 490, 491, or CLSS 492) of the senior year.

REQUIREMENTS OF THE MAJOR

Prerequisites None

Number of courses 10 term courses

Specific courses required GREK 390; CLCV 256 and 257

Distribution of courses 4 term courses in ancient Greek numbered 390 or higher; 1 term course in ancient Greek hist; 2 term courses in modern Greek numbered 130 or higher; 1 term course in postclassical Greek hist or culture

Substitution permitted a course in Greek history or culture for CLCV 256, and/or a course in Roman history or culture for CLCV 257, if they are not offered in a particular year

Senior requirement Senior dept exam

Intensive major Senior essay (CLSS 490, 491 or CLSS 492) in addition to above

FACULTY OF THE DEPARTMENT OF CLASSICS

Professors Egbert Bakker, Kirk Freudenburg, Emily Greenwood, Verity Harte, Brad Inwood, Diana Kleiner, Christina Kraus, Noel Lenski, Joseph Manning

Associate Professors Milette Gaifman, Andrew Johnston, Pauline LeVen, Irene Peirano Garrison

Assistant Professors Andrew Johnston, Jessica Lamont

Lecturers Françoise Gerardin, Ann Ellis Hanson, Susan Matheson, Timothy Robinson, Barbara Shailor, Joseph Solodow

Courses

Greek

GREK 110a, Beginning Greek: The Elements of Greek Grammar Treasa Bell

Introduction to ancient Greek. Emphasis on morphology and syntax within a structured program of readings and exercises. Prepares for GREK 120. No prior knowledge of Greek assumed. L1 RP 1½ Course cr

GREK 120b, Beginning Greek: Review of Grammar and Selected Readings Staff

Continuation of GREK 110. Emphasis on consolidating grammar and on readings from Greek authors. The sequence GREK 110, 120 prepares for 131 or 141. Prerequisite: GREK 110 or equivalent. L2 RP 1½ Course cr

* **GREK 125b, Intensive Beginning Greek** Timothy Robinson

An introduction to classical Greek for students with no prior knowledge of the language. Readings from Greek authors supplement intensive instruction in grammar and vocabulary. The course is intended to be of use to students with diverse academic backgrounds and interests. Prepares for GREK 131. Not open to students who have taken GREK 110, 120. L1, L2 RP 2 Course cr

GREK 131a, Greek Prose: An Introduction Rachel Love

Close reading of selections from classical Greek prose with review of grammar. Counts as L4 if taken after GREK 141 or equivalent. L3

GREK 141b, Homer: An Introduction Pauline LeVen

A first approach to reading Homeric poetry in Greek. Selected books of the *Iliad* or the *Odyssey*. Counts as L4 if taken after GREK 131 or equivalent. L3

* **GREK 450a, Euripides** Egbert Bakker

Close reading of two late plays of Euripides: *Helen* and *Ion*. Euripides' literary and dramatic technique; issues of myth, geography, and cultural and personal identity. L5, HU

* **GREK 454b, Greek Myth, Fiction, and Science Fiction** Pauline LeVen

Relationships between ancient Greek myths, fiction, and speculative/science fiction, with attention to interpretive approaches and methodologies. Narrative modes of representing reality; distinguishing fiction from myth and science fiction; cultural uses of myth and fiction. Readings include works by Homer, Longus, Lucian, and Philostratus. L5

* **GREK 459a, Gender & Citizenship in Athenian Law** Emily Greenwood

This course examines the intersection of gender and citizenship in Athenian forensic (lawcourt) oratory from the 4th century BCE. We read and analyze selected speeches by Lysias, Demosthenes, Aeschines, and Apollodorus with particular attention to the ways in which these speeches represent and negotiate norms of gender and an inquiry into the interrelationship of sex, gender, and citizenship in Athenian law. The course focuses on the translation and interpretation of Athenian lawcourt speeches, informed by scholarship on Athenian law, scholarship on gender and sexuality in ancient Greece, and pertinent works of gender theory. This is a bridge course, intended to build competence and confidence in reading Greek and interpreting Greek literature. Prerequisite: Completion of an L4 Greek course or its equivalent. L5, HU

* **GREK 463b, Praxis and Theory of the Greek Symposium** Egbert Bakker
 Reading and interpretation of a selection of texts (poetry and prose) pertaining to the Ancient Greek symposium as a central cultural institution. This is an L5 course (GREK 400/700) in the Classics programs (400 for undergraduate enrollment, 700 for graduate enrollment). Prerequisite is the 2-year (4-semesters) initiatory cycle (GREK 130-140). L5

Latin

LATN 110a, Beginning Latin: The Elements of Latin Grammar Staff
 Introduction to Latin. Emphasis on morphology and syntax within a structured program of readings and exercises. Prepares for LATN 120. No prior knowledge of Latin assumed. Preregistration, which is required, takes place at the Academic Fair. See the *Calendar for the Opening Days* or the departmental Web site for details about preregistration. L1 RP 1½ Course cr

LATN 120b, Beginning Latin: Review of Grammar and Selected Readings Staff
 Continuation of LATN 110. Emphasis on consolidating grammar and on readings from Latin authors. The sequence LATN 110, 120 prepares for 131 or 141. Prerequisite: LATN 110 or equivalent. L2 RP 1½ Course cr

LATN 131a, Latin Prose: An Introduction Jennifer Weintritt
 Close reading of a major work of classical prose; review of grammar as needed. Counts as L4 if taken after LATN 141 or equivalent. L3

LATN 141b, Latin Poetry: An Introduction Staff
 The course is devoted to Vergil. Counts as L4 if taken after LATN 131 or equivalent. L3

* **LATN 390b, 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. L5, HU

* **LATN 421a, Vergil's *Aeneid*** Kirk Freudenburg
 An in-depth study of Vergil's *Aeneid* within its political context. L5

LATN 414b, Roman Civil Wars Irene Peirano
 Ways in which Romans constructed and represented their civil wars in literature across a variety of genres (epic, lyric, historiography), authors (Vergil, Lucan, Caesar, Sallust) and time periods (late republic, empire). L5, HU

LATN 440a, Roman Friendship Joseph Solodow
 Readings from works by Catullus (selected poems), Cicero (*De Amicitia*), Horace (*Epistles I*), Seneca the Younger and Pliny the Younger (selected letters). The concept of friendship and its importance in Roman society; comparison with other societies. A bridge course between L4 and other L5 courses. L5, HU

* **LATN 462a, The *Histories* of Tacitus** Christina Kraus
 Close reading of the *Histories* of Tacitus and related selections from his other works. Attention to syntax and style. Focus on the influence of the author's background and experience on his narrative. L5, HU

* **LATN 494a or b, Independent Tutorial in Latin Language and Literature** Pauline LeVen

For students with advanced Latin language skills who wish to engage in concentrated reading and research on material not otherwise offered in courses. The work should result in a term paper or examination. A limited number of these courses may be offered toward the major. Offered subject to faculty availability.

Classics

* **CLSS 402b, 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 bookhands c. 1200–c. 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 401 or permission of instructor. L5, HU

* **CLSS 405a, Greek Papyrology** Ann Hanson

Literary and documentary papyri of Greek and Roman Egypt, concentrating on documents housed in the Beinecke Library from the late Ptolemaic and Roman periods. Topics include using papyri as sources for social and other histories; gaining familiarity with the language of the papyri; and the reading of literary and documentary hands. Prerequisites: proficiency in Greek; reading knowledge of German and French. L5, HU

* **CLSS 490a and CLSS 491b, Two-Term Senior Essay for the Intensive Major in Classics** Pauline LeVen

Qualified students may write a two-term senior essay in ancient literature or classical archaeology under the guidance of a faculty adviser. A written statement of purpose must be submitted to the director of undergraduate studies.

CLSS 492a or b, One-Term Senior Essay for the Intensive Major in Classics Pauline LeVen

Qualified students may write a one-term senior essay in ancient literature or classical archaeology under the guidance of a faculty adviser. A written statement of purpose must be submitted to the director of undergraduate studies.

Classical Civilization

* **CLCV 052a, The Myths of Oedipus** Staff

Study of different versions of the Oedipus myth, beginning with Sophocles' three plays (*Oedipus the King*, *Antigone*, and *Oedipus at Colonus*) and including modern adaptations such as those by Cocteau (*The Infernal Machine*), Fugard (*The Island*), and Dove (*The Darker Face of the Earth*); we also consider filmed adaptations such as Martha Grahame's "Night Journey" (1947), *The Gospel at Colonus* (1984), and *Oedipo alcalde* (1996). Secondary material, including works by cultural, psychological, and literary critics, provide background for the literary works. Readings, writing exercises, and discussion aim both to elucidate the original context of the plays in fifth-century Athens and to understand their contested and still vigorous place in the canon and in the western humanities. All readings in English. Enrollment limited to first-year students. Preregistration required; see under First-Year Seminar Program. HU

*** CLCV 119b / LITR 165b, The Invention of the Classic** Irene Peirano

The discourse of classicism from antiquity to modern times. Contemporary debates over the value of the classics in education; the emergence of classics as a discipline; changing definitions of the classic across time; notions commonly associated with the classics such as timelessness, beauty, and canon. Readings from Cicero, Horace, Dionysius of Halicarnassus, Winckelmann, Eliot, Gadamer, Foucault, Kermodé, Calvino, and Nussbaum. HU

CLCV 125a / PHIL 125a, Introduction to Ancient Philosophy Verity Harte

An introduction to ancient philosophy, beginning with the earliest pre-Socratics, concentrating on Plato and Aristotle, and including a brief foray into Hellenistic philosophy. Intended to be taken in conjunction with PHIL 126. WR, HU

CLCV 161a / ARCG 161a / HSAR 247a, Art and Myth in Greek Antiquity Milette Gaifman

Visual exploration of Greek mythology through the study of ancient Greek art and architecture. Greek gods, heroes, and mythological scenes foundational to Western culture; the complex nature of Greek mythology; how art and architecture rendered myths ever present in ancient Greek daily experience; ways in which visual representations can articulate stories. Use of collections in the Yale University Art Gallery. WR, HU

CLCV 175a / ARCG 252a / HSAR 252a, Roman Architecture Diana Kleiner

The great buildings and engineering marvels of Rome and its empire. Study of city planning and individual monuments and their decoration, including mural painting. Emphasis on developments in Rome, Pompeii, and central Italy; survey of architecture in the provinces. HU

CLCV 204b / HIST 300b, Alexander the Great and the Hellenistic World Joseph Manning

The history and culture of the ancient world between the rise of Macedonian imperialism in the fourth century B.C.E. and the annexation of Egypt by Augustus in 30 B.C.E. Particular attention to Alexander, one of the most important figures in world history, and to the definition of "Hellenism." HU

CLCV 205a / HIST 205a / HUMS 143a, Introduction to Ancient Greek History Staff

Introduction to Greek history, tracing the development of Greek civilization as manifested in the political, military, intellectual, and creative achievements from the Bronze Age through the end of the Classical period. Students read original sources in translation as well as secondary scholarship to better understand the rise and fall of the ancient Greeks—the civilization at the very heart of Western Civilization. HU

CLCV 206a / HIST 217a / HUMS 144a, The Roman Republic Staff

The origins, development, and expansion of Rome from the earliest times to the deaths of Caesar and Cicero. Cultural identity and interaction; slavery, class, and the family; politics, rhetoric, and propaganda; religion; imperialism; monumentality and memory; and the perception and writing of history. Application of literary and archaeological evidence. HU

CLCV 207b / HIST 218b, The Roman Empire Staff

The history of the Roman Empire from its establishment by Augustus to the reign of Justinian. Attention to social, intellectual, and religious changes, as well as to the framework of historical events within which these changes took place, and to the

processes by which the Roman Empire was replaced by the institutions of the Western Middle Ages and the Byzantine Empire. HU

* **CLCV 209a / LITR 230a / MGRK 215a, Nikos Kazantzakis: From Revolution to Nihilism** George Syrimis

The Greek poet, novelist, essayist, philosopher, playwright, and travel writer Nikos Kazantzakis. The philosophical influence of Darwin, Nietzsche, and Bergson on Kazantzakis; his fascination with the figures of Christ and Odysseus. Questions of fiction and autobiography, history and revolution, travel writing, twentieth-century existentialism, and the reception of the Homeric tradition. WR, HU TR

* **CLCV 216a / LITR 239a / MGRK 216a / WGSS 209a, Dionysus in Modernity** George Syrimis

Modernity's fascination with the myth of Dionysus. Questions of agency, identity and community, and psychological integrity and the modern constitution of the self. Manifestations of Dionysus in literature, anthropology, and music; the Apollonian-Dionysiac dichotomy; twentieth-century variations of these themes in psychoanalysis, surrealism, and magical realism. HU TR

CLCV 232b, Food and Wine in the Ancient Greek World Egbert Bakker

Food is more than carbohydrates and proteins. It is about culture and identity, both collective and individual, and it has symbolic value. In this course we study the political, symbolic, and poetic importance of food and wine in Ancient Greece. We see how food defines humans with respect to the gods, Greeks with respect to non-Greeks, and how food is a central component of the meaning of entire epic poems, such as the *Odyssey*. But we also look at the reality of food consumption and production and how food and drink was studied by the physicians and scientists of the ancient world. Readings in translation. HU

* **CLCV 319b / HIST 242Jb / MGRK 300b / WGSS 293b, The Olympic Games, Ancient and Modern** George Syrimis

Introduction to the history of the Olympic Games from antiquity to the present. The mythology of athletic events in ancient Greece and the ritual, political, and social ramifications of the actual competitions. The revival of the modern Olympic movement in 1896, the political investment of the Greek state at the time, and specific games as they illustrate the convergence of athletic cultures and sociopolitical transformations in the twentieth century. HU

CLCV 419a / NELC 119b / NELC 419a, Ancient Empires Kevin Van Bladel

This is an introduction to the history and cultures of the ancient empires of southwestern Asia, focusing on the period from the Assyrian and Persian Empires to the establishment of Islam (ca 900 BCE–ca 750 CE). Students learn how to use ancient primary sources critically to create a historical narrative and to understand the modern appropriation of ancient history for political and other purposes. Primary sources include classical Greek and Latin authors, as well as works composed in Iran, from royal inscriptions to neighboring Armenian and Aramaic sources chronicling war and strife. Major topics include the formation of early states, the kingdoms of Mesopotamia, Anshan and the Elamites, the Achaemenid dynasty, Alexander and his successors, the Parthian and Sasanian Persian empires and their rivalries with Rome, as well as the empires of Afghanistan and the kingdom of Armenia. Additionally, the course includes an introduction to the geography of southwestern Asia and a survey

of languages, Iranian and other religions, and some ancient literature from a variety of cultures. Events covered in this course contributed decisively to the demography of the present-day Near East and the social characteristics of its people, from the distribution of language communities to the variety of Near Eastern religions. Students gain some understanding of the makeup of the modern Near East, including how the population of the region became predominantly Muslim. HU

*** CLCV 450a and CLCV 451b, Two-Term Senior Project for the Major in Classical Civilization** Pauline LeVen

Qualified students may write a two-term senior essay under the guidance of a faculty adviser. An appropriate instructor is assigned to each student by the director of undergraduate studies in consultation with the student. In the first term, selected readings compensate for individual deficiencies and help the student achieve a balanced overview. In the second term, students select a topic for research from any area of the literature, history, culture, or philosophy of ancient Greece, Rome, or Hellenistic Egypt, or a topic from the classical tradition.

*** CLCV 452a or b, One-Term Senior Project for the Major in Classical Civilization**
Pauline LeVen

A one-term senior project. Students select a topic for research from any area of the literature, history, culture, or philosophy of ancient Greece, Rome, or Hellenistic Egypt, or a topic from the classical tradition. An appropriate instructor is assigned to each student by the director of undergraduate studies in consultation with the student.

*** CLCV 494a or b, Independent Tutorial in Classical Civilization** Pauline LeVen

For students who wish to pursue a specialized subject in classical civilization not otherwise covered in courses. Students are expected to provide a detailed reading list and a clear outline of their project early in the term. The work should result in a term paper or examination. A limited number of these courses may be offered toward the major. Readings in translation. Offered subject to faculty availability.

GRADUATE COURSES OF INTEREST TO UNDERGRADUATES

Various graduate seminars are open to juniors and seniors with the qualifications expected of graduate students, i.e., proficiency in the pertinent ancient and modern languages. Descriptions of the courses are available from the director of undergraduate studies. Permission is required of the instructor, the director of undergraduate studies, and the director of graduate studies.

Cognitive Science

Director of undergraduate studies: Joshua Knobe, 102 C, 432-1699,
joshua.knobe@yale.edu; www.yale.edu/cogsci

Cognitive science explores the nature of cognitive processes such as perception, reasoning, memory, attention, language, decision making, imagery, motor control, and problem solving. The goal of cognitive science, stated simply, is to understand how the mind works. Cognitive science is an inherently interdisciplinary endeavor, drawing on tools and ideas from fields such as psychology, computer science, linguistics, philosophy, economics, and neuroscience. Approaches include empirical studies of the ontogenetic and phylogenetic development of cognitive abilities, experimental work on cognitive processing in adults, attempts to understand perception and cognition based on patterns of breakdown in pathology, computational and robotic research that strives to simulate aspects of cognition and behavior, neuroscientific investigations of the neural bases of cognition using neural recording and brain scanning, and the development of philosophical theories of the nature of mind.

PREREQUISITE

An introductory survey course, CGSC 110, is normally taken by the end of the fall term of the sophomore year and prior to admission to the major.

REQUIREMENTS OF THE MAJOR

The requirements of the major for the B.S. and B.A. degrees are the same, except for the skills requirement and the senior requirement. Fourteen term courses, for a total of thirteen and one half course credits, are required for the major, including the introductory course and the senior requirement. Each major program must include the elements described below. The particular selection of courses must be approved by the director of undergraduate studies in order to assure overall coherence. No course may be used to fulfill more than one requirement for the major.

Breadth requirement A breadth requirement introduces students to the subfields of cognitive science. Each major is required to take a course from four of the following six areas:

1. Computer science: CPSC 201
2. Economics and decision making: ECON 159
3. Linguistics: LING 110, 116, 217, 130, 232, 253
4. Neuroscience: CGSC 201, MCDB 320, PSYC 160, 270
5. Philosophy: PHIL 126, 182, 269, 270, 271
6. Psychology: PSYC 110, 140, 139

Depth requirement Students fulfill a depth requirement by completing six courses that focus on a specific topic or area in cognitive science. The depth courses must be chosen from at least two disciplines, and are typically drawn from the six cognitive science subfields. It may be possible to draw depth courses from other fields when necessary to explore the student's focal topic, in consultation with the DUS. All six depth courses must be at the intermediate or advanced level; for most disciplines, courses numbered

300 or above fulfill the requirement. With permission of the DUS, up to two directed reading or research courses may count toward the depth requirement.

Skills requirement Because formal techniques are fundamental to cognitive science, one skills course is required, preferably prior to the senior year. Courses that fulfill the skills requirement for the B.A. include CPSC 112, 202, LING 224, PSYC 200, and 270. Other courses may fulfill this requirement with permission of the DUS. The skills requirement for the B.S. is fulfilled by PSYC 200 or another course with permission of the DUS.

Junior colloquium In the junior year, students are required to take CGSC 395, a half-credit colloquium in which majors discuss current issues and research in cognitive science and select a senior essay topic.

Credit/D/Fail Courses taken Credit/D/Fail may not be counted toward the requirements of the major, except with permission of the DUS.

SENIOR REQUIREMENT

In the senior year, students take CGSC 491, a full-credit capstone course in which the senior essay is written. Students in the course meet regularly with one another and with the faculty to discuss current work in cognitive science and their own developing research projects. Students must take this course during their last spring term at Yale. If spring is not the student's final term, (e.g., a planned December graduation date), then it is possible to attend the class and complete some of the assignments, but not turn in the finished thesis until November. In this case, a grade of INC will be given for the Spring term. (Unlike other incomplete grades at Yale, an incomplete for a thesis does not expire.)

B.S. degree program The B.S. degree is typically awarded to students who conduct empirical research as part of their senior requirement. This normally includes designing an experiment and collecting and analyzing data.

B.A. degree program The B.A. degree is typically awarded to students who conduct a nonempirical senior essay. There are no restrictions on the research format for the B.A.

ADVISING AND APPLICATION TO THE MAJOR

Students may apply to enter the major at any point after the first year. Applications must be made in writing to the DUS. Applications must include (a) an official or unofficial transcript of work at Yale, (b) a brief statement of purpose, which indicates academic interests and expected focus within the areas of the Cognitive Science major, and (c) a list of the six upper-level courses that the student plans to take as part of the research focus. Application forms and answers to frequently asked questions are available on the program's website.

REQUIREMENTS OF THE MAJOR

Prerequisite CGSC 110

Number of courses 14 term courses, for a total of 13.5 course credits (incl prereq and senior req)

Specific course required CGSC 395

Distribution of courses 1 course each in 4 of 6 subfields, as specified; 6 courses in a specific topic or area, as specified; 1 skills course, as specified

Senior requirement B.S. – Empirical research and senior essay in CGSC 491; B.A. – Nonempirical senior essay in CGSC 491

FACULTY ASSOCIATED WITH THE PROGRAM IN COGNITIVE SCIENCE

Professors Woo-kyoung Ahn (*Psychology*), Stephen Anderson (*Emeritus*), Amy Arnsten (*School of Medicine*), John Bargh (*Psychology*), Paul Bloom (*Psychology*), Hal Blumenfeld (*School of Medicine*), Marvin Chun (*Psychology*), Michael Della Rocca (*Philosophy*), Ravi Dhar (*School of Management*), Julie Dorsey (*Computer Science*), Robert Frank (*Linguistics*), Shane Frederick (*School of Management*), David Gelernter (*Computer Science*), Tamar Gendler (*Philosophy*), Laurence Horn (*Emeritus*) (*Linguistics*), Marcia Johnson (*Emeritus*), Dan Kahan (*Law School*), Frank Keil (*Psychology, Linguistics*), Joshua Knobe (*Philosophy*), Daeyeol Lee (*School of Medicine*), Gregory McCarthy (*Psychology*), Drew McDermott (*Computer Science*), Nathan Novemsky (*School of Management, Psychology*), Kenneth Pugh (*School of Medicine*), Ian Quinn (*Music*), Holly Rushmeier (*Computer Science*), Laurie Santos (*Psychology*), Brian Scassellati (*Computer Science, Mechanical Engineering*), Brian Scholl (*Chair*) (*Psychology*), Sun-Joo Shin (*Philosophy*), Jason Stanley (*Philosophy*), Zoltán Szabó (*Philosophy*), Nick Turk-Browne (*Psychology*), Tom Tyler (*Law School*), Fred Volkmar (*School of Medicine*), David Watts (*Anthropology*), Karen Wynn (*Psychology*), Gideon Yaffe (*Law School*), Raffaella Zanuttini (*Linguistics*), Steven Zucker (*Computer Science, Biomedical Engineering*)

Associate Professors Daylian Cain (*School of Management*), James McPartland (*Child Study Center*), Maria Piñango (*Linguistics*)

Assistant Professors Ryan Bennett (*Linguistics*), Steve Chang (*Psychology*), Philip Corlett (*Psychiatry*), Henry Cowles (*History*), Molly Crockett (*Psychology*), Yarrow Dunham (*Psychology*), Julian Jara-Ettinger (*Psychology*), Hedy Kober (*School of Medicine*), George Newman (*School of Management*)

Introductory Courses

CGSC 110a / PSYC 130a, Introduction to Cognitive Science Brian Scholl

An introduction to the interdisciplinary study of how the mind works. Discussion of tools, theories, and assumptions from psychology, computer science, neuroscience, linguistics, and philosophy. so

CGSC 139a / EDST 139a / PSYC 139a, The Mental Lives of Babies and Animals

Karen Wynn

Interdisciplinary exploration of the cognitive, social, and emotional capacities of creatures lacking language and culture. The extent to which our complex psychology is unique to mature humans; the relative richness of a mental life without language or culture. Some attention to particular human populations such as children with autism and adults with language disorders. so

CGSC 216b / LING 116b, Cognitive Science of Language Robert Frank

The study of language from the perspective of cognitive science. Exploration of mental structures that underlie the human ability to learn and process language, drawing on studies of normal and atypical language development and processing, brain imaging, neuropsychology, and computational modeling. Innate linguistic structure vs. determination by experience and culture; the relation between linguistic

and nonlinguistic cognition in the domains of decision making, social cognition, and musical cognition; the degree to which language shapes perceptions of color, number, space, and gender. SO

CGSC 277b / AFAM 198b / EDST 177b / EP&E 494b / PHIL 177b, Propaganda, Ideology, and Democracy Jason Stanley

Historical, philosophical, psychological, and linguistic introduction to the issues and challenges that propaganda raises for liberal democracy. How propaganda can work to undermine democracy; ways in which schools and the press are implicated; the use of propaganda by social movements to address democracy's deficiencies; the legitimacy of propaganda in cases of political crisis. HU

CGSC 282a / PHIL 182a / PSYC 182a, Perspectives on Human Nature Joshua Knobe

Comparison of philosophical and psychological perspectives on human nature. Nietzsche on morality, paired with contemporary work on the psychology of moral judgment; Marx on religion, paired with systematic research on the science of religious belief; Schopenhauer paired with social psychology on happiness. HU

Advanced Courses

CGSC 315a / PSYC 315a, The Modern Unconscious John Bargh

The notion of the unconscious mind traced from the early 1800s through Freud to present-day cognitive science, with a focus on the past thirty years. The power and function of the unconscious as a pervasive part of normal everyday human functioning. Readings from philosophy of mind and evolutionary biology. SO

CGSC 352a / NSCI 352a / PSYC 352a, Arrested or Adaptive Development in the Adolescent Brain BJ Casey

Study of empirical and theoretical accounts of adolescent-specific changes in the brain and in behavior that relate to the development of self control. Discussions will focus on adaptive and arrested adolescent brain development in the context of relevant legal, social, and health policy issues. SC

*** CGSC 390a, Junior Seminar in Cognitive Science** Mark Sheskin

Discussion of historically important papers in cognitive science. Topics are varied and reflect student interests. Some attention to planning for the senior project. Intended for juniors in the Cognitive Science major.

*** CGSC 421a / PSYC 421a, Cognitive Science of Pleasure** Paul Bloom

Exploration of the mysterious pleasures of the imagination, including daydreams, novels, movies, pretend play in children, and video games. Approach is eclectic, drawing on fields such as psychology, philosophy, neuroscience, evolutionary theory, and literary criticism. SO

*** CGSC 425b / PSYC 425b, Social Perception** Brian Scholl

Connections between visual perception, among the earliest and most basic of human cognitive processes, and social cognition, among the most advanced forms of higher-level cognition. 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. SO

* **CGSC 426b / EP&E 490b / PHIL 426b / PSYC 422b, The Cognitive Science of Morality** Joshua Knobe

Introduction to the emerging field of moral cognition. Focus on questions about the philosophical significance of psychological findings. Topics include the role of emotion in moral judgment; the significance of character traits in virtue ethics and personality psychology; the reliability of intuitions and the psychological processes that underlie them. HU

* **CGSC 437b / PSYC 437b, 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. SO RP

Courses for Majors

* **CGSC 395b, Junior Colloquium in Cognitive Science** Mark Sheskin

Survey of contemporary issues and current research in cognitive science. By the end of the term, students select a research topic for the senior essay. Enrollment limited to Cognitive Science majors. ½ Course cr

* **CGSC 471a and CGSC 472b, Directed Research in Cognitive Science** Joshua Knobe

Research projects for qualified students. The student must be supervised by a member of the Cognitive Science faculty, who sets the requirements and directs the research. To register, a student must submit a written plan of study to the director of undergraduate studies and the faculty supervisor. The normal minimum requirement is a written report of the completed research, but individual faculty members may set alternative equivalent requirements. Only one term may be offered toward the major, with permission of the director of undergraduate studies; two terms may be offered toward the bachelor's degree.

* **CGSC 473a and CGSC 474b, Directed Reading in Cognitive Science** Joshua Knobe

Individual study for qualified students who wish to investigate an area of cognitive science not covered in regular courses. The student must be supervised by a member of the Cognitive Science faculty, who sets the requirements and meets regularly with the student. To register, a student must submit a written plan of study to the director of undergraduate studies and the faculty supervisor. The normal minimum requirement is a term paper, but individual faculty members may set alternative equivalent requirements. Only one term may be offered toward the major, with permission of the director of undergraduate studies; two terms may be offered toward the bachelor's degree.

* **CGSC 491b, Senior Project** Mark Sheskin

A research colloquium leading to the completion of the senior essay. Students attend regular colloquium presentations. Enrollment limited to Cognitive Science majors.

Related Courses That May Count toward the Major

ANTH 267b / ARCG 267b, Human Evolution David Watts

Examination of the fossil record of human evolution, including both paleontological and archaeological evidence for changes in hominid behavior during the Pleistocene. Prerequisite: Introductory course in biological anthropology or biology. SO

*** CHLD 350b / EDST 350b / PSYC 350b, Autism and Related Disorders** Fred Volkmar and James McPartland

Weekly seminar focusing on autism and related disorders of socialization. A series of lectures on topics in etiology, diagnosis and assessment, treatment and advocacy, and social neuroscience methods; topics cover infancy through adulthood. Supervised experience in the form of placement in a school, residence, or treatment setting for individuals with autism spectrum disorders. Details about admission to the course are explained at the first course meeting. Prerequisite: an introductory psychology course. SO

CPSC 112b, Introduction to Programming Benedict Brown

Development on the computer of programming skills, problem-solving methods, and selected applications. No previous experience with computers necessary. QR

CPSC 201a or b, Introduction to Computer Science Stephen Slade

Introduction to the concepts, techniques, and applications of computer science. Topics include computer systems (the design of computers and their languages); theoretical foundations of computing (computability, complexity, algorithm design); and artificial intelligence (the organization of knowledge and its representation for efficient search). Examples stress the importance of different problem-solving methods. After CPSC 112 or equivalent. QR

CPSC 202a, Mathematical Tools for Computer Science Dana Angluin

Introduction to formal methods for reasoning and to mathematical techniques basic to computer science. Topics include propositional logic, discrete mathematics, and linear algebra. Emphasis on applications to computer science: recurrences, sorting, graph traversal, Gaussian elimination. QR

CPSC 470b, Artificial Intelligence Brian Scassellati

Introduction to artificial intelligence research, focusing on reasoning and perception. Topics include knowledge representation, predicate calculus, temporal reasoning, vision, robotics, planning, and learning. After CPSC 201 and 202. QR

[**CPSC 471, Advanced Topics in Artificial Intelligence**]

CPSC 475a / BENG 475a / EENG 475a, 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. Prerequisite: CPSC 112 and MATH 120, or with permission of instructor. QR, SC RP

CPSC 476b / BENG 476b, 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 analysis, and shape description and representation. After CPSC 475. QR, SC

ECON 159a or b, Game Theory Staff

An introduction to game theory and strategic thinking. Ideas such as dominance, backward induction, Nash equilibrium, evolutionary stability, commitment, credibility,

asymmetric information, adverse selection, and signaling are applied to games played in class and to examples drawn from economics, politics, the movies, and elsewhere. After introductory microeconomics. No prior knowledge of game theory assumed. QR, SO

LING 110a, Language: Introduction to Linguistics Jason Shaw

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 relation of linguistics to psychology, logic, and other disciplines. SO

LING 217a / EDST 237a / PSYC 317a, Language and Mind Maria Piñango

The structure of linguistic knowledge and how it is used during communication. The principles that guide the acquisition of this system by children learning their first language and adults learning a second language. The processing of language in real-time. Language breakdown as a result of brain damage. SO

LING 220b / PSYC 318b, General Phonetics Jason Shaw

Investigation of possible ways to describe the speech sounds of human languages. Acoustics and physiology of speech; computer synthesis of speech; practical exercises in producing and transcribing sounds. SO

LING 224a, Mathematics of Language Robert Frank

Study of formal systems that play an important role in the scientific study of language. Exploration of a range of mathematical structures and techniques; demonstrations of their application in theories of grammatical competence and performance including set theory, graphs and discrete structures, algebras, formal language, and automata theory. Evaluation of strengths and weaknesses of existing formal theories of linguistic knowledge. QR, SO

LING 227a / PSYC 327a, 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 instructor. QR, SO

LING 231b / PSYC 331b, Neurolinguistics Maria Piñango

The study of language as a cognitive neuroscience. The interaction between linguistic theory and neurological evidence from brain damage, degenerative diseases (e.g., Alzheimer's disease), mental illness (e.g., schizophrenia), neuroimaging, and neurophysiology. The connection of language as a neurocognitive system to other systems such as memory and music. SO

* **LING 232a, 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 220, or a grade of B or above in LING 110. SO

* **LING 235b, 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 the relationship of phonological theory to language

acquisition and learnability. Opacity, lexical phonology, and serial versions of optimality theory. Prerequisite: LING 232 or permission of instructor. SO RP

LING 253a, Syntax I Raffaella Zanuttini

If you knew all the words of a language, would you be able to speak that language? No, because you'd still need to know how to put the words together to form all and only the grammatical sentences of that language. This course focuses on the principles of our mental grammar that determine how words are put together to form sentences. Some of these principles are shared by all languages, some differ from language to language. The interplay of the principles that are shared and those that are distinct allows us to understand how languages can be very similar and yet also very different at the same time. This course is mainly an introduction to syntactic theory: it introduces the questions that the field asks, the methodology it employs, some of the main generalizations that have been drawn and results that have been achieved. Secondly, this course is also an introduction to scientific theorizing: what it means to construct a scientific theory, how to test it, and how to choose among competing theories. SO

LING 254b, Syntax II Hadas Kotek

Recent developments in the principles and parameters approach to syntactic theory. In-depth exploration of theoretical and empirical issues in long-distance dependencies (island effects, dependency types, movement vs. binding), the character of syntactic structure (constituency, thematic mapping, functional categories), and the architecture of grammatical derivations (logical form, operations for structure building, anaphora). Prerequisite: LING 253. SO

LING 263a, Semantics I Hadas Kotek

Introduction to truth-conditional compositional semantics. Set theory, first- and higher-order logic, and the lambda calculus as they relate to the study of natural language meaning. Some attention to analyzing the meanings of tense/aspect markers, adverbs, and modals. QR, SO

MCDB 320a / NSCI 320a, Neurobiology Haig Keshishian and Paul Forscher

The excitability of the nerve cell membrane as a starting point for the study of molecular, cellular, and systems-level mechanisms underlying the generation and control of behavior. Prerequisites: year of college-level chemistry; a course in physics is strongly recommended. SC

PHIL 126b, Introduction to Modern Philosophy from Descartes to Kant Michael Della Rocca

An introduction to major figures in the history of modern philosophy, with critical reading of works by Descartes, Malabranche, Spinoza, Leibniz, Locke, Berkeley, Hume, and Kant. Intended to be taken in conjunction with PHIL 125, although PHIL 125 is not a prerequisite. HU

PHIL 267a, Mathematical Logic Sun-Joo Shin

An introduction to the metatheory of first-order logic, up to and including the completeness theorem for the first-order calculus. Introduction to the basic concepts of set theory. Prerequisite: PHIL 115 or permission of instructor. QR

PHIL 270b, Epistemology Keith DeRose

Introduction to current topics in the theory of knowledge. The analysis of knowledge, justified belief, rationality, certainty, and evidence. HU

PHIL 271a / LING 271a, Philosophy of Language Jason Stanley

An introduction to contemporary philosophy of language, organized around four broad topics: meaning, reference, context, and communication. Introduction to the use of logical notation. HU

PSYC 110a or b, Introduction to Psychology Staff

A survey of major psychological approaches to the biological, cognitive, and social bases of behavior. SO

PSYC 131a, Human Emotion Matthias Siemer

Introduction to major discoveries in human emotion. Evolutionary theories of anger, love, and disgust; emotion and morality; cultural and gender differences; emotion and the brain; relation between emotion and thinking; development of emotion; and abnormal emotions in mental illness. SO RP

PSYC 140b / EDST 140b, Developmental Psychology Frank Keil

An introduction to research and theory on the development of perception, action, emotion, personality, language, and cognition from a cognitive science perspective. Focus on birth to adolescence in humans and other species. Prerequisite: PSYC 110. SO

PSYC 150b / EDST 160b, Social Psychology Staff

Theories, methodology, and applications of social psychology. Core topics include the self, social cognition/social perception, attitudes and persuasion, group processes, conformity, human conflict and aggression, prejudice, prosocial behavior, and emotion. Prerequisite: PSYC 110. SO

PSYC 160a / NSCI 160a, The Human Brain Gregory McCarthy

Introduction to the neural bases of human psychological function, including social, cognitive, and affective processing. Preparation for more advanced courses in cognitive and social neuroscience. Topics include memory, reward processing, neuroeconomics, individual differences, emotion, social inferences, and clinical disorders. Neuroanatomy, neurophysiology, and neuropharmacology are also introduced. SC

[PSYC 179, Thinking]**PSYC 200b, Statistics** Angela Johnston

Measures of central tendency, variability, association, and the application of probability concepts in determining the significance of research findings. QR

PSYC 270a or b / NSCI 235a or b, Research Methods in Behavioral Neuroscience

Nelson Donegan

Students design and conduct research to study brain function and behavior. Emphasis on hands-on participation in behavioral and neuroscience techniques. Prerequisites: PSYC 160 or 170, and a course in statistics, or with permission of instructor. SC

PSYC 303b / NSCI 355b, Social Neuroscience Molly Crockett

Exploration of the psychological and neural mechanisms that enable the formation, maintenance, and dissolution of social relationships. Topics include the neuroscience of how we form impressions and decide whether to instigate relationships with others; how we build relationships through trust, cooperation, attachment, conflict, and reconciliation; and group-level processes including intergroup bias, moral judgment, and decision making. Prerequisite: PSYC 110 or permission of instructor. SC

PSYC 335b / NSCI 340b, Cognitive Neuroscience Steve Wohn Chang

Examination of the fundamental and advanced principles underlying several cognitive functions from the perspectives of modern cognitive, systems, and computational neuroscience. Discussion of cognition in both humans and animal models through research of general neurobiological principles followed by several key examples from research studies that have influentially shaped the field. Prerequisite: PSYC 160 or specific chapter readings from the instructor. SC

College Seminars

The Residential College Seminar program is designed to enhance the educational life of the residential colleges by offering innovative courses, for credit, that fall outside departmental structures.

The faculty for the seminar program is drawn from many backgrounds, including Yale faculty, both from Yale College and from other schools of the University; leading scholars from other institutions; and individuals from walks of life outside the university setting. Residential college seminars for the fall and spring terms are described on the College Seminar Program's Website. The online listings contain course titles, descriptions, and prerequisites. Course syllabi are available on Canvas @ Yale.

Students apply to college seminars before classes begin through an online tool on the program's website or through a link in the online course description. Students may apply to a maximum of two college seminars in a given term; choices are not ranked by order of preference. Students may enroll in no more than four college seminars total during their time at Yale. Auditing is not permitted in college seminars.

Computer Science

Director of undergraduate studies: James Aspnes, 401 AKW, 432-1232, james.aspnes@yale.edu; cpsc.yale.edu

The Department of Computer Science offers both B.S. and B.A. degree programs, as well as three combined majors in cooperation with other departments: Electrical Engineering and Computer Science (p. 305), Computer Science and Mathematics (p. 234), and Computer Science and Psychology (p. 235). Each major program not only provides a solid technical education but also allows students either to take a broad range of courses in other disciplines or to complete the requirements of a second major.

The Computer Science and combined major programs share a common core of five computer science courses. The first is CPSC 201, a survey that demonstrates the breadth and depth of the field to students who have taken the equivalent of an introductory programming course. The remaining core courses cover discrete mathematics, data structures, systems programming and computer architecture, and algorithm analysis and design. Together these courses include the material that every major should know.

The core courses are supplemented by electives (and, for the combined majors, core courses in the other discipline) that offer great flexibility in tailoring a program to each student's interests. The capstone is the senior project, through which students experience the challenges and rewards of original research under the guidance of a faculty mentor.

Prospective majors are encouraged to discuss their programs with the director of undergraduate studies as early as possible.

INTRODUCTORY COURSES

The department offers a broad range of introductory courses to meet the needs of students with varying backgrounds and interests. Except for CPSC 200 and CPSC 201, none assumes previous knowledge of computers.

1. CPSC 100, taught jointly with Harvard University, teaches students majoring in any subject area how to program a computer and solve problems. No prior experience is required.
2. CPSC 112 teaches students majoring in any subject area how to program a computer and solve problems using the language Java. Students with previous programming experience should consider taking CPSC 201 instead.
3. CPSC 134 provides an introduction to computer music, including musical representations for computing, automated music analysis and composition, interactive systems, and virtual instrument design.
4. CPSC 150 explores how some of the key ideas in computer science have affected philosophy of mind, cognitivism, connectionism, and related areas. This humanities-style course requires a significant amount of reading and writing a paper, and satisfies the writing and the humanities and arts distributional requirements.
5. CPSC 151 studies the history of the graphical user interface in an attempt to guess its future. This course also satisfies the writing distributional requirement.

6. CPSC 183 explores the myriad ways that law and technology intersect, with a special focus on the role of cyberspace. This course satisfies the social science distributional requirement.
7. CPSC 200, intended as a survey course for non-majors, focuses on practical applications of computing technology while examining topics including computer hardware, computer software, and related issues such as security and software engineering.
8. CPSC 201 surveys the field of computer science, including systems (computers and their languages) and theory (algorithms, complexity, and computability). Students with sufficient programming experience may elect CPSC 201 without taking CPSC 112. (These courses meet at the same time so that students are easily able to change levels if necessary).
9. CPSC 202 presents the formal methods of reasoning and the concepts of discrete mathematics and linear algebra used in computer science and related disciplines.

REQUIREMENTS OF THE MAJOR

The B.S. and the B.A. degree programs have the same required five core courses: CPSC 201; CPSC 202 or MATH 244; CPSC 223; CPSC 323; and CPSC 365 or 366. CPSC 480 and 490 may not be counted toward these core courses.

B.S. degree program The B.S. degree program requires a total of twelve courses, six additional intermediate or advanced courses in Computer Science and the senior requirement.

B.A. degree program The B.A. degree program requires a total of ten courses, four additional intermediate or advanced course in Computer Science and the senior requirement.

Combined B.S./M.S. degree Exceptionally able and well-prepared students may complete a course of study leading to the simultaneous award of the B.S. and M.S. degrees after eight terms of enrollment. Eligibility requirements are described under "Simultaneous Award of the Bachelor's and Master's Degrees" in Section K, Special Arrangements (p. 64), in the Academic Regulations. Specific requirements for the combined degree in Computer Science are as follows:

1. Candidates must satisfy the Yale College requirements for the B.S. degree in Computer Science.
2. In fulfilling these requirements, students must complete eight graduate courses from the approved list, up to two of which may, with the permission of the director of undergraduate studies and the director of graduate studies, also be applied toward completion of the B.S. degree. At most, one of these eight courses may be CPSC 690, 691, or 692.
3. At the end of their fifth term of enrollment students must have achieved at least three-fourths A or A- grades in all of their course credits directly relating to the major.

Credit/D/Fail Courses taken Credit/D/Fail may not be counted toward the major. All courses in the major must be taken for a letter grade.

Roadmap See visual roadmap of the requirements.

SENIOR REQUIREMENT

In the senior year students must take CPSC 490, an independent project course in which students select an adviser to guide them in research in a subfield of computer science. With permission of the director of undergraduate studies, students may enroll in 490 more than once or before their senior year.

ADVISING

All Computer Science majors in the sophomore, junior, and senior years should have their programs approved by the director of undergraduate studies. Students majoring in Computer Science are advised to complete CPSC 201 and 223 by the end of the sophomore year.

Electives The Computer Science department encourages interdisciplinary study in which computer science plays a major role. Advanced courses in other departments that involve concepts from computer science and are relevant to an individual program may, with permission of the director of undergraduate studies, be counted toward the requirements.

Students considering graduate study in computer science are advised to take CPSC 421 and 422, as well as courses covering the breadth of computer science, including programming languages and systems, artificial intelligence, scientific computing, and theoretical computer science.

Students interested in using computers to solve scientific and engineering problems are advised to take CPSC 440 as well as computational courses offered in Applied Mathematics (p. 129) and in Engineering and Applied Science (p. 310).

The core mathematical background necessary to complete the Computer Science major is provided in CPSC 202. However, many advanced courses in graphics, computer vision, neural networks, and numerical analysis assume additional knowledge of linear algebra and calculus. Students who plan to take such courses as electives and who are unsure whether they have the appropriate mathematical background are encouraged to take MATH 222 or 225 and MATH 120.

Typical programs For students who already know how to program, typical B.S. programs starting in the first and sophomore years are indicated below. For typical B.A. programs, two of the electives would be omitted.

First-Year	Sophomore	Junior	Senior
CPSC 201	CPSC 202 CPSC 323	Two electives	CPSC 490
CPSC 223	CPSC 365 or 366 One elective	Two electives	One elective
	Sophomore	Junior	Senior
	CPSC 223	One elective	
	CPSC 201	CPSC 365 or 366	Two electives
	CPSC 202	CPSC 323	CPSC 490
		One elective	Two electives

REQUIREMENTS OF THE MAJOR

Prerequisites None

Number of courses *B.S.* – 12 term courses taken for letter grades (incl senior project);

B.A. – 10 term courses taken for letter grades (incl senior project)

Specific courses required *B.S. and B.A.* – CPSC 201; CPSC 202 or MATH 244;

CPSC 223, 323, and 365 or 366

Distribution of courses *B.S.* – 6 addtl intermediate or advanced Comp Sci courses;

B.A. – four addtl intermediate or advanced Comp Sci courses

Substitution permitted Advanced courses in other depts, with DUS permission

Senior requirement Senior project (CPSC 490)

FACULTY OF THE DEPARTMENT OF COMPUTER SCIENCE

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

Associate Professor Mahesh Balakrishnan

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

Senior Research Scientists Robert Bjornson, Andrew Sherman

Senior Lecturer Stephen Slade

Lecturers Benedict Brown, James Glenn, Kyle Jensen, *Natalie Melo, Scott Petersen, Brad Rosen, Xiyin Tang

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

†A joint appointment with primary affiliation in another department or school.

For a complete list of Computer Science Department personnel, visit <http://cpsc/yale.edu/>.

Introductory Courses

* CPSC 035b, Twenty-First Century Electronic and Computer Music Techniques

Scott Petersen

Exploration of twenty-first century electronic and computer music through the diverse subjects and issues at the intersection of technology and new music. How computers have changed and challenged the analysis, composition, production, and appreciation of music over the last fifty years. Knowledge of basic music theory and the ability to read Western musical notation is assumed. Enrollment limited to first-year students. Preregistration required; see under First-Year Seminar Program.

CPSC 101b, Great Ideas in Computer Science Stanley Eisenstat

An introduction for nonmajors to some of the most important ideas in computer science: what the computer is; how it works; what it can do and what it cannot do,

now and in the future. Topics include algorithms, elementary programming, hardware, language interpretation, software engineering, complexity, models of computation, and artificial intelligence. No previous programming experience required. QR

CPSC 112b, Introduction to Programming Benedict Brown

Development on the computer of programming skills, problem-solving methods, and selected applications. No previous experience with computers necessary. QR

CPSC 134a / MUSI 426, Programming Musical Applications Scott Petersen

Topics in computer music, including musical representations for computing, automated music analysis and composition, interactive systems, and virtual instrument design. Use of domain-specific programming languages and libraries to explore how the principles of computer science can be applied to music to create new interfaces, instruments, and tools. Recommended preparation: the ability to read music or play an instrument. QR

*** CPSC 150a, Computer Science and the Modern Intellectual Agenda** David Gelernter

Introduction to the basic ideas of computer science (computability, algorithm, virtual machine, symbol processing system), and of several ongoing relationships between computer science and other fields, particularly philosophy of mind. No previous experience with computers necessary. Enrollment limited to 25. WR, HU

CPSC 183a, Law, Technology, and Culture Brad Rosen

An exploration of the myriad ways in which law and technology intersect, with a special focus on the role of cyberspace. Topics include digital copyright, free speech, privacy and anonymity, information security, innovation, online communities, the impact of technology on society, and emerging trends. No previous experience with computers or law necessary. SO

*** CPSC 184b, Intellectual Property in the Digital Age** Xiyin Tang

The evolving and oftentimes vexing intellectual property regime of the new digital age. Focus on copyright, fair use, remix culture, access to knowledge, technological innovations, the increasing relevance of trademarks in the new information society, the tension between creativity/creating and the intellectual property rules which either foster or inhibit it, and the new information culture of the digital age. Prerequisite: CPSC 183 or permission of instructor. HU, SO

*** CPSC 185b, Control, Privacy, and Technology** Brad Rosen

The evolution of various legal doctrines with and around technological development. Topics include criminal law, privacy, search and seizure, digital rights, and the implications of technologically permitted methods of control on the law. Special attention to case law and policy. After CPSC 183. WR, SO

CPSC 200b, Introduction to Information Systems Stephen Slade

The real-world artifacts and implementations that comprise the vital computational organisms that populate our world. Hardware and software and the related issues of security, privacy, regulation, and software engineering. Examples stress practical applications of technology, as well as limitations and societal issues. After CPSC 100 or 112 or equivalent. QR

CPSC 201a or b, Introduction to Computer Science Stephen Slade

Introduction to the concepts, techniques, and applications of computer science. Topics include computer systems (the design of computers and their languages); theoretical

foundations of computing (computability, complexity, algorithm design); and artificial intelligence (the organization of knowledge and its representation for efficient search). Examples stress the importance of different problem-solving methods. After CPSC 112 or equivalent. QR

CPSC 202a, Mathematical Tools for Computer Science Dana Angluin

Introduction to formal methods for reasoning and to mathematical techniques basic to computer science. Topics include propositional logic, discrete mathematics, and linear algebra. Emphasis on applications to computer science: recurrences, sorting, graph traversal, Gaussian elimination. QR

CPSC 223a or b, Data Structures and Programming Techniques James Glenn

Topics include programming in C; data structures (arrays, stacks, queues, lists, trees, heaps, graphs); sorting and searching; storage allocation and management; data abstraction; programming style; testing and debugging; writing efficient programs. After CPSC 201 or equivalent. QR RP

CPSC 257a, Information Security in the Real World Stephen Slade

Introduction to information security, the practice of protecting information from unauthorized actions, in the context of computer systems. Topics include current security-related issues, basic adversarial models and threats to computer systems, potential defenses, security tools, and common security breaches and their wider impacts. Prerequisite: CPSC 100, 112, or equivalent programming experience, or with permission of instructor. QR

CPSC 262a / AMTH 262a / S&DS 262a, Computational Tools for Data Science Staff

An introduction to computational tools for data science. The analysis of data using regression, classification, clustering, principal component analysis, independent component analysis, dictionary learning, gradient methods, 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, programming. Prerequisites: after or concurrently with MATH 222, 225, or 231; after or concurrently with MATH 120, 230, or ENAS 151; after or concurrently with CPSC 100, 112, or ENAS 130. QR

*** CPSC 290a or b, Directed Research** Staff

Individual research. Requires a faculty supervisor and the permission of the director of undergraduate studies. May be taken more than once for credit.

Intermediate Courses

CPSC 323a, Introduction to Systems Programming and Computer Organization

Stanley Eisenstat

Machine architecture and computer organization, systems programming in a high-level language, issues in operating systems, software engineering, prototyping in scripting languages. After CPSC 223. QR RP

CPSC 338b / EENG 348b, Digital Systems Rajit Manohar

Development of engineering skills through the design and analysis of digital logic components and circuits. Introduction to gate-level circuit design, beginning with single gates and building up to complex systems. Hands-on experience with

circuit design using computer-aided design tools and programmable logic devices.

Recommended preparation: EENG 201b. RP

CPSC 365b, Algorithms James Glenn

Paradigms for algorithmic problem solving: greedy algorithms, divide and conquer, dynamic programming, and network flow. NP completeness and approximation algorithms for NP-complete problems. Algorithms for problems from economics, scheduling, network design and navigation, geometry, biology, and optimization. Provides algorithmic background essential to further study of computer science. Either CPSC 365 or CPSC 366 may be taken for credit. Prerequisites: CPSC 202 and 223. QR

Advanced Courses

CPSC 422a, Design and Implementation of Operating Systems Zhong Shao

The design and implementation of operating systems. Topics include synchronization, deadlock, process management, storage management, file systems, security, protection, and networking. After CPSC 323. QR

CPSC 423b, Principles of Operating Systems Abraham Silberschatz

A survey of the underlying principles of modern operating systems. Topics include process management, memory management, storage management, protection and security, distributed systems, and virtual machines. Emphasis on fundamental concepts rather than implementation. After CPSC 323. QR

CPSC 424a, 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. After CPSC 223 and MATH 222 or 225, or equivalents. QR

[**CPSC 426, Building Distributed Systems**]

CPSC 427a, Object-Oriented Programming Michael Fischer

Object-oriented programming as a means to efficient, reliable, modular, reusable code. Use of classes, derivation, templates, name-hiding, exceptions, polymorphic functions, and other features of C++. After CPSC 223. QR

[**CPSC 428, Language-Based Security**]

[**CPSC 430, Formal Semantics**]

CPSC 431a, Computer Music: Algorithmic and Heuristic Composition Scott Petersen
Study of the theoretical and practical fundamentals of computer-generated music, with a focus on high-level representations of music, algorithmic and heuristic composition, and programming languages for computer music generation. Theoretical concepts are supplemented with pragmatic issues expressed in a high-level programming language. Ability to read music is assumed. After CPSC 202 and 223. QR

CPSC 432b, 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. Ability to read music is assumed. After CPSC 202 and 223. QR

CPSC 433a, 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. After CPSC 323. QR

* **CPSC 434b, Topics in Networked Systems** Yang Yang

Study of networked systems such as the Internet and mobile networks which provide the major infrastructure components of an information-based society. Topics include the design principles, implementation, and practical evaluation of such systems in new settings, including cloud computing, software-defined networking, 5G, Internet of things, and vehicular networking. Concurrently with or after CPSC 323. QR

[**CPSC 435, Internet-Scale Applications**]

[**CPSC 436, Networked Embedded Systems and Sensor Networks**]

CPSC 437a, Introduction to Database Systems Abraham Silberschatz

Introduction to database systems. Data modeling. The relational model and the SQL query language. Relational database design, integrity constraints, functional dependencies, and normal forms. Object-oriented databases. Database data structures: files, B-trees, hash indexes. After CPSC 223. QR

[**CPSC 438, Database System Implementation and Architectures**]

CPSC 439b, Software Engineering Ruzica Piskac

Introduction to fundamental concepts in software engineering and to the development and maintenance of large, robust software systems. The process of collecting requirements and writing specifications; project planning and system design; methods for increasing software reliability, including delta debugging and automatic test-case generation; type systems, static analysis, and model checking. Students build software in teams. After CPSC 323. QR RP

* **CPSC 451b, The User Interface** David Gelernter

The user interface (UI) in the context of modern design, where tech has been a strong and consistent influence from the Bauhaus and U.S. industrial design of the 1920s and 1930s through the IBM-Eames design project of the 1950s to 1970s. The UI in the context of the windows-menus-mouse desktop, as developed by Alan Kay and Xerox in the 1970s and refined by Apple in the early 1980s. Students develop a detailed design and simple implementation for a UI. Prerequisite: CPSC 223 or equivalent.

CPSC 453a, Machine Learning for Biology Smita Krishnaswamy

Applications of machine learning methods in the analysis of high-throughput biological data with focus on genomic and proteomic data. Topics include methods for denoising data; non-linear dimensionality reduction for visualization and progression analysis; unsupervised clustering; and information theoretic analysis of gene regulatory and signaling networks.

CPSC 454a, 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. After CPSC 202 and 323 or equivalents. QR RP

[**CPSC 455, Economics and Computation**]

* **CPSC 456b / EENG 451b, Wireless Technologies and the Internet of Things**

Wenjun Hu

Fundamental theory of wireless communications and its application explored against the backdrop of everyday wireless technologies such as WiFi and cellular networks. Channel fading, MIMO communication, space-time coding, opportunistic communication, OFDM and CDMA, and the evolution and improvement of technologies over time. Emphasis on the interplay between concepts and their implementation in real systems. Prerequisites: 1) Introductory courses in mathematics, engineering, or computer science covering basics of the following topics: Linux skills, Matlab programming, probability, linear algebra, and Fourier transform; 2) Or by permission of the instructor. The course material will be self-contained as much as possible. The labs and homework assignments require Linux and MatLab skills and simple statistical and matrix analysis (using built-in Matlab functions). There will be a couple of introductory labs to refresh Linux and matlab skills if needed.

[**CPSC 457, Sensitive Information in a Connected World**]

[**CPSC 462, Graphs and Networks**]

CPSC 465b, 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. After CPSC 365 or 366. QR

[**CPSC 469, Randomized Algorithms**]

CPSC 470b, Artificial Intelligence Brian Scassellati

Introduction to artificial intelligence research, focusing on reasoning and perception. Topics include knowledge representation, predicate calculus, temporal reasoning, vision, robotics, planning, and learning. After CPSC 201 and 202. QR

[**CPSC 471, Advanced Topics in Artificial Intelligence**]

* **CPSC 473a, Intelligent Robotics Laboratory** Brian Scassellati

Students work in small teams to construct novel research projects using one of a variety of robot architectures. Project topics may include human-robot interaction, adaptive intelligent behavior, active perception, humanoid robotics, and socially assistive robotics. Enrollment limited to 20. After CPSC 472. QR

CPSC 474a, Computational Intelligence for Games James Glenn

Introduction to techniques used for creating computer players for games, particularly board games. Topics include combinatorial and classical game theory, stochastic search methods, applications of neural networks, and procedural content generation. Prerequisites: CPSC 202 and CPSC 223. QR

CPSC 475a / BENG 475a / EENG 475a, 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. Prerequisite: CPSC 112 and MATH 120, or with permission of instructor. QR, SC RP

CPSC 476b / BENG 476b, 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 analysis, and shape description and representation. After CPSC 475. QR, SC

CPSC 477b, 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. Prerequisites: CPSC 202 and CPSC 223, or permission of instructor. QR

CPSC 478a, 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. After CPSC 202 and 223. QR

*** CPSC 479b, 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. After CPSC 202 and 223. QR

*** CPSC 480a or b, Directed Reading** Staff

Individual study for qualified students who wish to investigate an area of computer science not covered in regular courses. A student must be sponsored by a faculty member who sets the requirements and meets regularly with the student. Requires a written plan of study approved by the faculty adviser and the director of undergraduate studies. May be taken more than once for credit.

*** CPSC 490a or b, Senior Project** Staff

Individual research intended to fulfill the senior requirement. Requires a faculty supervisor and the permission of the director of undergraduate studies. The student must submit a written report about the results of the project.

Computer Science and Mathematics

Directors of undergraduate studies: James Aspnes (Computer Science), 401 AKW, 432-1232, james.aspnes@yale.edu; Andrew Casson (Mathematics), 216 LOM, 432-7056, andrew.casson@yale.edu

Computer Science and Mathematics is an interdepartmental major for students who are interested in computational mathematics, the use of computers in mathematics, mathematical aspects of algorithm design and analysis, and theoretical foundations of computing.

REQUIREMENTS OF THE MAJOR

The major requires fourteen term courses as well as a senior project. Six of the fourteen courses must be in computer science: CPSC 201, 223, 323, and 365 or 366; one from CPSC 440, 462, 465, 468, or 469; and one additional advanced term course other than CPSC 480 or 490. The remaining eight courses must be in mathematics: MATH 120, either 222 or 225, 244, and five additional term courses numbered above MATH 200 other than MATH 470. MATH 230 and 231 may replace (but do not count in addition to) MATH 120 and 222 or 225.

Credit/D/Fail Courses taken Credit/D/Fail may not be counted toward the major.

SENIOR REQUIREMENT

The senior requirement is a project or an essay on a topic acceptable to both departments. An oral report on the mathematical aspects of the project must be presented to the Mathematics faculty.

ADVISING

The entire program of each student majoring in Computer Science and Mathematics must be approved by the director of undergraduate studies in each department.

REQUIREMENTS OF THE MAJOR

Prerequisites None

Number of courses 14 term courses (not incl senior req)

Specific courses required CPSC 201, 223, 323, 365 or 366; one from CPSC 440, 462, 465, 468, or 469; MATH 120, 222 or 225, 244

Distribution of courses 5 addtl courses in math numbered above 200 (may not be MATH 470); 1 addtl advanced course in comp sci (may not be CPSC 480 or 490)

Substitution permitted MATH 230, 231 for MATH 120 and 222 or 225

Senior requirement Senior project or senior essay on topic acceptable to Comp Sci and Math depts; oral report to Math dept on mathematical aspects of project

Computer Science and Psychology

Directors of undergraduate studies: James Aspnes (Computer Science), 401 AKW, 432-1232, james.aspnes@yale.edu; Woo-kyoung Ahn (Psychology), 319 SSS, 432-9626, woo-kyoung.ahn (woo-kyoung.ahn@yale.edu)@yale.edu (laurie.santos@yale.edu)

Computer Science and Psychology is an interdepartmental major designed for students interested in integrating work in these two fields. Each area provides tools and theories that can be applied to problems in the other. Examples of this interaction include cognitive science, artificial intelligence, and biological perception.

PREREQUISITE

The prerequisite for the major is PSYC 110, from which students who have scored 5 on the Advanced Placement test in Psychology are exempt. Beyond the prerequisite, the major requires fourteen term courses as well as a senior project.

REQUIREMENTS OF THE MAJOR

The major for the Class of 2021 and previous classes With DUS approval, the following changes to the requirements of the major may be fulfilled by students who declared their major under previous requirements.

The major for the Class of 2022 and subsequent classes Eight of the fourteen courses must be in computer science: CPSC 201, 202, 223, 323, and 365 or 366, and three advanced computer science courses in artificial intelligence (examples of such courses are those in the range CPSC 470 through CSPC 477). MATH 244 may substitute for CPSC 202. CPSC 480 and 490 may not be counted as one of these courses.

The remaining six courses must be in psychology, including PSYC 200; at least one from PSYC 210–299; at least two Psychology courses from the social science point of view; and at least two courses from the natural science point of view. At least one of the two psychology courses from both the social science point of view and the natural science point of view must be designated as Core in the course listings. Refer to the Psychology (p. 645) program overview for a listing of courses that fulfill the social science and natural science requirements.

With the permission of both directors of undergraduate studies, a course in cognitive psychology or cognitive science that is highly relevant to the major and that is not counted as one of the six courses in Psychology may substitute for one of the courses in artificial intelligence. An additional course in psychology and an examination arranged with the instructor of PSYC 200 may substitute for PSYC 200.

Credit/D/Fail No course in Computer Science taken Credit/D/Fail may be counted toward the major; no more than one course in Psychology taken Credit/D/Fail may be counted toward the major. No 200-level course in Psychology taken Credit/D/Fail may be counted.

SENIOR REQUIREMENT

Students must take either CPSC 490 or PSYC 499, and the project must be approved by the director of undergraduate studies in each department.

ADVISING

The entire program of each student majoring in Computer Science and Psychology must be approved by the director of undergraduate studies in each department.

REQUIREMENTS OF THE MAJOR

Prerequisite PSYC 110

Number of courses 14 term courses beyond prereq (not incl senior project)

Specific courses required CPSC 201, 202, 223, 323, and 365 or 366; PSYC 200

Distribution of courses 8 courses in Comp Sci, with 3 advanced AI courses; 6 courses in PSYC, inc PSYC 200; at least 1 additional course from PSYC 210–299; at least 2 from social science point of view and 2 from natural science point of view, with 1 designated Core course from each, as specified

Substitution permitted For CPSC 202, MATH 244; for 1 course in AI, 1 course in cognitive psychology or cognitive science; for PSYC 200, 1 addtl course in PSYC and exam arranged with instructor

Senior requirement CPSC 490 or PSYC 499, with project approved by DUS in each dept

Computing and the Arts

Director of undergraduate studies: Julie Dorsey (Computer Science), 507 AKW, 432-4249, julie.dorsey@yale.edu

Computing and the Arts is an interdepartmental major designed for students who wish to integrate work in computing with work in one of five arts disciplines: architecture, art, history of art, music, or theater studies.

For students with a computing perspective, issues in these disciplines present interesting and substantive problems: how musicians use computers to compose; the limitations of current software tools used by artists; the types of analyses done by art historians; challenges in designing and using virtual sets in the theater; ways that virtual worlds might help to envision new forms of artistic expression; and lessons that can be learned from trying to create a robotic conductor or performer.

For students with an artistic perspective, computing methods offer a systematic approach to achieving their vision. A foundation in computer science allows artists to understand existing computing tools more comprehensively and to use them more effectively. Furthermore, it gives them insight into what fundamentally can and cannot be done with computers, so they can anticipate the future development of new tools for computing in their field.

PREREQUISITES

The prerequisite for all students in the major is either CPSC 100 or CPSC 112, which should be taken during the first year. There is one additional prerequisite for the Architecture track, ARCH 150, and two additional prerequisites for the Art track, ART 111 and 114. There are no additional prerequisites for the History of Art track or the Music track. Additional prerequisites for the Theater Studies track are THST 110 and 111. There is no required favorable review of studio work for admission to the major in any track.

REQUIREMENTS OF THE MAJOR

Twelve term courses are required beyond the prerequisites, not including the two-term senior project. Six of the courses must be in Computer Science, including CPSC 201, 202, and 223. Students are advised to complete CPSC 202 and 223 by the end of the sophomore year. MATH 244 may be substituted for CPSC 202. The six remaining courses are selected from one of the arts disciplines. Students choose a track in architecture, art, history of art, music, or theater studies. All requirements for a single track must be satisfied, as specified below.

The Architecture track requires the following courses in addition to the Computer Science courses listed above: (1) ARCH 150, ARCH 200, 260, 262; (2) two elective courses from any of the three concentrations: Design; History, Theory, and Criticism; and Urban Studies ; (3) two courses from CPSC 475, 478, or 479; and (4) one additional intermediate or advanced CPSC course (excluding CPSC 490).

The Art track requires the following courses in addition to the Computer Science courses listed above, as well as a sophomore review at the School of Art: (1) two 100-level courses beyond ART 111 and 114, such as ART 132 or 145; (2) two courses in Art at the 200 or 300 level, such as ART 285 or ART 369; (3) ART 395 or ART 301; (4)

one course in Art at the 400 level, such as ART 495; (5) two courses selected from CPSC 475, 478, and 479; (6) one additional intermediate or advanced Computer Science course (excluding CPSC 490). Seniors following the art track are charged an annual \$200 studio fee and will have access to shared studio and facilities in the School of Art.

The History of Art track requires the following courses in addition to the Computer Science courses listed above: (1) one introductory, 100-level, History of Art course; (2) two History of Art courses at the 200, 300, or 400 level (the courses must represent two different areas as defined in the History of Art program description); (3) one studio art course (students may need to take a prerequisite course in Art to prepare for the studio course); (4) HSAR 401; (5) one 400-level seminar in History of Art; (6) two courses selected from CPSC 437, 475, 478, or 479, one of which must be CPSC 478 or 479; (7) one additional intermediate or advanced Computer Science course (excluding CPSC 490).

The Music track requires the following courses in addition to the Computer Science courses listed above: (1) MUSI 315; (2) five term courses chosen from MUSI 231, S290, 125, 316, 320, 321, MUSI 409, 420, 421, 495; (3) CPSC 431; (4) CPSC 432; (5) one additional intermediate or advanced Computer Science course (excluding CPSC 490).

The Theater Studies track requires the following courses in addition to the Computer Science courses listed above: (1) THST 210; (2) three courses in dramatic literature or theater history; (3) two upper-level Theater Studies production seminars in design, directing, or playwriting; (4) CPSC 431 or 432; (5) CPSC 478 or 479; (6) one additional intermediate or advanced Computer Science course (excluding CPSC 490).

Credit/D/Fail Courses taken Credit/D/Fail may not be counted toward the major.

SENIOR REQUIREMENT

The senior project requires two terms: one term of CPAR 491, and one term of ARCH 491, ART 496, HSAR 499, one from MUSI 496–499, or THST 471 or 491, depending on the track chosen. The project must be approved by the DUS and be acceptable to both departments. Students must submit a written report, including an electronic abstract and webpage(s).

ADVISING AND APPROVAL OF PROGRAM

The entire program of each student majoring in Computing and the Arts must be approved by the DUS.

REQUIREMENTS OF THE MAJOR

Prerequisites *All tracks*—CPSC 100 or CPSC 112; *Architecture track*—ARCH 150; *Art track*—ART 111, 114, and sophomore review; *Theater Studies track*—THST 110, 111

Number of courses 12 term courses beyond prereqs (not incl senior project)

Specific courses required *All tracks*—CPSC 201, 202, 223; *Architecture track*—ARCH 150, ARCH 200, 260, 262; 2 courses from CPSC 475, 478, or 479; *Art track*—ART 395 or 301; 2 from CPSC 475, 478, 479; *History of Art track*—2 from CPSC 437, 475, 478, 479, including 1 of CPSC 478, 479; 1 intro, 100-level course; HSAR 401; *Music track*—CPSC 431, 432; MUSI 315; *Theater Studies track*—CPSC 431 or 432; CPSC 478 or 479; THST 210

Distribution of courses *All tracks*—3 addtl courses in Comp Sci, incl 1 intermediate or advanced course beyond specific reqs (excluding CPSC 490); *Architecture track*—2 courses from the concentrations: Design; History, Theory, and Criticism; and Urban Studies; *Art track*—2 courses in Art at 100 level (excluding prereqs), 2 at 200 or 300 level, and 1 at 400 level as specified; *History of Art track*—2 courses in different areas of History of Art at 200, 300, or 400 level; 1 sem at 400-level in History of Art; 1 studio art course; *Music track*—5 courses from MUSI 231, S290, 125, 316, 320, 321, 409, 420, 421, 495; *Theater Studies track*—3 courses in dramatic lit or theater history; 2 production sems, as specified

Substitution permitted MATH 244 for CPSC 202

Senior requirement *All tracks*—Two-term senior project including CPAR 491, approved by DUS; *Architecture track*—ARCH 491; *Art track*—ART 496; *History of Art track*—HSAR 499; *Music track*—one from MUSI 496-499; *Theater Studies track*—THST 471 or 491

Courses

* CPAR 291a, Special Projects Staff

Individual research project in computing and the arts. Requires a faculty supervisor and permission of the director of undergraduate studies. May be taken more than once for credit.

* CPAR 491a, Senior Project in Computing and the Arts Staff

Individual research project for majors in Computing and the Arts. Requires two faculty supervisors, one from Computer Science and one from the department in the chosen track. Requires permission of the director of undergraduate studies. The student must present both a verbal and a written report describing the results of the project. May be taken more than once for credit.

DeVane Lecture Course

The next DeVane Lecture Course will be offered in the 2019-2020 academic year.

Directed Studies

Director of undergraduate studies: Kathryn Slanski, Whitney Humanities Center 321 (53 Wall St.), (203) 432-6630, kathryn.slanski@yale.edu; Chair of Humanities: Bryan Garsten, Whitney Humanities Center 212, (203) 432-1313, bryan.garsten@yale.edu; directedstudies.yale.edu

Directed Studies, a selective program for first-year students, is an interdisciplinary introduction to influential texts that have shaped Western civilization. Spanning works from ancient Greece to the twentieth century, Directed Studies is a coherent program of study that encourages students to put rich and complex texts into conversation with one another across time and across disciplinary boundaries. Students in Directed Studies learn to analyze challenging and urgent texts, participate meaningfully in seminar discussions, and write clear and persuasive analytic essays.

PREREQUISITES

Directed Studies has no prerequisites and is designed for students with or without any background in humanities or Western civilization, ancient or modern. (In order to enroll for the second term, students must have completed the first term's courses.)

UNIQUE TO THE PROGRAM

The Directed Studies program consists of three integrated full-year courses in Literature, Philosophy, and Historical and Political Thought. Approximately ten-percent of the first-year class are accepted each year. Students entering the program must enroll in all three courses and are expected to enroll for both semesters. Students participating in DS become members of a close knit and supportive intellectual cohort that endures well beyond the end of the first year.

Each of the three Directed Studies courses meets weekly for one lecture and two seminars. Seminars have a maximum of eighteen students and provide an opportunity to work closely with Yale faculty. The regular lectures and seminars are complemented by colloquia that feature distinguished speakers from Yale and beyond. Our study of written texts is enhanced by special sessions at the Yale Art Gallery, the Yale Center for British Art, and the Beinecke Rare Book and Manuscript Library.

Directed Studies fulfills a number of Yale College distributional requirements, including the two required course credits in the humanities and arts (HU), the two required course credits in the social sciences (SO), and the two required course credits in writing (WR). Moreover, courses taken in Directed Studies can be counted toward satisfying requirements in a variety of majors. For example, both terms of DS Historical and Political Thought may be counted toward the History major, and one term may be counted toward the major in Political Science; both terms of DS Literature may be counted toward the Literature major. The program serves as a strong foundation for all majors in Yale College, including many of the STEM fields, and is an outstanding basis for careers in law, public policy, business, education, the arts, journalism, consulting, engineering, and medicine.

Courses

*** DRST 001a and DRST 002b, Directed Studies: Literature** Staff

An examination of major literary works with an aim of understanding how a tradition develops. In the fall term, works and authors include Homer, Aeschylus, Sophocles, Virgil, the Bible, and Dante. In the spring term, authors vary somewhat from year to year and include Petrarch, Cervantes, Shakespeare, Milton, Wordsworth, Goethe, Tolstoy, Proust, and Eliot. WR, HU

*** DRST 003a and DRST 004b, Directed Studies: Philosophy** Staff

An examination of major figures in the history of Western philosophy with an aim of discerning characteristic philosophical problems and their interconnections. Emphasis on Plato and Aristotle in the fall term. In the spring term, modern philosophers include Descartes, Berkeley, Hume, Kant, and Nietzsche. WR, HU

*** DRST 005a and DRST 006b, Directed Studies: Historical and Political Thought**
Staff

A study of works of primary importance to political thought and intellectual history. Focus on the role of ideas in shaping events, institutions, and the fate of the individual. In the fall term, Herodotus, Thucydides, Plato, Aristotle, Augustine, and Aquinas. In the spring term, Machiavelli, Hobbes, Locke, Rousseau, Burke, Tocqueville, Emerson, Marx, Nietzsche, and Arendt. SO

East Asian Languages and Literatures

Director of undergraduate studies: TBD

The major in East Asian Languages and Literatures provides an intellectually focused and rigorous immersion in the East Asian humanities. The department's courses reflect the breadth, depth, and variety of East Asian textual traditions, premodern through modern, including film and theater. The major is focused on the analysis of literature, culture, and thought, and is built on a solid foundation of language study. Students elect either the Chinese or the Japanese track, but are encouraged to take courses in both tracks and to become familiar with aspects of East Asian literary culture that transcend geographic parameters.

COURSES FOR NONMAJORS

All courses offered by the Department of East Asian Languages and Literatures are open to nonmajors.

COURSE NUMBERING

Language courses use the subject codes CHNS, JAPN, or KREN. Multiple titled courses that include CHNS and JAPN subject codes and are numbered 200 to 299 have some sections taught in Chinese or Japanese. Courses with the subject code EALL are content courses whose focus is critical and humanistic; those numbered 200 to 299 are introductory, and those numbered 300 to 399 are advanced. Courses numbered EALL 001 to 099 are freshman seminars on East Asian literature, film, and humanities.

PREREQUISITE

Candidates for the major must complete CHNS 140 or JAPN 140 or the equivalent.

PLACEMENT PROCEDURES

Students who enroll in the department's language courses for the first time but who have studied Chinese, Japanese, or Korean elsewhere, and students who have skills in one of these languages because of family background, must take a placement examination at the beginning of the academic year. The times and places of the examinations are listed on the departmental website in August. The Chinese and Japanese examinations have online components accessed through the same site. Students of Japanese, Chinese, and Korean who are returning from programs abroad must take a placement examination, unless the course work was completed at an institution preapproved by the Richard U. Light Fellowship program. For questions, consult with the director of undergraduate studies.

REQUIREMENTS OF THE MAJOR

The major consists of at least eleven term courses beyond the prerequisite. Students must take two terms of advanced modern Chinese (CHNS 150 and 151 or equivalents) or advanced Japanese (JAPN 150 and 151 or equivalents), as well as two terms of literary Chinese or Japanese (CHNS 170 and 171, or JAPN 170 and 171). Students also take a survey course in Chinese, Japanese, or East Asian history and culture, preferably early in their studies. Three courses are required in literature in translation, taught in English, selected from EALL 200–399; one must be focused primarily on premodern content. These three may include courses on theater and film. In addition,

two advanced courses with readings in literary or modern Chinese and/or Japanese are required.

Credit/D/Fail A maximum of one course taken Credit/D/Fail may be counted toward the requirements of the major, with permission of the director of undergraduate studies.

SENIOR REQUIREMENT

Students prepare a one-term senior essay in EALL 491 or a yearlong senior essay in EALL 492 and 493. Those who elect a yearlong essay effectively commit to taking twelve term courses in the major, because the second term of the essay may not be substituted for any of the eleven required courses.

STUDY ABROAD

Students are encouraged to study abroad. Interested students should consult with the director of undergraduate studies and with the office of the Richard U. Light Fellowship to apply for support for programs in China, Japan, and Korea.

REQUIREMENTS OF THE MAJOR

Prerequisite CHNS 140 or JAPN 140 or equivalent

Number of courses 11 courses (incl one-term senior essay) or 12 courses (incl yearlong senior essay) beyond prereq

Specific courses required *Chinese track*—CHNS 150, 151, 170, 171, or equivalents;
Japanese track—JAPN 150, 151, 170, 171, or equivalents

Distribution of courses 1 course in Chinese, Japanese, or East Asian hist and culture;
3 courses in lit in translation numbered EALL 200–399, one of them premodern; 2 adv courses with readings in Chinese and/or Japanese

Senior requirement One-term senior essay (EALL 491) or yearlong senior essay (EALL 492, 493)

FACULTY OF THE DEPARTMENT OF EAST ASIAN LANGUAGES AND LITERATURES

Professors Kang-i Sun Chang, Aaron Gerow (*Chair*), Edward Kamens, Tina Lu, Jing Tsu

Assistant Professors Lucas Bender, Michael Hunter, Seth Jacobowitz

Senior Lecturer Pauline Lin

Lecturer Stephen Poland

Senior Lectors II Seungja Choi, Angela Lee-Smith

Senior Lectors Hsiu-hsien Chan, Min Chen, Koichi Hiroe, Rongzhen Li, Ninghui Liang, Fan Liu, Yoshiko Maruyama, Michiaki Murata, Hiroyo Nishimura, Masahiko Seto, Jianhua Shen, Mari Stever, Wei Su, Chuanmei Sun, Haiwen Wang, Yu-lin Wang Saussy, Peisong Xu, Yongtao Zhang, William Zhou

Lector Aoi Saito

Affiliated Faculty Chloe Starr (*Divinity School*)

Courses

East Asian Humanities

EALL 200a / CHNS 200 / HUMS 270a, The Chinese Tradition Tina Lu and Yongtao Zhang

An introduction to the literature, culture, and thought of premodern China, from the beginnings of the written record to the turn of the twentieth century. Close study of textual and visual primary sources, with attention to their historical and cultural backdrops. Students enrolled in CHNS 200 join a weekly Mandarin-language discussion section. No knowledge of Chinese required for students enrolled in EALL 200. Students enrolled in CHNS 200 must have L5 proficiency in Mandarin or permission of the course instructor. HU TR

EALL 206b / HSAR 206b / LITR 175b, Japan's Classics in Text and Image Edward Kamens

An introduction to the Japanese classics (poetry, narrative fiction, drama) in their manifestations in multiple media, especially in the visual and material realm. Special reference to and engagement with a simultaneous Yale University Art Gallery installation of rare books, paintings, and other works of art from Japan. No knowledge of Japanese required. Formerly JAPN 200. WR, HU TR

EALL 211a / LITR 174a / WGSS 405a, Women and Literature in Traditional China Kang-i Sun Chang

A study of major women writers in traditional China, as well as representations of women by male authors. The power of women's writing; women and material culture; women in exile; courtesans; Taoist and Buddhist nuns; widow poets; cross-dressing women; the female body and its metaphors; footbinding; notions of love and death; the aesthetics of illness; women and revolution; 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. Formerly CHNS 201. HU TR

* **EALL 230a / HUMS 269a, Poetry and Ethics Amidst Imperial Collapse** Lucas Bender

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

* **EALL 252a / FILM 446a / LITR 384a, Japanese Cinema before 1960** Aaron Gerow
The history of Japanese cinema to 1960, including the social, cultural, and industrial backgrounds to its development. Periods covered include the silent era, the coming of sound and the wartime period, the occupation era, the golden age of the 1950s, and the new modernism of the late 1950s. No knowledge of Japanese required. Formerly JAPN 270. HU TR

EALL 255b, 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. HU

* **EALL 256b / EAST 358b / GLBL 251b / HUMS 272b / LITR 265b, China in the World** Jing Tsu

Recent headlines about China in the world, deciphered in both modern and historical contexts. Interpretation of new events and diverse texts through transnational connections. Topics include China and Africa, Mandarinization, labor and migration, Chinese America, nationalism and humiliation, and art and counterfeit. Readings and discussion in English. HU

* **EALL 265b / LITR 251b, Japanese Literature after 1970** Stephen Poland
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. Enrollment limited to 20. No knowledge of Japanese required. HU

* **EALL 286a / HUMS 290a / LITR 285a / PORT 360a, The Modern Novel in Brazil and Japan** Seth Jacobowitz

Brazilian and Japanese novels from the late nineteenth century to the present. Representative texts from major authors are read in pairs to explore their commonalities and divergences. Topics include nineteenth-century realism and naturalism, the rise of mass culture and the avant-garde, and existentialism and postmodernism. No knowledge of Portuguese or Japanese required. HU TR

EALL 289a / LITR 255a, Crime and Detective Fiction in East Asian Literature and Film Stephen Poland

Exploration of East Asian literature, film, culture, and history through examination of the genre of "crime" or "detective" fiction. Topics include genre theory, as well as a variety of traveling themes in modernity, such as sexuality, surveillance, colonialism, scientific rationality, perversion, the urban, debt, violence, and transnational cultural flows. HU

* **EALL 299b, Decolonizing East Asia** Stephen Poland

Exploration of 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 day. Topics include Japan's imperial rivalry with colonial and postcolonial Europe; post-WWII cultural works and the neoimperialism of Soviet-American Cold War order; 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. HU

* **EALL 300a, Sinological Methods** Pauline Lin

A research course in Chinese studies, designed for students with background in modern and literary Chinese. Exploration and evaluation of the wealth of primary sources and research tools available in Chinese. For native speakers of Chinese, introduction to the secondary literature in English and instruction in writing professionally in English on topics about China. Topics include the compilation and development of Chinese bibliographies; bibliophiles' notes; editions, censorship, and textual variation and reliability; specialized dictionaries; maps and geographical gazetteers; genealogies and biographical sources; archaeological and visual materials; and major Chinese

encyclopedias and compendia. Prerequisite: CHNS 171 or equivalent. Formerly CHNS 202. HU

* **EALL 302a, Readings in Classical Chinese Prose** Kang-i Sun Chang
Close reading of classical Chinese texts (*wenyan*) primarily from late Imperial China. A selection of formal and informal prose, including memoirs, *sanwen* essays, classical tales, biographies, and autobiographies. Focus on cultural and historical contexts, with attention to reception in China and in some cases in Korea and Japan. Questions concerning readership and governmental censorship, function of literature, history and fictionality, memory and writing, and the aesthetics of qing (emotion). Readings in Chinese; discussion in English. Prerequisite: CHNS 171 or equivalent, or permission of instructor. Formerly CHNS 302. HU

* **EALL 357a, 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. No knowledge of Japanese required. HU TR

* **EALL 470a or b and EALL 471a or b, Independent Tutorial** Pauline Lin
For students with advanced Chinese, Japanese, or Korean language skills who wish to engage in concentrated reading and research on literary works in a manner not otherwise offered in courses. The work must be supervised by a specialist and must terminate in a term paper or its equivalent. Ordinarily only one term may be offered toward the major or for credit toward the degree. Permission to enroll requires submission of a detailed project proposal by the end of the first week of classes and its approval by the director of undergraduate studies.

* **EALL 491a or b, Senior Essay** Pauline Lin
Preparation of a one-term senior essay under faculty supervision.

* **EALL 492a or b and EALL 493a or b, Yearlong Senior Essay** Pauline Lin
Preparation of a two-term senior essay under faculty supervision. Credit for EALL 492 only on completion of EALL 493.

Chinese

* **CHNS 110a, Elementary Modern Chinese I** Staff
Intended for students with no background in Chinese. An intensive course with emphasis on spoken language and drills. Pronunciation, grammatical analysis, conversation practice, and introduction to reading and writing Chinese characters. Credit only on completion of CHNS 120. L1 RP 1½ Course cr

CHNS 112a, Elementary Modern Chinese for Advanced Learners I Hsiu-hsien Chan
First level of the advanced learner sequence. Intended for students with some aural proficiency but very limited ability in reading and writing Chinese. Training in listening and speaking, with emphasis on reading and writing. Placement confirmed by placement test and by instructor. L1 RP 1½ Course cr

* **CHNS 120a or b, Elementary Modern Chinese II** Staff
Continuation of CHNS 110. After CHNS 110 or equivalent. L2 RP 1½ Course cr

CHNS 122b, Elementary Modern Chinese for Advanced Learners II Hsiu-hsien Chan
Continuation of CHNS 112. L2

* **CHNS 130a or b, Intermediate Modern Chinese I** Staff

An intermediate course that continues intensive training in listening, speaking, reading, and writing and consolidates achievements from the first year of study. Students improve oral fluency, study more complex grammatical structures, and enlarge both reading and writing vocabulary. After CHNS 120 or equivalent. L3 RP 1½ Course cr

* **CHNS 132a, Intermediate Modern Chinese for Advanced Learners I** Staff

The second level of the advanced learner sequence. Intended for students with intermediate oral proficiency and elementary reading and writing proficiency. Students receive intensive training in listening, speaking, reading, and writing, supplemented by audio and video materials. The objective of the course is to balance these four skills and work toward attaining an advanced level in all of them. Prerequisite: CHNS 122b or equivalent. L3 RP 1½ Course cr

* **CHNS 140b, Intermediate Modern Chinese II** Staff

Continuation of CHNS 130. To be followed by CHNS 150. After CHNS 130 or equivalent. L4 RP 1½ Course cr

* **CHNS 142b, Intermediate Modern Chinese for Advanced Learners II** Staff

Continuation of CHNS 132. After CHNS 132 or equivalent. L4 1½ Course cr

* **CHNS 150a, Advanced Modern Chinese I** Staff

Third level of the standard foundational sequence of modern Chinese, with study in speaking, listening, reading, and writing. Use of audiovisual materials, oral presentations, skits, and longer and more frequent writing assignments to assimilate more sophisticated grammatical structures. Further introduction to a wide variety of written forms and styles. Use of both traditional and simplified forms of Chinese characters. After CHNS 140 or equivalent. L5 1½ Course cr

* **CHNS 151b, Advanced Modern Chinese II** Staff

Continuation of CHNS 150. After CHNS 150 or equivalent. L5 1½ Course cr

* **CHNS 152a, Advanced Modern Chinese for Advanced Learners I** Staff

The third level of the advanced learner sequence. Intended for students with intermediate high to advanced low speaking and listening skills and with intermediate reading and writing skills. The goal of the course is to help students effectively expand their skills in reading and writing while concurrently addressing the need to improve their listening and oral skills in formal environments. The materials cover a variety of topics relating to Chinese culture, society and cultural differences, supplemented with authentic video materials. Prerequisite: CHNS 142 or equivalent. L5 1½ Course cr

* **CHNS 153b, Advanced Modern Chinese for Advanced Learners II** Staff

The second level of the advanced learner sequence. Intended for students with intermediate to advanced oral proficiency and high elementary reading and writing proficiency. Students receive intensive training in listening, speaking, reading, and writing, supplemented by audio and video materials. The objective of the course is to balance these four skills and work toward attaining an advanced level in all of them. After CHNS 152 or equivalent. L5 1½ Course cr

* **CHNS 154a, Upper Advanced Modern Chinese III** William Zhou

Fourth level of the standard foundational sequence of modern Chinese, with study in speaking, listening, reading, and writing. Readings in a wide range of subjects form the basis of discussion and other activities. Students consolidate their skills, especially speaking proficiency, at an advanced level. Materials use both simplified and traditional characters. After CHNS 151 or equivalent. L5

* **CHNS 155b, Upper Advanced Modern Chinese IV** William Zhou

Continuation of CHNS 154. After CHNS 154 or equivalent. L5

* **CHNS 162a, Upper Advanced Modern Chinese for Advanced Learners III** Wei Su

Intended for students with advanced speaking and listening skills and with advanced low reading and writing skills (able to write 1,000–1,200 characters). Further readings on contemporary life in China and Taiwan, supplemented with authentic video materials. Class discussion, presentations, and regular written assignments. Texts in simplified characters with vocabulary in both simplified and traditional characters. After CHNS 153 or equivalent. L5

* **CHNS 163b, Upper Advanced Modern Chinese for Advanced Learners IV** Wei Su

Third level of the advanced learner sequence in Chinese. Intended for students with advanced speaking and listening skills (able to conduct conversations fluently) and with high intermediate reading and writing skills (able to write 1,000–1,200 characters). Further readings on contemporary life in China and Taiwan, supplemented with authentic video materials. Class discussion, presentations, and regular written assignments. Texts in simplified characters with vocabulary in both simplified and traditional characters. After CHNS 162 or equivalent. L5

* **CHNS 164a, Readings in Contemporary Chinese Fiction** Wei Su

Selected readings in Chinese fiction of the 1980s and 1990s. Development of advanced language skills in reading, speaking, and writing for students with an interest in literature and literary criticism. After CHNS 155, 162, or equivalent. L5

* **CHNS 165b, Readings in Modern Chinese Fiction** Wei Su

Reading and discussion of modern short stories, most written prior to 1949. Development of advanced language skills in reading, speaking, and writing for students with an interest in literature and literary criticism. After CHNS 155, 162, or equivalent. L5

* **CHNS 166a and CHNS 167b, Chinese Media and Society** William Zhou

Advanced language course with a strong focus on speaking and writing skills in formal style. Current affairs and issues in contemporary Chinese society explored through media forms such as news and blogs on the Internet, television, film, fine arts and so on. L5

* **CHNS 168a and CHNS 169b, Chinese for Global Enterprises** Min Chen

Advanced language course with a focus on Chinese business terminology and discourse. Discussion of China's economic and management reforms, marketing, economic laws, business culture and customs, and economic relations with other countries. Case studies from international enterprises that have successfully entered the Chinese market. After CHNS 155, 162, or equivalent. L5

CHNS 170a, Introduction to Literary Chinese I Pauline Lin

Reading and interpretation of texts in various styles of literary Chinese (*wenyan*), with attention to basic problems of syntax and literary style. After CHNS 151, 153, or equivalent. L5

*** CHNS 172a, Chinese for Scholarly Conversation** Yongtao Zhang

This course aims to bring students to advanced competence in all aspects of modern Chinese, and prepare students for advanced research or employment in a variety of China-related fields. Materials include readings on contemporary social, cultural, and political issues, which are written by prominent scholar writers in related fields. This level is suitable for students who have had four years of college Chinese prior to attending, or who have taken three years of an accelerated program meant for heritage speakers. Prerequisite: CHNS 155, CHNS 162, placement results equivalent to L5, or permission of instructor. L5

Japanese

*** JAPN 110a, Elementary Japanese I** Staff

Introductory language course for students with no previous background in Japanese. Development of proficiency in listening, speaking, reading, and writing, including 50 hiragana, 50 katakana, and 75 kanji characters. Introduction to cultural aspects such as levels of politeness and group concepts. In-class drills in pronunciation and conversation. Individual tutorial sessions improve conversational skills. Credit only on completion of JAPN 120. L1 RP 1½ Course cr

*** JAPN 120b, Elementary Japanese II** Staff

Continuation of JAPN 110, with additional materials such as excerpts from television shows, anime, and songs. Introduction of 150 additional kanji. After JAPN 110 or equivalent. L2 RP 1½ Course cr

*** JAPN 130a, Intermediate Japanese I** Staff

Continued development in both written and spoken Japanese. Aspects of Japanese culture, such as history, art, religion, and cuisine, explored through text, film, and animation. Online audio and visual aids facilitate listening, as well as the learning of grammar and kanji. Individual tutorial sessions improve conversational skills. After JAPN 120 or equivalent. L3 RP 1½ Course cr

*** JAPN 140b, Intermediate Japanese II** Staff

Continuation of JAPN 130. After JAPN 130 or equivalent. L4 RP 1½ Course cr

*** JAPN 150a, Advanced Japanese I** Staff

Advanced language course that further develops proficiency in reading, writing, speaking, and listening. Reading and discussion materials include works by Nobel Prize winners. Japanese anime and television dramas are used to enhance listening and to develop skills in culturally appropriate speech. Writing of essays, letters, and criticism solidifies grammar and style. Individual tutorial sessions improve conversational skills. After JAPN 140 or equivalent. L5 RP 1½ Course cr

*** JAPN 151b, Advanced Japanese II** Staff

Continuation of JAPN 150. After JAPN 150 or equivalent. L5 RP 1½ Course cr

* **JAPN 156a, Advanced Japanese III** Hiroyo Nishimura

Close reading of modern Japanese writing on current affairs, social science, history, and literature. Development of speaking and writing skills in academic settings, including formal speeches, interviews, discussions, letters, e-mail, and expository writing.

Interviews of and discussions with native speakers on current issues. Individual tutorial sessions provide speaking practice. L5 RP 1½ Course cr

* **JAPN 157b, Advanced Japanese IV** Michiaki Murata

Continuation of JAPN 156. After JAPN 156 or equivalent. L5 1½ Course cr

* **JAPN 162a, Reading Academic Japanese I** Koichi Hiroe

Close reading of major writings from the Meiji era to the present, including newspaper articles, scholarly works, fiction, and prose. Students gain a command of academic Japanese through comprehensive study of grammar in the context of culture. Individual tutorial sessions provide speaking practice. After JAPN 157 or equivalent; recommended to be taken after or concurrently with JAPN 170. L5

* **JAPN 164a and JAPN 165b, Academic and Professional Spoken Japanese** Michiaki Murata

Advanced language course with a focus on the speaking skills necessary in academic and professional settings. Includes online interviews, discussions, and debates with native Japanese students and scholars on contemporary topics such as globalization, environment, technology, human rights, and cultural studies. Individual tutorial sessions provide speaking practice. After JAPN 157 or equivalent. L5

* **JAPN 165b, Academic and Professional Spoken Japanese** Mari Stever

Advanced language course with a focus on the speaking skills necessary in academic and professional settings. Includes online interviews, discussions, and debates with native Japanese students and scholars on contemporary topics such as globalization, environment, technology, human rights, and cultural studies. Individual tutorial sessions provide speaking practice. After JAPN 164 or equivalent. L5

JAPN 170a, Introduction to Literary Japanese Edward Kamens

Introduction to the grammar and style of the premodern literary language (*bungotai*) through a variety of texts. After JAPN 151 or equivalent. L5

* **JAPN 171b, Readings in Literary Japanese** Staff

Close analytical reading of a selection of texts from the Nara through the Tokugawa periods: prose, poetry, and various genres. Introduction to *kanbun*. After JAPN 170 or equivalent. L5

Korean

* **KREN 110a, Elementary Korean I** Staff

A beginning course in modern Korean. Pronunciation, lectures on grammar, conversation practice, and introduction to the writing system (*Hankul*). Credit only on completion of KREN 120. L1 RP 1½ Course cr

* **KREN 120b, Elementary Korean II** Staff

Continuation of KREN 110. After KREN 110 or equivalent. L2 RP 1½ Course cr

* **KREN 130a, Intermediate Korean I** Seungja Choi

Continued development of skills in modern Korean, spoken and written, leading to intermediate-level proficiency. After KREN 120 or equivalent. L3 RP 1½ Course cr

* **KREN 132a, Intermediate Korean for Advanced Learners I** Seungja Choi

Intended for students with some oral proficiency but little or no training in *Hankul*. Focus on grammatical analysis, the standard spoken language, and intensive training in reading and writing. L3 RP 1½ Course cr

* **KREN 140b, Intermediate Korean II** Angela Lee-Smith

Continuation of KREN 130. After KREN 130 or equivalent. L4 RP 1½ Course cr

* **KREN 142b, Intermediate Korean for Advanced Learners II** Angela Lee-Smith

Continuation of KREN 132. After KREN 132 or equivalent. L4 RP 1½ Course cr

* **KREN 152a, Advanced Korean for Advanced Learners** Staff

An advanced course in modern Korean. Reading of short stories, essays, and journal articles, and introduction of 200 Chinese characters. Students develop their speaking and writing skills through discussions and written exercises. After KREN 142 or 151, or with permission of instructor. L5 1½ Course cr

* **KREN 154b, Advanced Korean III** Seungja Choi

An advanced language course designed to develop reading and writing skills using Web-based texts in a variety of genres. Students read texts independently and complete comprehension and vocabulary exercises through the Web. Discussions, tests, and intensive writing training in class. After KREN 151 or equivalent. L5

East Asian Studies

Director of undergraduate studies: Frances Rosenbluth, 308 RKZ, 432-5256, frances.rosenbluth@yale.edu; ceas.yale.edu

In the East Asian Studies major, students focus on a country or an area within East Asia and concentrate their work in the humanities or the social sciences. The major offers a liberal education that serves as excellent preparation for graduate study or for business and professional careers in which an understanding of East Asia is essential.

The major in East Asian Studies is interdisciplinary, and students typically select classes from a wide variety of disciplines. The proposed course of study must be approved by the director of undergraduate studies.

PREREQUISITE

The prerequisite to the major is completion of study at the L2 level of an East Asian language taught at Yale or the equivalent.

REQUIREMENTS OF THE MAJOR

Beyond the prerequisite, the major consists of thirteen course credits, which may include up to six taken in a preapproved program of study abroad. Six course credits must be taken in East Asian language courses, including a course at the L4 level and one year of advanced study (L5) with readings in the East Asian language.

Beyond the language requirement, the major includes seven course credits, six in the country or area of concentration and one outside it. Of the course credits in the area of concentration, one must be in the premodern period, at least two must be seminars, and one is the senior requirement (see below). These courses are normally taken at Yale during the academic year, but with prior approval of the DUS the requirement may be fulfilled through successful course work undertaken elsewhere.

Credit/D/Fail A maximum of one course taken Credit/D/Fail may be counted toward the requirements of the major, with permission of the DUS.

SENIOR REQUIREMENT

During the senior year, all students must satisfy a senior requirement consisting of a major research project that uses Chinese, Japanese, or Korean-language materials, reflects an up-to-date understanding of the region, and demonstrates a strong command of written English. This requirement can be met in one of three ways. Students may take a seminar that relates to the country or area of concentration, culminating in a senior thesis. Alternatively, students who are unable to write a senior essay in a seminar may complete a one-term senior essay in EAST 480 or a one-credit, two-term senior research project in EAST 491, 492 culminating in an essay. The adviser for the senior project should be a faculty member associated with the Council on East Asian Studies with a reading knowledge of the target language materials consulted for the essay.

ADVISING

Selection of courses Upon entering the major, students are expected to draw up an intellectually coherent sequence of courses in consultation with the DUS. They must consult with the DUS each term concerning their course schedules. They

should identify as soon as possible a faculty adviser in their area of specialization. As a multidisciplinary program, East Asian Studies draws on the resources of other departments and programs in the University. Students are encouraged to examine the offerings of other departments in both the humanities and the social sciences, as well as residential college seminars, for additional relevant courses. The stated area of concentration of each student determines the relevance and acceptability of other courses. For a complete listing of courses approved for the major, see the Council on East Asian Studies Website.

Courses in the graduate and professional schools Qualified students may elect pertinent courses in the Graduate School and in some of the professional schools with permission of the instructor, the EAST DUS, and the director of graduate studies of the relevant department or the dean or registrar of the professional school.

Combined B.A./M.A. degree program Exceptionally able and well-prepared students may complete a course of study leading to the simultaneous award of the B.A. and M.A. degrees after eight terms of enrollment. See "Simultaneous Award of the Bachelor's and Master's Degrees" in section K (p. 64) of the Academic Regulations. Interested students should consult the director of undergraduate studies prior to the fifth term of enrollment for specific requirements in East Asian Studies.

REQUIREMENTS OF THE MAJOR

Prerequisite L2 level of an East Asian lang taught at Yale or the equivalent

Number of courses 13 course credits beyond prereq (incl senior req); up to 6 may be in preapproved study abroad

Distribution of courses 6 course credits in East Asian lang courses, incl 1 L4 course and 1 year at L5 level with readings in the lang; 6 addtl course credits in country or area of concentration, incl 1 in premodern era and 2 sems; 1 course credit on East Asia outside country or area of concentration

Senior requirement Senior sem culminating in senior thesis, or one-term senior essay in EAST 480, or one-credit, two-term senior research proj in EAST 491, 492

FACULTY ASSOCIATED WITH THE PROGRAM OF EAST ASIAN STUDIES

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

Associate Professors William Honeychurch (*Anthropology*), Michael Hunter (*East Asian Languages & Literatures*), Hwansoo Kim (*Religious Studies*), Chloe Starr (*Divinity School*)

Assistant Professors Lucas Bender (*East Asian Languages & Literatures*), Eric Greene (*Religious Studies*), Denise Ho (*History*), Seth Jacobowitz (*East Asian Languages & Literatures*), Daniel Mattingly (*Political Science*)

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

Lecturers Charles Chang, Gabrielle Niu, Young Sun Park, Michael Thornton

Senior Lectors II Seungja Choi, Angela Lee-Smith

Senior Lectors Hsiu-hsien Chan, Min Chen, Koichi Hiroe, Rongzhen Li, Ninghui Liang, Fan Liu, Yoshiko Maruyama, Michiaki Murata, Hiroyo Nishimura, Yu-lin Wang Saussy, Masahiko Seto, Jianhua Shen, Mari Stever, Wei Su, Chuanmei Sun, Haiwen Wang, Peisong Xu, Yongtao Zhang, William Zhou

Lector Aoi Saito

Courses

EAST 310a / GBL 309a / PLSC 357a, The Rise of China Daniel Mattingly
Analysis of contemporary Chinese politics, with focus on how the country has become a major power and how the regime has endured. Topics include China's recent history, state, ruling party, economy, censorship, elite politics, and foreign policy. SO

EAST 338a / ECON 338a / GBL 318a, The Next China Stephen Roach
Economic development in China since the late 1970s. Emphasis on factors pushing China toward a transition from its modern export- and investment-led development model to a pro-consumption model. The possibility of a resulting identity crisis, underscored by China's need to embrace political reform and by the West's long-standing misperceptions of China. Prerequisite: introductory macroeconomics. SO

* **EAST 344a / PLSC 444a, Governing China** Daniel Mattingly
Advanced study of the domestic and international politics of China. Topics include China's recent history, elite politics, the rule of law, censorship, propaganda, nationalism, trade, territorial disputes, and international security. SO

* **EAST 358b / EALL 256b / GBL 251b / HUMS 272b / LITR 265b, China in the World** Jing Tsu
Recent headlines about China in the world, deciphered in both modern and historical contexts. Interpretation of new events and diverse texts through transnational connections. Topics include China and Africa, Mandarinization, labor and migration, Chinese America, nationalism and humiliation, and art and counterfeit. Readings and discussion in English. HU

* **EAST 401a / WGSS 401a, Gender in Modern Korea: History and Representation**
Staff
This seminar examines the cinematic representation of Korean masculinity and femininity through history: from the appearance of the New Woman in the early twentieth century to the commercialized woman under the wave of neoliberalism more recently. By contextualizing these themes within the history of modern Korea, this class introduces students to major filmic texts and encourages them to historicize the dominant representations of gender by identifying the relevant, preferred categories and aesthetics of particular periods. Students are expected to engage in critical reading, analysis, and writing. Students also analyze and interpret the cinematic depictions to ask how these films illuminate issues of gender within the context of major historical themes such as national identity, external relations, and political and social conflict. Korean history presents a special opportunity for such an exercise because of South Korea's very sophisticated popular culture industry, and because of this industry's welcome dedication to re-imagining historical figures, events, and settings. HU

* **EAST 402b, Chinese Art and Archaeology at the Yale University Art Gallery** Staff

This course is a study of major works in Chinese art and archaeology, as well as an investigation into collection history at the Yale University Art Gallery (YUAG). The course moves chronologically through major periods and sites of Chinese art and archaeology, with special attention paid to those represented by works in the YUAG. Classroom sessions are based on discussion and readings of primary texts in translation and secondary scholarship, while museum sessions involve close visual analysis and discussion of objects either in the galleries or object study classrooms (OSC). During museum sessions, students also examine the provenance of objects and associated archival materials. Students learn about the history of collecting Chinese objects throughout the 20th century and its relationship to the University. HU

* **EAST 405a / THST 326a, Chinese Opera** Staff

This course introduces students to varieties of Chinese opera through plays, Chinese theories of music and acting, modern scholarship, and recorded media. Furthermore, students learn strategies to evaluate written and performed aspects of Chinese opera in a manner that can be extended to Western opera, film, and other performed genres. HU

* **EAST 417b / ANTH 414b, Hubs, Mobilities, and World Cities** Helen Siu

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

* **EAST 454b / ECON 474b / GBL 312b, Economic and Policy Lessons from Japan**

Stephen Roach

An evaluation of modern Japan's protracted economic problems and of their potential implications for other economies, including the United States, Europe, and China. Policy blunders, structural growth impediments, bubbles, the global economic crisis of 2008, and Abenomics; risks of secular stagnation and related dangers to the global economy from subpar post-crisis recoveries. Focus on policy remedies to avert similar problems in other countries. Prerequisite: an introductory course in macroeconomics. SO

EAST 480a or b, One-Term Senior Essay Frances Rosenbluth

Preparation of a one-term senior essay under the guidance of a faculty adviser. Students must receive the prior agreement of the director of undergraduate studies and of the faculty member who will serve as the senior essay adviser. Students must arrange to meet with that adviser on a regular basis throughout the term.

* **EAST 491a and EAST 492b, Senior Research Project** Frances Rosenbluth

Two-term directed research project under the supervision of a ladder faculty member. Students should write essays using materials in East Asian languages when possible. Essays should be based on primary material, whether in an East Asian language or English. Summary of secondary material is not acceptable. Credit for EAST 491 only on completion of EAST 492. ½ Course cr per term

Electives within the Major

PREMODERN PERIOD

*** ANTH 362b, Unity and Diversity in Chinese Culture** Helen Siu

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

*** ANTH 397b / ARCG 397a or b, Archaeology of East Asia** Anne Underhill

Introduction to the findings and practice of archaeology in China, Japan, Korea, and southeast Asia. Methods used by archaeologists to interpret social organization, economic organization, and ritual life. Attention to major transformations such as the initial peopling of an area, establishment of farming villages, the development of cities, interregional interactions, and the nature of political authority. SO

CHNS 170a, Introduction to Literary Chinese I Pauline Lin

Reading and interpretation of texts in various styles of literary Chinese (*wenyan*), with attention to basic problems of syntax and literary style. After CHNS 151, 153, or equivalent. L5

EALL 200a / CHNS 200 / HUMS 270a, The Chinese Tradition Tina Lu and Yongtao Zhang

An introduction to the literature, culture, and thought of premodern China, from the beginnings of the written record to the turn of the twentieth century. Close study of textual and visual primary sources, with attention to their historical and cultural backdrops. Students enrolled in CHNS 200 join a weekly Mandarin-language discussion section. No knowledge of Chinese required for students enrolled in EALL 200. Students enrolled in CHNS 200 must have L5 proficiency in Mandarin or permission of the course instructor. HU TR

EALL 206b / HSAR 206b / LITR 175b, Japan's Classics in Text and Image Edward Kamens

An introduction to the Japanese classics (poetry, narrative fiction, drama) in their manifestations in multiple media, especially in the visual and material realm. Special reference to and engagement with a simultaneous Yale University Art Gallery installation of rare books, paintings, and other works of art from Japan. No knowledge of Japanese required. Formerly JAPN 200. WR, HU TR

EALL 211a / LITR 174a / WGSS 405a, Women and Literature in Traditional China Kang-i Sun Chang

A study of major women writers in traditional China, as well as representations of women by male authors. The power of women's writing; women and material culture; women in exile; courtesans; Taoist and Buddhist nuns; widow poets; cross-dressing women; the female body and its metaphors; footbinding; notions of love and death; the aesthetics of illness; women and revolution; 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. Formerly CHNS 201. HU TR

* **EALL 302a, Readings in Classical Chinese Prose** Kang-i Sun Chang

Close reading of classical Chinese texts (*wenyan*) primarily from late Imperial China. A selection of formal and informal prose, including memoirs, *sanwen* essays, classical tales, biographies, and autobiographies. Focus on cultural and historical contexts, with attention to reception in China and in some cases in Korea and Japan. Questions concerning readership and governmental censorship, function of literature, history and fictionality, memory and writing, and the aesthetics of qing (emotion). Readings in Chinese; discussion in English. Prerequisite: CHNS 171 or equivalent, or permission of instructor. Formerly CHNS 302. HU

HIST 321b, China from Present to Past, 2015–600 Valerie Hansen

Underlying causes of current issues facing China traced back to their origins in the premodern period. Topics include economic development, corruption, environmental crises, gender, and Pacific island disputes. Selected primary-source readings in English, images, videos, and Web resources. HU

JAPN 170a, Introduction to Literary Japanese Edward Kamens

Introduction to the grammar and style of the premodern literary language (*bungotai*) through a variety of texts. After JAPN 151 or equivalent. L5

* **JAPN 171b, Readings in Literary Japanese** Staff

Close analytical reading of a selection of texts from the Nara through the Tokugawa periods: prose, poetry, and various genres. Introduction to *kanbun*. After JAPN 170 or equivalent. L5

MODERN PERIOD

ANTH 254a, Japan: Culture, Society, Modernity Sarah LeBaron von Baeyer

Introduction to Japanese society and culture. The historical development of Japanese society; family, work, and education in contemporary Japan; Japanese aesthetics; and psychological, sociological, and cultural interpretations of Japanese behavior. WR, SO

* **ANTH 414b / EAST 417b, Hubs, Mobilities, and World Cities** Helen Siu

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

* **ARCH 341b / GLBL 253b / LAST 318b, Globalization Space** Keller Easterling

Infrastructure space as a primary medium of change in global polity. Networks of trade, energy, communication, transportation, spatial products, finance, management, and labor, as well as new strains of political opportunity that reside within their spatial disposition. Case studies include free zones and automated ports around the world, satellite urbanism in South Asia, high-speed rail in Japan and the Middle East, agripoles in southern Spain, fiber optic submarine cable in East Africa, spatial products of tourism in North Korea, and management platforms of the International Organization for Standardization. HU

* **EALL 252a / FILM 446a / LITR 384a, Japanese Cinema before 1960** Aaron Gerow

The history of Japanese cinema to 1960, including the social, cultural, and industrial backgrounds to its development. Periods covered include the silent era, the coming of sound and the wartime period, the occupation era, the golden age of the 1950s, and the new modernism of the late 1950s. No knowledge of Japanese required. Formerly JAPN 270. HU TR

EALL 255b, 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. HU

*** EALL 265b / LITR 251b, Japanese Literature after 1970** Stephen Poland

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. Enrollment limited to 20. No knowledge of Japanese required. HU

*** EALL 286a / HUMS 290a / LITR 285a / PORT 360a, The Modern Novel in Brazil and Japan** Seth Jacobowitz

Brazilian and Japanese novels from the late nineteenth century to the present. Representative texts from major authors are read in pairs to explore their commonalities and divergences. Topics include nineteenth-century realism and naturalism, the rise of mass culture and the avant-garde, and existentialism and postmodernism. No knowledge of Portuguese or Japanese required. HU TR

*** EALL 300a, Sinological Methods** Pauline Lin

A research course in Chinese studies, designed for students with background in modern and literary Chinese. Exploration and evaluation of the wealth of primary sources and research tools available in Chinese. For native speakers of Chinese, introduction to the secondary literature in English and instruction in writing professionally in English on topics about China. Topics include the compilation and development of Chinese bibliographies; bibliophiles' notes; editions, censorship, and textual variation and reliability; specialized dictionaries; maps and geographical gazetteers; genealogies and biographical sources; archaeological and visual materials; and major Chinese encyclopedias and compendia. Prerequisite: CHNS 171 or equivalent. Formerly CHNS 202. HU

*** EALL 357a, 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. No knowledge of Japanese required. HU TR

*** ECON 442b, Microfoundations of Growth in China** Xiaoxue Zhao

A comprehensive overview of the challenges China faces as it transitions from a centrally planned economy to adopting a greater reliance on market-based mechanisms. Review of microeconomic literature on China's recent economic and institutional transformation to provide a general analytical framework for understanding the economic implications of the process. Prerequisites: intermediate microeconomics and econometrics. SO

*** GLBL 312b / EAST 454b / ECON 474b, Economic and Policy Lessons from Japan**

Stephen Roach

An evaluation of modern Japan's protracted economic problems and of their potential implications for other economies, including the United States, Europe, and China.

Policy blunders, structural growth impediments, bubbles, the global economic crisis of 2008, and Abenomics; risks of secular stagnation and related dangers to the global economy from subpar post-crisis recoveries. Focus on policy remedies to avert similar problems in other countries. Prerequisite: an introductory course in macroeconomics.

SO

GLBL 318a / EAST 338a / ECON 338a, The Next China Stephen Roach

Economic development in China since the late 1970s. Emphasis on factors pushing China toward a transition from its modern export- and investment-led development model to a pro-consumption model. The possibility of a resulting identity crisis, underscored by China's need to embrace political reform and by the West's long-standing misperceptions of China. Prerequisite: introductory macroeconomics. SO

Ecology and Evolutionary Biology

Director of undergraduate studies: Marta Martínez Wells, 103 OML, 432-6294, marta.wells@yale.edu; eeb.yale.edu

The Department of Ecology and Evolutionary Biology (EEB) offers broad education in the biological sciences. The subject matter includes molecules, cells, organs, organisms, and ecosystems and the evolutionary processes that shape them. The department offers a B.A. and a B.S. degree. The B.A. program is intended for students who are interested in ecology, evolution, and organismal diversity as part of a liberal education but do not intend to pursue graduate work in the discipline. The B.S. program is designed for students planning to attend medical or veterinary school or to pursue graduate study in ecology and evolutionary biology, other biological disciplines, or the environmental sciences. The two programs share the same prerequisites and core requirements but differ in their electives and senior requirements.

Students majoring in EEB select one of two tracks. The requirements for track 1 emphasize courses appropriate for careers in ecology, evolutionary biology, and environmental science; track 2 is most appropriate for premedical and preveterinary students because it allows them to use as electives many courses required by medical schools. The EEB major offers opportunities for independent research in both laboratory-based and field-based scientific investigations.

COURSES FOR NONMAJORS

Several EEB courses have no college-level prerequisites and are suitable for nonmajors. These include all 100-level offerings as well as 200-level courses that deal with particular organism groups such as plants, fish, mammals, birds, or insects.

PREREQUISITES

The prerequisites for the major are intended to provide core scientific literacy; they include courses in biology, chemistry, physics, and mathematics. The introductory biology sequence BIOL 101, 102, 103, and 104 is required. Also required are a two-term lecture sequence in general chemistry, CHEM 161, 165 or CHEM 163, 167, taken with associated laboratories, CHEM 134L and 136L, and one term of organic chemistry, CHEM 174 or 175, or CHEM 220 or 221, with associated laboratories, CHEM 222L or 223L. Optionally, CHEM 174, 175, taken with CHEM 222L, 223L, satisfies the chemistry requirement. Two terms of physics are required, PHYS 170, 171 or higher, and one term of mathematics, MATH 115 or higher (not MATH 190), or S&DS 101-106. A different statistics course approved by the director of undergraduate studies may be substituted for the mathematics prerequisite.

A new online program, ONEXYS for Physics, will be offered in the summer by the Mathematics and Physics departments and by the Center for Teaching and Learning, to review math skills needed in preparation for introductory physics courses.

Acceleration credit awarded in chemistry, mathematics, and physics, or completion of advanced courses in those departments, may be accepted in place of the corresponding prerequisites for the EEB major. Students who have mathematics preparation equivalent to MATH 115 or higher are encouraged to take a statistics course (most often STAT 101-106) and/or additional mathematics courses such as MATH 120, 121, 222,

or 225. Because chemistry courses are prerequisite to several EEB courses, students are strongly urged to take general and organic chemistry in the first and sophomore years. Students who place out of general chemistry should take organic chemistry during their first year. Finishing the prerequisites early allows for a more flexible program in later years.

PLACEMENT PROCEDURES

Students can place out of the introductory biology sequence (BIOL 101, 102, 103, 104) only by means of the biology placement examination administered jointly by the biological science departments, EEB, MB&B, and MCDB.

Potential EEB majors are expected to take the mathematics placement test. Those who place above the level of MATH 112 may proceed to prerequisite courses for the EEB major; those who place into MATH 112 must take calculus before other prerequisites.

For information about placement examinations, refer to the *Calendar for the Opening Days of College* and the First-Year Website. The Chemistry department arranges placement in chemistry courses.

REQUIREMENTS OF THE MAJOR

B.A. degree program Beyond the prerequisites, the B.A. requires three lecture courses and one laboratory, for three and one-half course credits, and the senior requirement. In track 1, the required courses are E&EB 220, 225, and a lecture course on organismal diversity chosen from E&EB 246–272, along with its associated laboratory. Required courses in track 2 include E&EB 290, E&EB 295 or BENG 350, MCDB 300; and E&EB 291L.

B.S. degree program The B.S. requirements are the same as those for the B.A., with the addition of at least two electives, for two course credits, in either track 1 or track 2. At least one of the electives must be a lecture or a seminar. Most EEB, MCDB, or MB&B courses numbered 200 or above qualify as electives, as do most research courses and laboratories in a biological sciences department or in the Yale School of Medicine. Courses from other departments may qualify with permission of the director of undergraduate studies (DUS).

Substitutions permitted Two upper-level courses in Geology and Geophysics (excluding paleobiology courses), Mathematics, Computer Science, or Engineering and Applied Science can be substituted for the required term of organic chemistry and laboratory. A second term of organic chemistry and laboratory and up to two terms of physics laboratories are allowed as electives. Courses from other departments may also be suitable as electives. All substitutions require the permission of the DUS. College seminars may not be counted toward the requirements of the major.

Limit on research courses While independent research courses may be taken multiple times for credit, there are restrictions on the number of such courses that can be included in a student's curriculum. See Course Credits and Course Loads (p. 44) in the Academic Regulations. Interested sophomores and juniors can take E&EB 469 and E&EB 474.

Credit/D/Fail No course taken Credit/D/Fail may be counted toward the EEB major, including prerequisites.

Roadmap See visual roadmap of the requirements.

SENIOR REQUIREMENT

B.A. degree program Students in the B.A. degree program fulfill the senior requirement either by completing one term of independent study in E&EB 470 or by writing a senior essay. The senior essay may be related to the subject matter of a course, but the senior essay is a separate departmental requirement in addition to any work done in a course and does not count toward the grade in any course. Students intending to write a senior essay must obtain an approval form from the office of the director of undergraduate studies and have it signed by the senior essay adviser before the end of the course selection period. Senior essays must be submitted to the DUS by the last day of classes.

B.S. degree program Students in the B.S. degree program fulfill the senior requirement by completing one term of original research in E&EB 475, 476, 495, or 496.

ADVISING

First-year students considering a major in Ecology and Evolutionary Biology are invited to consult with the DUS. After the first year, students should choose an adviser from the department faculty who has interests comparable to their own and/or is a fellow of their residential college. For additional information, visit the EEB Website. Students in EEB should consult one of the advisers assigned to their class (see below). The course schedules of all EEB majors (including sophomores intending to major in EEB) must be signed by a faculty member in EEB; the signature of the DUS is not required. Students whose regular adviser is on leave can consult the DUS to arrange for an alternate.

Class of 2019: Casey Dunn, OML 326 (432-3109); Erika Edwards, OML 326 (432-3869)

Class of 2020: Carla Staver, OML 404 (436-9200); Alavaro Sanchez, OML 327C (432-6778)

Class of 2021: Adalgisa Caccone, ESC 140 (432-5259); Marta Wells, OML 103 (432-6294)

Class of 2022: Marta Wells, OML 103 (432-6294)

Graduate courses of interest to undergraduates Graduate courses in the biological and biomedical sciences that may be of interest to undergraduates are listed in the Graduate School's online bulletin, and many are posted on the Biological and Biomedical Sciences Website. Additional information is available from the DUS and the director of graduate studies. Undergraduates with an appropriate background may enroll with the permission of the director of graduate studies and the instructor.

STUDY ABROAD

Participation in study abroad field programs is encouraged. Credit for such programs may apply toward the major; interested students should consult the DUS prior to going abroad.

REQUIREMENTS OF THE MAJOR

Prerequisites Introductory biology sequence (BIOL 101, 102, 103, 104); 2-term general chemistry lecture sequence (CHEM 161, 165 or CHEM 163, 167) with labs (CHEM

134L, 136L); 1 term of organic chemistry (CHEM 174 or 175, or CHEM 220 or 221) with labs (CHEM 222L or 223L); CHEM 174, 175 taken with CHEM 222L, 223L satisfies both chemistry requirements; 2 terms of physics (PHYS 170, 171 or higher); 1 term of MATH 115 or higher (not MATH 190) or S&DS 101–106

Number of courses *B.A.* – 3½ course credits beyond prereqs (not incl senior req);
B.S. – 5½ course credits beyond prereqs (not incl senior req)

Specific courses required *Track 1* – E&EB 220, 225; 1 from E&EB 246–272, with lab;
Track 2 – E&EB 290, E&EB 295 or BENG 350, MCDB 300; and E&EB 291L

Distribution of courses *B.S.* – 2 electives as specified

Substitutions permitted With DUS permission: other stat course for math or stat prereq; two upper-level courses in G&G, MATH, CPSC, or ENAS for organic chemistry and lab; the second term of organic chemistry and lab and two physics labs for electives

Senior requirement *B.A.* – E&EB 470 or senior essay; *B.S.* – at least one term of E&EB 475, 476, 495, or 496

FACULTY OF THE DEPARTMENT OF ECOLOGY AND EVOLUTIONARY BIOLOGY

Professors †Richard Bribiescas, †Nicholas Christakis, Michael Donoghue, Casey Dunn, Erika Edwards, †Alison Galvani, †Vivian Irish, Walter Jetz, Thomas Near, David Post, Jeffrey Powell, Richard Prum, †Eric Sargis, †Oswald Schmitz, †David Skelly, Stephen Stearns, Paul Turner, †J. Rimas Vaišnys, Günter Wagner (*Interim Chair*)

Associate Professors †Forrest Crawford, †James Noonan, †Jeffrey Townsend, David Vasseur

Assistant Professors †Craig Brodersen, †Liza Comita, Alvaro Sanchez, Carla Staver

Senior Lecturer Marta Martínez Wells

Lecturers Adalgisa Caccone, Linda Puth

†A joint appointment with primary affiliation in another department or school.

Introductory Courses

[E&EB 050, The Evolution of Beauty]

* E&EB 106a / HLTH 155a / MCDB 106a, **Biology of Malaria, Lyme, and Other Vector-Borne Diseases** Alexia Belperron

Introduction to the biology of pathogen transmission from one organism to another by insects; special focus on malaria, dengue, and Lyme disease. Biology of the pathogens including modes of transmission, establishment of infection, and immune responses; the challenges associated with vector control, prevention, development of vaccines, and treatments. Intended for non-science majors; preference to freshmen and sophomores. Prerequisite: high school biology. SC

E&EB 115a / F&ES 315a, **Conservation Biology** Linda Puth

An introduction to ecological and evolutionary principles underpinning efforts to conserve Earth's biodiversity. Efforts to halt the rapid increase in disappearance of both plants and animals. Discussion of sociological and economic issues. SC

* **E&EB 125b / G&G 125b, History of Life** Derek Briggs, Pincelli Hull, and Bhart-Anjan Bhullar

Examination of fossil and geologic evidence pertaining to the origin, evolution, and history of life on Earth. Emphasis on major events in the history of life, on what the fossil record reveals about the evolutionary process, on the diversity of ancient and living organisms, and on the evolutionary impact of Earth's changing environment. SC

* **E&EB 145b, Plants and People** Linda Puth

The interaction of plants and people throughout history explored from biological, historical, anthropological, and artistic perspectives. Basic botany; plants in the context of agriculture; plants as instruments of trade and societal change; plants as inspiration; plants in the environment. Includes field trips to the greenhouses at Yale Marsh Botanical Garden, the Yale Peabody Museum and Herbarium, the Yale Farm, and the Yale Art Gallery. SC

* **E&EB 175Lb, Virus Discovery and Evolution** Alita Burmeister

An inquiry-based, hands-on introduction to sampling bacteriophages (bacteria-specific viruses) from natural environments. Emphasis on lab methods to characterize viruses via growth assays and genome sequencing, and to experimentally evolve viruses on bacteria. Readings and discussion on virus biodiversity, role of viruses in the environment, and virus applications to solve human problems. SC ½ Course cr

[**E&EB 190, The Evolution of Beauty**]

E&EB 210a / S&DS 101a, Introduction to Statistics: Life Sciences Jonathan Reuning-Scherer and Staff

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. QR

E&EB 246a, Plant Diversity and Evolution Michael Donoghue

Introduction to the major plant groups and their evolutionary relationships, with an emphasis on the diversification and global importance of flowering plants. To be taken concurrently with E&EB 247L. Prerequisite: a general understanding of biology and evolution. SC

E&EB 247La, Laboratory for Plant Diversity and Evolution Michael Donoghue

Hands-on experience with the plant groups examined in the accompanying lectures. Local field trips. To be taken concurrently with E&EB 246. SC ½ Course cr

E&EB 250a, Biology of Terrestrial Arthropods Marta Wells

Evolutionary history and diversity of terrestrial arthropods (body plan, phylogenetic relationships, fossil record); physiology and functional morphology (water relations, thermoregulation, energetics of flying and singing); reproduction (biology of reproduction, life cycles, metamorphosis, parental care); behavior (migration, communication, mating systems, evolution of sociality); ecology (parasitism, mutualism, predator-prey interactions, competition, plant-insect interactions). To be taken concurrently with E&EB 251L. SC

E&EB 251La, Laboratory for Biology of Terrestrial Arthropods Marta Wells

Comparative anatomy, dissections, identification, and classification of terrestrial arthropods; specimen collection; field trips. Concurrently with or after E&EB 250. SC ½ Course cr

E&EB 264a, Ichthyology Richard Harrington

A survey of fish diversity, including jawless vertebrates, chimaeras and sharks, lungfishes, and ray-finned fishes. Topics include the evolutionary origin of vertebrates, the fossil record of fishes, evolutionary diversification of major extant fish lineages, biogeography, ecology, and reproductive strategies of fishes. SC

E&EB 265La, Laboratory for Ichthyology Richard Harrington

Laboratory and field studies of fish diversity, form, function, behavior, and classification. The course primarily involves study of museum specimens and of living and fossil fishes. Concurrently with E&EB 264. SC ½ Course cr

*** E&EB 272b, 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. Enrollment limited to 50. SC

*** E&EB 273Lb, Laboratory for Ornithology** Richard Prum

Laboratory and field studies of avian morphology, diversity, phylogeny, classification, identification, and behavior. Enrollment limited to 12. SC ½ Course cr

Intermediate and Advanced Courses

Prerequisites for all intermediate and advanced E&EB courses are BIOL 101, 102, 103, and 104, or permission of the instructor.

E&EB 220a / EVST 223a, General Ecology David Vasseur

The theory and practice of ecology, including the ecology of individuals, population dynamics and regulation, community structure, ecosystem function, and ecological interactions at broad spatial and temporal scales. Topics such as climate change, fisheries management, and infectious diseases are placed in an ecological context. Prerequisite: MATH 112 or equivalent. SC

E&EB 223Lb, Evolution, Functional Traits, and the Tree of Life Marta Wells

Study of evolutionary novelties, their functional morphology, and their role in the diversity of life. Introduction to techniques used for studying the diversity of animal body plans. Evolutionary innovations that have allowed groups of organisms to increase their diversity. SC ½ Course cr

E&EB 225b, Evolutionary Biology Alvaro Sanchez De Andres and Jeffrey Powell

An overview of evolutionary biology as the discipline uniting all of the life sciences. Reading and discussion of scientific papers to explore the dynamic aspects of evolutionary biology. Principles of population genetics, paleontology, and systematics; application of evolutionary thinking in disciplines such as developmental biology, ecology, microbiology, molecular biology, and human medicine. SC

E&EB 228b, Ecology and Evolution of Infectious Diseases 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. Prerequisite: BIOL 104 or permission of instructor. SC

* **E&EB 230a / EVST 221a / F&ES 221a, Field Ecology** Linda Puth

A field-based introduction to ecological research, using experimental and descriptive approaches, comparative analysis, and modeling for field and small-group projects. Weekly field trips explore local lake, salt marsh, rocky intertidal, traprock ridge, and upland forest ecosystems. Includes one Saturday field trip and a three-day trip during the October recess. Concurrently with or after E&EB 220 or with permission of instructor. SC

* **E&EB 235a / HLTH 250a, Evolution and Medicine** Stephen Stearns

Introduction to the ways in which evolutionary science informs medical research and clinical practice. Diseases of civilization and their relation to humans' evolutionary past; the evolution of human defense mechanisms; antibiotic resistance and virulence in pathogens; cancer as an evolutionary process. Students view course lectures on line; class time focuses on discussion of lecture topics and research papers. Prerequisite: BIOL 101-104. WR, SC

E&EB 255a / G&G 316, Invertebrates Casey Dunn

An overview of animal diversity that explores themes including animal phylogenetics (evolutionary relationships), comparative studies of evolutionary patterns across species, organism structure and function, and the interaction of organisms with their environments. Most animal lineages are marine invertebrates, so marine invertebrates are the focus of most of the course. This lecture must be taken concurrently with the lab E&EB 256L. SC

E&EB 256La, Laboratory for Invertebrates Casey Dunn

The study of invertebrate anatomy and diversity in a laboratory and field setting. Activities will include will examine live animals and museum specimens, as well as local field trips. Some field trips will fall on weekends. This lab must be taken concurrently with the lecture E&EB 255. SC ½ Course cr

* **E&EB 275b / EVST 400b, Biological Oceanography** Mary Beth Decker

Exploration of a range of coastal and pelagic ecosystems. Relationships between biological systems and the physical processes that control the movements of water and productivity of marine systems. Anthropogenic impacts on oceans, such as the effects of fishing and climate change. Includes three Friday field trips. Enrollment limited to 15. SC

[**E&EB 280, Mammalogy**]

E&EB 290b, Comparative Developmental Anatomy of Vertebrates Günter Wagner

A survey of the development, structure, and evolution of major vertebrate groups. Topics include the micro-anatomy of major organ systems, the developmental underpinnings of the vertebrate body plan, and the development, structure, and evolution of the major organ systems such as the locomotory system, sensory organs, digestive tract, reproductive tract, and nervous system. SC

* **E&EB 291Lb, Comparative Anatomy of Vertebrates Laboratory** Staff

Microscopic examination of histological and embryological preparations. Dissection of selected vertebrate species including shark, bony fish, frog, lizard, and rat. To be taken with E&EB 290. SC ½ Course cr

E&EB 300a / ANTH 300a / EVST 182a, Primate Behavior and Ecology Eduardo Fernandez-Duque

Socioecology of primates compared with that of other mammals, emphasizing both general principles and unique primate characteristics. Topics include life-history strategies, feeding ecology, mating systems, and ecological influences on social organization. SC, SO

E&EB 305b, Plant Ecology Ann Staver

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. Incorporation of empirical and theoretical perspectives, emphasizing the empirical origins of concepts in plant ecology and effective empirical tests of conceptual and mathematical predictions. Prerequisites: E&EB 220 and MATH 115. QR, SC RP

[**E&EB 310, Evolutionary Systems Biology**]

[**E&EB 320, Advanced Ecology**]

E&EB 326b, Plant Structure and Function Erika Edwards

The primary aim of this course is to examine the relationship between the structure of plants and their physiological systems, and the role of the environment in shaping the evolution and diversity of vascular plants. Lectures focus on exploring the basics of plant morphology, and the anatomical and physiological adaptations of leaves, stems, and roots to different habitats. A comparative, phylogenetic approach is emphasized. Students work on a set of group projects that are designed to test long-standing assumptions about the evolution and adaptive nature of certain plant traits. Projects differ from year to year, and although the general theme is chosen by the professor, students are expected to play a large role in experimental design and focus. Students leave the class with a solid foundation both in plant anatomy and eco-physiology and in applying a phylogenetic comparative approach to studies of organismal biology. Furthermore, they gather first hand experience in data collection, experimental design, data analysis, and the collaborative presentation of a scientific study. Students must also enroll in E&EB 327L as a co-requisite. Prerequisite: E&EB 246 and BIOL 104, or permission of the instructor. SC

E&EB 327Lb, Plant Structure and Function Lab Erika Edwards

The primary aim of this course is to examine the relationship between the structure of plants and their physiological systems, and the role of the environment in shaping the evolution and diversity of vascular plants. A comparative, phylogenetic approach is emphasized. In the lab students are first exposed to a broad overview of the anatomy and morphology of plant leaves, stems, roots, and reproductive structures. Students then work on a set of group projects that are designed to test long-standing assumptions about the evolution and adaptive nature of certain plant traits. Projects differ from year to year, and although the general theme is chosen by the professor, students are expected to play a large role in experimental design and focus. Students gather first hand experience in data collection, experimental design, data analysis, and the collaborative presentation of a scientific study. This lab course is a requisite of E&EB 326, which must be taken at the same time. ½ Course cr

* **E&EB 342b / ANTH 335b, 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. Recommended preparation: ANTH 116 or BIOL 104. SC

* **E&EB 380b, 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. After E&EB 220 and 225, or with permission of instructor. WR, SC

E&EB 428a / AMTH 428a / G&G 428a / PHYS 428a, 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. Prerequisite: PHYS 301, MATH 247, or equivalent. QR, SC

E&EB 464b / ANTH 464b / ARCG 464b, 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. SC, SO

* **E&EB 469a or b, Tutorial** Marta Wells

Individual or small-group study for qualified students who wish to investigate an area of ecology or evolutionary biology not presently covered by regular courses. A student must be sponsored by a faculty member who sets requirements and meets weekly with the student. One or more written examinations and/or a term paper are required.

To register, the student must submit a written plan of study approved by the faculty instructor to the director of undergraduate studies. Students are encouraged to apply during the term preceding the tutorial. Proposals must be submitted no later than the first day of the second week of the term in which the student enrolls in the tutorial.

The final paper is due in the hands of the director of undergraduate studies by the last day of reading period in the term of enrollment. In special cases, with approval of the director of undergraduate studies, this course may be elected for more than one term, but only one term may be counted as an elective toward the requirements of the major. Normally, faculty sponsors must be members of the EEB department.

* **E&EB 470a or b, Senior Tutorial** Marta Wells

Tutorial for seniors in the B.A. degree program who elect a term of independent study to complete the senior requirement. A thesis, fifteen to twenty pages in length, is required. A student must be sponsored by a faculty member who sets requirements and meets weekly with the student. To register, the student must submit a written plan of study approved by the faculty instructor to the director of undergraduate studies. Students are encouraged to apply during the term preceding the tutorial. Proposals

must be submitted no later than the first day of the second week of the term in which the student enrolls in the tutorial. The final paper is due in the hands of the director of undergraduate studies by the last day of reading period in the term of enrollment. Normally, faculty sponsors must be members of the EEB department. Enrollment limited to seniors. Fulfills the senior requirement for the B.A. degree.

*** E&EB 474a or b, Research** Marta Wells

One term of original research in an area relevant to ecology or evolutionary biology. This may involve, for example, laboratory work, fieldwork, or mathematical or computer modeling. Students may also work in areas related to environmental biology such as policy, economics, or ethics. The research project may not be a review of relevant literature but must be original. In all cases students must have a faculty sponsor who oversees the research and is responsible for the rigor of the project. Students are expected to spend ten hours per week on their research projects. Using the form available from the office of undergraduate studies or from the Classes server, students must submit a research proposal that has been approved by the faculty sponsor to the director of undergraduate studies, preferably during the term preceding the research. Proposals are due no later than the first day of the second week of the term in which the student enrolls in the course. The final research paper is due in the hands of the director of undergraduate studies by the last day of reading period in the term of enrollment.

*** E&EB 475a and E&EB 476b, Senior Research** Marta Wells

One term of original research in an area relevant to ecology or evolutionary biology. This may involve, for example, laboratory work, fieldwork, or mathematical or computer modeling. Students may also work in areas related to environmental biology such as policy, economics, or ethics. The research project may not be a review of relevant literature but must be original. In all cases students must have a faculty sponsor who oversees the research and is responsible for the rigor of the project. Students are expected to spend ten hours per week on their research projects. Using the form available from the office of undergraduate studies or from the Classes server, students must submit a research proposal that has been approved by the faculty sponsor to the director of undergraduate studies, preferably during the term preceding the research. Proposals are due no later than the first day of the second week of the term in which the student enrolls in the course. The final research paper is due in the hands of the director of undergraduate studies by the last day of classes in the term of enrollment. Fulfills the senior requirement for the B.S. degree. Enrollment limited to seniors.

*** E&EB 495a and E&EB 496b, Intensive Senior Research** Marta Wells

One term of intensive original research during the senior year under the sponsorship of a Yale faculty member. Similar to other research courses except that a more substantial portion of a student's time and effort should be spent on the research project (a minimum average of twenty hours per week). A research proposal approved by the sponsoring faculty member must be submitted to the director of undergraduate studies; forms are available from the office of undergraduate studies. For research in the fall term, approval is encouraged during the spring term of the junior year. Proposals are due no later than the first day of the second week of the term in which the student enrolls in the course. The final research paper is due in the hands of the director of undergraduate studies by the last day of reading period in the term of enrollment.

One term of intensive research fulfills a portion of the senior requirement for the B.S. degree. 2 Course cr per term

Economics

Director of undergraduate studies: Ebonya Washington, ebonya.washington@yale.edu, (ebonya.washington@yale.edu) Rm. 36, 37 Hillhouse Ave., 432-9901; registrar: Qazi Azam, qazi.azam@yale.edu, Room 101A, 28 Hillhouse Ave., 432-3574; economics.yale.edu/undergraduate-program

Economics is much broader than the study of recessions and inflation or stocks and bonds. Economists study decision making and incentives and how taxes create incentives for labor market and savings behavior. Many current public policy debates concern questions of economics, including: causes and consequences of inequality and gender and racial wage gaps; how to address poverty; the impact of immigration and trade on the well-being of a country's citizens; the cause of the Great Recession; and how to predict future downturns.

Those with economics training find employment in government agencies, non-profits, and, of course, economic consulting and investment banking. In addition to pursuing advanced degrees in economics, economics majors go on to do graduate work in law and business.

INTRODUCTORY COURSES

Introductory courses in microeconomics; macroeconomics; and data analysis and econometrics serve students considering a major in Economics, as well as others who seek an introduction to the subject. ECON 115 is concerned with microeconomics and includes such topics as markets, prices, production, distribution, and the allocation of resources. ECON 116 covers such macroeconomic issues as unemployment, inflation, growth, and international economics. ECON 117 introduces students to basic aspects of working with data to answer economic questions, as well as to the fundamentals of statistical analysis. ECON 116 and 117 have microeconomics as a prerequisite. Despite the numbering, students may wish to take ECON 117 before or concurrently with ECON 116, as the data skills taught in ECON 117 may be helpful in ECON 116. ECON 115, 116, and 117 are lecture courses with accompanying discussion sections.

First-year students and sophomores looking for smaller, slightly more discussion-oriented versions of introductory microeconomics and macroeconomics may enter a lottery for admission to ECON 110 and 111. Those with little or no experience in calculus may be better served by ECON 108, which covers microeconomics with greater discussion of quantitative methods and examples. ECON 108, 110, and 115 are similar in substance; ECON 111 and 116 are similar in substance as well. A student may receive credit for only one course each in introductory microeconomics and introductory macroeconomics.

The department recommends that students interested in majoring in Economics take at least two introductory economics courses in the first year. In order to make the introductory courses available to all first-year students and to students majoring in other subjects, the introductory courses do not have a mathematics requirement.

PLACEMENT AND EXEMPTIONS FOR INTRODUCTORY COURSES

In the summer before they enter, all first-year students receive, through the University's electronic bulletin board, a personalized recommendation for a first course in economics, based on application data and AP (and equivalent) exam scores.

The department recommends that students with little or no calculus enroll in ECON 108. Those with a stronger background should enroll in ECON 110 (if successful in the lottery) or ECON 115. In general, students who receive a score of 5 on the Microeconomics or Macroeconomics AP exam *and* a score of 5 on the AP Calculus BC exam are allowed to place out of the corresponding introductory course and instead enroll in intermediate-level courses (ECON 121 or 125 for microeconomics, ECON 122 or 126 for macroeconomics). Students who have the requisite AP Economics score but not the corresponding AP Calculus score may take calculus (e.g., MATH 115, 118, or 120), and then place out of the corresponding introductory economics course. Students may substitute a score of 7 on the International Baccalaureate higher-level Economics examination or A on the GCE A-level Economics examination for AP test scores of 5 in economics. In addition, a score of 7 on the International Baccalaureate higher-level Mathematics examination or A on the GCE A-level Mathematics examination may be substituted for a qualifying AP Calculus score.

Because of its emphasis on data manipulation, the department recommends that even students with a background in statistics should begin their econometrics and data analysis training with ECON 117.

REQUIREMENTS OF THE MAJOR

Students majoring in Economics are required to take twelve term courses. Three of these are the introductory courses, one in microeconomics, one in macroeconomics, and one in data analysis and econometrics. All majors must take the following courses: one term of intermediate microeconomics (ECON 121 or 125) and one term of intermediate macroeconomics (ECON 122 or 126); and one Yale mathematics course, usually selected from MATH 112, 115, 118, or 120. The department recommends that students also take ECON 123, a course in econometrics and data analysis at the intermediate level. All of the aforementioned required courses should be completed prior to the senior year. Majors must also take two courses numbered ECON 400–491, at least one of which must be taken in the senior year.

Subject to approval by the director of undergraduate studies, students may count toward the major one course related to economics but taught in another field, in addition to the required course in mathematics.

Mathematics Students are advised to meet the mathematics requirement for the major during their first year. To fulfill the requirement, the department recommends that majors take MATH 118 or 120. Students who place out of these mathematics courses must take a higher-level mathematics course at Yale and should consult the DUS for help choosing a course. Students who intend to pursue a graduate degree in economics should take additional math courses, including linear algebra (MATH 222 or 225) and real analysis (MATH 300 or 301).

Data analysis and econometrics Students are strongly advised to take a two-term sequence of data analysis and econometrics courses, especially if they are considering writing a senior essay or are interested in research experience on or off campus. The

statistical analysis of economic data has become central to the work of economists, and the ability to analyze large data sets is a skill that will serve students in the job market both inside and outside of academia. Most students should take ECON 117, followed by 123. ECON 132 and 420 are more advanced courses in data analysis and applied econometrics. Students with a stronger mathematics background, who prefer a more theoretical treatment of the material or who plan to pursue a graduate degree in economics, are encouraged to take either ECON 135 or S&DS 241 and S&DS 242, followed by ECON 136. (Note: S&DS 241 and 242 together count as one course towards the economics major.) Prospective majors are urged to start their econometrics sequence in the fall of sophomore year.

Intermediate microeconomics and macroeconomics Two course options are available in both microeconomics and macroeconomics. The standard intermediate courses are ECON 121 and 122. Students with a stronger mathematics background are encouraged to take ECON 125 and 126 instead. The intermediate courses need not be taken in sequence: in particular, ECON 125 is not required for 126.

Field courses The department offers a wide selection of upper-level courses that explore in greater detail material presented in introductory courses. Advanced fields of economics include theoretical, quantitative, and mathematical economics; market organization; human resources; finance; international and development economics; public policy and the public sector; health; labor; poverty; environmental economics; and economic history. Some field courses have only introductory microeconomics as a prerequisite. Others apply intermediate-level theory or econometrics to economic problems and institutions, and for this reason list one or more of the theory or econometrics courses as prerequisites.

Advanced lecture courses Advanced lecture courses, generally numbered ECON 400–449, are limited-enrollment courses that cover relatively advanced material in more depth than regular field courses. Prerequisites usually include two of intermediate microeconomics, intermediate macroeconomics, and econometrics or a mathematics course such as MATH 120. Advanced lecture courses may be applied toward the senior requirement. While these courses vary in approach, they share features of other Economics courses: like field courses, they devote some time to traditional lecturing, and like seminars, they emphasize class interaction, the writing of papers, and the reading of journal articles.

Seminars Although there is diversity in approaches in the various seminars (courses generally numbered ECON 450–489), all have in common an emphasis on class interaction, the writing of papers, and the reading of journal articles. Seminars represent an opportunity for students to apply and extend the economics they have learned through their earlier coursework. Seminars may be applied toward the senior requirement.

Enrollment in seminars and advanced lecture courses is limited. Senior Economics majors who have not yet completed the senior requirement for the major are given priority for these courses and may preregister; see the departmental website for instructions. Students must take two of three core courses in intermediate microeconomics, intermediate macroeconomics, and econometrics before enrolling in

a seminar. Other majors and nonmajors may also enroll in Economics seminars and advanced lecture courses as space permits, but they may not preregister.

Distinction in the Major To be considered for Distinction, students must meet the appropriate grade standards as described in this bulletin under Honors (p. 31) and submit a senior essay to the Economics department. Students who fail to submit an essay will not be considered for Distinction. Grade computation for Distinction does not include the introductory economics courses, the required mathematics course, or courses taken outside Yale.

Credit/D/Fail Courses taken Credit/D/Fail and residential college seminars may not be counted toward the requirements of the major.

Roadmap See visual roadmap of the requirements.

SENIOR REQUIREMENT

Majors are required to take two departmental courses numbered ECON 400–491, at least one of which must be taken in the senior year. The senior requirement must be met by taking Yale Economics courses.

Senior essay Only those majors who submit a senior essay earning a grade of A or A- are eligible for Distinction in the Major. There are four types of senior essays: (1) students may write a one-term essay in the fall of the senior year as an independent project on a topic of their own design under the close and regular supervision of a faculty adviser (ECON 491); (2) students may write a two-term essay starting in the fall and continued into the spring of the senior year as an independent project on a topic of their own design under the close and regular supervision of a faculty adviser (ECON 491 and ECON 492); (3) students may write a one-term essay in an advanced departmental course (numbered 400–489) taken during the fall term of the senior year; or (4) students may write a two-term essay beginning in an advanced departmental course (numbered 400–489) taken during the fall term, and completed in the spring of the senior year as an independent project under the close and regular supervision of a faculty adviser (ECON 492). Under this final option the instructor of the advanced departmental course taken in the fall term typically serves as the faculty adviser.

Note that the essay must be written during the senior year and that students may submit a senior essay only if they have an approved prospectus and a senior essay adviser. Senior essays that are not submitted on time will receive a grade of Incomplete. Senior essays with grades of Incomplete without permission of the residential college dean are subject to grade penalties when submitted.

Students are advised to complete a second semester of econometrics either before or concurrently with writing the senior essay; at least one of the two econometrics courses should be ECON 117, 123, 132 or 420. Beginning with the class of 2021, students will not be allowed to write a senior essay without completing two semesters of econometrics.

Meetings for seniors to discuss the senior essay guidelines and requirements will be held on Tuesday, August 28, 2018 at 12:15 p.m. and Wednesday, August 29, 2018 at 4:00 p.m. in Room 106, 28 Hillhouse Avenue. Senior essay prospectus forms are due Monday, October 1, 2018.

ADVISING

The Economics department has faculty representatives/advisers for each residential college, typically fellows of that college. Students majoring in economics should consult with and secure written approval of their course selection from one of their college representatives. Questions concerning the major or programs of study should also be directed to the college representative. College representatives can be found on the department website.

Transfer Credits Students who take a term abroad or take summer courses outside of Yale may petition the DUS to count at most two courses from outside Yale toward the requirements of the major. Students who take a year abroad may petition to count at most three courses. Many economics courses taken outside Yale do not meet the requirements of the Economics major; students should consult with the DUS before taking such courses. Courses taken outside Yale may not be counted toward the major requirements in introductory microeconomics, introductory macroeconomics, intermediate microeconomics, intermediate macroeconomics, or econometrics. See the departmental website section on transferring credits.

Graduate courses Well-qualified students who have acquired the requisite background in undergraduate courses may, with written permission of the instructor, the DUS, and the director of graduate studies, be admitted to graduate courses and seminars. Descriptions of courses are available on the department website.

Students who are planning graduate work in economics should take additional mathematics courses beyond the one-term course required for the major. Many graduate programs in economics require courses in multivariate calculus, linear algebra, and real analysis. Please see the department website on PhD program preparation. Students are urged to discuss their plans for graduate work with the DUS as early in their college careers as possible.

REQUIREMENTS OF THE MAJOR

Prerequisites None

Number of courses 12 term courses (incl senior req)

Specific courses required ECON 121 or 125; ECON 122 or 126; 123, 132, or 136

Distribution of courses 3 introductory classes (or equivalents with DUS permission); 2 core courses (intermediate micro and intermediate macro); 1 math course; 4 electives (additional econometrics or courses numbered 159 and above)

Substitution permitted 1 related course in another dept, with DUS approval

Senior requirement 2 courses numbered ECON 400–491, at least 1 in senior year

FACULTY OF THE DEPARTMENT OF ECONOMICS

Professors Joseph Altonji, Donald Andrews, Costas Arkolakis, Dirk Bergemann, Steven Berry, Truman Bewley, Xiaohong Chen, Ray Fair, John Geanakoplos, Pinelopi Goldberg, Timothy Guinnane, Philip Haile, Marina Halac, Johannes Horner, Gerald Jaynes, Yuichi Kitamura, Alvin Klevorick, Samuel Kortum, Naomi Lamoreaux, Giovanni Maggi, Konstantinos Meghir, Giuseppe Moscarini, William Nordhaus, Gerard Padro-Miquel, Peter Phillips, Benjamin Polak, Mark Rosenzweig, Larry Samuelson, Anna Sanktjohanser, Robert Shiller, Anthony Smith, Aleh Tsyvinski, Edward Vytlačil, Ebonya Washington, Fabrizio Zilibotti

Associate Professors Timothy Armstrong, Mitsuru Igami

Assistant Professors Jose-Antonio Espin-Sanchez, Mira Frick, Zhen Huo, John Eric Humphries, Ryota Iijima, Ilse Lindenlaub, Yusuke Narita, Michael Peters, Nicholas Ryan, Joseph Shapiro, Cormac O'Dea

Senior Lecturers Marnix Amand, Michael Boozer, Evangelia Chalioti, William Hawkins, Tolga Koker, Guillermo Noguera, Maria Saez Marti

Lecturer Katerina Simons

Introductory Courses

* **ECON 108a or b, Quantitative Foundations of Microeconomics** Tolga Koker
Introductory microeconomics with a special emphasis on quantitative methods and examples. Intended for students with limited or no experience with calculus. Enrollment limited. Online preregistration is required; visit economics.yale.edu/undergraduate-program for more information. May not be taken after ECON 110 or 115. QR, SO

* **ECON 110a or b, An Introduction to Microeconomic Analysis** Staff
Similar to ECON 115, but taught as a lecture discussion with limited enrollment. Enrollment limited to first-years and sophomores. Online preregistration is required; visit economics.yale.edu/undergraduate-program for more information. May not be taken after ECON 108 or 115. QR, SO

* **ECON 111a or b, An Introduction to Macroeconomic Analysis** Staff
Similar to ECON 116, but taught as a lecture discussion with limited enrollment. Enrollment limited to first-years and sophomores. Online preregistration is required; visit economics.yale.edu/undergraduate-program for more information. May not be taken after ECON 116. Prerequisite: ECON 108, 110, or 115. SO

ECON 115a or b, Introductory Microeconomics Staff

An introduction to the basic tools of microeconomics to provide a rigorous framework for understanding how individuals, firms, markets, and governments allocate scarce resources. The design and evaluation of public policy. May not be taken after ECON 108 or 110. QR, SO

ECON 116a or b, Introductory Macroeconomics Staff

An introduction that stresses how the macroeconomy works, including the determination of output, unemployment, inflation, interest rates, and exchange rates. Economic theory is applied to current events. May not be taken after ECON 111. Prerequisite: ECON 108, 110, or 115. SO

ECON 117a or b, Introduction to Data Analysis and Econometrics Staff

Introduction to data analysis from the beginning of the econometrics sequence; exposure to modern empirical economics; and development of credible economic analysis. This course emphasizes working directly and early with data, through such economic examples as studies of environmental/natural resource economics, intergenerational mobility, discrimination, and finance. Topics include: probability, statistics, and sampling; selection, causation and causal inference; regression and model specification; and machine learning and big data. Prerequisites: ECON 108, 110, 115,

or equivalent and familiarity with single variable calculus. Students who have taken ECON 131 may not receive major credit for this course. QR, SO

Intermediate Courses

ECON 121a or b, Intermediate Microeconomics Staff

The theory of resource allocation and its applications. Topics include the theory of choice, consumer and firm behavior, production, price determination in different market structures, welfare, and market failure. After introductory microeconomics and completion of the mathematics requirement for the major or its equivalent. Elementary techniques from multivariate calculus are introduced and applied, but prior knowledge is not assumed. May not be taken after ECON 125. QR, SO

ECON 122a or b, Intermediate Macroeconomics Staff

Contemporary theories of employment, finance, money, business fluctuations, and economic growth. Their implications for monetary and fiscal policy. Emphasis on empirical studies, financial and monetary crises, and recent policies and problems. Enrollment limited in the fall term. After two terms of introductory economics and completion of the mathematics requirement for the major or its equivalent. May not be taken after ECON 126. QR, SO

ECON 125a, Microeconomic Theory Staff

Similar to ECON 121 but with a more intensive treatment of consumer and producer theory, and covering additional topics including choice under uncertainty, game theory, contracting under hidden actions or hidden information, externalities and public goods, and general equilibrium theory. Recommended for students considering graduate study in economics. After introductory economics, and MATH 118 or 120 or equivalent. May not be taken after ECON 121. QR, SO

* **ECON 126b, Macroeconomic Theory** Giuseppe Moscarini

Similar to ECON 122 but with a more intensive treatment of the mathematical foundations of macroeconomic modeling, and with rigorous study of additional topics. Recommended for students considering graduate study in economics. After two terms of introductory economics, and MATH 118 or 120 or equivalent. May not be taken after ECON 122. QR, SO

Data Analysis and Econometrics

ECON 123b, Intermediate Data Analysis and Econometrics Edward Vytlačil

Comprehensive and theoretical examination of econometrics, with further exploration of topics covered in ECON 117. A term research project addresses a research question chosen by the student, and involves the application of learned methods to a relevant data set. Prerequisites: ECON 108, 110, 115, or equivalent; ECON 117; and familiarity with single variable calculus. QR, SO

ECON 132a or b, Econometrics and Data Analysis II Staff

Continuation of ECON 131, with a focus on multivariate regression. Topics include statistical inference, choice of functional form, heteroskedasticity, serial correlation, two-stage least squares, qualitative choice models, time series models, and forecasting. Emphasis on statistical computing and the mechanics of how to conduct and present empirical research. After two terms of introductory economics, completion of the

mathematics requirement for the major, and ECON 131 or 135 or a course in the STAT 101–106 series. QR, SO

ECON 135a, Introduction to Probability and Statistics Donald Andrews

Foundations of mathematical statistics: probability theory, distribution theory, parameter estimation, hypothesis testing, regression, and computer programming. Recommended for students considering graduate study in economics. After introductory microeconomics and either (1) MATH 118; or (2) MATH 120 and either MATH 222 or MATH 225. QR, SO

ECON 136b, Econometrics Yuichi Kitamura

Continuation of ECON 135 with a focus on econometric theory and practice: problems that arise from the specification, estimation, and interpretation of models of economic behavior. Topics include classical regression and simultaneous equations models; panel data; and limited dependent variables. Recommended for students considering graduate study in economics. Prerequisites: After ECON 135 or STAT 241 and 242. May not be taken concurrently with STAT 242. QR, SO

Field Courses

ECON 159a or b, Game Theory Staff

An introduction to game theory and strategic thinking. Ideas such as dominance, backward induction, Nash equilibrium, evolutionary stability, commitment, credibility, asymmetric information, adverse selection, and signaling are applied to games played in class and to examples drawn from economics, politics, the movies, and elsewhere. After introductory microeconomics. No prior knowledge of game theory assumed. QR, SO

ECON 170b, Health Economics and Public Policy Howard Forman

Application of economic principles to the study of the U.S. health care system. Emphasis on basic principles about the structure of the U.S. system, current problems, proposed solutions, and the context of health policy making and politics. After introductory microeconomics. SO

ECON 171b / AFAM 469b / EDST 271b, Urban Inequalities and Educational Inequality Gerald Jaynes

Analysis of contemporary policy problems related to academic under performance in lower income urban schools and the concomitant achievement gaps among various racial and ethnic groups in United States K-12 education. Historical review of opportunity inequalities and policy solutions proposed to ameliorate differences in achievement and job readiness. Students benefit from practical experience and interdisciplinary methods, including a lab component with time spent in a New Haven high school. Prerequisites: Any course offered by Education Studies, or one course in history or any social science, either: Anthropology, Economics, Political Science, Psychology, Sociology. EDST 110 is preferred, although not required. SO

ECON 182b / HIST 135b, American Economic History Staff

The growth of the American economy since 1790, both as a unique historical record and as an illustration of factors in the process of economic development. The American experience viewed in the context of its European background and patterns of industrialization overseas. After introductory microeconomics. WR, SO

ECON 184b / GBLB 234b, International Economics Peter Schott

Introduction to conceptual tools useful for understanding the strategic choices made by countries, firms, and unions in a globalized world. After two terms of introductory economics. SO

ECON 187a, European Economic History, 1815–1945 Timothy Guinnane

European economic growth and development from the industrialization of Germany and other Continental countries in the early nineteenth century through World War II. The role of institutional development, the role of trade and imperialism, agricultural improvements, and industrialization. After two terms of introductory economics. SO

ECON 210b / EDST 201b, Economics of Education Joseph Altonji

Application of basic economic concepts and empirical methods to the analysis of education. Topics include the economic return to secondary and postsecondary education, the quality of elementary and secondary education, the market for teachers, inequality in education attainment, and school choice. Prerequisites: ECON 108, 110, or 115. A prior course in statistics or econometrics is helpful but not required. SO

ECON 251b, Financial Theory Staff

Study of the financial system as part of the global economy, rather than only the financial world. Topics include bond pricing, the capital asset pricing model, option pricing, the social security system, the mortgage market, hedge funds, collateral, default, and financial crises. Prerequisite: After introductory microeconomics. QR, SO

ECON 252b, Financial Markets Robert Shiller

An overview of the ideas, methods, and institutions that permit human society to manage risks and foster enterprise. Description of practices today and analysis of prospects for the future. Introduction to risk management and behavioral finance principles to understand the functioning of securities, insurance, and banking industries. After two terms of introductory economics. SO

ECON 255a, Introduction to Corporate Finance Michael Pascutti

Introduction to the concepts and techniques necessary to analyze and implement optimal investment decisions. Prerequisite: introductory microeconomics and introductory macroeconomics. SO

ECON 325a or b, Economics of Developing Countries: Focus on South Asia Staff

This class addresses the economics of poverty and development with a particular focus on South Asia. Why do some countries appear to belong to radically different economic systems? What historical legacies have contributed to poverty in South Asia? And what work is currently being done to address persistent underdevelopment and poverty in the region? Prerequisites: ECON 115 or equivalent; ECON 121; ECON 131. SO

ECON 330b / EVST 340b, Economics of Natural Resources Robert Mendelsohn

Microeconomic theory brought to bear on current issues in natural resource policy. Topics include regulation of pollution, hazardous waste management, depletion of the world's forests and fisheries, wilderness and wildlife preservation, and energy planning. After introductory microeconomics. QR, SO

ECON 338a / EAST 338a / GBLB 318a, The Next China Stephen Roach

Economic development in China since the late 1970s. Emphasis on factors pushing China toward a transition from its modern export- and investment-led development model to a pro-consumption model. The possibility of a resulting identity crisis,

underscored by China's need to embrace political reform and by the West's long-standing misperceptions of China. Prerequisite: introductory macroeconomics. SO

ECON 339b, Advance Competition Economics and Policy Fiona Scott Morton
Limits that antitrust laws, as applied and interpreted by agencies, courts, and competitors, place on firm behavior. Economic theories underlying antitrust enforcement. Whether legal rules restricting competitive behavior increase social welfare and how they affect managerial choices. The evidence and reasoning advanced in key antitrust cases; how outcomes may affect social welfare and firm strategies. Goals and procedures of US and EU antitrust agencies. SO

ECON 350a, Mathematical Economics: General Equilibrium Theory Truman Bewley
An introduction to general equilibrium theory and its extension to equilibria involving uncertainty and time. Discussion of the economic role of insurance and of intertemporal models, namely, the overlapping generations model and the optimal growth theory model. Recommended for students considering graduate study in economics. After MATH 118 or 120, and intermediate microeconomics. QR, SO

ECON 351b, Mathematical Economics: Game Theory Johannes Horner
Introduction to game theory and choice under uncertainty. Analysis of the role of information and uncertainty for individual choice behavior, as well as application to the decision theory under uncertainty. Analysis of strategic interaction among economic agents, leading to the theory of auctions and mechanism design. Recommended for students considering graduate study in economics. After MATH 118, 120, and intermediate microeconomics. QR, SO

*** ECON 360b, Capital Markets** Staff

Topics related to capital markets, with emphasis on the financial crisis of 2007–2008. The design, pricing, and trading of corporate bonds, credit derivatives, and money market instruments; bond restructuring, bond ratings, and financial crises; basic tools used to address such issues, including fixed income mathematics, binomial option pricing, and swaps. Prerequisites: intermediate microeconomics and econometrics. Note: Econ 360a “Capital Markets” is cross-listed with SOM MGT 947a and has space for up to five undergraduates.

ECON 361b, Corporate Finance Kelly Shue

Financial management from inside the corporation or operating entity. Topics include capital budgeting and valuation, optimal capital structure, initial public offerings, mergers, and corporate restructuring. Cases and problem sets provide applications. Prerequisites: intermediate microeconomics and econometrics.

*** ECON 363a, Global Financial Crisis** Andrew Metrick and Timothy Geithner
Comprehensive survey of the causes, events, policy responses, and aftermath of the recent global financial crisis. Study of the dynamics of financial crises in a modern economy. Prerequisite: Successful completion of a course in introductory economics. SO

ECON 375a / GBL 219a, Monetary Policy William English

Introduction to modern macroeconomic models and how to use the models to examine some of the key issues that have faced monetary policymakers during and after the global financial crisis of 2008–2009. Prerequisites: Intermediate level macroeconomics (ECON 122 or 126) and introductory econometrics (ECON 131 or 135). WR, SO

Advanced Lecture Courses

Senior Economics majors may preregister for advanced lecture courses; see the departmental website for instructions. Other interested students may enroll with permission of the instructor during the course selection period.

*** ECON 403b / GBLB 332b, Trade and Development** Guillermo Noguera

Comparison of selected developing countries, where international trade has brought about rapid growth and large-scale reductions in poverty, with other countries, where global trade has increased inequality and brought little growth. Both theoretical models and empirical evidence are used. Prerequisites: intermediate microeconomics and an econometrics or statistics course. SO

*** ECON 407a / GBLB 310a, International Finance** Staff

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. SO

ECON 409a, Firms, Markets, and Competition Philip Haile

Analysis of imperfectly competitive markets, focusing on the interactions among firm behavior, market structure, and market outcomes. Topics include oligopoly, collusion, predation, firm entry, advertising, and price discrimination as well as public policy implications of market behavior. After intermediate microeconomics or equivalent. QR, SO

*** ECON 410b, The Economics of Innovation** Mitsuru Igami

Study of forces that drive the process of innovation. Creativity and creative destruction; the innovator's dilemma; incentives to innovate; competitive advantage; industry evolution; intellectual property. Use of both formal theoretical models and quantitative empirical studies, as well as descriptive studies from management strategy and economic history. Prerequisites: econometrics and intermediate microeconomics.

*** ECON 412b, International Environmental Economics** Joseph Shapiro

Introduction to international and environmental economics and to research that combines the two fields. Methods for designing and analyzing environmental policy when economic activity and pollution cross political borders. Effects of market openness on the environment and on environmental regulation; international economics and climate change. Prerequisites: intermediate microeconomics and econometrics. SO

*** ECON 413a / AMTH 437a / EENG 437a / S&DS 430a, 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. Prerequisites: MATH 120 and 222, or equivalents. May not be taken after AMTH 237. QR

ECON 414a, Economic Models of New Technology Evangelia Chalioti

Analysis of firms' incentives to innovate, focusing on the effects of market power on the intensity of innovative activity. Topics include strategic investment in innovation,

patent races, the diffusion of knowledge, intellectual property (IP) protection systems, IP licensing, research joint ventures, litigation, venture capital, and conflicts between IP rights and antitrust regulation. Prerequisites: intermediate microeconomics and econometrics. SO

ECON 416a, Labor Economics: Employment, Wages, and Skills Ilse Lindenlaub
Topics in labor economics from theoretical and empirical points of view. Models of supply and demand in a competitive market economy; changes in the allocation of workers to jobs, wage distribution, and wage inequality; reasons why the labor market may not be perfectly competitive; and what determines unemployment and the reallocation of workers after job loss. Prerequisites: intermediate microeconomics and econometrics. SO

ECON 417b, Computational Methods in Economics Anthony Smith
Introduction to the basic tools of numerical analysis and how to apply them to the study of economic models in a variety of subdisciplines, including macroeconomics, labor economics, industrial organization, public finance, and environmental economics. Prerequisite: intermediate microeconomics, intermediate macroeconomics, and econometrics. SO

ECON 419a, Financial Time Series Econometrics Xiaohong Chen
Survey of methods used to analyze financial time series data. Classic linear models; autocorrelation in error variances; methods that allow for nonlinearities; methods tailored to analysis of high-frequency data and modeling of value at risk; vector autoregressive models; factor models; the Kalman filter. Prerequisites: ECON 131 and 132, or ECON 135 and 136. SO

* **ECON 422b, Neuroeconomics for Economists** Ifat Levy
Study of neuroscience, neuroimaging, and the tools and training needed by economics students to join neuroscientists and psychologists in the emerging field of neuroeconomics. Critical reading of neuroeconomics papers, translating experimental economics models into neuroeconomics paradigms, and use of neuroscientific data in economics research. Prerequisite: intermediate microeconomics and econometrics. SO

ECON 424b / GBL 308b, Central Banking William English
Introduction to the different roles and responsibilities of modern central banks, including the operation of payments systems, monetary policy, supervision and regulation, and financial stability. Discussion of different ways to structure central banks to best manage their responsibilities. Prerequisites: Intermediate Microeconomics, Intermediate Macroeconomics, and Introductory Econometrics. SO

ECON 433a, The Economics of Space Konstantinos Arkolakis
Analysis of the ways that space affects economic behavior. The course develops the required quantitative techniques to analyze detailed spatial information on economic activity and pairs them with simple models that determine how economic activity is allocated across space. See <https://www.theeconomicsofspace.com/>. Prerequisites: MATH 118, 120, or permission of instructor. SO

Seminars

Senior Economics majors may preregister for departmental seminars; see the departmental website for instructions. Other interested students may enroll with permission of the instructor during the course selection period.

* **ECON 408b / GBLB 238b, International Trade Policy** Giovanni Maggi
Analysis of issues concerning international trade policy and agreements, including recent academic research. Welfare analysis of trade policy; the political economy of trade policy; international trade agreements. Attention to both theoretical methods and empirical research. Prerequisites: intermediate microeconomics and ECON 184. SO

* **ECON 442b, Microfoundations of Growth in China** Xiaoxue Zhao
A comprehensive overview of the challenges China faces as it transitions from a centrally planned economy to adopting a greater reliance on market-based mechanisms. Review of microeconomic literature on China's recent economic and institutional transformation to provide a general analytical framework for understanding the economic implications of the process. Prerequisites: intermediate microeconomics and econometrics. SO

* **ECON 444b, Market Inefficiencies and the Limits of Arbitrage** Michael Pascutti
The role of hedge funds in the United States financial markets and hedge fund behavior; understanding what hedge funds do, why they exist, and how they are different from other investment vehicles. Study of investment strategies that provide opportunity and risk for investors and study of academic papers analyzing (risky) arbitrage strategies. Prerequisite: intermediate microeconomics and econometrics. SO

* **ECON 449b, The Economic Analysis of Conflict** Staff
The purpose of this class is to introduce students to the microeconomic analysis of internal conflict. In particular, we will study how conflict imposes economic costs on the population and how people react to conflict. Students will work on an empirical paper throughout the semester. Intermediate micro and econometrics. SO

* **ECON 450a, Investment Analysis** Dean Takahashi and David Swensen
Examination of investment management in theory and practice. Discussion of asset allocation, investment strategy, and manager selection from the perspective of an institutional investor. Focus on the degree of market efficiency and opportunity for generating attractive returns. SO

* **ECON 454a / EP&E 254a / GBLB 331a, 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. Prerequisite: ECON 122. SO

* **ECON 456b, Private Equity Investing** Michael Schmertzler
A case-oriented study of principal issues and investment types found in substantial private equity portfolios. Discussion of enterprise valuation, value creation, business economics, negotiation, and legal structure, based on primary source materials and

original cases. Prerequisite: Econometrics, or ECON 255, or permission of instructor.
SO

* **ECON 461b, Economics, Addiction, and Public Policy** Jody Sindelar
Smoking, alcoholism, illicit drugs, and obesity studied from economic and policy perspectives. Focus on causes of and solutions to problems. After introductory microeconomics. SO

* **ECON 465a / EP&E 224a / GBLB 330a, Debating Globalization** Ernesto Zedillo
Facets of contemporary economic globalization, including trade, investment, and migration. Challenges and threats of globalization: inclusion and inequality, emerging global players, global governance, climate change, and nuclear weapons proliferation. Prerequisite: background in international economics and data analysis. Preference to seniors majoring in Economics or EP&E. SO RP

* **ECON 467b / GBLB 307b, Economic Evolution of the Latin American and Caribbean Countries** Ernesto Zedillo
Economic evolution and prospects of the Latin American and Caribbean (LAC) countries. Topics include the period from independence to the 1930s; import substitution and industrialization to the early 1980s; the debt crisis and the "lost decade"; reform and disappointment in the late 1980s and the 1990s; exploration of selected episodes in particular countries; and speculations about the future. Prerequisites: intermediate microeconomics and macroeconomics. SO

* **ECON 468b, Institutions and Incentives in Economic Development** Mark Rosenzweig
Assessment of alternative policies and programs designed to promote economic development; examination of fundamental problems of underdeveloped areas and consideration of how and whether such programs resolve them. The roles of indigenous institutions in low-income countries in alleviating problems of underdevelopment. Prerequisites: intermediate microeconomics and econometrics. SO

* **ECON 470b / EP&E 232b / GBLB 233b, 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.

* **ECON 471b / EP&E 297b, Topics in Cooperative Game Theory** Pradeep Dubey
The theory and applications of cooperative games. Topics include matching, bargaining, cost allocation, market games, voting games, and games on networks. Prerequisite: intermediate microeconomics.

* **ECON 473b / EP&E 227b / PLSC 343b, Equality** John Roemer
Egalitarian theories of justice and their critics. Readings in philosophy are paired with analytic methods from economics. Topics include Rawlsian justice, utilitarianism, the veil of ignorance, Dworkin's resource egalitarianism, Roemer's equality of opportunity, Marxian exploitation, and Nozickian procedural justice. Some discussion

of American economic inequality, Nordic social democracy, and the politics of inequality. Recommended preparation: intermediate microeconomics. SO

*** ECON 474b / EAST 454b / GLBL 312b, Economic and Policy Lessons from Japan**

Stephen Roach

An evaluation of modern Japan's protracted economic problems and of their potential implications for other economies, including the United States, Europe, and China. Policy blunders, structural growth impediments, bubbles, the global economic crisis of 2008, and Abenomics; risks of secular stagnation and related dangers to the global economy from subpar post-crisis recoveries. Focus on policy remedies to avert similar problems in other countries. Prerequisite: an introductory course in macroeconomics. SO

*** ECON 475a / EP&E 286a, Discrimination in Law, Theory, and Practice**

Gerald Jaynes

How law and economic theory define and conceptualize economic discrimination; whether economic models adequately describe behaviors of discriminators as documented in court cases and government hearings; the extent to which economic theory and econometric techniques aid our understanding of actual marketplace discrimination. Prerequisites: introductory microeconomics and at least one additional course in Economics, African American Studies, Ethnicity, Race, and Migration, or Women's, Gender, and Sexuality Studies.

*** ECON 476a, The Theory and Application of Corporate Credit Investing**

John Rapaport

Exploration of the theory and practical application of investing in corporate debt, particularly U.S. credit markets from the perspective of a market participant. Course work based on economic theory, with focus on original cases and primary materials. Prerequisites: ECON 122 and 136 or permission of instructor. SO

*** ECON 483b / SAST 476b, The Economics of India**

Ray Fair

The history and contemporary status of India's economy, including policy debates and growth potential. The Indian economy during the colonial era, the period of Nehruvian socialism, and the subsequent crisis and reforms; modern industry, services, agriculture, and finance; the development of human capital in India through health and education programs. Case studies from current economic research. Prerequisites: intermediate microeconomics and econometrics. SO

Senior Essay and Directed Reading Courses

*** ECON 491a and ECON 492b, The Senior Essay**

Ebonya Washington

Students deciding to write one-term senior essays by enrolling in ECON 491, or two-term senior essays by enrolling in ECON 491 and 492, must choose their topics and advisers by Monday, October 1, 2018. One-term senior essays are due at the end of the last week of classes in the fall term. Two-term senior essays are due by 4:30 p.m. on Wednesday, April 3, 2019. Essays should be submitted electronically to the Economics department (qazi.azam@yale.edu). Failure to turn the essay in on time will result in grade penalties and the loss of consideration for distinction. Advisers are chosen with the assistance of the DUS. The format and character of the departmental senior essay may vary to suit the interest of the student and the demands of the topic, but it is expected that the tools and concepts of economic analysis will be employed and that

the essay will contain original research. Paper lengths may vary; the normal expectation is thirty pages. Students may receive up to two credits for the senior essay, though it counts as only one departmental seminar whether one or two terms are taken. Meetings for seniors to discuss the senior essay guidelines and requirements will be held on Tuesday August 28, 2018 at 12:15 p.m. and Wednesday, August 29, 2018 at 4:00 p.m. in Room 106, 28 Hillhouse Avenue. Senior essay prospectus forms are due Monday, October 1, 2018.

* **ECON 498a, Directed Reading** Ebonya Washington

Junior and senior economics majors desiring a directed reading course in special topics in economics not covered in other graduate or undergraduate courses may elect this course, usually not more than once, with written permission of the director of undergraduate studies and of the instructor. The instructor meets with the student regularly, typically for an hour a week, and the student writes a paper or a series of short essays. Junior and senior majors may take this course for a letter grade, but it does not meet the requirement for a department seminar.

Economics and Mathematics

Directors of undergraduate studies: Ebonya Washington

(Economics), Rm. 36, 37 Hillhouse Ave., 432-9901,

ebonya.washington@yale.edu; registrar: qazi.azam@yale.edu; Andrew Casson

(Mathematics), 216 LOM, 432-7056, andrew.casson@yale.edu

The Economics and Mathematics major is intended for students with a strong interest in both mathematics and economics and for students who may pursue a graduate degree in economics.

PREREQUISITES

The major has prerequisites in both mathematics and economics: MATH 120; ECON 110 or 115; and ECON 111 or 116. With permission of the directors of undergraduate studies, upper-level courses may be substituted for prerequisite courses. Upper-level courses substituted for prerequisites do not count toward the total of twelve term courses (beyond the introductory level in economics and mathematics) required for the major.

REQUIREMENTS OF THE MAJOR

A total of twelve term courses is required beyond the introductory level in economics and in mathematics: seven term courses in economics and five term courses in mathematics. These courses must include:

1. Two courses in economic theory, ECON 125 and ECON 126. (Beginning with the class of 2021, ECON 121 may no longer be substituted for ECON 125 and ECON 122 may no longer be substituted for ECON 126).
2. A year of mathematical economics, ECON 351 and one of ECON 350, 417, or 433
3. Two courses in econometrics, ECON 135 and 136 (with permission of the director of undergraduate studies in Economics, S&DS 241 and 242 may be taken instead of ECON 135, in which case they count as one economics course and not as mathematics courses).
4. A course in linear algebra, MATH 222 or 225 (or 230 and 231, for two course credits).
5. An introductory course in analysis, MATH 300 or 301.

Distinction in the Major To be considered for Distinction in the Major, students must meet minimum grade standards, as specified in the (p. 31) Undergraduate Curriculum (p. 31) (p. 31) section, and submit a senior essay that earns a grade of A or A-. One-term essays may be written in either an Economics department senior seminar or in ECON 491. Two-term senior essays may be written in either an Economics senior seminar and ECON 492 or in ECON 491 and 492. (The paper must be written in a course taken in the senior year.) For details see Economics (p. 272). All courses beyond the introductory level in Mathematics and Economics are counted in the computation of grades for Distinction.

Credit/D/Fail Courses taken Credit/D/Fail may not be counted toward the requirements of the major.

SENIOR REQUIREMENT

Students must take the senior seminar in mathematics, MATH 480. A senior essay in Economics is optional.

ADVISING

Students interested in the major should consult both directors of undergraduate studies, and verify with each that their proposed program meets the relevant guidelines. Registration forms must be signed by both directors of undergraduate studies each term.

REQUIREMENTS OF THE MAJOR

Prerequisites MATH 120; ECON 110 or 115; ECON 111 or 116

Number of courses 12 term courses beyond prerequisites (incl senior req)

Distribution of courses 5 courses in math and 7 in econ

Specific courses required ECON 125, 126, 135, 136, (ECON 350 or 417 or 433),
ECON 351; MATH 222 or 225 (or 230 and 231), MATH 300 or 301

Substitution permitted S&DS 241 and 242 for ECON 135, with permission of DUS in
Econ

Senior requirement Senior sem in math (MATH 480); optional senior essay in
economics

Education Studies

Executive director: Mira Debs, 493 College Rm. 408, 432-4631, mira.debs@yale.edu; (mira.debs@yale.edu) yalecollege.yale.edu/content/education-studies

Education Studies is a multidisciplinary academic program in Yale College that provides a structure for students interested in educational institutions, policy, teaching, and learning. The program promotes a multidisciplinary understanding of the role of education historically, socially, politically, and economically.

Any Yale College student interested in education studies may take the introductory survey course, EDST 110, Foundations in Education Studies. This lecture course explores the historical, social, philosophical, and theoretical underpinnings of the field and helps students understand the critical role of education in society. The course examines aspects of education research, policy, and practice.

In the fall of the sophomore year, students who have successfully completed or are currently enrolled in EDST 110 may apply to become a Yale Education Studies Scholar. The program selects students with appropriate background and interest in education research, policy, and practice, and develops their experience and involvement in issues related to education. Each cohort of students participates in symposia and other events, explores educational topics through collaboration, and establishes an advising relationship with mentors. Education Studies Scholars also gain practical field experience through an appropriate academic-year educational opportunity or summer field experience.

Each Education Studies Scholar develops a course plan that advances the student's interests in an aspect of education studies. To fulfill the requirements of the program, students must complete EDST 110, at least two electives, a capstone senior seminar during the fall term of the senior year, a capstone thesis-equivalent research project during the spring term of the senior year, and the requirements of a Yale College major.

Courses

* **EDST 107b / MB&B 107b / PHYS 107b, Being Human in STEM** Helen Caines and Andrew Miranker

A collaboratively-designed, project-oriented course that seeks to examine, understand, and disseminate how diversity of gender, race, religion, sexuality, economic circumstances, etc. shape the STEM experience at Yale and nationally, and that seeks to formulate and implement solutions to issues that are identified. Study of relevant peer-reviewed literature and popular-press articles. Implementation of a questionnaire and interviews of STEM participants at Yale. Creation of role-play scenarios for provoking discussions and raising awareness. Design and implementation of group interventions. so

EDST 110a / SOCY 112a, Foundations in Education Studies Staff

Introduction to key issues and debates in the U.S. public education system. Focus on the nexus of education practice, policy, and research. Social, scientific, economic, and political forces that shape approaches to schooling and education reform. Theoretical and practical perspectives from practitioners, policymakers, and scholars. so

* **EDST 125a / CHLD 125a / PSYC 125a, Child Development** Nancy Close and Carla Horwitz

The reading of selected material with supervised participant-observer experience in infant programs, a day-care and kindergarten center, or a family day-care program. Regularly scheduled seminar discussions emphasize both theory and practice. An assumption of the course is that it is not possible to understand children – their behavior and development – without understanding their parents and the relationship between child and parents. The focus is on infancy as well as early childhood. Enrollment limited to juniors and seniors. WR, SO

* **EDST 127a or b / CHLD 127a or b / PSYC 127a or b, Theory and Practice of Early Childhood Education** Carla Horwitz

Development of curricula for preschool children – infants through six-year-olds – in light of current research and child development theory. Regularly scheduled seminar sessions emphasize both theory and practice. Workshop exploration of early childhood curriculum materials. Weekly observation practicum in a preschool or kindergarten classroom. Priority for juniors, seniors, and Education Study students. WR, SO RP

* **EDST 128b / CHLD 128b / PSYC 128b, Language, Literacy, and Play** Nancy Close and Carla Horwitz

The complicated role of play in the development of language and literacy skills among preschool-aged children. Topics include social-emotional, cross-cultural, cognitive, and communicative aspects of play. WR, SO RP

EDST 139a / CGSC 139a / PSYC 139a, The Mental Lives of Babies and Animals

Karen Wynn

Interdisciplinary exploration of the cognitive, social, and emotional capacities of creatures lacking language and culture. The extent to which our complex psychology is unique to mature humans; the relative richness of a mental life without language or culture. Some attention to particular human populations such as children with autism and adults with language disorders. SO

EDST 140b / PSYC 140b, Developmental Psychology Frank Keil

An introduction to research and theory on the development of perception, action, emotion, personality, language, and cognition from a cognitive science perspective. Focus on birth to adolescence in humans and other species. Prerequisite: PSYC 110. SO

EDST 144a / ER&M 211a / SOCY 144a, Race, Ethnicity, and Immigration Grace Kao

Exploration of sociological studies and theoretical and empirical analyses of race, ethnicity, and immigration, with focus on race relations and racial and ethnic differences in outcomes in contemporary U.S. society (post-1960s). Study of the patterns of educational and labor market outcomes, incarceration, and family formation of whites, blacks (African Americans), Hispanics, and Asian Americans in the United States, as well as immigration patterns and how they affect race and ethnic relations.

SO

EDST 160b / PSYC 150b, Social Psychology Staff

Theories, methodology, and applications of social psychology. Core topics include the self, social cognition/social perception, attitudes and persuasion, group processes, conformity, human conflict and aggression, prejudice, prosocial behavior, and emotion. Prerequisite: PSYC 110. SO

* **EDST 162a / SOCY 162a, Methods in Quantitative Sociology** Lloyd Grieger
Introduction to methods in quantitative sociological research. Topics include: data description; graphical approaches; elementary probability theory; bivariate and multivariate linear regression; regression diagnostics. Students use Stata for hands-on data analysis. QR, SO

EDST 177b / AFAM 198b / CGSC 277b / EP&E 494b / PHIL 177b, Propaganda, Ideology, and Democracy Jason Stanley

Historical, philosophical, psychological, and linguistic introduction to the issues and challenges that propaganda raises for liberal democracy. How propaganda can work to undermine democracy; ways in which schools and the press are implicated; the use of propaganda by social movements to address democracy's deficiencies; the legitimacy of propaganda in cases of political crisis. HU

EDST 180b / PSYC 180b, Abnormal Psychology Jutta Joormann

The major forms of psychopathology that appear in childhood and adult life. Topics include the symptomatology of mental disorders; their etiology from psychological, biological, and sociocultural perspectives; and issues pertaining to diagnosis and treatment. SO

* **EDST 191b / CHLD 126b, Clinical Child Development and Assessment of Young Children** Nancy Close

Exposure to both conceptual material and clinical observations on the complexity of assessing young children and their families. Prerequisites: CHLD 125 or CHLD 128. SO
½ Course cr

EDST 201b / ECON 210b, Economics of Education Joseph Altonji

Application of basic economic concepts and empirical methods to the analysis of education. Topics include the economic return to secondary and postsecondary education, the quality of elementary and secondary education, the market for teachers, inequality in education attainment, and school choice. Prerequisites: ECON 108, 110, or 115. A prior course in statistics or econometrics is helpful but not required. SO

* **EDST 210a, Theory and Practice in American Education** Staff

An examination of the roles played by primary, secondary, and higher education in American society. The idealized purposes, nature, and value of education compared to actual practice. The goals of education at all levels; the degree to which such goals are being achieved. Vocational vs. liberal education; the obligations and limits of formal education in helping students overcome social and economic inequities. Preference to Education Studies Scholars and to students who have completed EDST 110. WR, SO

* **EDST 215a or b, Equity and Innovation in International Education** Staff

This course provides an introduction to the field of international education and a close look at how innovation can address some of the world's most pressing education barriers. Through discussions, case studies, and guest speakers, students are exposed to how different education systems around the globe function; the roles and responsibilities different stakeholders play across these systems; and how innovation within existing systems and from outside groups can help overcome barriers to education. Topics include: research, policy, and practice of international education, including global standards of education, provision of education, and barriers to education; the field of social entrepreneurship and innovation, and how disruptive innovation can help or hinder education systems; what it means to provide a quality

education system, who should provide it, and how we can achieve quality education for all children globally; and how to analyse, and develop innovative and system change solutions to education equity issues. Prerequisite: EDST 110 recommended. SO

*** EDST 225b, Child Care, Society, and Public Policy** Staff

Exploration of societal decisions about where children under the age of five spend their days. Topics include where young children belong; how to regulate, pay for, and support child care arrangements; consideration of gender, race, and family finances; and the profound impact of these decisions on the well-being of children, families, and the economy. Assignments draw heavily on student insights and reflections. Preference in enrollment will go to students who have taken EDST 110, with Education Studies Scholars receiving priority. SO

*** EDST 230b, American Education and the Law** Staff

Interactions between American primary-school education and the American legal system, with a focus on historical and contemporary case law. The relationship between schooling and the state; constitutional, statutory, and regulatory law governing the rights and responsibilities of educators, students, and parents; equal educational opportunity. Recommended preparation: EDST 110. Preference to Education Studies Scholars. SO

*** EDST 233b / FILM 233b, Children and Schools in Global Cinema** Dudley Andrew

Children have long been, and remain, the target of many films. They precipitated some of the earliest studies of the new medium and its regulation as well. But this seminar turns the tables on the premise that children have also been dangerous for the cinema. As subjects and actors in films, they have proven recalcitrant, unpredictable, combustible; in short, they have behaved as children often do. Insofar as cinema is an institution, children must be disciplined to ensure its smooth operation. And yet much of what is valuable in cinema involves the very unpredictability that is natural in children. This seminar operates as a dialogue between education and cinema across the living bodies of children. We give the cinema and children the first and last words in this dialogue, 'education' being asked to learn, not teach. We defamiliarize education by bringing into our classroom children and films foreign to the United States, including films from France, Africa, Iran, and East Asia Foundations in Education Studies recommended. HU

*** EDST 235b, Education and the Culture Wars** Staff

Examination of the historical development and politics of the "culture wars" with a focus on how battles over the "soul of America" have focused on the American education system. Conflict over "American values" issues like abortion, gay marriage, and religion are compounded by legal battles over federal funding and school choice. Study of interdisciplinary readings from law, politics, history, and cultural studies. Preference for enrollment will be given to Education Studies Scholars.

EDST 237a / LING 217a / PSYC 317a, Language and Mind Maria Piñango

The structure of linguistic knowledge and how it is used during communication. The principles that guide the acquisition of this system by children learning their first language and adults learning a second language. The processing of language in real-time. Language breakdown as a result of brain damage. SO

* **EDST 240b / SOCY 396b, Cities, Suburbs, and School Choice** Staff

The changing dynamic between cities and suburbs and the role of individuals and institutions in promoting desegregation or perpetuating segregation since the mid-twentieth century. The government's role in the expansion of suburbs; desegregating schools; the rise of school choice through magnets and charters; the effects of inner-ring suburban desegregation and of urban gentrification on the landscape of education reform. Recommended preparation: EDST 110. Preference to Education Studies Scholars. SO RP

* **EDST 250b, Contemporary Challenges to Liberal Education** Staff

The evolving nature and purpose of liberal learning. Ways in which contemporary liberal education is threatened by challenges such as the rising costs of attending liberal arts colleges and disagreements about the purpose and value of higher education. Students evaluate their Yale experience against national liberal education norms and develop models for strengthening liberal education in America. May not be taken after CSBK 300. WR, SO

EDST 271b / AFAM 469b / ECON 171b, Urban Inequalities and Educational Inequality Gerald Jaynes

Analysis of contemporary policy problems related to academic under performance in lower income urban schools and the concomitant achievement gaps among various racial and ethnic groups in United States K-12 education. Historical review of opportunity inequalities and policy solutions proposed to ameliorate differences in achievement and job readiness. Students benefit from practical experience and interdisciplinary methods, including a lab component with time spent in a New Haven high school. Prerequisites: Any course offered by Education Studies, or one course in history or any social science, either: Anthropology, Economics, Political Science, Psychology, Sociology. EDST 110 is preferred, although not required. SO

* **EDST 290a, Leadership, Change, and Improvement in Education** Staff

Analysis of the most significant challenges faced by the United States educational system, drawing upon research from a range of academic disciplines to understand how schools and districts operate and why certain educational challenges persist, sometimes over multiple generations of students. Students will study successful educational improvement efforts to better understand the political and organizational strategies necessary to improve student experiences and outcomes at scale, as well as the leadership practices necessary to successfully implement and sustain such strategies. Preference given to Education Studies Scholars or others who have taken EDST 110. SO

* **EDST 350b / CHLD 350b / PSYC 350b, Autism and Related Disorders** Fred

Volkmar and James McPartland

Weekly seminar focusing on autism and related disorders of socialization. A series of lectures on topics in etiology, diagnosis and assessment, treatment and advocacy, and social neuroscience methods; topics cover infancy through adulthood. Supervised experience in the form of placement in a school, residence, or treatment setting for individuals with autism spectrum disorders. Details about admission to the course are explained at the first course meeting. Prerequisite: an introductory psychology course. SO

* **EDST 355a / PSYC 355a, Clinical Psychology in the Community** Kristi Lockhart
Mental disorders as they are treated within a community setting. Students participate in a fieldwork placement, working either one-on-one or in groups with the psychiatrically disabled. Seminar meetings focus on such topics as the nature of severe mental disorders, the effects of deinstitutionalization, counseling skills, and social policy issues related to mental health. Prerequisite: PSYC 180 or permission of instructor.

* **EDST 377a / PSYC 477a, Psychopathology and the Family** Kristi Lockhart
The influence of the family on development and maintenance of both normal and abnormal behavior. Special emphasis on the role of early childhood experiences. Psychological, biological, and sociocultural factors within the family that contribute to variations in behavior. Relations between family and disorders such as schizophrenia, depression, anorexia nervosa, and criminality. Family therapy approaches and techniques. SO

* **EDST 400a, Advanced Topics in Education Studies** Staff
Preparation for a thesis-equivalent capstone project. Building community among each year's cohort through reading seminal texts in Education Studies, while laying the foundation for spring capstone projects through discussion of education studies methodologies and practical research design. First course in the yearlong sequence, followed by EDST 410. EDST 110 and two Education Studies electives. Enrollment limited to senior Education Studies Scholars.

* **EDST 410b, Senior Colloquium and Project** Staff
Culmination of the Education Studies Undergraduate Scholars program. Students conduct a rigorous project on a topic of their choice in education research, policy, and/or practice. Enrollment limited to senior Education Studies Scholars.

* **EDST 478b / MUSI 452b, Music, Service, and Society** Sebastian Ruth
The role of musicians in public life, both on and off the concert stage. New ways in which institutions of music can participate in the formation of civil society and vibrant communities. The potential influence of music on the lives of people experiencing political or social oppression. HU RP

Electrical Engineering

Director of undergraduate studies: Mark Reed, 523 BCT, 432-4306, mark.reed@yale.edu; seas.yale.edu/departments/electrical-engineering

Electrical Engineering broadly encompasses disciplines such as microelectronics, photonics, computer engineering, signal processing, control systems, and communications. Three electrical engineering degree programs are offered, as well as a joint degree between the electrical engineering and computer science departments.

1. The B.S. in Electrical Engineering, accredited by the Engineering Accreditation Commission of ABET, Inc., is the flagship degree program and is the most challenging program in electrical engineering. This program is appropriate for highly motivated students who are interested in entering the engineering profession, and who wish for a flexible enough program to consider a variety of other career paths.
2. The B.S. in Engineering Sciences (Electrical) provides similar technical exposure and equivalent rigor as the ABET program, while retaining the flexibility for students to take a broader range of courses than those mandated by the ABET curriculum. The B.S. in Engineering Sciences (Electrical) is suitable for careers in technology and is a popular choice for those choosing academic, industrial, or entrepreneurial career paths.
3. The B.A. in Engineering Sciences (Electrical) is suitable for careers outside of technology, including managerial, financial, and entrepreneurial career options.
4. The fourth program is a joint Electrical Engineering and Computer Science B.S. degree, that offers a unique blend of electrical engineering and computer science courses that retains the rigor of both fields. This degree is a popular choice for those interested in information technology careers.

The program's educational objectives prepare students for four potential paths. An academic path qualifies graduates to enter a top-tier graduate program conducting research with broad applications or significant consequences, and eventually to teach at an academic or research institution. Graduates following an industrial path can enter a technical path or a managerial path. An entrepreneurial path allows graduates to bring broad knowledge to a startup company, which can deliver a product or service that meets societal needs. Graduates who elect a nontraditional engineering path might complete a professional program such as business, law, or medicine, to which their engineering knowledge will be valuable.

PREREQUISITES

See Electrical Engineering and Computer Science (p. 305) for the requirements of the joint B.S. degree

All three remaining degree programs require MATH 112 and MATH 115 if applicable, ENAS 151 or MATH 120 or higher, ENAS 130 (CPSC 100 and 112 do not fulfill this requirement), and PHYS 180, 181 or higher (PHYS 170, 171 is acceptable for the B.A. degree). Acceleration credits awarded on entrance can be used to satisfy the MATH 112 and 115 requirements. Students whose preparation exceeds the level of ENAS 151 or MATH 120 are asked to take a higher-level mathematics course instead, such as MATH 250. Similarly, students whose preparation at entrance exceeds the

level of PHYS 180, 181 are asked to take higher-level physics courses instead, such as PHYS 200, 201. Students whose programming skills exceed the level of ENAS 130 are asked to take a more advanced programming course instead, such as CPSC 201; consult with the director of undergraduate studies.

REQUIREMENTS OF THE MAJOR

Because the introductory courses are common to all three degree programs, students do not usually need to make a final choice before the junior year. Each student's program must be approved by the DUS.

B.S. degree program in Electrical Engineering The ABET-accredited B.S. in Electrical Engineering requires, beyond the prerequisites, four term courses in mathematics and science and thirteen term courses covering topics in engineering. These courses include:

1. Mathematics and basic science (four term courses): ENAS 194; MATH 222 or 225; APHY 322 or equivalent; S&DS 238, or S&DS 241, or equivalent.
2. Electrical engineering and related subjects (thirteen term courses): EENG 200, 201, 202, 203, 310, 320, 325, 348, and 481 (the ABET design project senior requirement); and four engineering electives, at least three of which should be at the 400 level. MENG 390, CPSC 365 or CPSC 366, and all 400-level Computer Science courses qualify as ABET electives. The senior independent research project EENG 471 and/or EENG 472 also qualify.

The introductory engineering courses are designed such that they may be taken concurrently in the sophomore year; for example, in the fall term students may take EENG 200 and EENG 202, followed by EENG 201 and EENG 203 in the spring term. These courses may be taken in any order, with the exception of EENG 203, which requires EENG 200 as a prerequisite. In this case, it would be helpful to take ENAS 194 and/or ENAS 130 in the first year.

A sample ABET-accredited B.S. degree schedule for students who have taken the equivalent of one year of calculus in high school (and thus are not required to take MATH 112 and MATH 115) could include:

First Year: EENG 200, EENG 201, ENAS 151, PHYS 180, and PHYS 181
 Sophomore: EENG 202, EENG 203, ENAS 130, ENAS 194, and MATH 222
 Junior: EENG 310, EENG 320, EENG 325, EENG 348, S&DS 238, and 1 elective
 Senior: APHY 322, EENG 481, and 3 electives

A sample schedule for students that enter into the ABET-accredited B.S. major at the sophomore year could include:

First Year: ENAS 151, ENAS 130, ENAS 194, PHYS 180, and PHYS 181
 Sophomore: EENG 200, EENG 201, EENG 202, EENG 203, and MATH 222
 Junior: EENG 310, EENG 320, EENG 325, EENG 348, S&DS 238, and 1 elective
 Senior: APHY 322, EENG 481, and 3 electives

A sample schedule for students who enter into the ABET-accredited B.S. major in the first year (and are required to take MATH 112 and MATH 115) and only seek to fulfill basic distribution requirements with no engineering courses, could be:

First Year: MATH 112, MATH 115, PHYS 180, PHYS 181, and ENAS 130
 Sophomore: ENAS 151, EENG 201, EENG 202, EENG 203, and MATH 222

Junior: ENAS 194, EENG 310, EENG 320, EENG 325, EENG 348, and S&DS 238
 Senior: APHY 322, EENG 481, and 4 electives

B.S. degree program in Engineering Sciences (Electrical) This program requires fewer technical courses and allows more freedom for work in technical areas outside the traditional electrical engineering disciplines (e.g., biomedical engineering, mechanical engineering, physics, etc.). It requires thirteen technical term courses beyond the prerequisites, specifically: MATH 222 or 225; ENAS 194; EENG 200, 201, 202, 203; EENG 471 or 472 (the senior requirement), or with permission of the instructor and the director of undergraduate studies, 481; and six electives approved by the DUS, at least three of which must be at the 400 level.

For students who have taken the equivalent of one year of calculus in high school (and thus are not required to take MATH 112 and MATH 115), a sample schedule for the B.S. degree in Engineering Science (Electrical) could be:

First Year: EENG 200, EENG 201, ENAS 151, PHYS 180, and PHYS 181
 Sophomore: EENG 202, EENG 203, ENAS 130, ENAS 194, and MATH 222
 Junior: 3 electives
 Senior: EENG 471 and/or EENG 472, and 3 electives

The B.S. degree in Engineering Sciences (Electrical) requires fewer specific courses and 4 less courses overall than the ABET-accredited degree. Any of the courses required for the ABET-accredited major qualify as electives for this degree, as well as other courses with substantial electrical engineering context, subject to the approval of the DUS. For students entering the major during the sophomore year, or those that need introductory calculus in their first year, sample schedules are similar to those described for the ABET-accredited degree program, with the differences in the B.S. Engineering Sciences (Electrical) degree applied.

The flexibility during the junior and senior years in the schedule above is often used to accommodate a second major, such as Economics (p. 272), Applied Physics (p. 134), Computer Science (p. 224), Physics, or Mechanical Engineering.

B.A. degree program in Engineering Sciences (Electrical) This program is appropriate for those planning a career in fields such as business, law, or medicine where scientific and technical knowledge is likely to be useful. It requires eight technical term courses beyond the prerequisites, specifically: MATH 222 or 225, or ENAS 194; EENG 200, 201, 202, and 471 and/or 472 (the senior requirement); and three approved electives.

Credit/D/Fail Courses taken Credit/D/Fail may not be counted toward the requirements of the major.

SENIOR REQUIREMENT

A research or design project carried out in the senior year is required in all three programs and must be approved by the DUS. Students take EENG 471, 472, or 481, present a written report, and make an oral presentation. Arrangements to undertake a project in fulfillment of the senior requirement must be made by the end of shopping period in the term in which the student will enroll in the course; by this date, a prospectus approved by the intended faculty adviser must be submitted to the DUS.

ADVISING AND APPROVAL OF PROGRAMS

All Electrical Engineering and Engineering Sciences majors must have their programs approved by the DUS. Arrangements to take EENG 471, 472, or 481 are strongly suggested to be made during the term preceding enrollment in the course. Independent research courses taken before the senior year are graded on a Pass/Fail basis but may be counted toward the requirements of the major.

REQUIREMENTS OF THE MAJOR

ELECTRICAL ENGINEERING, B.S.

Prerequisites MATH 112, 115; ENAS 151 or MATH 120 or higher; ENAS 130; PHYS 180, 181 or higher

Number of courses 17 term courses beyond prereqs, incl senior req

Specific courses required ENAS 194; MATH 222 or 225; APHY 322; S&DS 238 or S&DS 241; EENG 200, 201, 202, 203, 310, 320, 325, 348

Distribution of courses 4 engineering electives, 3 at 400 level

Senior requirement One-term design project (EENG 481)

ENGINEERING SCIENCES (ELECTRICAL), B.S. AND B.A.

Prerequisites *Both degrees* – MATH 112, 115; ENAS 151 or MATH 120 or higher; ENAS 130; *B.S.* – PHYS 180, 181 or higher; *B.A.* – PHYS 170, 171 or higher

Number of courses *B.S.* – 13 term courses beyond prereqs, incl senior req; *B.A.* – 8 term courses beyond prereqs, incl senior req

Specific courses required *B.S.* – ENAS 194; MATH 222 or 225; EENG 200, 201, 202, 203; *B.A.* – 1 from ENAS 194 or MATH 222 or 225; EENG 200, 201, 202

Distribution of courses *B.S.* – 6 electives approved by DUS, 3 at 400 level; *B.A.* – 3 electives approved by DUS

Senior requirement *B.S.* – one-term research or design project (EENG 471 or 472 or, with permission of DUS, 481); *B.A.* – one-term research or design project (EENG 471 or 472)

FACULTY OF THE DEPARTMENT OF ELECTRICAL ENGINEERING

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

Associate Professors Richard Lethin (*Adjunct*), Sekhar Tatikonda, Fengnian Xia

Assistant Professors Wenjun Hu, Amin Karbasi, Jakub Szefer

Courses

EENG 200a, Introduction to Electronics Mark Reed

Introduction to the basic principles of analog and digital electronics. Analysis, design, and synthesis of electronic circuits and systems. Topics include current and voltage laws that govern electronic circuit behavior, node and loop methods for solving circuit problems, DC and AC circuit elements, frequency response, nonlinear circuits, semiconductor devices, and small-signal amplifiers. A lab session approximately every other week. After or concurrently with MATH 115 or equivalent. QR, SC

EENG 201b, Introduction to Computer Engineering Jakub Szefer

Introduction to the theoretical principles underlying the design and programming of simple processors that can perform algorithmic computational tasks. Topics include data representation in digital form, combinational logic design and Boolean algebra, sequential logic design and finite state machines, and basic computer architecture principles. Hands-on laboratory involving the active design, construction, and programming of a simple processor. QR

EENG 202a, Communications, Computation, and Control Wenjun Hu

Introduction to systems that sense, process, control, and communicate. Topics include communication systems (compression, channel coding); network systems (network architecture and routing, wireless networks, network security); estimation and learning (classification, regression); and signals and systems (linear systems, Fourier techniques, bandlimited sampling, modulation). MATLAB programming and laboratory experiments illustrate concepts. Prerequisite: MATH 115. QR

EENG 203b, Circuits and Systems Design Hong Tang

Introduction to design in a laboratory setting. A wide variety of practical systems are designed and implemented to exemplify the basic principles of systems theory. Systems include audio filters and equalizers, electrical and electromechanical feedback systems, radio transmitters and receivers, and circuits for sampling and reconstructing music. Prerequisites: EENG 200 and 202. QR, SC RP

*** EENG 235a and EENG 236b, Special Projects** Mark Reed

Faculty-supervised individual or small-group projects with emphasis on laboratory experience, engineering design, or tutorial study. Students are expected to consult the director of undergraduate studies and appropriate faculty members about ideas and suggestions for suitable topics during the term preceding enrollment. These courses may be taken at any time during the student's career. Enrollment requires permission of both the instructor and the director of undergraduate studies, and submission to the latter of a one- to two-page prospectus signed by the instructor. The prospectus is due in the departmental office one day prior to the date that the student's course schedule is due. ½ Course cr per term

EENG 310b, Signals and Systems Kumpati Narendra

Concepts for the analysis of continuous and discrete-time signals including time series. Techniques for modeling continuous and discrete-time linear dynamical systems including linear recursions, difference equations, and shift sequences. Topics include continuous and discrete Fourier analysis, Laplace and Z transforms, convolution, sampling, data smoothing, and filtering. Prerequisite: MATH 115. Recommended preparation: EENG 202. QR

EENG 320a, Introduction to Semiconductor Devices Hong Tang

An introduction to the physics of semiconductors and semiconductor devices. Topics include crystal structure; energy bands in solids; charge carriers with their statistics and dynamics; junctions, p-n diodes, and LEDs; bipolar and field-effect transistors; and device fabrication. Additional lab one afternoon per week. Prepares for EENG 325 and 401. Recommended preparation: EENG 200. PHYS 180 and 181 or permission of instructor QR, SC

EENG 325a, Electronic Circuits Fengnian Xia

Models for active devices; single-ended and differential amplifiers; current sources and active loads; operational amplifiers; feedback; design of analog circuits for particular functions and specifications, in actual applications wherever possible, using design-oriented methods. Includes a team-oriented design project for real-world applications, such as a high-power stereo amplifier design. Electronics Workbench is used as a tool in computer-aided design. Additional lab one afternoon per week. Prerequisite: EENG 200. QR RP

EENG 348b / CPSC 338b, Digital Systems Rajit Manohar

Development of engineering skills through the design and analysis of digital logic components and circuits. Introduction to gate-level circuit design, beginning with single gates and building up to complex systems. Hands-on experience with circuit design using computer-aided design tools and microcontroller programming. Recommended preparation: EENG 201. QR

EENG 401b / APHY 321b, Semiconductor Silicon Devices and Technology Tso-Ping Ma

Introduction to integrated circuit technology, theory of semiconductor 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, solar cells, MOS capacitors, MOSFETs, and integrated circuits. Prerequisite: EENG 320 or equivalent or permission of instructor. QR, SC

EENG 406b, Photovoltaic Energy Fengnian Xia

Survey of photovoltaic energy devices, systems, and applications, including review of optical and electrical properties of semiconductors. Topics include solar radiation, solar cell design, performance analysis, solar cell materials, device processing, photovoltaic systems, and economic analysis. Prerequisite: EENG 320 or permission of instructor. QR, SC

EENG 408a, Electronic Materials: Fundamentals and Applications Jung Han

Survey and review of fundamental issues associated with modern microelectronic and optoelectronic materials. Topics include band theory, electronic transport, surface kinetics, diffusion, materials defects, elasticity in thin films, epitaxy, and Si integrated circuits. Prerequisite: EENG 320 or permission of instructor. QR, SC

*** EENG 410b, Photonics and Optical Electronics** 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. QR, SC

*** EENG 416a, 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. Prerequisite: EENG 320 or equivalent, or permission by instructor.

*** EENG 418b / APHY 418b, Heterojunction Devices** Mark Reed

The science and technology of semiconductor and semiconductor device physics, with emphasis on contemporary heterojunction devices. Compound semiconductor material

properties and growth techniques; high speed and millimeter-wave devices; quantum well and superlattice devices; and device modeling. A laboratory component involves device fabrication and measurement. Prerequisite: APHY 439 or equivalent. QR, SC

EENG 426a / ENAS 876, Silicon Compilation Rajit Manohar

An upper-level course on compiling computations into digital circuits using asynchronous design techniques. Emphasis is placed on the synthesis of circuits that are robust to uncertainties in gate and wire delays by the process of program transformations. Topics include circuits as concurrent programs, delay-insensitive design techniques, synthesis of circuits from programs, timing analysis and performance optimization, pipelining, and case studies of complex asynchronous designs. Prerequisite: EENG 201 and introductory programming, or permission of instructor.

EENG 434b / ENAS 496b / MATH 251b / S&DS 351b, Stochastic Processes Yihong Wu

Introduction to the study of random processes including linear prediction and Kalman filtering, Poisson counting process and renewal processes, Markov chains, branching processes, birth-death processes, Markov random fields, martingales, and random walks. Applications chosen from communications, networking, image reconstruction, Bayesian statistics, finance, probabilistic analysis of algorithms, and genetics and evolution. Prerequisite: S&DS 241 or equivalent. QR

EENG 436a, Systems and Control Kumpati Narendra

Design of feedback control systems with applications to engineering, biological, and economic systems. Topics include state-space representation, stability, controllability, and observability of discrete-time systems; system identification; optimal control of systems with multiple outputs. Prerequisites: ENAS 194, MATH 222 or 225, and EENG 310 or permission of instructor. QR

*** EENG 437a / AMTH 437a / ECON 413a / S&DS 430a, 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. Prerequisites: MATH 120 and 222, or equivalents. May not be taken after AMTH 237. QR

*** EENG 442a / AMTH 342a, Linear Systems** A. Stephen Morse

Introduction to finite-dimensional, continuous, and discrete-time linear dynamical systems. Exploration of the basic properties and mathematical structure of the linear systems used for modeling dynamical processes in robotics, signal and image processing, economics, statistics, environmental and biomedical engineering, and control theory. Prerequisite: MATH 222 or permission of instructor. QR

EENG 445a / BENG 445a, Biomedical Image Processing and Analysis James Duncan and Lawrence Staib

A study of the basic computational principles related to processing and analysis of biomedical images (e.g., magnetic resonance, computed X-ray tomography, fluorescence microscopy). Basic concepts and techniques related to discrete image representation, multidimensional frequency transforms, image enhancement, motion

analysis, image segmentation, and image registration. Prerequisite: BENG 352 or EENG 310 or permission of instructors. Recommended preparation: familiarity with probability theory.

*** EENG 449a, Computer Architectures for Cognitive Processing and Machine**

Learning Richard Lethin

Introduction to the development of computer architectures specialized for cognitive processing, including both offline 'thinking machines' and embedded devices. The history of machines, from early conceptions in defense systems to contemporary initiatives. Instruction sets, memory systems, parallel processing, analog architectures, probabilistic architectures. Application and algorithm characteristics. Prerequisites: EENG 201, 325, and CPSC 112. QR

EENG 450a, Applied Digital Signal Processing J. Rimas Vaišnys

An analysis, by computer, of processing requirements. Relevant probability and estimation theories applied to measurements corrupted by noise. Point estimates and system identification from random processes. MATLAB simulations verify the analysis. Prerequisite: EENG 310 or permission of instructor. QR

*** EENG 451b / CPSC 456b, Wireless Technologies and the Internet of Things**

Wenjun Hu

Fundamental theory of wireless communications and its application explored against the backdrop of everyday wireless technologies such as WiFi and cellular networks. Channel fading, MIMO communication, space-time coding, opportunistic communication, OFDM and CDMA, and the evolution and improvement of technologies over time. Emphasis on the interplay between concepts and their implementation in real systems. Prerequisites: 1) Introductory courses in mathematics, engineering, or computer science covering basics of the following topics: Linux skills, Matlab programming, probability, linear algebra, and Fourier transform; 2) Or by permission of the instructor. The course material will be self-contained as much as possible. The labs and homework assignments require Linux and MatLab skills and simple statistical and matrix analysis (using built-in Matlab functions). There will be a couple of introductory labs to refresh Linux and matlab skills if needed.

*** EENG 452a, Internet Engineering** Leandros Tassioulas

Introduction to basic Internet protocols and architectures. Topics include packet-switch and multi-access networks, routing, flow control, congestion control, Internet protocols (IP, TCP, BGP), the client-server model, IP addressing and the domain name system, wireless access networks, and mobile communications. Prerequisite: a college-level course in mathematics, engineering, or computer science, or with permission of instructor. QR

EENG 454b / AMTH 364b / S&DS 364b, Information Theory Andrew Barron

Foundations of information theory in communications, statistical inference, statistical mechanics, probability, and algorithmic complexity. Quantities of information and their properties: entropy, conditional entropy, divergence, redundancy, mutual information, channel capacity. Basic theorems of data compression, data summarization, and channel coding. Applications in statistics and finance. After STAT 241. QR

*** EENG 471a and EENG 472b, Advanced Special Projects** Mark Reed

Faculty-supervised individual or small-group projects with emphasis on research (laboratory or theory), engineering design, or tutorial study. Students are expected to

consult the director of undergraduate studies and appropriate faculty members about ideas and suggestions for suitable topics during the term preceding enrollment. These courses may be taken at any appropriate time during the student's career and may be taken more than once. Enrollment requires permission of both the instructor and the director of undergraduate studies, and submission to the latter of a one- to two-page prospectus signed by the instructor. The prospectus is due in the departmental office one day prior to the date that the student's course schedule is due.

EENG 475a / BENG 475a / CPSC 475a, 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. Prerequisite: CPSC 112 and MATH 120, or with permission of instructor. QR, SC RP

*** EENG 481b, Advanced ABET Projects** Roman Kuc

Study of the process of designing an electrical device that meets performance specifications, including project initiation and management, part specification, teamwork, design evolution according to real-world constraints, testing, ethics, and communication skills. Design project consists of electronic sensor, computer hardware, and signal analysis components developed by multidisciplinary teams. Prerequisites: EENG 310, 320, 325, and 348. RP

Electrical Engineering and Computer Science

Directors of undergraduate studies: Mark Reed (Electrical Engineering), 523 BCT, 432-4306, mark.reed@yale.edu; James Aspnes (Computer Science), 401 AKW, 432-1232, james.aspnes@yale.edu

Electrical Engineering and Computer Science is an interdepartmental major designed for students who want to integrate work in these two fields. It covers discrete and continuous mathematics, algorithm analysis and design, digital and analog circuits, signals and systems, systems programming, and computer engineering. It provides coherence in its core program, but allows flexibility to pursue technical electives.

PREREQUISITES

The prerequisites for the major are MATH 112, 115, and ENAS 151 or MATH 120; CPSC 112 (for students without previous programming experience); and PHYS 180 and 181, or 200 and 201. For the Class of 2022 and subsequent classes, acceleration credits may not be used to satisfy prerequisites. For the Class of 2021 and previous classes, acceleration credits may be used to satisfy some of these requirements. However, because the B.S. programs in Electrical Engineering and in Engineering Sciences (Electrical) both limit the use of such credits, students who wish to retain the option of switching to these programs should consult the director of undergraduate studies in Electrical Engineering when planning their course schedules.

REQUIREMENTS OF THE MAJOR

B.S. degree program The major requires fifteen term courses beyond the prerequisites: CPSC 201, 202, 223, 323, and 365 or 366; EENG 200, 201, 202, and 203; one from MATH 222, 225, or S&DS 241; four advanced electives, two in electrical engineering, two in computer science; and a senior project. MATH 244 may be substituted for CPSC 202. Electives must be 300- or 400-level courses in the departments of Electrical Engineering (p. 296) and Computer Science (p. 224), or must be approved by the DUS in each department. Double-titled courses may be counted either way to fulfill this requirement. CPSC 480 and 490 may not be used as electives. With permission of the DUS in each department, EENG 471 or 472 may be used as an electrical engineering elective.

For students who have taken the equivalent of one year of calculus in high school and have some programming experience, a typical program would be:

First-Year	Sophomore	Junior	Senior
EENG 200	CPSC 201	CPSC 202	Senior project
ENAS 151	EENG 202	CPSC 323	One elective
PHYS 180			
EENG 201	CPSC 223	CPSC 365 or 366	Two electives
PHYS 181	EENG 203	One elective	
	MATH 222		

Students with no programming experience should take CPSC 112 in the fall of their first year and either postpone EENG 200 until their sophomore year or take ENAS 151 or MATH 120 in the spring.

For students with one term of calculus and no programming experience, a typical program would be:

First-Year	Sophomore	Junior	Senior
CPSC 112	CPSC 201	CPSC 202	Two electives
MATH 115	EENG 200	CPSC 323	
PHYS 180	EENG 202	S&DS 241	
EENG 201	CPSC 223	CPSC 365 or 366	Senior project
MATH 120	EENG 203	One elective	One elective
PHYS 181			

For students with no calculus and no programming experience, a typical program would be:

First-Year	Sophomore	Junior	Senior
CPSC 112	CPSC 201	CPSC 202	Two electives
MATH 112	EENG 200	CPSC 323	
PHYS 170	ENAS 151	EENG 202	
EENG 201	CPSC 223	CPSC 365 or 366	Senior project
MATH 115	MATH 222	EENG 203	One elective
PHYS 171		One elective	

Students who start with MATH 112 may satisfy the physics prerequisite by taking PHYS 170 and 171 in their first year, as shown in the table above. However, because the B.S. programs in Electrical Engineering and in Engineering Sciences (Electrical) do not allow this substitution, students who wish to retain the option of switching to these programs should postpone physics until their sophomore year.

Credit/D/Fail Courses taken Credit/D/Fail may not be counted toward the requirements of the major.

SENIOR REQUIREMENT

The senior project must be completed in CPSC 490 or EENG 471 or 472, depending on the adviser's department, and must be approved by the DUS in each department.

ADVISING AND APPROVAL OF PROGRAMS

The entire program of a student majoring in Electrical Engineering and Computer Science must be approved by the DUS in each department.

Accreditation Students interested in pursuing an ABET-accredited degree should consider the B.S. program in Electrical Engineering. See under Electrical Engineering (p. 296).

REQUIREMENTS OF THE MAJOR

Prerequisites MATH 112, 115, and ENAS 151 or MATH 120; CPSC 112 (students without previous programming experience); PHYS 180, 181, or 200, 201 (PHYS 170, 171 is acceptable for students who need to take MATH 112)

Number of courses 15 term courses beyond prereqs (incl senior project)

Specific courses required CPSC 201, 202, 223, 323, and 365 or 366; EENG 200, 201, 202, and 203; one from MATH 222 or 225 or S&DS 241

Distribution of courses 4 addtl 300- or 400-level electives, 2 in electrical engineering, 2 in comp sci

Substitution permitted MATH 244 for CPSC 202; advanced courses in other depts, with permission of DUS in each dept

Senior requirement Independent project (CPSC 490 or EENG 471 or 472) approved by DUS in each dept

Energy Studies

Energy Studies is one of four multidisciplinary academic programs in Yale College. The curriculum is designed to provide select undergraduates with the broad knowledge and skills needed for advanced studies, leadership, and success in energy-related fields, at a time when the world faces enormous challenges in moving its energy systems toward greener, more sustainable sources, while eliminating energy poverty around the world. The curriculum is divided into three tracks: Energy Science and Technology, Energy and the Environment, and Energy and Society, and requires the completion of six graded term courses plus a senior capstone project. Admission to the Energy Studies Undergraduate Scholars program is by application in the fall term of sophomore year. Accepted students are normally required to enroll in the program's gateway course, APHY 100.

In addition to their participation in the program, Energy Studies Scholars must complete the requirements of a Yale College major. Yale College does not offer a major in energy studies. For additional information, visit the program's website.

Engineering

Dean of the School of Engineering & Applied Science: Mitchell Smooke, 105 17HH, 432-4200, engineering@yale.edu; seas.yale.edu

Engineering programs are offered in the departments of Biomedical Engineering, Chemical and Environmental Engineering, Computer Science, Electrical Engineering, and Mechanical Engineering and Materials Science. These departments are administered by the Dean of the School of Engineering & Applied Science. The School also offers interdisciplinary courses bearing on engineering programs.

Curricula in Yale's undergraduate engineering and applied science programs range from technically intensive ones to those with lesser technical content that allow students considerable freedom to include courses of a nontechnical nature in their studies. Programs accredited by the Engineering Accreditation Commission of ABET, Inc., the accreditor for university programs in engineering, are the most intensive. ABET-accredited programs include B.S. degrees in Chemical Engineering, Electrical Engineering, and Mechanical Engineering.

Some students find that less intensive programs better meet their needs when considering a joint major and/or careers in fields requiring less comprehensive technical knowledge. Such non-ABET programs include the B.S. in Biomedical Engineering, Computer Science, or Environmental Engineering and the B.S. in Engineering Sciences – Chemical, Electrical, or Mechanical – as well as the B.A. in Computer Science or in Engineering Sciences – Electrical, Environmental, or Mechanical – designed for students planning careers in business, law, medicine, journalism, or politics who want their liberal arts education to include study of the impact science and technology have on society. A related major in Applied Mathematics is also available.

For engineering courses and descriptions of the major programs mentioned above, see under Applied Mathematics (p. 129), Biomedical Engineering (p. 173), Chemical Engineering (p. 182), Computer Science (p. 224), Electrical Engineering (p. 296), Engineering and Applied Science (p. 310), Environmental Engineering (p. 333), and Mechanical Engineering (p. 533).

Engineering and Applied Science

Director of undergraduate studies: Vincent Wilczynski, 107 BCT, 432-4221, vincent.wilczynski@yale.edu

Courses in Engineering and Applied Science fall into three categories: those intended primarily for students majoring in one of the several engineering and applied science disciplines; those designed for students majoring in subjects other than engineering, the applied sciences, and the natural sciences; and those designed to meet common interests of students majoring in engineering, the applied sciences, or the natural sciences.

In the first category, the departments of Biomedical Engineering, Chemical and Environmental Engineering, Computer Science, Electrical Engineering, and Mechanical Engineering and Materials Science offer courses intended primarily for majors in engineering and applied science disciplines. Courses in these departments may also be relevant for students with appropriate backgrounds who are majoring in chemistry, physics, biology, geology and geophysics, and mathematics. For information about majors in engineering and their related courses, see under Biomedical Engineering (p. 173), Chemical Engineering (p. 182), Computer Science (p. 224), Electrical Engineering (p. 296), Environmental Engineering (p. 333), and Mechanical Engineering (p. 533).

The School of Engineering and Applied Science is responsible for courses in the other two categories: technology for students majoring in subjects other than engineering, the applied sciences, and the natural sciences; and topics common to students majoring in engineering, the applied sciences, and the natural sciences. Courses for non-science majors are intended for all students seeking a broad perspective on issues of scientific and technological import, and they introduce students who may be planning careers in law, business, or public service to concepts and methods of engineering and applied science. Courses for science and engineering majors include topics in applied mathematics and computation.

Courses without Prerequisites in Engineering

* **ENAS 100b / APHY 100b / EVST 100b / G&G 105b / PHYS 100b, Energy**

Technology and Society Daniel Prober, Michael Oristaglio, and Julie Paquette
The technology and use of energy. Impacts on the environment, climate, security, and economy. Application of scientific reasoning and quantitative analysis. Intended for non-science majors with strong backgrounds in math and science. QR, SC

ENAS 110b / APHY 110b, The Technological World Staff

An exploration of modern technologies that play a role in everyday life, including the underlying science, current applications, and future prospects. Examples include solar cells, light-emitting diodes (LEDs), computer displays, the global positioning system, fiber-optic communication systems, and the application of technological advances to medicine. For students not committed to a major in science or engineering; no college-level science or mathematics required. Prerequisite: high school physics or chemistry.

QR, SC

* **ENAS 118a, Introduction to Engineering, Innovation, and Design** Vincent Wilczynski and Lawrence Wilen

An introduction to engineering, innovation, and design process. Principles of material selection, stoichiometry, modeling, data acquisition, sensors, rapid prototyping, and elementary microcontroller programming. Types of engineering and the roles engineers play in a wide range of organizations. Lectures are interspersed with practical exercises. Students work in small teams on an engineering/innovation project at the end of the term. Priority to freshmen. RP

ENAS 156b / ASTR 156b, Introduction to Digital Dome Media Staff

The design and production of planetarium shows, art projects, or other immersive or interactive projects with a digital dome projection system, including the ScidomeHD digital system and the stereo projector system, both located at the Leitner Family Observatory and Planetarium (LFOP) and with the portable Starlab dome. Topics include real-time and scripted control of 3D graphics engines; mapping of images and video onto a spherical dome; 3D rendering using Blender, Processing, and vpython; audio and video editing for dome content; interactive projects; and basic design principles for narrative and interactive educational shows. Some programming or digital media experience is recommended. SC ½ Course cr

ENAS 335a / EP&E 204a, Professional Ethics Mercedes Carreras

A theoretical and case-oriented approach to ethical decision making. Concepts, tools, and methods for constructing and justifying solutions to moral problems that students may face as professionals. SO

Applied Mathematics and Computation Courses

ENAS 151a or b / APHY 151a or b / PHYS 151a or b, Multivariable Calculus for Engineers Staff

An introduction to multivariable calculus focusing on applications to engineering problems. Topics include vector-valued functions, vector analysis, partial differentiation, multiple integrals, vector calculus, and the theorems of Green, Stokes, and Gauss. Prerequisite: MATH 115 or equivalent. QR RP

ENAS 194a or b / APHY 194a or b, Ordinary and Partial Differential Equations with Applications Staff

Basic theory of ordinary and partial differential equations useful in applications. First- and second-order equations, separation of variables, power series solutions, Fourier series, Laplace transforms. Prerequisites: ENAS 151 or equivalent, and knowledge of matrix-based operations. QR RP

ENAS 440a / MENG 440a, Applied Numerical Methods for Algebraic Systems, Eigensystems, and Function Approximation Beth Anne Bennett

The derivation, analysis, and implementation of various numerical methods. Topics include root-finding methods, numerical solution of systems of linear and nonlinear equations, eigenvalue/eigenvector approximation, polynomial-based interpolation, and numerical integration. Additional topics such as computational cost, error analysis, and convergence are studied in several contexts throughout the course. Prerequisites: MATH 115, and 222 or 225, or equivalents; ENAS 130 or some experience with Matlab, C++, or Fortran programming. QR RP

ENAS 441b / MENG 441b, Applied Numerical Methods for Differential Equations

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. Prerequisites: MATH 115, and 222 or 225, or equivalents; ENAS 130 or some knowledge of Matlab, C++, or Fortran programming; ENAS 194 or equivalent. ENAS 440 is not a prerequisite. QR RP

*** ENAS 450b / APHY 450b / MENG 450b, Advanced Synchrotron Techniques and Electron Spectroscopy of Materials** Charles Ahn

Introduction to concepts of advanced x-ray and electron-based techniques used for understanding the electronic, structural, and chemical behavior of materials. Students learn from world-leading experts on fundamentals and practical applications of various diffraction, spectroscopy, and microscopy methods. Course highlights the use of synchrotrons in practical experiments. Prerequisites: physics and quantum mechanics/physical chemistry courses for physical science and engineering majors, or by permission of instructor. QR, SC

ENAS 496b / EENG 434b / MATH 251b / S&DS 351b, Stochastic Processes Yihong

Wu

Introduction to the study of random processes including linear prediction and Kalman filtering, Poisson counting process and renewal processes, Markov chains, branching processes, birth-death processes, Markov random fields, martingales, and random walks. Applications chosen from communications, networking, image reconstruction, Bayesian statistics, finance, probabilistic analysis of algorithms, and genetics and evolution. Prerequisite: S&DS 241 or equivalent. QR

English Language and Literature

Director of undergraduate studies: Jessica Brantley, 107 LC, 432-2224, jessica.brantley@yale.edu; **associate director of undergraduate studies:** Sunny Xiang, 107 LC, 432-2224, sunny.xiang@yale.edu; **registrar:** Erica Sayers, 106 LC, 432-2226, erica.sayers@yale.edu; **assistant registrar:** Jane Bordiere, 107 LC, 432-2224, jane.bordiere@yale.edu; english.yale.edu/welcome-english-major

The undergraduate program in English teaches students foundational research and writing skills and cultivates their powers of argument and analysis. Courses offered by the department are designed to develop students' understanding of important works of English, American, and world literatures in English; to provide historical perspectives from which to read and analyze these works; and to deepen students' insight into their own experience. For students interested in creative writing, the department offers an array of courses taught by renowned professional writers. Student writers at Yale work in all of the major genres, including fiction, poetry, play and film writing, nonfiction prose, and journalism, and they often enjoy the satisfaction of publication or performance for both local and national audiences.

The ability to write well remains a rare but prized skill in almost every domain of our world, and English majors go on to careers in many fields of endeavor. The analytic talents and the writing and speaking skills honed in the major can lead graduates to careers in fields such as advocacy, publishing, teaching, the arts, law, venture capital, medicine, and policy making.

COURSES FOR NONMAJORS AND MAJORS

Introductory courses Courses numbered from 114 to 130 are introductory and are open to all students in Yale College. Students planning to elect an introductory course in English should refer to the departmental website for information about preregistration. Once preregistered, students must attend the first and all subsequent course meetings for that particular section until the end of the second week of classes in order to retain a place. If a student misses a class meeting during this period without informing the instructor beforehand, his or her place will immediately be filled from the waiting list. Students may change their section by attending the desired section. If there are no available seats, the student may be placed on the waiting list for that section.

Advanced courses Advanced courses are open to upper level students; the faculty recommends that students both within and outside the major prepare for such work with two terms of introductory English. Lecture courses cover major periods, genres, and figures of English and American literature. They serve as general surveys of their subjects, and are typically offered every year or every other year. Sophomores and juniors are encouraged to enroll in lecture courses in order to gain broad perspectives in preparation for more specialized study. Seminars, by contrast, offer more specialized or intensive treatment of their topics, or engage topics not addressed in the lecture courses. While seminars are often offered more than once, students should not expect the same seminars to be offered from one year to the next. All courses are open to both majors and nonmajors, although advanced seminars are intended primarily for junior and senior English majors.

Writing courses Besides introductory courses that concentrate on the writing of expository prose (ENGL 114, 115, 120, and 121), the English department offers a number of creative writing courses. The introductory creative writing course, ENGL 123, is open to any student who has not taken an intermediate or advanced course in the writing of fiction, poetry, or drama. Interested students must preregister for ENGL 123, but they need not submit a writing sample to gain admission. Many of the more advanced creative writing courses require an application in advance, with admission based on the instructor's judgment of the student's work. Application details and forms are available on the English Website. Students with questions about this process should consult the department registrar.

Students may in some cases arrange a tutorial in writing (ENGL 470), normally after having taken intermediate and advanced writing courses. All students interested in creative writing courses should also consult the current listing of residential college seminars.

FOUNDATIONAL COURSES

It is valuable for students majoring in English to have both a detailed understanding of major poets who have written in English and some acquaintance with the classics of American and world anglophone literature. All majors are accordingly required to take three of the four foundational courses from ENGL 125, 126, 127, 128. Prospective English majors are strongly encouraged to complete these requirements by the end of the sophomore year. Those who have not enrolled in the Directed Studies program should also consider taking both ENGL 129 and 130, foundational courses in the European literary tradition. A student may count up to five introductory courses toward the major.

If, due to a late change of major or other circumstance, it is impossible to take three foundational courses, students may satisfy the requirements of the major by substituting for one foundational course (1) DRST 001 and 002, (2) ENGL 129 and 130, or (3) two advanced courses that deal substantially and intensively with similar material. Courses that deal with more than one writer are acceptable for this purpose. Substitute courses for the foundational requirement may also count toward the historical distribution requirements. All substitutions require permission from the DUS.

REQUIREMENTS OF THE MAJOR

At least fourteen courses are required for the major, including the senior requirement. Each student, in consultation with a departmental faculty adviser, bears the responsibility for designing a coherent program, which must include the following elements:

Each student must take: (1) three foundational courses chosen from ENGL 125, 126, 127, and 128; (2) at least one advanced course (numbered 131 or higher) in each of the following four historical periods, as indicated in the course listings: Medieval, Renaissance, 18th/19th Century, 20th/21st Century; (3) at least one seminar in both the junior and the senior years.

A student whose program meets these requirements may, with permission of the DUS, count as electives toward the major as many as two upper-level courses in other departments. One of these courses should normally be a literature course in English

translation or in another language, and neither may be counted toward the historical period requirement. Certain residential college seminars, with permission of the DUS, may also be substituted for electives in the major. No more than two courses in creative writing may be counted toward the major; ENGL 123 does not count toward this limit.

Library requirement Each English major must make an appointment to meet with Yale's Librarian for Literature in English or another research librarian within the first four weeks of the term during which the student is fulfilling the first of the two term senior requirements for the major.

Credit/D/Fail Courses taken Credit/D/Fail may be counted toward the requirements of the major.

THE WRITING CONCENTRATION

The writing concentration is an intensive track for English majors who want more sustained work in creative writing. While there are many ways to pursue creative writing at Yale, and within the English Department, the writing concentration provides a structure for creative work and a community of support that many writers find rewarding. The writing concentration is not a separate degree or certificate; it is a part of the English major and builds on the wealth of its literary offerings. It aims to give English majors with demonstrated interest and achievement in writing an opportunity to plan the writing courses they take in a coordinated way and to do advanced work in tutorial. The writing concentration accepts a limited number of serious writing students at the end of the junior year or, occasionally, in the first term of senior year.

Students who enter the writing concentration must fulfill the same requirements as all English majors, except that they count four creative writing courses toward the major, including ENGL 489, a tutorial in which students produce a single sustained piece of writing or a portfolio of shorter works. It is expected that senior applicants will have completed by the end of the fall term the following: 1) at least two creative writing courses numbered 451 or higher, with at least one course in the genre in which they plan to complete ENGL 489 (i.e., either poetry, fiction, nonfiction, or drama) and 2) one course in another genre, which may include a creative writing course numbered 131 or higher. Creative writing concentrators must complete at least 11 literature courses in addition to their creative writing courses. Residential college seminars are not acceptable for credit toward the writing concentration, except by permission of the DUS. The writing concentration senior project may be offered in partial fulfillment of the senior requirement. Concentrators should fulfill the senior library requirement in the term in which they do the literature component of their senior requirement.

Applications for the writing concentration should be submitted to the English department office in 107 LC or online as directed on the departmental website, during the designated sign-up period in the term before enrollment is intended.

SENIOR REQUIREMENTS

Students must complete a two-course senior requirement consisting of one of the following combinations: (1) two senior seminars; (2) a senior seminar and a one-term senior essay; (3) a two-term senior essay, with permission of the DUS; (4) a senior seminar or one-term senior essay and the senior project in the writing concentration. Students who wish to complete the senior requirement by the end of the fall term of the senior year may begin it in the spring of the junior year. Each English major must

make an appointment to meet with Yale's Librarian for Literature in English or another research librarian within the first four weeks of the term during which the student is fulfilling the first of the two term requirement for the major. A junior seminar in which the student, with the permission of the DUS and of the instructor, fulfills the senior requirement may be counted as a senior seminar. At the start of term the student must arrange with the instructor to do any additional work necessary to make the course an appropriate capstone experience.

Senior seminar Senior seminars, usually numbered 400–449, are designated "Senior Seminar" in the course listings, but they are open to interested juniors, as well. The final essays written for senior seminars are intended to provide an appropriate culmination to the student's work in the major and in Yale College. Such essays should rest on significant independent work and should be of substantial length. In researching and writing the essay, the student should consult regularly with the seminar instructor, and may consult with other faculty members as well.

Senior essay The senior essay is an independent literary-critical project on a topic of the student's own design, which is undertaken in regular consultation with a faculty adviser. Writing a senior essay provides a structure for English majors who want the opportunity to explore a research topic in a more sustained and intensive way, as well as a community of support that many majors find rewarding. It should ordinarily be written in an area on which the student has focused in previous studies. It may be written during one or two terms; single-term essays may be converted to yearlong essays through application to the DUS. See the course listings for ENGL 490 and 491 for procedures. Students fulfilling the senior requirement through a two-term senior essay or through a senior essay and the senior writing concentration project must take a seminar during their senior year, but it need not be a 400-level seminar.

Prospectuses and applications for senior essays should be submitted to the office of the English department in 107 LC or online as directed on the department website, during the designated sign-up period in the term before enrollment is intended.

ADVISING

Students planning a program of study in English are strongly encouraged to consult a faculty adviser in the English department, the departmental representative in their residential college, or the DUS for advice about their course choices. A list of departmental representatives is available on the department website.

In the fall of the junior year, each English major formally chooses a faculty adviser from the English department, and, in consultation with that adviser, completes a statement outlining progress in the major. Course schedules for all majors should be discussed with, and approved by, their faculty advisers. The DUS and the ADUS can also discuss and approve schedules, if necessary. Schedules may be submitted to the residential college dean's office only after approval.

Individual programs of study In exceptional cases, a student whose interests and aims are well defined may, in consultation with the DUS, work out a program of study departing from the usual requirements of the major. Such a program must, however, meet the stated general criteria of range and coherence. For interdepartmental programs that include courses covering English literature, see Literature; (p. 506) Directed Studies (p. 241); American Studies (p. 109); African American Studies (p. 95);

Ethnicity, Race, and Migration (p. 357); Theater Studies (p. 720); and Women's, Gender, and Sexuality Studies (p. 730).

Graduate school Students considering graduate work in English should be aware that a reading knowledge of certain classical and modern European languages is ordinarily required for admission to graduate study, and that a course orienting them to critical theory can be especially helpful preparation.

REQUIREMENTS OF THE MAJOR

Number of courses 14 courses (incl senior req)

Distribution of courses 3 courses chosen from ENGL 125, 126, 127, and 128; 1 adv course (numbered 131 or higher) in each of four historical periods as specified; 1 junior seminar; up to 5 courses numbered ENGL 130 or below; up to 2 creative writing courses. *Writing concentration* – same, except 4 creative writing courses including at least 2 numbered 451 or higher, one in same genre as ENGL 489; and 1 in another genre, numbered 131 or higher; at least 11 literature courses

Substitutions permitted DRST 001 and 002 or ENGL 129 and 130 or two upper-level courses with overlapping material may substitute for one foundational course; up to 2 relevant upper-level courses in other departments may substitute for electives in the major; residential college seminars may substitute for electives in the major; all substitutions require DUS permission

Senior requirement *Standard major* – 2 senior sems, or 1 senior sem and 1 senior essay (ENGL 490), or a two-term senior essay (ENGL 490, 491); meeting with Yale librarian; *Writing concentration* – senior sem or senior essay, and ENGL 489

FACULTY OF THE DEPARTMENT OF ENGLISH

Professors Harold Bloom, Jessica Brantley, Leslie Brisman, David Bromwich, Ardis Butterfield, Jill Campbell, Joe Cleary, Michael Denning, Wai Chee Dimock, Anne Fadiman (*Adjunct*), Paul Fry (*Emeritus*), Louise Glück (*Adjunct*), Jacqueline Goldsby, Langdon Hammer (*Chair*), Margaret Homans, Amy Hungerford, David Scott Kastan, Jonathan Kramnick, Traugott Lawler (*Emeritus*), Lawrence Manley, Donald Margulies (*Adjunct*), Stefanie Markovits, Alastair Minnis, Stephanie Newell, John Durham Peters, Caryl Phillips, David Quint, Claudia Rankine, Marc Robinson, John Rogers, Caleb Smith, Robert Stepto, Emily Thornbury, Katie Trumpener, Michael Warner, Ruth Yeazell

Associate Professors Catherine Nicholson, Anthony Reed, R. John Williams

Assistant Professors Anastasia Eccles, Marta Figlerowicz, Ben Glaser, Alanna Hickey, Naomi Levine, Priyasha Mukhopadhyay, Joseph North, Jill Richards, Sunny Xiang

Senior Lecturers James Berger, Michael Cunningham, Richard Deming, Shifra Sharlin, Cynthia Zarin

Lecturers Melissa Barton, Felisa Baynes-Ross, Steven Brill, Jami Carlacio, Danielle Chapman, Susan Choi, Andrew Ehrgood, Greg Ellermann, Randi Epstein, Joseph Gordon, David Gorin, Karin Gosselink, Derek Greene, Rona Johnston Gordon, Rosemary Jones, Heather Klemann, Verlyn Klinkenborg, Timothy Kreiner, Katja Lindskog, Pamela Newton, Mark Oppenheimer, Timothy Robinson, Karin Roffman, Pamela Schirmeister, Adam Sexton, Kim Shirkhani, Margaret Spillane,

Michele Stepto, Sarah Stillman, Barbara Stuart, Rasheed Tazudeen, Ryan Wepler, Christian Wiman, Bob Woodward

Courses

*** ENGL 010b, Jane Austen** Staff

Close study of Austen's novels, with special attention to the critique of social and literary convention. Enrollment limited to first-year students. Preregistration required; see under First-Year Seminar Program. WR, HU

*** ENGL 015a / AFAM 016 / AFST 015a, South African Writing after Apartheid**

Stephanie Newell

An introduction to creative writing published in South Africa from the end of Apartheid in 1994 to the present. Close readings of contemporary fiction with additional material drawn from popular culture, including films, magazines, and music. Enrollment limited to first-year students. Preregistration required; see under First-Year Seminar Program.

WR, HU

*** ENGL 021b, Fiction and Consciousness** Jonathan Kramnick

Study of literature and the representation of consciousness, focusing in particular on the novel, from Jane Austen to the present. What literature can tell us about the way minds work; how novels represent the felt experience of people going about their lives; how literature partners with other ways of understanding the mind, such as psychology and neuroscience. Enrollment limited to first-year students. Preregistration required; see under First-Year Seminar Program. WR, HU

*** ENGL 023b / HUMS 072b, Reading Recent North American Short Fiction** Joseph

Gordon

The short story is generally considered to be North American in origin. As one of its goals, the course examines the ways in which the genre has developed in recent decades into a vehicle for storytelling from marginalized or subaltern voices such as those of people of color, women, LGBT people, immigrants and refugees, war veterans, students, and children. The course also explores how collections of stories gathered by a single author may resemble but yet be distinguishable from novels, and examines some very recent short stories that are influenced by nontraditional forms of imaginative writing, such as graphic fiction, self-help manuals, and social media. Authors are likely to include: Grace Paley, Alice Munro, Raymond Carver, Rohinton Mistry, ZZ Packer, Sherman Alexie, Tao Lin, Jhumpa Lahiri, Edward P. Jones, Elizabeth Strout, Junot Diaz, Phil Klay, Viet Thanh Nguyen, Alison Bechdel, Lorrie Moore, Jennifer Egan, and Teju Cole. Enrollment limited to first-year students. Preregistration required; see under First-Year Seminar Program. WR, HU

*** ENGL 024a, Suspense and Narrative** Staff

Exploration of suspense as a significant narrative mode and a historically conditioned feeling. Readings trace an arc from the rise of suspense in sentimental and Gothic fiction in the eighteenth century, through its preeminence in the nineteenth-century novel, to its consolidation as a marketable genre in the twentieth century. With brief supplemental readings in the philosophy of aesthetics and narrative theory. Enrollment limited to first-year students. Preregistration required; see under First-Year Seminar Program. WR, HU

*** ENGL 025a / LITR 023a / SAST 059a, Modern South Asian Literature, 1857-2017**
Staff

Exploration of literary texts from South Asia, 1857 to the present. Close reading of literary texts from India, Pakistan, Bangladesh, and Sri Lanka, alongside political speeches, autobiographies, and oral narratives. Topics include colonialism, history writing, migration, language, caste, gender and desire, translation, politics and the novel. Enrollment limited to first-year students. Preregistration required; see under First-Year Seminar Program. WR, HU

*** ENGL 114a or b, Writing Seminars** Staff

Instruction in writing well-reasoned analyses and academic arguments, with emphasis on the importance of reading, research, and revision. Using examples of nonfiction prose from a variety of academic disciplines, individual sections focus on topics such as the city, childhood, globalization, inequality, food culture, sports, and war. WR

*** ENGL 115a or b, Literature Seminars** Staff

Exploration of major themes in selected works of literature. Individual sections focus on topics such as war, justice, childhood, sex and gender, the supernatural, and the natural world. Emphasis on the development of writing skills and the analysis of fiction, poetry, drama, and nonfiction prose. WR, HU

*** ENGL 120a or b, Reading and Writing the Modern Essay** Staff

Close reading of great nonfiction prepares students to develop mastery of the craft of powerful writing in the humanities and in all fields of human endeavor, within the university and beyond. Study of some of the finest essayists in the English language, including James Baldwin, Joan Didion, Leslie Jamison, Jhumpa Lahiri, George Orwell, David Foster Wallace, and Virginia Woolf. Assignments challenge students to craft persuasive arguments from personal experience, to portray people and places, and to interpret fundamental aspects of modern culture. WR

*** ENGL 121a or b, Styles of Academic and Professional Prose** Staff

A seminar and workshop in the conventions of good writing in a specific field. Each section focuses on one academic or professional kind of writing and explores its distinctive features through a variety of written and oral assignments, in which students both analyze and practice writing in the field. Section topics, which change yearly, are listed at the beginning of each term on the English departmental website. This course may be repeated for credit in a section that treats a different genre or style of writing; may not be repeated for credit toward the major. Prerequisite: ENGL 114, 115, 120, or another writing-intensive course at Yale. WR

*** ENGL 123a, Introduction to Creative Writing** Staff

Introduction to the writing of fiction, poetry, and drama. Development of the basic skills used to create imaginative literature. Fundamentals of craft and composition; the distinct but related techniques used in the three genres. Story, scene, and character in fiction; sound, line, image, and voice in poetry; monologue, dialogue, and action in drama. HU

*** ENGL 125a, Readings in English Poetry I** Staff

Introduction to the English literary tradition through close reading of select poems from the seventh through the seventeenth centuries. Emphasis on developing skills of literary interpretation and critical writing; diverse linguistic and social histories; and the many varieties of identity and authority in early literary cultures. Readings may

include *Beowulf*, *The Canterbury Tales*, Middle English lyrics, *The Faerie Queene*, *Paradise Lost*, and poems by Isabella Whitney, Philip Sidney, William Shakespeare, Amelia Lanyer, John Donne, and George Herbert, among others. WR, HU

*** ENGL 126b, Readings in English Poetry II** Staff

Introduction to the English literary tradition through close reading of select poems from the eighteenth century through the present. Emphasis on developing skills of literary interpretation and critical writing; diverse genres and social histories; and modernity's multiple canons and traditions. Authors may include Alexander Pope, William Wordsworth, Elizabeth Barrett Browning, Robert Browning, W. B. Yeats, T. S. Eliot, Langston Hughes, Gertrude Stein, Gwendolyn Brooks, Elizabeth Bishop, and Derek Walcott, among others. WR, HU

*** ENGL 127a or b, Readings in American Literature** Staff

Introduction to the American literary tradition in a variety of poetic and narrative forms and in diverse historical contexts. Emphasis on developing skills of literary interpretation and critical writing; diverse linguistic and social histories; and the place of race, class, gender, and sexuality in American literary culture. Authors may include Phillis Wheatley, Henry David Thoreau, Herman Melville, Walt Whitman, Emily Dickinson, Frederick Douglass, Gertrude Stein, Langston Hughes, Ralph Ellison, Flannery O'Connor, Alan Ginsberg, Chang-Rae Lee, and Toni Morrison, among others. WR, HU

*** ENGL 128a or b, Readings in Comparative World English Literatures** Staff

An introduction to the literary traditions of the Anglophone world in a variety of poetic and narrative forms and historical contexts. Emphasis on developing skills of literary interpretation and critical writing; diverse linguistic, cultural and racial histories; and on the politics of empire and liberation struggles. Authors may include Daniel Defoe, Mary Prince, J. M. Synge, James Joyce, C. L. R. James, Claude McKay, Jean Rhys, Yvonne Vera, Chinua Achebe, Ng#g# wa Thiong'o, J. M. Coetzee, Brian Friel, Amitav Ghosh, Salman Rushdie, Alice Munro, Derek Walcott, and Patrick White, among others. WR, HU

*** ENGL 129a / LITR 168a, Tragedy in the European Literary Tradition** Staff

The genre of tragedy from its origins in ancient Greece and Rome through the European Renaissance to the present day. Themes of justice, religion, free will, family, gender, race, and dramaturgy. Works include Homer's *Iliad* and plays by Aeschylus, Sophocles, Euripides, Seneca, Shakespeare, Racine, Ibsen, Chekhov, Brecht, Beckett, and Soyinka. Focus on textual analysis and on developing the craft of persuasive argument through writing. WR, HU

*** ENGL 130b / LITR 169b, Epic in the European Literary Tradition** Staff

The epic tradition traced from its foundations in ancient Greece and Rome to the modern novel. The creation of cultural values and identities; exile and homecoming; the heroic in times of war and of peace; the role of the individual within society; memory and history; politics of gender, race, and religion. Works include Homer's *Odyssey*, Vergil's *Aeneid*, Dante's *Inferno*, Cervantes's *Don Quixote*, and Joyce's *Ulysses*. Focus on textual analysis and on developing the craft of persuasive argument through writing. WR, HU

ENGL 132b, Science Fiction Alfred Guy

A survey of twentieth- and twenty-first-century science fiction, focusing on how changing technologies produce new ideas about human identity. Emphasis on innovations in science and engineering as well as new forms of social, political, and economic life. Works by Robert Heinlein, Philip K. Dick, Ursula Le Guin, and William Gibson. WR, HU

*** ENGL 134a or b, Reading Fiction for Craft** Staff

Fundamentals of the craft of fiction writing explored through readings from classic and contemporary short stories and novels. Focus on how each author has used the fundamentals of craft. Writing exercises emphasize elements such as voice, structure, point of view, character, and tone. HU

*** ENGL 135a, Reading Poetry for Craft** David Gorin

An introduction to reading and writing poetry. Classic examples from Shakespeare and Milton, the modernist poetics of Stein, Pound, Moore, and Stevens, and recent work in a variety of forms and traditions. Students develop a portfolio of poems and write an essay on the poetic craft of poets who have influenced their work. HU

ENGL 136b, Vampires, Castles, and Werewolves Heather Klemann

Study of eighteenth- and nineteenth-century gothic fiction and the persistence, resurgence, and adaptation of gothic tropes in twentieth- and twenty-first-century film, television, and prose. Readings include *Frankenstein*, *Northanger Abbey*, *The Strange Case of Dr. Jekyll and Mr. Hyde*, and *Dracula*. Films and TV include *Inception*, *Black Swan*, Alfred Hitchcock's *Rebecca*, and episodes from *Buffy the Vampire Slayer*. Prerequisite: Freshmen must have taken a WR seminar course in the fall term. WR, HU

*** ENGL 150a / LING 150a, Old English** Staff

An introduction to the language, literature, and culture of earliest England. A selection of prose and verse, including riddles, heroic poetry, meditations on loss, a dream vision, and excerpts from *Beowulf*, which are read in the original Old English. HU

*** ENGL 153b, The Earliest English Literature** Alexandra Reider

An introduction to the rich literary tradition of Anglo-Saxon England (c. 650 - c. 1100). Emphasis on the diversity of ways the Anglo-Saxons approached, preserved, and appreciated the written word. Readings include poems, histories, travel narratives, and riddles; all readings in Modern English. WR, HU

ENGL 183a, Poetry since 1950 Langdon Hammer

Poets and poetic movements from the second half of the twentieth century in the United States, England, Ireland, and the Caribbean. Authors include Bishop, Lowell, O'Hara, Ginsberg, Plath, Ashbery, Merrill, Larkin, Gunn, Hill, Heaney, Muldoon, and Walcott. WR, HU

ENGL 187a / AMST 239, Love and Hate in the American South Caleb Smith

An introduction to the literature and culture of the American South, a region of the mind identified with the former Confederate States of America and fabricated from a mix of beautiful dreams and violent nightmares, including: histories of slavery and settler colonialism, gothic fiction, the Delta blues, Hollywood movies, evangelical sermons, *The Confessions of Nat Turner*, love poems, protest poems, prison songs, *The Adventures of Huckleberry Finn*, country music, photographs, "Strange Fruit," folk tales, memoirs, cookbook recipes, and other fantasies. Close reading, cultural analysis, and

historical context. Literary works by Capote, Faulkner, Hurston, Jacobs, O'Connor, Poe, Twain, Toomer, Walker, Welty, Wright. Music, film, and other media. HU

ENGL 192b / FILM 240b / LITR 143b, World Cinema Dudley Andrew

Development of ways to engage films from around the globe productively. Close analysis of a dozen complex films, with historical contextualization of their production and cultural functions. Attention to the development of critical skills. Includes weekly screenings, each followed immediately by discussion. HU

ENGL 193b / AFAM 185b, The Harlem Renaissance Anthony Reed

Study of the social, political, and aesthetic circumstances of the Harlem Renaissance, one of the most important periods in African American life. Focus on constitutive debates and key texts to better understand the origins and aims of the movement and its connection to formal politics and activism. Frequent use of relevant materials in Beinecke Library. WR, HU

ENGL 196b / FILM 160b, Introduction to Media Francesco Casetti

Introduction to the long history of media as understood in classical and foundational (and even more recent experimental) theories. Topics involve the technologies of modernity, reproduction, and commodity, as well as questions regarding knowledge, representation, public spheres, and spectatorship. Special attention given to philosophies of language, visuality, and the environment, including how digital culture continues to shape these realms. WR, HU

ENGL 200a, Shakespeare: Comedies and Romances Lawrence Manley

Love, sex, gender, society, and theater practice in Shakespeare's comic genres, from the early farces and romantic comedies to the problem plays and late romances. WR, HU

ENGL 201b, Shakespeare: Histories and Tragedies David Kastan

A study of Shakespeare's histories and tragedies, focusing on attentive reading of the play texts and consideration of the theatrical, literary, intellectual, political, and social worlds in which the plays were written, performed, and experienced. HU

* **ENGL 204b, Shakespeare and Marlowe** Lawrence Manley

A study of mutual influence and literary rivalry in major plays and poems by Shakespeare and Christopher Marlowe. Attention to Elizabethan dramaturgy, poetics, and theater history; to the authors' debts and contributions to the intellectual heritage of the Renaissance; and to their controversial treatments of politics, religion, mass violence and crowd psychology, ethnicity, and sexuality. WR, HU

* **ENGL 221b / AFAM 212b, African American Literature in the Archives** Melissa Barton

Examination of African American literary texts within their archival context; how texts were planned, composed, revised, and received in their time. Students pair texts with archival materials from Beinecke Library, including manuscripts, correspondence, photographs, and ephemera. Readings include Lorraine Hansberry, Langston Hughes, James Weldon Johnson, August Wilson, and Richard Wright. HU

* **ENGL 234b / AFAM 206b, Literature of the Black South** Sarah Mahurin

Examination of the intersections between African American and Southern literatures, with consideration of the ways in which the American South remains a space that simultaneously represents and repels an African American ethos. HU

* **ENGL 235a / AMST 346a / HUMS 252a, Poetry and Objects** Staff

This course on 20th and 21st century poetry studies the non-symbolic use of familiar objects in poems. We meet alternating weeks in the Beinecke library archives and the Yale Art Gallery objects study classroom to discover literary, material, and biographical histories of poems and objects. Additionally, there are scheduled readings and discussions with contemporary poets. Assignments include both analytical essays and the creation of online exhibitions. WR, HU

* **ENGL 237b / EVST 237b, Animals in Literature and Theory** Jonathan Kramnick

Consideration of the role animals play in our aesthetic, ethical, political, and scientific worlds through reading of fiction, poetry, philosophy, and critical theory. Topics include: animal sentience and experience; vegetarianism; animal fables; pet keeping; animals alongside disability, race, and gender; and the representation of animal life in the visual arts. WR, HU

* **ENGL 241a / EVST 224a, Writing About The Environment** Alan Burdick

Exploration of ways in which the environment and the natural world can be channeled for literary expression. Reading and discussion of essays, reportage, and book-length works, by scientists and non-scientists alike. Students learn how to create narrative tension while also conveying complex – sometimes highly technical – information; the role of the first person in this type of writing; and where the human environment ends and the non-human one begins.

* **ENGL 244b / FILM 397b / THST 228b, Writing about the Performing Arts**

Margaret Spillane

Introduction to journalistic reporting on performances as current events, with attention to writing in newspapers, magazines, and the blogosphere. The idea of the audience explored in relation to both a live act or screening and a piece of writing about such an event. Students attend screenings and live professional performances of plays, music concerts, and dance events. WR, HU

* **ENGL 245a or b, Introduction to Writing Fiction** Staff

An intensive introduction to the craft of fiction, designed for aspiring creative writers. Focus on the fundamentals of narrative technique and peer review.

* **ENGL 246a or b, Introduction to Writing Poetry** Staff

A seminar workshop for students who are beginning to write poetry or who have no prior workshop experience at Yale. RP

* **ENGL 247a / HSAR 460a, Writing about Contemporary Figurative Art** Margaret

Spillane

A workshop on journalistic strategies for looking at and writing about contemporary paintings of the human figure. Practitioners and theorists of figurative painting; controversies, partisans, and opponents. Includes field trips to museums and galleries in New York City. WR, HU

* **ENGL 248a or b, Writing the Television Drama** Staff

Crafting the television drama with a strong emphasis on creating and developing an original concept from premise to pilot; with consideration that the finest television dramas being created today aspire to literary quality. Students read original scripts of current and recent critically acclaimed series and create a series “bible” which will

include formal story and world descriptions, orchestrated character biographies, a detailed pilot outline, and two or more acts of an original series pilot.

* **ENGL 249b, English Literature and the French Revolution** David Bromwich
A survey of political, moral, and literary works evoked by the revolution controversy, including those by Burke, Wordsworth, and Wollstonecraft. WR, HU

* **ENGL 250a, Romantic Poetry** Leslie Brisman
Introduction to the work of Blake, Coleridge, Wordsworth, Shelley, and Keats, with some attention to Byron, to the poets' own problematic revisions, and to the minor poets of this rich period of poetic innovation and revolutionary spirit. WR, HU RP

* **ENGL 252b, Poets and Painters: Wordsworth, Constable, Byron, Turner** Paul Fry
The rise of landscape in the works of Wordsworth, Constable, Byron, and Turner, with emphasis on the nonhuman in relation to consciousness and history. Some attention to the influence of earlier poetry and visual art and to effects on later painters. WR, HU

* **ENGL 255b, Writing Humor** Ryan Wepler
Skills essential to humor writing, with an emphasis on texture, tone, character, and narrative. Students read the work of classmates and pieces by professional humor writers with the goal of generating an ever-expanding set of techniques for both reading humor and writing humorously. Recommended preparation: ENGL 120. WR

* **ENGL 258b, Writing about Food** Barbara Stuart
Writing about food within cultural contexts. Through reading essays written by the luminaries of the food world, students explore food narratives from many angles, including family meals, recipes, cookbooks, restaurant reviews, memoir, and film. WR

* **ENGL 260b, Shakespeare and the Craft of Writing Poetry** Erica Chapman
This course aims to demystify the Bard by discerning elements of his craft, introducing students to contemporary poets inspired by Shakespeare, and teaching students how to employ aspects of Shakespeare's craft in their own poems – without sounding Elizabethan. With the belief that Shakespeare's poetry is still utterly alive, and that many of the best contemporary poems find their origin in his protean touch. Weekly reading alternates between one of the plays and one book of contemporary poetry, while weekly assignments alternate between critical response papers and creative assignments, focusing on specific craft elements, such as “The Outlandish List: How to Make Anaphora Exciting,” “Verbs: How to Hurtle a Poem Forward,” “Concrete Nouns as the Key to Clear Narrative,” “The Poet as Culture Vulture: How to Collect and Command Contemporary Details,” “Wilding: How to Loot and Weirden the Natural World,” “Layers of the Word: Wit and Double Meanings,” “Exciting Enjambments: How to Keep Iambic Pentameter From Being Boring,” “Finis: How to Make a Poem End.” Students decide before midterm whether they want to take the course as a Renaissance Literature or Creative Writing credit, and this determines whether their final will be a creative portfolio or a critical essay; their midterm assignment will be the opposite of their final assignment, so a student taking the class as a Literature credit (and writing a critical essay for their final) will do the creative writing option at midterm. Permission of the instructor required.

* **ENGL 262a / HIST 262Ja / HUMS 410a, Modernities: Nineteenth-Century Historical Narratives** Stefanie Markovits and Stuart Semmel
British historical narratives in the nineteenth century, an age often cited as the crucible of modern historical consciousness. How a period of industrialization and

democratization grounded itself in imagined pasts – whether recent or distant, domestic or foreign – in both historical novels and works by historians who presented programmatic statements about the nature of historical development. WR, HU

ENGL 265a, Gender, Class, and Narrative Form in the Victorian Novel Ruth Yeazell

A selection of nineteenth-century novels, with particular attention to questions of gender, class, and narrative form. Authors chosen from the Brontës, Gaskell, Dickens, Collins, Eliot, Trollope, and Hardy. HU

* **ENGL 275b, Emerson, Dickinson, and Melville** Richard Deming

Study of central works by three foundational writers of the nineteenth century. Cultural and historical context; questions concerning American identity, ethics, and culture, as well as the function of literature; the authors' views on the intersections of philosophy and religious belief, culture, race, gender, and aesthetics. Readings include novels, poems, short fiction, and essays. WR, HU

* **ENGL 276a, Jane Austen and Walter Scott: History and Manners in the Romantic Novel** Staff

Reading of selected works by Jane Austen and Walter Scott – the preeminent novelists of the Romantic period – with special attention to reception and the formation of the related concepts of “history” and “manners.” Readings include: *Sense and Sensibility*, *Mansfield Park*, *Persuasion*, *Waverley*, and *Ivanhoe*. WR, HU

* **ENGL 278a / AMST 281a, Antebellum American Literature** Michael Warner

Introduction to writing from the period leading up to and through the Civil War. The growth of African American writing in an antislavery context; the national book market and its association with national culture; emergence of a language of environment; romantic ecology and American pastoral; the “ecological Indian”; evangelicalism and the secular; sentimentalism and gender; the emergence of sexuality; poetics. WR, HU

* **ENGL 287a, Literature and the Future, 1887 to the Present** Robert Williams

A survey of literature's role in anticipating and constructing potential futures since 1887. Early Anglo-American and European futurism during the years leading up to World War I; futures of speculative fiction during the Cold War; futuristic dreams of contemporary cyberpunk. What literature can reveal about the human need to understand both what is coming and how to respond to it. WR, HU

* **ENGL 290a / LITR 261, The Canon in the Colony: Reading Literature Abroad** Staff

Exploration of the life of English literature in the colonial and postcolonial world, from the nineteenth century to the present. Close reading of literary texts, publishing statistics, school textbooks, film, and postcolonial theory. Topics include canon formation, education reform, colonial publishing, gender and education, global Shakespeare. WR, HU

* **ENGL 314a, The Irish Literary Revival** Joseph Cleary

A broad overview of Irish culture and literature between roughly 1890 and the end of World War II. The efforts of Irish writers to end Ireland's long-standing cultural subordination to England and to create a distinctive and distinguished Irish national literature. Discussion of recent postcolonial, Marxist, and world literature critical approaches to the period. Authors include Oscar Wilde, W. B. Yeats, James Joyce, Elizabeth Bowen, and Samuel Beckett. HU

* **ENGL 334b, Postcolonial World Literatures, 1945 to the Present** Stephanie Newell
Introduction to key debates about postwar world literatures in English, to the politics of English as a language of postcolonial literature, and to debates about globalization and culture. Themes include colonial history, postcolonial migration, translation, national identity, cosmopolitanism, and global literary prizes. WR, HU

* **ENGL 346a / HUMS 253a / RLST 233a, Poetry and Faith** Christian Wiman
Issues of faith examined through poetry, with a focus on modern Christian poems from 1850 to the present. Some attention to poems from other faith traditions, as well as to secular and antireligious poetry. HU

* **ENGL 357a / LITR 426a / WGSS 340a, Feminist and Queer Theory** Jill Richards
Historical survey of feminist and queer theory from the Enlightenment to the present, with readings from key British, French, and American works. Focus on the foundations and development of contemporary theory. Shared intellectual origins and concepts, as well as divergences and conflicts, among different ways of approaching gender and sexuality. WR, HU

* **ENGL 358b, Literature for Young People** Michele Stepto
An eclectic approach to stories and storytelling for and by children. Authors include Nathaniel Hawthorne, Louisa May Alcott, Carlo Collodi, Jean de Brunhoff, Ursula LeGuin, J. K. Rowling, Dr. Seuss, Maurice Sendak, Philip Pullman, and Neil Gaiman.
WR, HU RP

* **ENGL 359b / WGSS 352b, Feminist and Queer Literary Methods** Margaret Homans
This course explores feminist and queer literary criticism and theory, the use of feminist and queer literary methods across disciplines, and the uses of literary evidence in gender and sexuality studies. Rather than covering a particular period or genre of literature, the course uses a selection of primary texts in English from Shakespeare to the present, from multiple literary genres (fiction, poetry, drama, memoir, creative nonfiction), and from popular culture and non-literary sources as well as canonical texts. Most of the reading, however, will be in literary criticism and theory and in scholarly writing that makes use of literary methods. Topics include the power of narrative and of representation to create norms; the intersectional gender politics of language, including issues of access, code-switching, and appropriation; the uses of narrative as a scholarly tool and of narrative methods across disciplines; historicisms and presentisms; and art as activism. Students learn to do research in literary criticism and theory, and practice thinking broadly about the cultural work that literature does and about the uses of literary methods and practices in other fields. WR, HU

* **ENGL 361a / THST 329a, Theater Now** Marc Robinson
Study of the drama, performance, and dance theater created in the last ten years, with special attention to work produced in 2017–2018. Readings from both published and unpublished American and British plays, contemporary criticism and theory, interviews, and essays by the artists themselves. Video of works created by companies such as Elevator Repair Service and the Nature Theater of Oklahoma. May include attendance of productions at performance spaces in and around New York City. HU

* **ENGL 385a / WGSS 339a, Fiction and Sexual Politics** Margaret Homans
Historical survey of works of fiction that have shaped and responded to feminist, queer, and transgender thought from the late eighteenth century to the present. Authors

include Wollstonecraft, C. Bronte, H. Jacobs, C. P. Gilman, R. Hall, Woolf, Wittig, Walker, Anzaldua, Morrison, Kingston, Winterson, and Bechdel. WR, HU

* **ENGL 395a / LITR 154a, The Bible as a Literature** Leslie Brisman

Study of the Bible as a literature—a collection of works exhibiting a variety of attitudes toward the conflicting claims of tradition and originality, historicity and literariness. Pre-1800 with completion of supplementary assignments in the language of the King James Bible. If there is sufficient interest, a second section will be offered. WR, HU RP

* **ENGL 405b / AFAM 406b / AMST 405b, Autobiography in America** Robert Stepto

A study of autobiographical writings from Mary Rowlandson's Indian captivity narrative (1682) to the present. Classic forms such as immigrant, education, and cause narratives; prevailing autobiographical strategies involving place, work, and photographs. Authors include Franklin, Douglass, Jacobs, Antin, Kingston, Uchida, Balakian, Rodriguez, and Bechdel. WR, HU

* **ENGL 416a, Contemporary British Fiction** Caryl Phillips

A study of literature that responds to a changing post-World War II Britain, with attention to the problem of who "belongs" and who is an "outsider." Authors include Alan Hollinghurst, Kazuo Ishiguro, Colin McInnes, Samuel Selvon, Ruth Praver Jhabvala, and John Osborne. WR, HU RP

* **ENGL 426a / LITR 412a, Modernism, Empire, World Crisis** Joseph Cleary

Drawing on recent scholarship on modernist studies, postcolonial studies, and literary world-systems, this seminar explores how some leading Anglophone writers produced bold new works that engaged with conceptions of European civilizational crisis, the transfer of political power and cultural capital from Europe to the United States, and a rapidly-changing world order. Readings include Pascale Casanova, Alexis de Tocqueville, Henry James, Ford Maddox Ford, Ezra Pound, James Joyce, D. H. Lawrence, T. S. Eliot, W. B. Yeats, Gertrude Stein, and F. Scott Fitzgerald. WR, HU

* **ENGL 430b / AMST 425b / EVST 430b, American Culture and the Rise of the Environment** Michael Warner

U.S. literature from the late eighteenth century to the Civil War explored in the context of climate change. Development of the modern concept of the environment; the formation and legacy of key ideas in environmentalism; effects of industrialization and national expansion; utopian and dystopian visions of the future. WR, HU

* **ENGL 435b, Henry James** Ruth Yeazell

Selected novels by Henry James, from *Roderick Hudson* through *The Golden Bowl*. Particular attention to the international theme and to the ways in which James's later novels revisit and transform the matter of his earlier ones. WR, HU

* **ENGL 438b / AMST 475b, Performing American Literature** Wai Chee Dimock

A broad selection of short stories, poems, and novels, accompanied by class performances, and 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; book illustration; game design; and creative use of social media. Readings include poetry by Walt Whitman and Emily Dickinson; plays by Suzan-lori Parks; and fiction by F. Scott Fitzgerald, Ray Bradbury, Walter Mosley, Jhumpa Lahiri, and Junot Diaz. WR, HU

* **ENGL 449a / AFAM 449a / AFST 449a, Challenges to Realism in Contemporary African Fiction** Stephanie Newell

Introduction to experimental African novels that challenge realist and documentary modes of representation. Topics include mythology, gender subversion, politics, the city, migration, and the self. Ways of reading African and postcolonial literature through the lenses of identity, history, and nation. WR, HU

* **ENGL 450b, Daily Themes** Mark Oppenheimer

Writing of prose at the intermediate level. Daily assignments of c. 300 words, a weekly lecture, and a weekly tutorial. Application forms available on the Web by mid-November. Application open to all undergraduates. Counts as a nonfiction course in the writing concentration. WR

* **ENGL 453a / THST 320a, Playwriting** Donald Margulies

A seminar and workshop on reading for craft and writing for the stage. In addition to weekly prompts and exercises, readings include modern American and British plays by Pinter, Mamet, Churchill, Kushner, Nottage, Williams, Hansberry, Hwang, Vogel, and Wilder. Emphasis on play structure, character, and conflict. RP

* **ENGL 455b, Writing about Oneself** Anne Fadiman

A seminar and workshop in first-person writing. Students explore a series of themes (e.g., family, love, loss, identity) both by writing about their own lives and by reading British and American memoirs, autobiographies, personal essays, and letters. An older work, usually from the nineteenth or early twentieth century, is paired each week with a more recent one on the same theme. WR

* **ENGL 456a / HUMS 427a / JDST 316a / LITR 348a, The Practice of Literary Translation** Robyn Creswell

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). HU

* **ENGL 459a / EVST 215a / MB&B 459a, Writing about Science, Medicine, and the Environment** Carl Zimmer

Advanced non-fiction workshop in which students write about science, medicine, and the environment for a broad public audience. Students read exemplary work, ranging from newspaper articles to book excerpts, to learn how to translate complex subjects into compelling prose. Admission by permission of the instructor only. Applicants should email the instructor at carl@carlzimmer.com with the following information: 1. One or two samples of nonacademic, nonfiction writing. (No fiction or scientific papers, please.) Indicate the course or publication, if any, for which you wrote each sample. 2. A note in which you briefly describe your background (including writing experience and courses) and explain why you'd like to take the course. WR RP

* **ENGL 460a or b, Advanced Poetry Writing** Staff

A seminar and workshop in the writing of verse. May be repeated for credit with a different instructor. RP

* **ENGL 465a or b, Advanced Fiction Writing** Staff

An advanced workshop in the craft of writing fiction. May be repeated for credit with a different instructor.

* **ENGL 466a, Writing the Contemporary Essay** Cynthia Zarin

A seminar and workshop in the contemporary essay. Public versus private voice, the responsibilities of the essayist, and the evolution of writing in the first person. Readings include essays by Joan Didion, Jonathan Lethem, Jenny Diski, Zadie Smith, M. F. K. Fisher, Bruce Chatwin, John Berger, and Oliver Sacks.

* **ENGL 467a or b / PLSC 253a or b, Journalism** Staff

Examination of the practices, methods, and impact of journalism, with focus on reporting and writing; consideration of how others have done it, what works, and what doesn't. Students learn how to improve story drafts, follow best practices in journalism, improve methods for obtaining, skeptically evaluating, and assessing information, as well as writing a story for others to read. The core course for Yale Journalism Scholars. No prerequisites. WR

* **ENGL 468b / THST 327b, Advanced Playwriting Workshop** Donald Margulies

An intensive workshop in advanced playwriting techniques. Discussion of works by contemporary playwrights. In addition to weekly exercises, students write a full-length play. Admission by application only. Application details and forms are available at english.yale.edu/undergraduate/applications-and-deadlines. RP

* **ENGL 469a, Advanced Nonfiction Writing** Anne Fadiman

A seminar and workshop with the theme "At Home in America." Students consider the varied ways in which modern American literary journalists write about place, and address the theme themselves in both reportorial and first-person work. No prerequisites. WR, HU

* **ENGL 474a, The Genre of the Sentence** Verlyn Klinkenborg

A workshop that explores the sentence as the basic unit of writing and the smallest unit of perception. The importance of the sentence itself versus that of form or genre. Writing as an act of discovery. Includes weekly writing assignments. Not open to freshmen. HU

* **ENGL 480a, Reporting and Crafting the Long-form Narrative** Sarah Stillman

A feature-writing workshop in the reporting and writing of memorable long-form magazine narratives. Close readings of exemplary investigative works. Emphasis on reporting strategies and storytelling tools for interviewing diverse subjects, generating suspense, crafting scenes, and reconstructing events through use of human and non-human sources.

* **ENGL 481b / THST 322b, Advanced Playwriting** Deborah Margolin

A seminar and workshop in advanced playwriting that furthers the development of an individual voice. Study of contemporary and classical plays to understand new and traditional forms. Students write two drafts of an original one-act play or adaptation for critique in workshop sessions. Familiarity with basic playwriting tools is assumed. Open to juniors and seniors, nonmajors as well as majors, on the basis of their work; priority to Theater Studies majors. Writing samples should be submitted to the instructor before the first class meeting. Prerequisite: THST 320 or 321, or a college seminar in playwriting, or equivalent experience. RP

* **ENGL 487a or b / ENGL 470, Tutorial in Writing** Staff

A writing tutorial in fiction, poetry, playwriting, screenwriting, or nonfiction for students who have already taken writing courses at the intermediate and advanced levels. Conducted with a faculty member after approval by the director

of undergraduate studies. Students must apply in the previous term; deadlines and instructions are posted at english.yale.edu/undergraduate/applications-and-deadlines. Prerequisites: two courses in writing.

*** ENGL 488a or b, Special Projects for Juniors or Seniors** Staff

Special projects set up by the student in an area of particular interest with the help of a faculty adviser and the director of undergraduate studies, intended to enable the student to cover material not otherwise offered by the department. The course may be used for research or for directed reading, but in either case a term paper or its equivalent is normally required. The student meets regularly with the faculty adviser. To apply for admission, a student must submit an application and prospectus signed by the faculty adviser to the office of the director of undergraduate studies. Students must apply in the previous term; deadlines and instructions are posted at english.yale.edu/undergraduate/applications-and-deadlines.

*** ENGL 489a or b, The Writing Concentration Senior Project** Staff

A term-long project in writing, under tutorial supervision, aimed at producing a single longer work (or a collection of related shorter works). An application and prospectus signed by the student's adviser must be submitted to the office of the director of undergraduate studies by November 16, 2018, for spring-term projects and by April 11, 2019, for fall-term projects. The project is due by the end of the last week of classes (fall term), or the end of the next-to-last week of classes (spring term). Application details and forms are available at english.yale.edu/undergraduate/applications-and-deadlines.

*** ENGL 490a or b, The Senior Essay I** Jill Richards

Students wishing to undertake an independent senior essay in English must apply through the office of the director of undergraduate studies in the previous term; deadlines and instructions are posted at english.yale.edu/undergraduate/applications-and-deadlines. For one-term senior essays, the essay itself is due in the office of the director of undergraduate studies according to the following schedule: (1) end of the fourth week of classes: five to ten pages of writing and/or an annotated bibliography; (2) end of the ninth week of classes: a rough draft of the complete essay; (3) end of the last week of classes (fall term) or end of the next-to-last week of classes (spring term): the completed essay. Consult the director of undergraduate studies regarding the schedule for submission of the yearlong senior essay.

*** ENGL 491a or b, The Senior Essay II** Jill Richards

Second term of the optional yearlong senior essay. Students may begin the yearlong essay in the spring term of the junior year, allowing for significant summer research, with permission of the instructor. Students must apply in the previous term; deadlines and instructions are posted at english.yale.edu/undergraduate/applications-and-deadlines. After ENGL 490.

OTHER COURSES RELATED TO ENGLISH LANGUAGE AND LITERATURE

*** DRST 001a and DRST 002b, Directed Studies: Literature** Staff

An examination of major literary works with an aim of understanding how a tradition develops. In the fall term, works and authors include Homer, Aeschylus, Sophocles, Virgil, the Bible, and Dante. In the spring term, authors vary somewhat from year to year and include Petrarch, Cervantes, Shakespeare, Milton, Wordsworth, Goethe, Tolstoy, Proust, and Eliot. WR, HU

* **HUMS 150a, Shakespeare and the Canon: Histories, Comedies, and Poems** Harold Bloom

A reading of Shakespeare's histories, comedies, and poems, with an emphasis on their originality in regard to tradition and their influence on Western representation since the seventeenth century. Secondary readings included. HU

* **HUMS 151b, Shakespeare and the Canon: Tragedies and Romances** Harold Bloom

A reading of Shakespeare's tragedies and romances, with an emphasis on their originality in regard to tradition: *Hamlet*, *Othello*, *King Lear*, *Macbeth*, and *Antony and Cleopatra*, *The Winter's Tale*, and *The Tempest*. HU

* **HUMS 152a, Poetic Influence from Shakespeare to Keats** Harold Bloom

The complexities of poetic influence in the traditions of the English language, from Shakespeare to Keats. HU

* **HUMS 153b, Poetic Influence from Shakespeare to Hart Crane** Harold Bloom

The complexities of poetic influence in the tradition of the English language. Works by Shakespeare, Milton, Wordsworth, Shelley, Keats, Tennyson, Robert Browning, and Yeats, followed by an American sequence of Whitman, Dickinson, Wallace Stevens, and Hart Crane. HU

THST 110a and THST 111b, Survey of Theater and Drama Elise Morrison

An introduction to theater history, plays, aesthetic theories, and performance techniques. From antiquity to the Restoration period in the fall and continuing through to the present in the spring. HU

Environment

At Yale, the environment is studied from a variety of perspectives. Majors are offered in Architecture (p. 145), Chemical Engineering (p. 182), Ecology and Evolutionary Biology (p. 261), Environmental Engineering (p. 333), Environmental Studies (p. 336), and Geology and Geophysics (p. 397). The program in Forestry & Environmental Studies (p. 384) offers courses in environmental science, policy, and management. Many other departments and programs offer courses pertinent to the study of environment, including American Studies (p. 109), Anthropology (p. 120), Chemistry (p. 187), Economics (p. 272), English (p. 313), Global Affairs (p. 417), History (p. 434), History of Art (p. 451), Political Science (p. 626), Sociology (p. 681), and Study of the City (p. 719). Some professional schools and programs offer relevant courses that may admit undergraduates, including Public Health, Forestry & Environmental Studies, the Law School, and the School of Management.

Environmental Engineering

Director of undergraduate studies: Jordan Peccia, 523 17 Hillhouse, 432-4385, jordan.peccia@yale.edu; seas.yale.edu/departments/chemical-and-environmental-engineering

Environmental engineering encompasses the scientific assessment and development of engineering solutions to environmental problems affecting land, water, and air (the biosphere). The field embraces broad environmental concerns, including the safety of drinking water, groundwater protection and remediation, wastewater treatment, indoor and outdoor air pollution, solid and hazardous waste disposal, cleanup of contaminated sites, the prevention of pollution through product and process design, and strategies for sustainable water and energy use and production.

Environmental engineers must balance competing technical, social, and legal issues concerning the use of environmental resources. Because of the complexity of these challenges, environmental engineers need a broad understanding not only of engineering disciplines but also of chemistry, biology, geology, and economics. Accordingly, the program allows students in the major to select an emphasis on environmental engineering technology, sustainability, global health, economics, or energy and climate change. The program prepares students for leadership positions in industry and government agencies or for further studies in engineering, science, business, law, and medicine.

Two degree programs are offered: the B.S. in Environmental Engineering, and the B.A. in Engineering Sciences (Environmental). The B.S. degree program in Environmental Engineering is designed for students who desire a strong background in environmental engineering leading to a career in the field. The B.A. degree program in Engineering Sciences (Environmental) is intended for students whose careers will involve, but not be dominated by, the skills of environmental engineering. The B.A. program is appropriate for those contemplating a career in which scientific and technological problems can play an important role, as is often the case in law, business, medicine, or public service.

PREREQUISITES

B.A. degree program in Engineering Sciences (Environmental) The B.A. degree program requires MATH 112 and 115; a two-term lecture sequence in chemistry; and PHYS 170, 171.

B.S. degree program in Environmental Engineering The B.S. degree program has the following prerequisites in mathematics and basic sciences: MATH 112, 115; MATH 120 or ENAS 151; ENAS 194; a two-term lecture sequence in chemistry, with corresponding labs; PHYS 180, 181; and BIOL 101 and 102 or 103 and 104.

REQUIREMENTS OF THE MAJOR

B.A. degree program The B.A. degree program requires nine term courses beyond the prerequisites, including the senior requirement. Students take ENVE 120, 360, and either 373 or 377. Five electives must be chosen in consultation with the DUS.

B.S. degree program The B.S. degree program requires at least twelve term courses beyond the prerequisites, including the senior requirement. Students take CENG 300

or MENG 211, ENVE 120, 360, 373, 377, and either 315 or 448, EVST 344, and MENG 361 or F&ES 714. At least three electives must be chosen in consultation with the DUS, preferably within one of the following tracks: environmental engineering technology, sustainability, global health, economics, or energy and climate change.

Credit/D/Fail No course taken Credit/D/Fail may count toward the major, including prerequisites.

SENIOR REQUIREMENT

B.A. degree program Students in the B.A. program must pass ENVE 416 or ENVE 490 in their senior year.

B.S. degree program Students in the B.S. program must pass ENVE 416 or ENVE 490 in their senior year.

REQUIREMENTS OF THE MAJOR

ENGINEERING SCIENCES (ENVIRONMENTAL), B.A.

Prerequisites MATH 112, 115; two-term lecture sequence in chemistry; PHYS 170, 171

Number of courses 9 term courses beyond prereqs (incl senior req)

Specific courses required ENVE 120, 360; ENVE 373 or 377

Distribution of courses 5 electives approved by DUS

Senior requirement ENVE 416 or ENVE 490

ENVIRONMENTAL ENGINEERING, B.S.

Prerequisites MATH 112, 115; MATH 120 or ENAS 151; ENAS 194; two-term lecture sequence in chemistry, with labs; PHYS 180, 181; BIOL 101 and 102 or 103 and 104

Number of courses 12 term courses beyond prereqs (incl senior req)

Specific courses required CENG 300 or MENG 211; ENVE 120, 360, 373, 377; ENVE 315 or 448; EVST 344; MENG 361 or F&ES 714

Distribution of courses 3 electives as specified

Senior requirement ENVE 416 or ENVE 490

FACULTY ASSOCIATED WITH THE PROGRAM IN ENVIRONMENTAL ENGINEERING

Professors Paul Anastas (*Forestry & Environmental Studies*), Michelle Bell (*Forestry & Environmental Studies*), Ruth Blake (*Geology & Geophysics*), Menachem Elimelech (*Chemical & Environmental Engineering*), Edgar Hertwich (*Forestry & Environmental Studies*), Edward Kaplan (*School of Management*), Jaehong Kim (*Chemical & Environmental Engineering*), Jordan Peccia (*Chemical & Environmental Engineering*), Lisa Pfefferle (*Chemical & Environmental Engineering*), Julie Zimmerman (*Chemical & Environmental Engineering*)

Assistant Professor Drew Gentner (*Chemical & Environmental Engineering*)

Courses

ENVE 315b / CENG 315b, Transport Phenomena Amir Haji Akbari Balou
Unified treatment of momentum, energy, and chemical species transport including conservation laws, flux relations, and boundary conditions. Topics include convective and diffusive transport, transport with homogeneous and heterogeneous chemical reactions and/or phase change, and interfacial transport phenomena. Emphasis on problem analysis and mathematical modeling, including problem formulation, scaling

arguments, analytical methods, approximation techniques, and numerical solutions.

Prerequisite: ENAS 194 or permission of instructor. QR, SC RP

ENVE 373a / CENG 373a, Air Pollution Control Drew Gentner

An overview of air quality problems worldwide with a focus on emissions, chemistry, transport, and other processes that govern dynamic behavior in the atmosphere. Quantitative assessment of the determining factors of air pollution (e.g., transportation and other combustion-related sources, chemical transformations), climate change, photochemical “smog,” pollutant measurement techniques, and air quality management strategies. Prerequisite: ENVE 120. QR, SC RP

*** ENVE 377a / CENG 377a, Water Quality Control** Jaehong Kim

Study of the preparation of water for domestic and other uses and treatment of wastewater for recycling or discharge to the environment. Topics include processes for removal of organics and inorganics, regulation of dissolved oxygen, and techniques such as ion exchange, electro dialysis, reverse osmosis, activated carbon adsorption, and biological methods. Prerequisite: ENVE 120 or permission of instructor. SC RP

ENVE 416b / CENG 416b, Chemical Engineering Process Design Eric Altman

Study of the techniques for and the design of chemical processes and plants, applying the principles of chemical engineering and economics. Emphasis on flowsheet development and equipment selection, cost estimation and economic analysis, design strategy and optimization, safety and hazards analysis, and environmental and ethical considerations. Enrollment limited to seniors majoring in Chemical Engineering or Environmental Engineering. QR, SC RP

ENVE 441a, Biological Processes in Environmental Engineering Jordan Peccia

Fundamental aspects of microbiology and biochemistry, including stoichiometry, kinetics, and energetics of biochemical reactions, microbial growth, and microbial ecology, as they pertain to biological processes for the transformation of environmental contaminants; principles for analysis and design of aerobic and anaerobic processes, including suspended- and attached-growth systems, for treatment of conventional and hazardous pollutants in municipal and industrial wastewaters and in groundwater. Prerequisites: CHEM 161, 165, or 163, 167 (or CHEM 112, 113, or 114, 115, or 118); MCDB 290 or equivalent; or with permission of instructor. SC

ENVE 448a, 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. Prerequisite: ENVE 120 or permission of instructor. QR, SC

[ENVE 473, Air Quality and Energy]

*** ENVE 490a, Senior Project** Jordan Peccia

Individual research and design projects supervised by a faculty member in Environmental Engineering, or in a related field with permission of the director of undergraduate studies.

Environmental Studies

Director of undergraduate studies: TBD; www.yale.edu/evst

Environmental Studies offers the opportunity to examine human relations with their environments from diverse perspectives. The major encourages interdisciplinary study in a) social sciences, including anthropology, political science, law, economics, and ethics; b) humanities, to include history, literature, religion, and the arts; and c) natural sciences, such as biology, ecology, human health, geology, and chemistry. Students work with faculty advisers and the DUS to concentrate on some of the most pressing environmental and sustainability issues of our time: climate change, food and agriculture, urbanism, conservation, sustainable natural resource management, justice, markets, and governance.

Students may pursue either a B.A. or a B.S. degree within Environmental Studies. The B.A. program is intended for students who wish to concentrate in the social sciences and humanities. The B.S. program encourages students to focus in the natural sciences, especially fields such as environmental health and medicine, ecology, and climate science. Both degree programs culminate in a senior essay project that is commonly preceded by independent summer research.

The major for the Class of 2020 and previous classes With DUS approval, the following changes to the prerequisite and core major requirements of the B.A. degree program may be fulfilled by students who declared their major under previous requirements. There are no changes to the B.S. degree program.

The major for the Class of 2021 and subsequent classes The B.A. degree program does not require any specific prerequisites; there are two new core course major requirements as outlined below. There are no changes to the B.S. degree program.

PREREQUISITES

The B.A. degree program has no prerequisites.

The B.S. degree program requires a natural science laboratory or field course focusing on research and analytic methods chosen from EVST 202L, 221, 234L, 244, 290, 362, or G&G 126L; and a term course in mathematics, physics, or statistics selected from MATH 112 and above (excluding MATH 190), or PHYS 170 and above, or S&DS 101 and above; two-term lecture series in chemistry (or CHEM 170 or CHEM 167), and two terms of biology from BIOL 101-104, or G&G 125, or MCDB 123.

Students are advised to take chemistry and biology during the first year before enrolling in the EVST core courses in natural sciences. It is recommended that students complete the prerequisites by the end of their sophomore year, although this is not required.

REQUIREMENTS OF THE MAJOR

B.A. degree program The B.A. degree requires at least thirteen course credits, consisting of the core requirements, the concentration, and the senior requirement.

B.S. degree program In addition to the prerequisites, the B.S. degree requires at least twelve course credits, consisting of the core requirements, the concentration, and the two-term senior requirement.

B.A. core courses One course in statistics or mathematics, selected from S&DS 101 or above, or MATH 112 or above; two core courses in the humanities selected from EVST 120, 226, 255, 340, or 345; and three natural science core courses. Students may choose natural science courses, all of which have the science (Sc) designation, from EVST 191, 200, 223, 242; E&EB 115 or 145; G&G 120 or 140; G&G 125 or MCDB 123; CHEM 161 or 165; EVST 202L, 221, 234L, 244, 290, 362, or G&G 126L; or CDE 508. Completing one course in each area is recommended before the end of the sophomore year.

B.S. core courses Two core courses in the humanities and social sciences selected from EVST 120, 226, 255, 340, or 345; and two natural science core courses from EVST 200, 223, 242, or G&G 140. Completing one course in each area is recommended before the end of the sophomore year.

Areas of concentration Students plan their concentration in consultation with the director of undergraduate studies and the student's adviser. A concentration is defined as six courses that provide analytical depth in a particular environmental problem or issue of interest, as well as disciplinary expertise. One of these six courses must be an advanced seminar (200 level or higher) that exposes students to primary literature, extensive writing requirements, and experience with research methods. For the B.S. degree, three of the six courses must have the science (Sc) designation, and two must provide interdisciplinary context to the concentration. Past concentrations include biodiversity and conservation; climate change and energy; environmental history; environmental policy; food and agriculture; human health and environment; and urban environments. Students also have the opportunity to design a unique concentration within the major, in consultation with the DUS.

Credit/D/Fail No course taken Credit/D/Fail may be counted toward the major, including prerequisites.

Roadmap See visual roadmap of the requirements.

SENIOR REQUIREMENT

In the junior year, all students consult with their advisers on the design of their project and submit a preliminary plan to the DUS for approval.

B.A. degree program For the B.A. degree, students most often complete two terms of EVST 496, a colloquium in which they write their senior essay. One-term senior projects require the permission of the DUS, and are generally undertaken only in conjunction with a double major. Only those students who complete a two-term essay are eligible for Distinction in the Major.

B.S. degree program For the B.S. degree, students complete two terms of EVST 496.

ADVISING AND APPLICATION TO THE MAJOR

Students typically apply to enter the major during their sophomore year. Applications are accepted throughout the year, and must be made in writing to the DUS; details can be found on the program's website. Juniors who have already completed considerable

course work toward the major may also apply. Students considering a major in Environmental Studies should consult the DUS as early as possible in the first year.

Summer Environmental Fellowship During the summer, many students gain experience in the field through research or internships in an area pertinent to their academic development or their senior essay project. Internships may be arranged with nonprofit organizations, government agencies, or corporations. Although the summer program is optional, many students take advantage of this opportunity with some financial support from the program.

REQUIREMENTS OF THE MAJOR

Prerequisites *B.A.* — no prerequisites; *B.S.* — one course from EVST 202L, 221, 234L, 244, 290, 362, or G&G 126L; MATH 112 or above (excluding MATH 190), or PHYS 170 or above, or S&DS 101 or above; two-term lecture sequence in chem, or CHEM 170 or 167; two terms from BIOL 101 and 102, or 103 and 104, or G&G 125, or MCDB 123

Number of courses *B.A.* — at least 13 course credits, incl senior project; *B.S.* — at least 12 course credits, beyond prereqs and incl senior project

Specific courses required *B.A.* — 6 core courses, as specified; *B.S.* — 2 core courses in humanities and social sciences and 2 core courses in natural sciences, as specified

Distribution of courses *B.A.* — 6 courses in area of concentration, including 1 advanced sem as specified; *B.S.* — 6 courses in area of concentration, 3 of which must have Sc designation, and 1 advanced sem as specified

Senior requirement *B.A.* — one- or two-term research project and colloq (EVST 496); *B.S.* — two-term research project and colloq (EVST 496)

FACULTY ASSOCIATED WITH THE PROGRAM OF ENVIRONMENTAL STUDIES

Professors Gaboury Benoit (*Forestry & Environmental Studies*), Graeme Berlyn (*Forestry & Environmental Studies*), Ruth Blake (*Geology & Geophysics*), Mark Bradford (*Forestry & Environmental Studies*), Derek Briggs (*Geology & Geophysics*), Gary Brudvig (*Chemistry, Molecular Biophysics & Biochemistry*), Benjamin Cashore (*Forestry & Environmental Studies*), Deborah Coen (*History*), Michael Donoghue (*Ecology & Evolutionary Biology, Forestry & Environmental Studies*), Michael Dove (*Forestry & Environmental Studies, Anthropology*), Menachem Elimelech (*Chemical & Environmental Engineering*), Thomas Graedel (*Forestry & Environmental Studies*), Benedict Kiernan (*History*), Robert Mendelsohn (*Forestry & Environmental Studies, Economics*), Alan Mikhail (*History*), Jeffrey Park (*Geology & Geophysics*), Peter Perdue (*History*), David Post (*Ecology & Evolutionary Biology*), Jeffrey Powell (*Ecology & Evolutionary Biology, Forestry & Environmental Studies*), Peter Raymond (*Forestry & Environmental Studies*), Paul Sabin (*History*), James Saiers (*Forestry & Environmental Studies*), Oswald Schmitz (*Forestry & Environmental Studies, Ecology & Evolutionary Biology*), James Scott (*Political Science, Anthropology*), Karen Seto (*Forestry & Environmental Studies*), Kalyanakrishnan Sivaramakrishnan (*Anthropology, Forestry & Environmental Studies*), David Skelly (*Forestry & Environmental Studies, Ecology & Evolutionary Biology*), Brian Skinner (*Geology & Geophysics*), Ronald Smith (*Geology & Geophysics, Forestry & Environmental Studies*), Stephen Stearns (*Ecology & Evolutionary Biology*), Charles Tomlin (*Forestry & Environmental Studies (Visiting)*), John Wargo (*Forestry & Environmental Studies, Political Science*), Harvey Weiss (*Near Eastern Languages & Civilizations, Anthropology*),

John Wettlaufer (*Geology & Geophysics*), Robert Wyman (*Molecular, Cellular, & Developmental Biology*)

Associate Professors Laura Barraclough (*American Studies*), David Vasseur (*Ecology & Evolutionary Biology*), Julie Zimmerman (*Chemical & Environmental Engineering*)

Assistant Professors Anjelica Gonzalez (*Biomedical Engineering*), William Rankin (*History, History of Science*)

Senior Lecturers Shimon Anisfeld, Carol Carpenter, Amity Doolittle, John Grim, Fred Strebeigh

Lecturers Ian Cheney, Mary Beth Decker, Kealoha Freidenburg, Gordon Geballe, Paul Lussier, Linda Puth, Catherine Skinner

Introductory Courses

* **EVST 007a, The New England Forest** Marlyse Duguid

Exploration of the natural history of southern New England, with specific focus on areas in and around New Haven. Pertinent environmental issues, such as climate change, endangered species, and the role of glacial and human history in shaping vegetative patterns and processes, are approached from a multi-disciplinary framework and within the context of the surrounding landscape. Enrollment limited to freshmen. Preregistration required; see under Freshman Seminar Program.

* **EVST 010a / G&G 010a, Earth, Resources, Energy, and the Environment** Mary-Louise Timmermans

Humankind's interactions with, and place within, the natural world. Plate tectonics and natural disasters, biological evolution and mass extinction, human evolution, population growth and ecology, industrial resources, groundwater and pollution, fossil fuels and energy transitions, the carbon cycle and greenhouse gases, paleoclimates, current global warming, alternative energies, and a planetary perspective on the Earth as a singular oasis in space. Enrollment limited to freshmen. Preregistration required; see under Freshman Seminar Program. SC

* **EVST 020a / F&ES 020a, Sustainable Development in Haiti** Gordon Geballe

The principles and practice of sustainable development explored in the context of Haiti's rich history and culture, as well as its current environmental and economic impoverishment. Enrollment limited to first-year students. Preregistration required; see under First-Year Seminar Program. WR

* **EVST 100b / APHY 100b / ENAS 100b / G&G 105b / PHYS 100b, Energy**

Technology and Society Daniel Prober, Michael Oristaglio, and Julie Paquette
The technology and use of energy. Impacts on the environment, climate, security, and economy. Application of scientific reasoning and quantitative analysis. Intended for non-science majors with strong backgrounds in math and science. Enrollment limited to 24. For application instructions, visit the course site on Classes*v2. QR, SC

Core Courses

HUMANITIES AND SOCIAL SCIENCES

EVST 226a / ARCG 226a / NELC 268a, Global Environmental History Harvey Weiss
The dynamic relationship between environmental and social forces from the Pleistocene glaciations to the Anthropocene present. Pleistocene extinctions; transition from hunting and gathering to agriculture; origins of cities, states, and civilization; adaptations and collapses of Old and New World civilizations in the face of climate disasters; the destruction and reconstruction of the New World by the Old. Focus on issues of adaptation, resilience, and sustainability, including forces that caused long-term societal change. SO

EVST 255b / F&ES 255b / PLSC 215b, Environmental Politics and Law John Wargo
Exploration of the politics, policy, and law associated with attempts to manage environmental quality and natural resources. Themes of democracy, liberty, power, property, equality, causation, and risk. Case histories include air quality, water quality and quantity, pesticides and toxic substances, land use, agriculture and food, parks and protected areas, and energy. SO

EVST 340b / ECON 330b, Economics of Natural Resources Robert Mendelsohn
Microeconomic theory brought to bear on current issues in natural resource policy. Topics include regulation of pollution, hazardous waste management, depletion of the world's forests and fisheries, wilderness and wildlife preservation, and energy planning. After introductory microeconomics. QR, SO

ENVIRONMENTAL SCIENCE

EVST 223a / E&EB 220a, General Ecology David Vasseur
The theory and practice of ecology, including the ecology of individuals, population dynamics and regulation, community structure, ecosystem function, and ecological interactions at broad spatial and temporal scales. Topics such as climate change, fisheries management, and infectious diseases are placed in an ecological context. Prerequisite: MATH 112 or equivalent. SC

Intermediate and Advanced Courses

The following courses have been approved for developing areas of concentration. Other courses may be suitable for designing an area of concentration with permission of the director of undergraduate studies.

EVST 125a / G&G 120a, Earth's Changing Climate Jeffrey Park
The science of contemporary climate change or "global warming." Historical and contemporary methods used by scientists to draw conclusions concerning Earth's complex climate system and human influences on it, and to predict future climates. Risk assessment, response options. SC

EVST 182a / ANTH 300a / E&EB 300a, Primate Behavior and Ecology Eduardo Fernandez-Duque
Socioecology of primates compared with that of other mammals, emphasizing both general principles and unique primate characteristics. Topics include life-history strategies, feeding ecology, mating systems, and ecological influences on social organization. SC, SO

EVST 191a or b, Trees: Environmental Biology and Global Significance Craig Brodersen

Underlying principles that govern tree biology in both time and space. The biophysics of energy balance, water transport, and gas exchange, from individual plant organs to the tree and forest canopy; principles of cells and membranes; the fundamental differences between plant and animal cells; regional and global patterns in forest dynamics; implications of disruptions in the biotic and abiotic environment. Case studies focus on understanding forests and forest products and their global significance. SC

* **EVST 200b / G&G 115b, Earth System Science** Jeffrey Park

A survey of geoscience. Interaction of lithosphere, hydrosphere, atmosphere, and Earth's deep interior; natural controls on environment and climate in past, present, and future; rocks, minerals, glaciers, earthquakes, and volcanoes; natural hazards and natural resources. (Formerly G&G 200) SC

* **EVST 212a / EP&E 390a / PLSC 212a, Democracy and Sustainability** Michael Fotos

Democracy, liberty, and the sustainable use of natural resources. Concepts include institutional analysis, democratic consent, property rights, market failure, and common pool resources. Topics of policy substance are related to human use of the environment and to U.S. and global political institutions. WR, SO

* **EVST 215a / ENGL 459a / MB&B 459a, Writing about Science, Medicine, and the Environment** Carl Zimmer

Advanced non-fiction workshop in which students write about science, medicine, and the environment for a broad public audience. Students read exemplary work, ranging from newspaper articles to book excerpts, to learn how to translate complex subjects into compelling prose. Admission by permission of the instructor only. Applicants should email the instructor at carl@carlzimmer.com with the following information: 1. One or two samples of nonacademic, nonfiction writing. (No fiction or scientific papers, please.) Indicate the course or publication, if any, for which you wrote each sample. 2. A note in which you briefly describe your background (including writing experience and courses) and explain why you'd like to take the course. WR RP

* **EVST 221a / E&EB 230a / F&ES 221a, Field Ecology** Linda Puth

A field-based introduction to ecological research, using experimental and descriptive approaches, comparative analysis, and modeling for field and small-group projects. Weekly field trips explore local lake, salt marsh, rocky intertidal, traprock ridge, and upland forest ecosystems. Includes one Saturday field trip and a three-day trip during the October recess. Concurrently with or after E&EB 220 or with permission of instructor. SC

* **EVST 224a / ENGL 241a, Writing About The Environment** Alan Burdick

Exploration of ways in which the environment and the natural world can be channeled for literary expression. Reading and discussion of essays, reportage, and book-length works, by scientists and non-scientists alike. Students learn how to create narrative tension while also conveying complex – sometimes highly technical – information; the role of the first person in this type of writing; and where the human environment ends and the non-human one begins. WR

* **EVST 231a, Temperate Woody Plant Taxonomy and Dendrology** Marlyse Duguid
 Identification of the major temperate plant families, with a focus on North American forest species; integration of morphology, phenology, ecology, biogeography, and the natural history of tree species. Course work includes field identification of woody plants, and phylogenetic systematics as the structure for understanding the evolutionary history and relationships between species. SC

* **EVST 234La, Field Science: Environment and Sustainability** L. Kealoha Freidenburg

A field course that explores the effects of human influences on the environment. Analysis of pattern and process in forested ecosystems; introduction to the principles of agroecology, including visits to local farms; evaluation of sustainability within an urban environment. Weekly field trips and one weekend field trip. SC

* **EVST 237b / ENGL 237b, Animals in Literature and Theory** Jonathan Kramnick
 Consideration of the role animals play in our aesthetic, ethical, political, and scientific worlds through reading of fiction, poetry, philosophy, and critical theory. Topics include: animal sentience and experience; vegetarianism; animal fables; pet keeping; animals alongside disability, race, and gender; and the representation of animal life in the visual arts. WR, HU

* **EVST 244a, Coastal Environments in a Changing World** Mary Beth Decker
 The effects of human action and natural phenomena on coastal marine ecosystems. Methods used by coastal scientists to address environmental issues; challenges associated with managing and conserving coastal environments. Priority to Environmental Studies majors; open to nonmajors as space permits. SC

* **EVST 247b / EP&E 497b / PLSC 219b, Politics of the Environment** Peter Swenson
 Historical and contemporary politics aimed at regulating human behavior to limit damage to the environment. Goals, strategies, successes, and failures of movements, organizations, corporations, scientists, and politicians in conflicts over environmental policy. Focus on politics in the U.S., including the role of public opinion; attention to international regulatory efforts, especially with regard to climate change. SO

EVST 255b / F&ES 255b / PLSC 215b, Environmental Politics and Law John Wargo
 Exploration of the politics, policy, and law associated with attempts to manage environmental quality and natural resources. Themes of democracy, liberty, power, property, equality, causation, and risk. Case histories include air quality, water quality and quantity, pesticides and toxic substances, land use, agriculture and food, parks and protected areas, and energy. SO

* **EVST 264a, Environmental Influences on Human, Community, and Global Health**
 Staff

An introduction to the concepts, principles, tools, and applications of environmental health. Study of the intersections and relationships between environmental sources, hazardous agents, and public health, including the physical, chemical, and biological agents in air, water, soil, food, and other environmental media, as well as social factors, that may adversely affect human health.

EVST 273b, Ecology and the Future of Life on Earth Oswald Schmitz
 Study of sustainability in a new epoch of human domination of Earth, known as the Anthropocene. Students will learn to think critically and construct arguments about the ecological and evolutionary interrelationship between humans and nature and gain

insight on how to combine ethical reasoning with scientific principles, to ensure that species and ecosystems will thrive and persist. SC

* **EVST 285b / F&ES 285b, Political Ecology of Tropical Forest Conservation** Amity Doolittle

Study of the relationship between society and the environment focusing on tropical forest conservation. Global processes of environmental conservation, development, and conflicts over natural resource use and control; approaches to conserving trees and forest cover using strategies that support biodiversity and rural agricultural livelihoods; specific focus on tropical forest landscapes dominated by agriculture and cattle ranching practices using Panama and Columbia as a case studies None SO

* **EVST 290b / F&ES 290b, Geographic Information Systems** Charles Tomlin
A practical introduction to the nature and use of geographic information systems (GIS) in environmental science and management. Applied techniques for the acquisition, creation, storage, management, visualization, animation, transformation, analysis, and synthesis of cartographic data in digital form.

EVST 292a / GLBL 217a / PLSC 149a, Sustainability in the Twenty-First Century
Daniel Esty

Sustainability as a guiding concept for addressing twenty-first century tensions between economic, environmental, and social progress. Using a cross-disciplinary set of materials from the “sustainability canon,” students explore the interlocking challenges of providing abundant energy, reducing pollution, addressing climate change, conserving natural resources, and mitigating the other impacts of economic development. SO

EVST 318b / AMST 236b / HIST 199b / HSHM 207b, American Energy History Paul Sabin

The history of energy in the United States from early hydropower and coal to present-day hydraulic fracturing, deepwater oil, wind, and solar. Topics include energy transitions and technological change; energy and democracy; environmental justice and public health; corporate power and monopoly control; electricity and popular culture; labor struggles; the global quest for oil; changing national energy policies; the climate crisis. HU

* **EVST 324a / ANTH 322a / SAST 306a, Environmental Justice in South Asia**
Kalyanakrishnan Sivaramakrishnan

Study of South Asia's nation building and economic development in the aftermath of war and decolonization in the 20th century. How it generated unprecedented stress on natural environments; increased social disparity; and exposure of the poor and minorities to environmental risks and loss of homes, livelihoods, and cultural resources. Discussion of the rise of environmental justice movements and policies in the region as the world comes to grips with living in the Anthropocene. SO

* **EVST 344a / F&ES 344a, Aquatic Chemistry** Gaboury Benoit

A detailed examination of the principles governing chemical reactions in water. Emphasis on developing the ability to predict the aqueous chemistry of natural, engineered, and perturbed systems based on a knowledge of their biogeochemical setting. Calculation of quantitative solutions to chemical equilibria. Focus on inorganic chemistry. Topics include elementary thermodynamics, acid-base equilibria, alkalinity,

speciation, solubility, mineral stability, redox chemistry, and surface complexation reactions. SC

EVST 347b, Biogeochemistry and Pollution Gaboury Benoit

Introduction to biogeochemistry and to the nature and behavior of environmental pollutants, including chemical, biological, and physical processes. The fundamental classes of chemical reactions in the environment; critical analysis of chemical data; sampling techniques; analytical methods; natural biogeochemical controls on environmental chemistry. Case studies examine contaminants of special interest such as acid precipitation, nutrients, and sewage.

* **EVST 348b, Yellowstone and Global Change** Susan Clark

Introduction to sustainability issues in natural resource management and policy, using the Greater Yellowstone ecosystem as a case study. Topics include large carnivores, wildlife conservation, parks, energy, and transportation. Priority to Environmental Studies majors.

* **EVST 352b / AMST 304b, Food and Documentary** Ian Cheney

Survey of contemporary public debates and current scientific thinking about how America farms and eats explored through the medium of documentary film. Includes a brief history of early food and agrarian documentaries, with a focus on twenty-first century films that consider sustainable food. HU

* **EVST 362b / ARCG 362b / G&G 362b, 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. Prerequisites: college-level physics or chemistry, two courses in geology and natural science of the environment or equivalents, and computer literacy. QR, SC

* **EVST 368b / HIST 491Jb / HSHM 479b / RLST 368b, The History of the Earth from Noah to Darwin** Ivano Dal Prete

Young earth creationism and flood geology have long been among the most divisive features of American culture and politics. Yet a basic postulate is shared across the spectrum: for better or worse, the old age of the Earth is regarded as the recent product of a secular science, consistently rejected by traditional Christianity. This seminar challenges this long-established narrative, by uncovering the surprising boldness, complexity, and societal diffusion of pre-modern debates on the history of the Earth, and of humankind itself. Students have opportunity to explore the nature, assumptions, and methods of Earth sciences before the advent of modern geology, to question ingrained assumptions about their relation to religion and society, and to place outstanding issues into historical perspective. How have the great monotheistic religions dealt with the possibility of an ancient Earth? Was a young creation always important in traditional Christianity? If not, what led to the emergence of young Earth creationism as a force to be reckoned with? What are the intellectual roots of American preadamism, which claims that the black and white races were created at different times and do not descend from the same ancestor? These and other questions are addressed not only through scholarly literature in the field, but also with the analysis of literary, visual, and material sources available on campus. WR, HU

* **EVST 399a / ANTH 478a / ARCG 399a / NELC 399a, 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. SO

* **EVST 400b / E&EB 275b, Biological Oceanography** Mary Beth Decker

Exploration of a range of coastal and pelagic ecosystems. Relationships between biological systems and the physical processes that control the movements of water and productivity of marine systems. Anthropogenic impacts on oceans, such as the effects of fishing and climate change. Includes three Friday field trips. Enrollment limited to 15. SC

* **EVST 415b / BENG 405b, Biotechnology and the Developing World** Anjelica Gonzalez

Study of technological advances that have global health applications. Ways in which biotechnology has enhanced quality of life in the developing world. The challenges of implementing relevant technologies in resource-limited environments, including technical, practical, social, and ethical aspects. Prerequisite: MCDB 120, or BIOL 101 and 102.

* **EVST 422a / ANTH 409a / ER&M 394a / F&ES 422a, Climate and Society from Past to Present** Michael Dove

Discussion of the major traditions of thought – both historic and contemporary – regarding climate, climate change, and society; focusing on the politics of knowledge and belief vs disbelief; and drawing on the social sciences and anthropology in particular. SO

* **EVST 424a / ANTH 406a / PLSC 420a, Rivers: Nature and Politics** James Scott

The natural history of rivers and river systems and the politics surrounding the efforts of states to manage and engineer them. SO

* **EVST 430b / AMST 425b / ENGL 430b, American Culture and the Rise of the Environment** Michael Warner

U.S. literature from the late eighteenth century to the Civil War explored in the context of climate change. Development of the modern concept of the environment; the formation and legacy of key ideas in environmentalism; effects of industrialization and national expansion; utopian and dystopian visions of the future. WR, HU

* **EVST 454b / PLSC 454b, Data Science for Politics and Policy** Fredrik Sävje

Data plays an increasingly important role in policy making and politics. The ability to draw valid conclusions from quantitative information can tilt elections or be the difference between a successful or failed policy. This course teaches how to use tools from statistics, data science, and machine learning to solve problems and challenges faced in policy making and politics. Students learn how data can help people make campaign decisions, detect election fraud, predict election outcomes, and investigate if a policy had the intended effect. Students receive an introduction to statistical programming in R, supervised and unsupervised machine learning, and causal inference. QR, SO

* **EVST 463a and EVST 464b / AMST 463a and AMST 464b / FILM 455a and FILM 456b, Documentary Film Workshop** Charles Musser

A yearlong workshop designed primarily for majors in Film and Media Studies or American Studies who are making documentaries as senior projects. Seniors in other majors admitted as space permits. RP

* **EVST 473b / ANTH 473b / ARCG 473b / NELC 473b, Abrupt Climate Change and Societal Collapse** Harvey Weiss

The coincidence of societal collapses throughout history with decadal and century-scale drought events. Challenges to anthropological and historical paradigms of cultural adaptation and resilience. Examination of archaeological and historical records and high-resolution sets of paleoclimate proxies. HU, SO

Senior Project

* **EVST 496a or b, Senior Research Project and Colloquium** John Wargo and Jeffrey Park

Independent research under the supervision of members of the faculty, resulting in a senior essay. Students meet with peers and faculty members regularly throughout the fall term to discuss the progress of their research. Projects should offer substantial opportunity for interdisciplinary work on environmental problems. Students typically complete a two-term senior essay, but students completing the requirements of two majors may consider a one-term senior project.

Ethics, Politics, and Economics

Director of undergraduate studies: Peter Swenson, 115 Prospect St., 432-5677, peter.swenson@yale.edu; (oliver.azura@yale.edu) epe.yale.edu

In an era of global interdependence and rapid technological change, we need to think practically about the institutional dynamics of power and governance. We have to understand the technical complexities of economic and statistical analysis at the same time that we think critically about basic moral and political choices. Constructive responses to such problems as coping with natural and social hazards, allocation of limited social resources (e.g., medical care), or morally sensitive political issues (e.g., affirmative action and war crimes) require close knowledge of their political, economic, and social dimensions, and a capacity to think rigorously about the basic questions they raise.

The major in Ethics, Politics, and Economics joins the analytic rigor of the social sciences and the enduring normative questions of philosophy to promote an integrative and critical understanding of the institutions, practices, and policies that shape the contemporary world.

REQUIREMENTS OF THE MAJOR

Requirements of the major for the of Class of 2019 With DUS approval, the following changes to the requirements of the major may be fulfilled by students who declared their major under previous requirements.

Requirements of the major for the Class of 2020 and subsequent classes All students majoring in Ethics, Politics, and Economics must take twelve term courses, including five introductory courses, three core courses (one of which must be an advanced seminar), and four concentration area courses which comprise a student's individual area of concentration. The concentration is developed in consultation with the director of undergraduate studies and should culminate in a senior essay written in the area defined by the concentration.

Introductory courses Introductory courses provide a basic familiarity with contemporary economic analysis and survey central issues in ethics and political philosophy. Such a background is necessary to understand theories that combine different approaches to the three areas of inquiry (ethics, politics, economics) and to assess policies with complex political, economic, and moral implications.

The introductory courses include one course from each of the following five topics: ethics; political philosophy; game theory; intermediate microeconomics; and econometrics, and in particular ECON 131 or its equivalent (ECON 135, SOCY 162, GLBL 121, S&DS 230, or S&DS 238).

Core courses The major requires that students take three core courses, EP&E 215, and two additional core courses from the major's three core areas, one of which must be an advanced seminar anchored in at least two of the major's three core areas of ethics, politics, or economics. The DUS can offer guidance regarding appropriate courses to fulfill this requirement.

The *Ethics* core draws from courses on normative thinking from philosophy and political science (theory only), or from EP&E courses with Philosophy or Political Science listed as secondary departments.

The *Politics* core includes courses offered by Political Science as the primary department, or EP&E courses with Political Science listed as the secondary department.

The *Economics* core comprises courses offered by Economics as the primary department, or Political Science courses cross-listed with Economics.

Areas of concentration Each student defines an area of concentration in consultation with the DUS. The concentration enables students to frame an important problem and shape a systematic course of inquiry, employing analytical methods and substantive theories drawn from the three fields. Students should not only recognize the accomplishments of varied interdisciplinary efforts, but also attempt to represent and in some cases further develop those accomplishments in their own work.

For many students, the concentration treats a contemporary problem with a substantial policy dimension (domestic or international), but some students may wish to emphasize philosophical and methodological issues. Areas of concentration must consist of four courses appropriate to the theme, including the seminar or independent study course in which the senior essay is written (see "Senior Requirement" below). In designing the area of concentration, students are encouraged to include seminars from other departments and programs. The DUS will also require students to show adequate competence in data analysis when the area of concentration requires it.

The following are examples of possible areas of concentration: distributive justice; government regulation of market economies; environmental policy; philosophy of law; gender relations; democracy and multiculturalism; contemporary approaches to public policy; war and coercion; war crimes and crimes against humanity; medical ethics; international political economy; philosophy of the social sciences; social theory and ethics; cultural analysis and political thought; and civil society and its normative implications. However, students may wish to frame their own concentration more precisely.

Credit/D/Fail Students admitted to the major may take one of their Ethics, Politics, and Economics courses Credit/D/Fail. Such courses count as non-A grades in calculations for Distinction in the Major.

SENIOR REQUIREMENT

A senior essay is required for the major and should constitute an intellectual culmination of the student's work in Ethics, Politics, and Economics. The essay should fall within the student's area of concentration and may be written within a relevant seminar, with the consent of the instructor and approval of the DUS. If no appropriate seminar is offered in which the essay might be written, the student may instead enroll in EP&E 491 with approval of the DUS and a faculty member who will supervise the essay. Students who wish to undertake a more substantial yearlong essay may enroll in EP&E 492, 493.

The senior essay reflects more extensive research than an ordinary Yale College seminar paper and employs a method of research appropriate to its topic. Some papers might be written entirely from library sources; others may employ field interviews and direct

observation; still others may require statistical or econometric analysis. The student should consult frequently with the seminar instructor or adviser, offering partial and preliminary drafts for criticism. Students are encouraged to incorporate analysis using the tools of all three of the major's fields.

Senior essays written in the fall term are due on Monday, December 3, 2018. Senior essays written in the spring term and yearlong essays are due on Monday, April 15, 2019. One-term essays are normally expected to be forty to fifty pages in length; yearlong essays are normally expected to be eighty to one hundred pages in length.

ADVISING AND APPLICATION TO THE MAJOR

Application to the major Students apply to enter the major at the end of the fall term of their sophomore year. Applications must be submitted via email to the program's registrar at kellianne.farnham@yale.edu no later than 4 p.m. on Monday, December 3, 2018. Applications must include the application cover sheet, a current CV, a transcript of work at Yale that indicates fall-term 2018 courses, and a brief application essay, all submitted in a single PDF file. If possible, applicants should include a copy of a paper written for a course related to the subject matter of Ethics, Politics, and Economics. More information regarding the application process and the cover sheet is available on the program's website.

Graduate work Some graduate and professional school courses are open to qualified undergraduates and may be of interest to EP&E majors (e.g., courses in the Schools of Nursing, Forestry & Environmental Studies, Management, and Public Health). Permission to enroll is required from the instructor as well as the appropriate representative of the graduate or professional program. Note that not all professional school courses yield a full course credit in Yale College. See Courses in the Yale Graduate and Professional Schools in the Academic Regulations. (p. 70)

REQUIREMENTS OF THE MAJOR

Prerequisites None

Number of courses 12 (incl senior req)

Specific course required EP&E 215 and ECON 131, or its equivalent

Distribution of courses 1 introductory course in each of political phil, game theory, ethics, intermediate microeconomics, and econometrics (ECON 131), as specified; 3 core courses (incl EP&E 215 and 1 advanced sem); 4 courses, incl course for senior req, in area of concentration defined by student in consultation with DUS

Senior requirement Senior essay in area of concentration (in a sem or in EP&E 491 or in EP&E 492 and 493)

FACULTY ASSOCIATED WITH THE PROGRAM OF ETHICS, POLITICS, AND ECONOMICS

Professors Seyla Benhabib (*Political Science, Philosophy*), Dirk Bergemann (*Economics*), Donald Brown (*Economics*), David Cameron (*Political Science*), Stephen Darwall (*Philosophy*), Ron Eyerman (*Sociology*), Bryan Garsten (*Political Science*), Jacob Hacker (*Political Science*), Shelly Kagan (*Philosophy*), Joseph LaPalombara (*Emeritus*) (*Political Science*), Giovanni Maggi (*Economics*), William Nordhaus (*Economics*), Thomas Pogge (*Philosophy*), Douglas Rae (*Political Science*), John Roemer (*Political Science*), Susan Rose-Ackerman (*Political Science, Law School*), Frances Rosenbluth (*Director*) (*Political*

Science), Ian Shapiro (*Political Science*), Jason Stanley (*Philosophy*), Peter Swenson (*DUS*) (*Political Science*), Steven Wilkinson (*Political Science*)

Senior Lecturer Boris Kapustin (*Political Science*)

Lecturers Elaine Dezenski (*Global Studies*), Michael Fotos (*Political Science*), Karen Goodrow (*Political Science*), Stephen Latham (*Political Science*)

Courses

EP&E 203a / PLSC 452a / S&DS 102a, 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. QR

EP&E 204a / ENAS 335a, Professional Ethics Mercedes Carreras

A theoretical and case-oriented approach to ethical decision making. Concepts, tools, and methods for constructing and justifying solutions to moral problems that students may face as professionals. SO

EP&E 209a / PLSC 453a / S&DS 103a, 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. QR

*** EP&E 215a or b, Classics of Ethics, Politics, and Economics** Staff

A critical examination of classic and contemporary works that treat problems of ethics, politics, and economics as unities. Topics include changing conceptions of private and public spheres, the content and domain of individual freedom, and ethical and political limits to the market. Readings from the works of Aristotle, Hobbes, Locke, Smith, Bentham, Mill, Hegel, Marx, Hayek, Rawls, and others. HU, SO

EP&E 220a / PLSC 342a, Strategic Models of Politics Milan Svulik

Introduction to formal political theory including application of rational choice and game theoretic analysis. Key topics and findings include: why voters vote in elections; how candidates choose platforms; why common resources tend to be overexploited; whether the state is needed for public good provision; how electoral systems shape politicians' and voters' behavior; whether voters can hold politicians accountable for their performance in office; how constitutions affect politicians' incentives to compromise; and why countries fight wars. SO

*** EP&E 224a / ECON 465a / GBLB 330a, Debating Globalization** Ernesto Zedillo

Facets of contemporary economic globalization, including trade, investment, and migration. Challenges and threats of globalization: inclusion and inequality, emerging global players, global governance, climate change, and nuclear weapons proliferation. Prerequisite: background in international economics and data analysis. Preference to seniors majoring in Economics or EP&E. SO RP

*** EP&E 227b / ECON 473b / PLSC 343b, Equality** John Roemer

Egalitarian theories of justice and their critics. Readings in philosophy are paired with analytic methods from economics. Topics include Rawlsian justice, utilitarianism, the veil of ignorance, Dworkin's resource egalitarianism, Roemer's equality of

opportunity, Marxian exploitation, and Nozickian procedural justice. Some discussion of American economic inequality, Nordic social democracy, and the politics of inequality. Recommended preparation: intermediate microeconomics. SO

EP&E 231a / GLBL 180a / PLSC 346a, Game Theory and International Relations

Alexandre Debs

Introduction to game theory and its applications in political science and economics, with a focus on international relations. Standard solution concepts in game theory; case studies from important episodes in the history of international relations, including World War II, the Cuban missile crisis, and the 2003 U.S.-led invasion of Iraq.

Recommended preparation: introductory microeconomics. QR, SO

* **EP&E 232b / ECON 470b / GLBL 233b, 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.

* **EP&E 243a / GLBL 336a / LAST 423a / PLSC 423a, Political Economy of Poverty Alleviation** Ana De La O

Overview of classic and contemporary approaches to the question of why some countries have done better than others at reducing poverty. Emphasis on the role of politics. SO

* **EP&E 245a / PLSC 152a, Global Firms and National Governments** Joseph LaPalombara

Interactions between large-scale firms that make international investments and policy makers and government officials in the “host” countries. National and subnational officials who work to attract investments (or not) and who set policies regulating global firms and their investments. Focus on less-developed countries. Theories as to why firms “globalize”; case studies of controversies created by overseas corporate investments; the changing economic landscape associated with investments by countries such as China, Brazil, and India. SO

* **EP&E 248b / PLSC 256b, American Political Institutions** Michael Fotos

The origins and development of American political institutions, especially in relation to how institutions shape the policy process. Issues of temporality, policy feedback, and policy substance. WR, SO

* **EP&E 250a / PLSC 354a, 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. SO

* **EP&E 254a / ECON 454a / GLBL 331a, 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. Prerequisite: ECON 122. SO

* **EP&E 257b / LAST 251b / PLSC 399b, Politics in Latin America** Ana De La O
Overview and analysis of politics in Latin America. The emergence of democracy and the forces that led to the unprecedented increase in inequality in the twentieth century. Topics include institutional design, historical legacies, corruption, clientelism, and violence.

* **EP&E 280a / PLSC 301a, Ancient Greek Political Development** Daniela Cammack
Varieties of political experience in the ancient Greek world during the archaic, classical, and hellenistic periods. Attention to different regime types, places, political forms, institutions, and persons. SO

* **EP&E 286a / ECON 475a, Discrimination in Law, Theory, and Practice** Gerald Jaynes
How law and economic theory define and conceptualize economic discrimination; whether economic models adequately describe behaviors of discriminators as documented in court cases and government hearings; the extent to which economic theory and econometric techniques aid our understanding of actual marketplace discrimination. Prerequisites: introductory microeconomics and at least one additional course in Economics, African American Studies, Ethnicity, Race, and Migration, or Women's, Gender, and Sexuality Studies.

EP&E 295b / PLSC 344b, Game Theory and Political Science Deborah Beim
Introduction to game theory – a method by which strategic interactions among individuals and groups in society are mathematically modeled – and its applications to political science. Concepts employed by game theorists, such as Nash equilibrium, subgame perfect equilibrium, and perfect Bayesian equilibrium. Problems of cooperation, time-consistency, signaling, and reputation formation. Political applications include candidate competition, policy making, political bargaining, and international conflict. No prerequisites other than high school algebra. Political Science majors who take this course may not count ECON 159 toward the major. QR, SO

* **EP&E 297b / ECON 471b, Topics in Cooperative Game Theory** Pradeep Dubey
The theory and applications of cooperative games. Topics include matching, bargaining, cost allocation, market games, voting games, and games on networks. Prerequisite: intermediate microeconomics.

* **EP&E 299b / PLSC 332b, Philosophy of Science for the Study of Politics** Hélène Landemore
An examination of the philosophy of science from the perspective of the study of politics. Particular attention to the ways in which assumptions about science influence models of political behavior, the methods adopted to study that behavior, and the relations between science and democracy. Readings include works by both classic and contemporary authors. SO

* **EP&E 303b / AFST 303b / SOCY 330b, Civil Sphere and Democracy** Jeffrey Alexander
Examination of civil sphere theory in dialogue with normative and empirical approaches to civil society. The sacred and profane binaries that animate the civil sphere are studied, as are such civil sphere organizations as polls, mass media, electoral system,

law, and office. Topics include: United States presidential elections, immigration and its controversies, the civil rights movement, the crisis of contemporary journalism, recent controversies over church pedophilia, the financial system, telephone hacking, and the challenge of de-provincializing civil sphere theory. HU, SO

* **EP&E 312a / PLSC 297a, Moral Choices in Politics** Boris Kapustin

A study of how and why people make costly moral choices in politics. Figures studied include Thomas More, Abraham Lincoln, Nelson Mandela, Václav Havel, and Aung San Suu Kyi. SO

* **EP&E 324a / PLSC 244a, Journalism, Liberalism, Democracy** James Sleeper

The news media's role in configuring the democratic public sphere, from the early synergy of print capitalism and liberalism through the corporate consolidation of mass media and the recent fragmentation and fluidity of "news." Classical-humanist and civic-republican responses to these trends. SO

* **EP&E 334a / PHIL 455a, 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 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). Prerequisite: a course in moral philosophy. HU

* **EP&E 353b / PLSC 305b, Critique of Political Violence** Boris Kapustin

Methods of conceptualizing political violence that are prevalent in contemporary political philosophical discourse. Use of theoretical-analytical tools to examine the modes violence assumes and the functions it performs in modern political life as well as the meanings and possibilities of nonviolence in politics. SO

* **EP&E 380a / PLSC 313a, Bioethics, Politics, and Economics** Stephen Latham

Ethical, political, and economic aspects of a number of contemporary issues in biomedical ethics. Topics include abortion, assisted reproduction, end-of-life care, research on human subjects, and stem cell research. SO

* **EP&E 390a / EVST 212a / PLSC 212a, Democracy and Sustainability** Michael Fotos

Democracy, liberty, and the sustainable use of natural resources. Concepts include institutional analysis, democratic consent, property rights, market failure, and common pool resources. Topics of policy substance are related to human use of the environment and to U.S. and global political institutions. WR, SO

* **EP&E 396a / AMST 469a / PLSC 251a, Progressivism: Theory and Practice**

Stephen Skowronek

The progressive reform tradition in American politics. The tradition's conceptual underpinnings, social supports, practical manifestations in policy and in new governmental arrangements, and conservative critics. Emphasis on the origins of progressivism in the early decades of the twentieth century, with attention to latter-day manifestations and to changes in the progressive impulse over time. SO

* **EP&E 401a / HUMS 325a / RLST 370a, Law, Morality, and Religion** Andrew Forsyth

The relationship – if any – between law, morality, and religion. Topics include the twentieth-century jurisprudential debate on law and morality; debates on law's relationship to reason and will, flourishing and restraint, in the "Western" tradition from antiquity to early modernity; and the U.S. Constitution and debates over free exercise and establishment of religion. HU

* **EP&E 411a / PLSC 287a, Democracy and Distribution** Ian Shapiro

An examination of relations between democracy and the distribution of income and wealth. Focus on ways in which different classes and coalitions affect, and are affected by, democratic distributive politics. Open to juniors and seniors. SO

* **EP&E 421a or b / PLSC 320a or b, Ethics, Law, and Current Issues** Karen Goodrow

Examination of how freedom of speech and bias influence the criminal justice system, focusing on wrongful convictions and administration of the death penalty. Understanding the role of potential bias at various levels and the competing interests of protecting speech, due process, and the innocent. Topics include limitations on speech, practical effects of speech, the efficacy of the death penalty, actual innocence, gender/race/economic bias and its effects on the justice system, as well as best practices for improving our sense of justice.

* **EP&E 471a or b, Directed Reading and Research** Peter Swenson

For individual reading and research unrelated to the senior essay. Students must obtain the signature of the faculty member supervising their independent work on an Independent Study Form (available from the Ethics, Politics, and Economics registrar's office). This form must be submitted to the director of undergraduate studies at the time the student's class schedule is submitted.

* **EP&E 478a / PHIL 450a, The Problem of Evil** Keith DeRose

The challenge that evil's existence in the world poses for belief in a perfectly good and omnipotent God. The main formulations of the problem of evil; proposed ways of solving or mitigating the problem and criticism of those solutions. Skeptical theism, the free-will defense, soul-making theodicies, and doctrines of hell. HU

* **EP&E 480a / PHIL 465a, Recent Work in Ethical Theory** Stephen Darwall

A study of recently published works on ethics and its foundations. Issues include the grounds of normativity and rightness and the role of the virtues. HU

* **EP&E 490b / CGSC 426b / PHIL 426b / PSYC 422b, The Cognitive Science of Morality** Joshua Knobe

Introduction to the emerging field of moral cognition. Focus on questions about the philosophical significance of psychological findings. Topics include the role of emotion in moral judgment; the significance of character traits in virtue ethics and personality psychology; the reliability of intuitions and the psychological processes that underlie them. HU

* **EP&E 491a or b, The Senior Essay** Peter Swenson

A one-term senior essay. The essay should fall within the student's area of concentration. If no appropriate seminar is offered in which the essay might be written, the student, in consultation with the director of undergraduate studies, should choose an appropriate member of the faculty to supervise the senior essay. Students must obtain the signature of the faculty member supervising their independent work on an

Independent Study Form (available from the Ethics, Politics, and Economics registrar's office). This form must be submitted to the director of undergraduate studies at the time the student's class schedule is submitted.

*** EP&E 492a and EP&E 493b, The Yearlong Senior Essay** Peter Swenson

A two-term senior essay. The essay should fall within the student's area of concentration. The student, in consultation with the director of undergraduate studies, should choose an appropriate member of the faculty to supervise the senior essay. Students must obtain the signature of the faculty member supervising their independent work on an Independent Study Form (available from the Ethics, Politics, and Economics registrar's office). This form must be submitted to the director of undergraduate studies at the time the student's class schedule is submitted.

EP&E 494b / AFAM 198b / CGSC 277b / EDST 177b / PHIL 177b, Propaganda, Ideology, and Democracy Jason Stanley

Historical, philosophical, psychological, and linguistic introduction to the issues and challenges that propaganda raises for liberal democracy. How propaganda can work to undermine democracy; ways in which schools and the press are implicated; the use of propaganda by social movements to address democracy's deficiencies; the legitimacy of propaganda in cases of political crisis. HU

*** EP&E 496a / PLSC 448a, 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. Prerequisites: three courses in political science. SO

*** EP&E 497b / EVST 247b / PLSC 219b, Politics of the Environment** Peter Swenson

Historical and contemporary politics aimed at regulating human behavior to limit damage to the environment. Goals, strategies, successes, and failures of movements, organizations, corporations, scientists, and politicians in conflicts over environmental policy. Focus on politics in the U.S., including the role of public opinion; attention to international regulatory efforts, especially with regard to climate change. SO

OTHER COURSES RELATED TO ETHICS, POLITICS, AND ECONOMICS

PHIL 175b, Introduction to Ethics Shelly Kagan

What makes one act right and another wrong? What am I morally required to do for others? What is the basis of morality? These are some of the questions raised in moral philosophy. Examination of two of the most important answers, the theories of Mill and Kant, with brief consideration of the views of Hume and Hobbes. Discussion of the question: Why be moral? HU

PLSC 114a, Introduction to Political Philosophy Hélène Landemore

Fundamental issues in contemporary politics investigated through reflection on classic texts in the history of political thought. Emphasis on topics linked to modern constitutional democracies, including executive power, representation, and political parties. Readings from Plato, Machiavelli, Hobbes, Locke, Rousseau, Madison and Hamilton, Lincoln, and Tocqueville, in addition to recent articles on contemporary issues. SO

PLSC 118b, The Moral Foundations of Politics Ian Shapiro

An introduction to contemporary discussions about the foundations of political argument. Emphasis on the relations between political theory and policy debate (e.g., social welfare provision and affirmative action). Readings from Bentham, Mill, Marx, Burke, Rawls, Nozick, and others. SO

Ethnicity, Race, and Migration

Director of undergraduate studies: Dixia Ramirez, Rm. 204, 35 Broadway, 436-9316, dixia.ramirez@yale.edu; (albert.laguna@yale.edu) erm.yale.edu

The program in Ethnicity, Race, and Migration enables students to engage in an interdisciplinary, comparative study of forces that have created a multicultural, multiethnic, and multiracial world. The major emphasizes familiarity with the intellectual traditions and debates surrounding the concepts of indigeneity, ethnicity, nationality, and race; grounding in both the history of migration and its contemporary manifestations; and knowledge of and direct engagement with the cultures, structures, and peoples formed by these migrations.

REQUIREMENTS OF THE MAJOR

The major for the Class of 2020 and previous classes With DUS approval, the following changes to the requirements of the major may be fulfilled by students who declared their major under previous requirements.

The major for the Class of 2021 and subsequent classes Students must complete twelve term courses in Ethnicity, Race, and Migration, including the senior requirement. These twelve normally include ER&M 200, an introductory course on the issues and disciplines involved in the study of ethnicity, race, and migration. In the junior year, all majors are required to take ER&M 300, a seminar that introduces majors to scholarship in ethnic studies, postcolonial studies, and cultural studies.

Area of concentration In consultation with the DUS, each student defines an area of concentration consisting of six term courses, one of which must be a methods course; these concentration courses do not include the senior essay or project. Advanced work in the foreign language related to a student's area of concentration is advised.

SENIOR REQUIREMENT

There are two options for the senior requirement. Majors may choose a year-long senior essay or project and take the senior colloquium (ER&M 491) on theoretical and methodological issues in the fall and then complete the requirement by writing a senior essay in the senior project seminar (ER&M 492) during the spring term. Alternatively, students may take an upper-level ER&M seminar and write a senior essay of thirty to thirty-five pages in addition to completing all course requirements. This seminar may be taken during either the fall or spring term.

ADVISING

Prospective majors should consult the director of undergraduate studies early in their academic careers to discuss an individual plan of study. Enrollment in the major requires permission of the director of undergraduate studies prior to the beginning of the fall term of the junior year.

As a multidisciplinary program, Ethnicity, Race, and Migration draws on the resources of other departments and programs in the University. Students are encouraged to examine the offerings of other departments in both the humanities and the social sciences, interdisciplinary programs of study housed in the MacMillan Center and elsewhere, and residential college seminars for additional relevant courses. The stated area of concentration of each student determines the relevance and acceptability of

other courses. Students are also encouraged to engage in community-based learning opportunities.

STUDY ABROAD

Because of the major's emphasis on international and transnational work, students are encouraged to undertake a term abroad. They should consult with the DUS to identify courses from study abroad programs that may count toward the major.

REQUIREMENTS OF THE MAJOR

Prerequisites None

Number of courses 12 term courses (incl senior req)

Specific courses required ER&M 200, 300

Distribution of courses 6 courses in area of concentration, 1 of which must be a methods course

Senior requirement Senior colloq (ER&M 491) and senior essay or project (ER&M 492); or senior essay in upper-level seminar

FACULTY ASSOCIATED WITH THE PROGRAM OF ETHNICITY, RACE, AND MIGRATION

Professors Ned Blackhawk (*History, American Studies*), Hazel Carby (*African American Studies, American Studies*), Michael Denning (*American Studies, English*), Inderpal Grewal (*American Studies, Women's, Gender, & Sexuality Studies*), Matthew Jacobson (*American Studies, African American Studies, History*), Gilbert Joseph (*History*), Mary Lui (*American Studies, History*), Stephen Pitti (*History, American Studies*), Ana Ramos-Zavas (*American Studies, Ethnicity, Race, & Migration, Women's, Gender, & Sexuality Studies*), Alicia Schmidt Camacho (*American Studies*), Jing Tsu (*East Asian Languages & Literatures*)

Associate Professors Zareena Grewal (*American Studies*), Daniel HoSang (*Ethnicity, Race, & Migration, American Studies*), Daniel Magaziner (*History*)

Assistant Professors Rene Almeling (*Sociology*), Laura Barraclough (*American Studies*), Albert Laguna (*American Studies, Ethnicity, Race, & Migration*), Vida Maralani (*Sociology*), Joanna Radin (*History of Science, Medicine, & Public Health, Anthropology, History*), Dixa Ramirez (*American Studies, Ethnicity, Race, & Migration*)

Lecturers Aaron Carico (*American Studies, Ethnicity, Race, & Migration*), David Simon (*Political Science*), Quan Tran (*American Studies, Ethnicity, Race, & Migration*)

Required Courses

ER&M 200a, Introduction to Ethnicity, Race, and Migration Alicia Camacho
Historical roots of contemporary ethnic and racial formations and competing theories of ethnicity, race, and migration. Cultural constructions and social practices of race, ethnicity, and migration in the United States and around the world. HU, SO

* **ER&M 300a or b, Comparative Ethnic Studies** Staff

Introduction to the methods and practice of comparative ethnic studies. Examination of racial formation in the United States within a transnational framework. Legacies of colonialism, slavery, and racial exclusion; racial formation in schools, prisons, and

citizenship law; cultural politics of music and performance; social movements; and postcolonial critique. SO

Electives within the Major

AFAM 162b / AMST 162b / HIST 187b, African American History from Emancipation to the Present Staff

An examination of the African American experience since 1861. Meanings of freedom and citizenship are distilled through appraisal of race and class formations, the processes and effects of cultural consumption, and the grand narrative of the civil rights movement. WR, HU

* **AFAM 346a / HSAR 471a, Black Atlantic Photography** Kobena Mercer

Introduction to the social and artistic history of photography in Black Atlantic contexts from the mid-nineteenth century to the present. Uses of the photographic image in shaping understandings of race relations and black identities. Codes and conventions by which photographs are evaluated in terms of truth, reflection, testimony, expressivity, and construction. HU

* **AFAM 410b / AMST 310b / WGSS 410b, Interdisciplinary Approaches to African American Studies** Anthony Reed

An interdisciplinary, thematic approach to the study of race, nation, and ethnicity in the African diaspora. Topics include class, gender, color, and sexuality; the dynamics of reform, Pan-Africanism, neocolonialism, and contemporary black nationalism. Use of a broad range of methodologies. WR, HU, SO

* **AMST 405b / AFAM 406b / ENGL 405b, Autobiography in America** Robert Stepto

A study of autobiographical writings from Mary Rowlandson's Indian captivity narrative (1682) to the present. Classic forms such as immigrant, education, and cause narratives; prevailing autobiographical strategies involving place, work, and photographs. Authors include Franklin, Douglass, Jacobs, Antin, Kingston, Uchida, Balakian, Rodriguez, and Bechdel. WR, HU

ANTH 254a, Japan: Culture, Society, Modernity Sarah LeBaron von Baeyer

Introduction to Japanese society and culture. The historical development of Japanese society; family, work, and education in contemporary Japan; Japanese aesthetics; and psychological, sociological, and cultural interpretations of Japanese behavior. WR, SO

* **ANTH 386a / GLBL 393a, Humanitarian Interventions: Ethics, Politics, and Health** Catherine Panter-Brick

Analysis of humanitarian interventions from a variety of social science disciplinary perspectives. Issues related to policy, legal protection, health care, morality, and governance in relation to the moral imperative to save lives in conditions of extreme adversity. Promotion of dialogue between social scientists and humanitarian practitioners. WR, SO

ER&M 187a / AMST 133a / HIST 107a, Introduction to American Indian History Ned Blackhawk

Survey of American Indian history, beginning with creation traditions and migration theories and continuing to the present day. Focus on American Indian nations whose homelands are located within the contemporary United States. Complexity and change

within American Indian societies, with emphasis on creative adaptations to changing historical circumstances. HU

ER&M 206b / PLSC 437b / SOCY 223b, The Politics of Ethnic and National Identity

Maria Jose Hierro

Introduction to the study of ethnic and national identity, their determinants and consequences in comparative perspective. SO

ER&M 209b / LITR 279b / VIET 220b, Introduction to Vietnamese Culture, Values, and Literature Staff

Introduction to Vietnamese culture and values. Topics include cultural and national identity, aesthetics, the meaning of life, war, and death. Selected readings from Zen poems, folklore, autobiographies, and religious and philosophical writings. Course is taught in English and is an alternative to Western perspectives. Readings in translation. No previous knowledge of Vietnamese required. HU

ER&M 211a / EDST 144a / SOCY 144a, Race, Ethnicity, and Immigration Grace Kao

Exploration of sociological studies and theoretical and empirical analyses of race, ethnicity, and immigration, with focus on race relations and racial and ethnic differences in outcomes in contemporary U.S. society (post-1960s). Study of the patterns of educational and labor market outcomes, incarceration, and family formation of whites, blacks (African Americans), Hispanics, and Asian Americans in the United States, as well as immigration patterns and how they affect race and ethnic relations.

SO

* **ER&M 221b / AMST 206b / WGSS 222b, Introduction to Critical Refugee Studies**

Quan Tran

Reconfiguring refugees as fluid subjects and sites of social, political, and cultural critiques. Departing from dominant understandings of refugees as victims, consideration instead of refugees as complex historical actors, made visible through processes of colonization, imperialism, war, displacement, state violence, and globalization, as well as ethical, social, legal, and political transformations. Focus on second-half of the twentieth century. SO

* **ER&M 224b / AMST 368b, Marxism and Social Movements in the Nineteenth Century** Michael Denning

The history and theory of the socialist and Marxist traditions from their beginnings in the early nineteenth century to the world upheavals of 1917–19. Relations to labor, feminist, abolitionist, and anticolonial movements. RP

ER&M 238a / AFST 238a / AMST 238a, Introduction to Third World Studies Gary

Okhiro

Introduction to the historical and contemporary theories and articulations of Third World studies (comparative ethnic studies) as an academic field and practice. Consideration of subject matters; methodologies and theories; literatures; and practitioners and institutional arrangements. SO

ER&M 243b / AMST 234b / HIST 188b / RLST 342b, Spiritual But Not Religious

Zareena Grewal

Study of the historical and contemporary “unchurching” trends in American religious life in a comparative perspective and across different scales of analysis in order to think

about the relationship between spirituality, formal religion, secular psychology and the self-help industry. HU, SO

ER&M 282a / AMST 272a / HIST 183a / WGSS 272a, Asian American History, 1800 to the Present Mary Lui

An introduction to the history of East, South, and Southeast Asian migrations and settlement to the United States from the late eighteenth century to the present. Major themes include labor migration, community formation, U.S. imperialism, legal exclusion, racial segregation, gender and sexuality, cultural representations, and political resistance. HU

* **ER&M 297b / AMST 371b, Food, Race, and Migration in United States Society**
Quan Tran

Exploration of the relationship between food, race, and migration in historical and contemporary United States contexts. Organized thematically and anchored in selected case studies, this course is comparative in scope and draws from contemporary work in the fields of food studies, ethnic studies, migration studies, American studies, anthropology, and history. SO

* **ER&M 304a / HIST 194Ja / LAST 194a, Hemisphere Divided, United States and Latin America** Staff

The history of U.S.-Latin American relations. Themes include imperialism and ideology, political economy, cultural exchange, environmental history, and issues of gender, race, nationhood, and indigeneity. WR, HU

* **ER&M 308b / AMST 398b / HIST 158Jb, American Indian Law and Policy** Ned Blackhawk

Survey of the origins, history, and legacies of federal Indian law and policy during two hundred years of United States history. The evolution of U.S. constitutional law and political achievements of American Indian communities over the past four decades. WR, HU

* **ER&M 342a / HIST 372Ja / LAST 372a, Revolutionary Change and Cold War in Latin America** Gilbert Joseph

Analysis of revolutionary movements in Latin America against the backdrop of the Cold War. Critical examination of popular images and orthodox interpretations. An interdisciplinary study of the process of revolutionary change and cold war at the grassroots level. WR, HU

* **ER&M 360b / HLTH 370b / HSHM 432b / SOCY 390b / WGSS 390b, Politics of Reproduction** Rene Almeling

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

* **ER&M 364b / HIST 334Jb / LAST 334b, Ethnicity, Nationalism, and the Politics of Knowledge in Latin America** Marcela Echeverri Munoz

Examination of ethnicity and nationalism in Latin America through the political lens of social knowledge. Comparative analysis of the evolution of symbolic, economic, and political perspectives on indigenous peoples, peasants, and people of African

descent from the nineteenth century to the present. Consideration of the links between making ethnic categories in the social sciences and in literature and the rise of political mechanisms of participation and representation that have characterized the emergence of cultural politics. WR, HU RP

* **ER&M 394a / ANTH 409a / EVST 422a / F&ES 422a, Climate and Society from Past to Present** Michael Dove

Discussion of the major traditions of thought – both historic and contemporary – regarding climate, climate change, and society; focusing on the politics of knowledge and belief vs disbelief; and drawing on the social sciences and anthropology in particular. SO

* **ER&M 408a / AFAM 272a / AMST 408a, Race and Comedy** Albert Laguna

Introduction to theories of the ludic and to critical race theory. Ways in which comic modes have been utilized by racialized subjects to represent and issue critiques of the dominant culture. Analysis of stand-up comedy, film, television, and novels. HU

* **ER&M 409a / AMST 345a / WGSS 408a, Latinx Ethnography** Ana Ramos-Zayas
Consideration of ethnography within the genealogy and intellectual traditions of Latinx Studies. Topics include: questions of knowledge production and epistemological traditions in Latin America and U.S. Latino communities; conceptions of migration, transnationalism, and space; perspectives on “(il)legality” and criminalization; labor, wealth, and class identities; contextual understandings of gender and sexuality; theorizations of affect and intimate lives; and the politics of race and inequality under white liberalism and conservatism in the United States. SO

* **ER&M 419a / AFAM 390a / SOCY 319a, Ethnography of the African American Community** Elijah Anderson

An ethnographic study of the African American community. Analysis of ethnographic and historical literature, with attention to substantive, conceptual, and methodological issues. Topics include the significance of slavery, the racial ghetto, structural poverty, the middle class, the color line, racial etiquette, and social identity. SO

* **ER&M 435a / AMST 422a / HIST 151Ja, Writing Tribal Histories** Staff

Historical overview of American Indian tribal communities, particularly since the creation of the United States. Challenges of working with oral histories, government documents, and missionary records. WR, HU

* **ER&M 439a / AMST 439a, Fruits of Empire** Gary Okihiro

Readings, discussions, and research on imperialism and "green gold" and their consequences for the imperial powers and their colonies and neo-colonies. Spatially conceived as a world-system that enmeshes the planet and as earth's latitudes that divide the temperate from the tropical zones, imperialism as discourse and material relations is this seminar's focus together with its implantations – an empire of plants. Vast plantations of sugar, cotton, tea, coffee, bananas, and pineapples occupy land cultivated by native and migrant workers, and their fruits move from the tropical to the temperate zones, impoverishing the periphery while profiting the core. Fruits of Empire, thus, implicates power and the social formation of race, gender, sexuality, class, and nation. HU, SO

* **ER&M 463b / AFAM 358b / SOCY 373b, Ethnography of Policing and Race** Staff
Ethnography is the systematic study of culture and a method of knowledge production utilized by social scientists to apprehend, comprehend, and represent cultural groups

and other social phenomena. This course explores the ethnographic representations of policing historically alongside the American construction of race. It explores the complex nature of policing in racially concentrated contexts. Additionally, it explores the warrants of ethnography as it relates to the study of policing and race. Students examine the tension between typical racial minorities and policing and the experiences of various other racialize groups that have appeared in and fallen out of focus as targets for racialize police contact. SO

* **FILM 454b / AMST 454b / ER&M 388b, Narrating the Lives of Refugees** Zareena Grewal

Analysis of contemporary representations of refugee experiences with special attention to the processes by which war, colonialism, displacement, encampment, and racialization shape the lives of refugees in New Haven and beyond. Topics include the representation of refugees as a source of political crisis; one dimensional representations of refugees as victims in need of rescue, national subjects unfit for citizenship, and as a political and social threat; and how current refugee problems create definitional difficulties for states and international agencies. HU, SO

HIST 119b / AFAM 172b, The Civil War and Reconstruction Era, 1845–1877 David Blight

The causes, course, and consequences of the American Civil War. A search for the multiple meanings of a transformative event, including national, sectional, racial, constitutional, social, gender, intellectual, and individual dimensions. HU

HIST 332a / AFST 333a, African Encounters with Colonialism Daniel Magaziner

How African societies and peoples encountered, engaged, and endured the colonial and postcolonial world, from the arrival of Kiswahili-speaking traders at the shores of Lake Victoria in the 1840s through the rise and fall of European colonialism and the resulting forms of neocolonialism. Transformations and continuities in African religious life; gendered sociability; popular culture. HU

* **HIST 385Jb / MMES 347b, Reformers and Revolutionaries in the Arab World** Rosie Bsheer

Major social and intellectual trends of the Arab world and their relation to major events and movements of the twentieth century. The influence of colonial, postcolonial, and neocolonial thought; issues faced by activists, lawyers, feminists, leftists, nationalists, Islamists, secularists, liberals, and unionists; ways in which such struggles shaped people's social lives and futures; the causes and implications of current uprisings. WR, HU

LITR 143b / ENGL 192b / FILM 240b, World Cinema Dudley Andrew

Development of ways to engage films from around the globe productively. Close analysis of a dozen complex films, with historical contextualization of their production and cultural functions. Attention to the development of critical skills. Includes weekly screenings, each followed immediately by discussion. HU

* **SOCY 319a / AFAM 390a / ER&M 419a, Ethnography of the African American Community** Elijah Anderson

An ethnographic study of the African American community. Analysis of ethnographic and historical literature, with attention to substantive, conceptual, and methodological issues. Topics include the significance of slavery, the racial ghetto, structural poverty, the middle class, the color line, racial etiquette, and social identity. SO

* **THST 335b / AFST 435b, West African Dance: Traditional to Contemporary** Lacina Coulibaly

A practical and theoretical study of the traditional dances of Africa, focusing on those of Burkina Faso and their contemporary manifestations. Emphasis on rhythm, kinesthetic form, and gestural expression. The fusion of modern European dance and traditional African dance. Admission by audition during the first class meeting. HU RP

WGSS 405a / EALL 211a / LITR 174a, Women and Literature in Traditional China
Kang-i Sun Chang

A study of major women writers in traditional China, as well as representations of women by male authors. The power of women's writing; women and material culture; women in exile; courtesans; Taoist and Buddhist nuns; widow poets; cross-dressing women; the female body and its metaphors; footbinding; notions of love and death; the aesthetics of illness; women and revolution; 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. Formerly CHNS 201. HU TR

Individual Research and Senior Essay Courses

* **ER&M 471a and ER&M 472b, Individual Reading and Research for Juniors and Seniors** Staff

For students who wish to cover material not otherwise offered by the program. The course may be used for research or for directed reading. In either case a term paper or its equivalent is required. Students meet regularly with a faculty adviser. To apply for admission, students submit a prospectus signed by the faculty adviser to the director of undergraduate studies.

* **ER&M 491a, The Senior Colloquium: Theoretical and Methodological Issues**
Quan Tran

A research seminar intended to move students toward the successful completion of their senior projects, combining discussions of methodological and theoretical issues with discussions of students' fields of research.

* **ER&M 492b, The Senior Essay or Project** Staff

Independent research on a one-term senior essay or project.

Film and Media Studies

Director of undergraduate studies: Katerina Clark, Rm. 203, 451 College, 432-0712, katerina.clark@yale.edu

The major in Film and Media Studies focuses on the history, theory, criticism, and production of cinema and other moving-image media. Courses examine cinema and the broader landscape of audiovisual media as significant modern art forms, and the contributions of moving-image media as cultural and communicative practices of enduring social significance. As an interdisciplinary program centered in the humanities, Film and Media Studies offers students latitude in defining their course of study within the framework established by the Film and Media Studies Committee. With this freedom comes the responsibility of carefully planning a coherent and well-focused program. Because of the special demands of Film and Media Studies and the diversity of its offerings, potential majors are encouraged to consult the director of undergraduate studies early in their academic careers.

PREREQUISITE

Students normally take FILM 150 in their first or second year. This course is useful preparation, and in some cases a prerequisite, for many other courses in the major.

REQUIREMENTS OF THE MAJOR

The Film and Media Studies major consists of twelve term courses, including the prerequisite and the senior requirement. Students are required to take FILM 160, and FILM 320, preferably by the end of their sophomore year. In addition, students are required to take one upper-level course in the study of representative films from a non-American national cinema (e.g. German expressionist cinema, Italian cinema, or world cinema) and one course in critical studies. Students also must take at least one course on the creative process in film; appropriate courses are listed under "Production Seminars." Courses taken outside the Film and Media Studies department will not count toward the major without the permission of the DUS. Admission to senior-level seminars is at the instructor's discretion, but the Film and Media Studies program will ensure that every senior major gains admission to the required number of seminars.

The intensive major Students of substantial accomplishment and commitment to film and media studies are encouraged to pursue the intensive major. Students in the intensive major complete a senior project in production and also write a senior essay. The intensive major in Film and Media Studies is intended for students who are not pursuing two majors. Students must request approval from the Film and Media Studies Committee at the end of their junior year by submitting a proposal that outlines their objectives and general area of study.

Credit/D/Fail No more than one course taken Credit/D/Fail may be counted toward the major with permission of the DUS.

SENIOR REQUIREMENT

During the senior year, each student takes one or two senior-level seminars or the equivalent and submits a senior essay or senior project, which should represent a culmination of work in the major and in Yale College. The senior requirement does require both critical writing and writing in images. Those undertaking creative senior

projects should be expected to produce a paper of approximately fifteen pages in which the student discusses such questions as the genre to be used in the project, existing precedents for the topic, and his or her strategy in working on the project. Those undertaking to fulfill the senior requirement by writing a senior essay should additionally take a course in which they are expected to do, minimally, a small production assignment.

Majors graduating in December must submit their senior essays or senior projects to the DUS by Friday, December 7, 2018; those graduating in May, by Friday, April 26, 2019. A second reader assigned by the DUS participates in evaluating the essays and/or projects.

Preparation for a senior project Those students hoping to produce a film script or video as their senior project should make sure that they have taken enough courses in video production and screenwriting to be accepted into an advanced course in screenwriting or production. Senior creative projects in Film and Media Studies must be produced in conjunction with one such upper-level course. Students often start by completing FILM 161, 162 by the end of their sophomore year, and continue with FILM 355, 356 by the end of their junior year, to prepare for FILM 455, 456 or 483, 484 in their senior year. Those students interested in screenwriting often begin with FILM 350. Students interested in filmmaking should also take courses in screenwriting, and vice versa. Some production courses are available in the summer program in Prague.

Senior project Students who wish to complete a senior project as an alternative to an essay must petition the Film and Media Studies Committee for approval of their project at the end of the junior year. Projects might include writing a screenplay or producing a video. Students electing such an alternative should note that the project must be undertaken and accomplished over two terms. A limited number of students making films or videos are admitted to either the Advanced Fiction Film Workshop (FILM 483, 484) or the Documentary Film Workshop (FILM 455, 456), and receive three credits for their projects (two credits for FILM 483, 484 or 455, 456, and one for FILM 493 or 494). Such a choice effectively commits students to one extra course in addition to the twelve courses required for the major, because FILM 493 or 494 does not count toward the fourteen required courses when taken in conjunction with FILM 483, 484 or 455, 456. Students may undertake a production project outside the workshops if (1) the Film and Media Studies Committee approves their petition, (2) they have found a primary adviser qualified and willing to provide the necessary supervision, and (3) they have identified the equipment necessary to execute the project. Such students may count FILM 493 and 494 toward the twelve courses required for the major.

Preparation for a senior essay Students in their senior year may prefer to write a senior essay rather than work on a creative project. To prepare, they should take advantage of the variety of courses in film history, media studies, and criticism and theory offered by the program, as well as such topics as American independent cinema, film theory, and African American cinema.

Senior essay For the student writing a senior essay, several options are possible. First, the student may enroll in two terms of relevant senior-level seminars (usually courses numbered in the 400s) and write a substantial term paper of twenty-five pages, double-

spaced, for one of these courses. Second, the student may do independent research on a yearlong senior essay (FILM 491, 492). This option is intended for students with clearly defined topics that do not relate closely to a senior-level seminar. During the first two weeks of the first term of senior year, a petition for permission to do independent research should be submitted to the DUS in the form of a brief prospectus, approved by the proposed faculty adviser to the essay. Such research receives two terms of credit; the product of a two-term research essay is a work of at least fifty pages. Third, the senior requirement may be completed by combining one single-term senior-level seminar with one term of an independent research project (FILM 491 or 492), resulting in a paper of thirty-five pages. Whichever option is chosen, the essay should be written on a topic informed by the student's previous course work at Yale College. In researching and writing the essay, the student should consult regularly with the seminar instructor, supplying preliminary drafts as appropriate, and may consult with other faculty members as well.

ADVISING

Foreign Languages Study of relevant foreign languages is urged for all Film and Media Studies majors. Students considering graduate work should become proficient in French or another modern language. Those choosing to study film in relation to a foreign culture must have good listening and reading abilities in that language.

REQUIREMENTS OF THE MAJOR

Prerequisite FILM 150

Number of courses 12 term courses, incl prerequisite and senior requirement

Specific courses required FILM 160 and FILM 320

Distribution of courses 1 upper-level national or world cinema course (non-American); 1 production course; 1 critical studies course

Senior requirement *For senior essay*—2 terms of senior-level seminars, or 2 terms of senior essay (FILM 491, 492), or 1 term of each; *for senior project*—2 terms of senior project in FILM 455, 456, or 483, 484, and either FILM 493 or 494, for a total of 13 term courses; or 2 terms of senior project in FILM 493, 494 *with approved petition*

Intensive major Both senior project in production and senior essay

FACULTY ASSOCIATED WITH THE PROGRAM OF FILM AND MEDIA STUDIES

Professors *Dudley Andrew (*Comparative Literature, Film & Media Studies*), Carol Armstrong (*History of Art*), David Bromwich (*English*), *Francesco Casetti (*Chair*) (*Humanities, Film & Media Studies*), *Katerina Clark (*Comparative Literature, Slavic Languages & Literatures*), Michael Denning (*American Studies, English*), *Aaron Gerow (*East Asian Languages & Literatures, Film & Media Studies*), Inderpal Grewal (*Women's, Gender, & Sexuality Studies*), *John MacKay (*Film & Media Studies, Slavic Languages & Literatures*), *Millicent Marcus (*Italian*), Kobena Mercer (*History of Art, African American Studies*), *Charles Musser (*American Studies, Film & Media Studies*), John Durham Peters (*English, Film & Media Studies*), *Brigitte Peucker (*German, Film & Media Studies*), *Katie Trumpener (*Comparative Literature, English*), Laura Wexler (*American Studies, Women's, Gender, & Sexuality Studies*)

Associate Professors Moira Fradinger (*Comparative Literature*), Zareena Grewal (*Ethnicity, Race, & Migration*), Brian Kane (*Music*), Brian Walsh (*English*), *R. John Williams (*English*)

Assistant Professors Marijeta Bozovic (*Slavic Languages & Literatures, Film & Media Studies, Women's Gender & Sexuality Studies*), *Rizvana Bradley (*African American Studies, Film & Media Studies*), Marta Figlerowicz (*Comparative Literature, English*)

Senior Lecturer *Marc Lapadula (*Film & Media Studies*)

Lecturers *Jonathan Andrews (*Art, Film & Media Studies*), James Charney (*School of Medicine*), Oksana Chefranova (*Film & Media Studies*), Michael Kerbel (*American Studies, Film & Media Studies*), Camille Thomasson (*Film & Media Studies*)

Critic Sandra Luckow (*Art*)

Senior Lectors Krystyna Illakowicz (*Slavic Languages & Literatures*), Karen von Kunes (*Slavic Languages & Literatures*)

*Member of the Film and Media Studies Advisory Committee.

Required Courses

FILM 150a, Introduction to Film Studies John MacKay and Rizvana Bradley
A survey of film studies concentrating on theory, analysis, and criticism. Students learn the critical and technical vocabulary of the subject and study important films in weekly screenings. Prerequisite for the major. WR, HU

FILM 160b / ENGL 196b, Introduction to Media Francesco Casetti
Introduction to the long history of media as understood in classical and foundational (and even more recent experimental) theories. Topics involve the technologies of modernity, reproduction, and commodity, as well as questions regarding knowledge, representation, public spheres, and spectatorship. Special attention given to philosophies of language, visuality, and the environment, including how digital culture continues to shape these realms. WR, HU

* **FILM 320b, Close Analysis of Film** Oksana Chefranova
Ways in which traditional genres and alternative film forms establish or subvert convention and expectation and express thematic and ideological concerns. The balancing of narrative containment and excess, as well as action and image. Use of body and voice, space and music. Examples include films by Antonioni, Zhang, Ozu, and Hitchcock. Prerequisite: FILM 150. HU

National Cinemas

FILM 240b / ENGL 192b / LITR 143b, World Cinema Dudley Andrew
Development of ways to engage films from around the globe productively. Close analysis of a dozen complex films, with historical contextualization of their production and cultural functions. Attention to the development of critical skills. Includes weekly screenings, each followed immediately by discussion. HU

* **FILM 243b / MGRK 218b / WGSS 245b, Family in Greek Literature and Film**
George Syrimis

The structure and multiple appropriations of the family unit, with a focus on the Greek tradition. The influence of aesthetic forms, including folk literature, short stories, novels, and film, and of political ideologies such as nationalism, Marxism, and totalitarianism. Issues related to gender, sibling rivalry, dowries and other economic factors, political allegories, feminism, and sexual and social violence both within and beyond the family. WR, HU TR

* **FILM 360b / LITR 301b / RUSS 380b, Putin's Russia and Protest Culture** Marijeta Bozovic

Survey of Russian literature and culture since the fall of communism. The chaos of the 1990s; the solidification of power in Putin's Russia; the recent rise of protest culture. Sources include literature, film, and performances by art collectives. Readings and discussion in English; texts available in Russian. WR, HU

* **FILM 419b / GMAN 368b / LITR 382b, German New Waves in Cold War Europe**
Katie Trumpener

Comparative study of New Wave cinema in East and West Germany, with a focus on aesthetic ferment, institutional barriers, and transformation. Berlin as the best place to follow Europe's emerging cinematic New Waves before 1961. Distinctive approaches developed by young filmmakers in East and West Germany to political and documentary filmmaking, to the Nazi past and the Cold War, and to class, gender, and social transformation. Knowledge of German helpful but not necessary. WR, HU

* **FILM 457b / ITAL 303b / LITR 359b, Italian Film from Postwar to Postmodern**
Millicent Marcus

A study of important Italian films from World War II to the present. Consideration of works that typify major directors and trends. Topics include neorealism, self-reflexivity and metacinema, fascism and war, and postmodernism. Films by Fellini, Antonioni, Rossellini, De Sica, Visconti, Pasolini, Bertolucci, Wertmuller, Tornatore, and Moretti. Most films in Italian with English subtitles. WR, HU

Film Theory, Visual Media, and Special Topics

* **FILM 045b / THST 099b, Dance on Film** Emily Coates

An examination of dance on film from c. 1920 to the present, including early Hollywood pictures, the rise of Bollywood, avant-garde films of the postwar period, translations of stage choreography to screen, music videos, and dance film festivals. The impact of industry, circulation and audience, aesthetic lineages, and craft in the union of the two mediums. Students develop an original short film for a final class project. No prior dance or filmmaking experience necessary. Enrollment limited to first-year students. Preregistration required; see under First-Year Seminar Program. WR, HU

* **FILM 099a / LITR 099a, Film and the Arts** Dudley Andrew

A study of cinema as it developed into a significant art form, including its interactions with fiction, theater, and painting. Focus on André Bazin's reflections on cinema in response to Chaplin, Welles, and Cocteau, as well as to writers such as Faulkner, Sartre, and Malraux. Enrollment limited to first-year students. Preregistration required; see under First-Year Seminar Program. WR, HU RP

FILM 232b, Classical Hollywood Narrative 1920–1960 Camille Thomasson

Survey of Classical Hollywood films. Topics include history of the studio system; origin and development of genres; the film classics of the Classical Hollywood period, and the producers, screenwriters, directors, and cinematographers who created them. WR, HU

FILM 244a / AMST 247a / HIST 147a / HLTH 170a / HSHM 202a, Media and Medicine in Modern America John Warner and Gretchen Berland

Relationships between medicine, health, and the media in the United States from 1870 to the present. The changing role of the media in shaping conceptions of the body, creating new diseases, influencing health and health policy, crafting the image of the medical profession, informing expectations of medicine and constructions of citizenship, and the medicalization of American life. HU

* **FILM 346b / GMAN 225b / LITR 362b, Intermediality in Film** Brigitte Peucker
Film is a hybrid medium, the meeting point of several others. This course focuses on the relationship of film to theater, painting, and video, suggesting that where two media are in evidence, there is usually a third. Topics include space, motion, framing, color, theatricality, tableau vivant, ekphrasis, spectatorship, and new media. Readings feature art historical and film theoretical texts as well as essays pertinent to specific films. Films by Fassbinder, Bergman, von Trier, Jarman, Godard, Haneke, Antonioni, Greenaway and others. HU

* **FILM 406a / ITAL 304a / LITR 367a, Literature into Film** Millicent Marcus
Strategies employed by filmmakers who adapt literary works to the screen. Detailed comparisons between cinematic adaptations and the novels, plays, and short stories on which they are based. Case studies of literary works that pose a variety of challenges to filmmakers. HU

* **FILM 454b / AMST 454b / ER&M 388b, Narrating the Lives of Refugees** Zareena Grewal
Analysis of contemporary representations of refugee experiences with special attention to the processes by which war, colonialism, displacement, encampment, and racialization shape the lives of refugees in New Haven and beyond. Topics include the representation of refugees as a source of political crisis; one dimensional representations of refugees as victims in need of rescue, national subjects unfit for citizenship, and as a political and social threat; and how current refugee problems create definitional difficulties for states and international agencies. HU, SO

Production Seminars

* **FILM 161b / ART 241b, Introductory Film Writing and Directing** Sandra Luckow
Problems and aesthetics of film studied in practice as well as in theory. In addition to exploring movement, image, montage, point of view, and narrative structure, students photograph and edit their own short videotapes. Emphasis on the writing and production of short dramatic scenes. Priority to majors in Art and in Film & Media Studies. Materials fee: \$150. Prerequisite for all majors: ART 142; additional prerequisite for Film & Media Studies majors: FILM 150. RP

* **FILM 162a or b / ART 142a or b, Introductory Documentary Filmmaking** Sandra Luckow

The art and craft of documentary filmmaking. Basic technological and creative tools for capturing and editing moving images. The processes of research, planning,

interviewing, writing, and gathering of visual elements to tell a compelling story with integrity and responsibility toward the subject. The creation of nonfiction narratives. Issues include creative discipline, ethical questions, space, the recreation of time, and how to represent "the truth." Materials fee: \$150. RP

* **FILM 330a, The Screenwriter's Craft** Camille Thomasson

A rigorous writer's workshop. Students conjure, write, rewrite, and study films. Read screenplays, view movie clips, parse films, and develop characters and a scenario for a feature length screenplay. By the end of term, each student will have created a story outline and written a minimum of fifteen pages of an original script. All majors welcome.

* **FILM 350a or b, Screenwriting** Marc Lapadula

A beginning course in screenplay writing. Foundations of the craft introduced through the reading of professional scripts and the analysis of classic films. A series of classroom exercises culminates in intensive scene work. Prerequisite: FILM 150. Not open to freshmen.

FILM 355b / ART 341b, Intermediate Film Writing and Directing Jonathan Andrews

In the first half of the term, students write three-scene short films and learn the tools and techniques of staging, lighting, and capturing and editing the dramatic scene. In the second half of the term, students work collaboratively to produce their films. Focus on using the tools of cinema to tell meaningful dramatic stories. Materials fee: \$150. Enrollment limited to 8. Priority to majors in Art and in Film & Media Studies. Prerequisites: ART 241. RP

FILM 356a / ART 342a, Intermediate Documentary Filmmaking Sandra Luckow

Students explore the storytelling potential of the film medium by making documentary art. The class concentrates on finding and capturing intriguing, complex scenarios in the world and then adapting them to the film form. Questions of truth, objectivity, style, and the filmmaker's ethics are considered using examples of students' work. Exercises in storytelling principles. Materials fee: \$150. Limited enrollment. Priority to majors in Art and in Film & Media Studies. Prerequisites: ART 141 or 142, and FILM 150. HU RP

* **FILM 395b, Intermediate Screenwriting** Marc Lapadula

A workshop in writing short screenplays. Frequent revisions of each student's script focus on uniting narrative, well-delineated characters, dramatic action, tone, and dialogue into a polished final screenplay. Prerequisite: FILM 350. Priority to majors in Film & Media Studies.

* **FILM 397b / ENGL 244b / THST 228b, Writing about the Performing Arts**

Margaret Spillane

Introduction to journalistic reporting on performances as current events, with attention to writing in newspapers, magazines, and the blogosphere. The idea of the audience explored in relation to both a live act or screening and a piece of writing about such an event. Students attend screenings and live professional performances of plays, music concerts, and dance events. WR, HU

* **FILM 455a and FILM 456b / AMST 463a and AMST 464b / EVST 463a and EVST 464b, Documentary Film Workshop** Charles Musser

A yearlong workshop designed primarily for majors in Film and Media Studies or American Studies who are making documentaries as senior projects. Seniors in other majors admitted as space permits. RP

* **FILM 483a and FILM 484b / ART 442a and ART 443b, Advanced Film Writing and Directing** Jonathan Andrews

A yearlong workshop designed primarily for majors in Art and in Film & Media Studies making senior projects. Each student writes and directs a short fiction film. The first term focuses on the screenplay, production schedule, storyboards, casting, budget, and locations. In the second term students rehearse, shoot, edit, and screen the film. Materials fee: \$150. Enrollment limited to 8. Priority to majors in Art and in Film & Media Studies. Prerequisite: ART 341.

* **FILM 487a and FILM 488b, Advanced Screenwriting** Marc Lapadula

Students write a feature-length screenplay. Emphasis on multiple drafts and revision. Admission in the fall term based on acceptance of a complete step-sheet outline for the story to be written during the coming year. Primarily for Film & Media Studies majors working on senior projects. Prerequisite: FILM 395 or permission of instructor.

Individual Research and Senior Essay Course or Project

* **FILM 471a or b, Independent Directed Study** Katerina Clark

For students who wish to explore an aspect of film and media studies not covered by existing courses. The course may be used for research or directed readings and should include one lengthy essay or several short ones as well as regular meetings with the adviser. To apply, students should present a prospectus, a bibliography for the work proposed, and a letter of support from the adviser to the director of undergraduate studies. Term credit for independent research or reading may be granted and applied to any of the requisite areas upon application and approval by the director of undergraduate studies.

* **FILM 491a and FILM 492b, The Senior Essay** Katerina Clark

An independent writing and research project. A prospectus signed by the student's adviser must be submitted to the director of undergraduate studies by the end of the second week of the term in which the essay project is to commence. A rough draft must be submitted to the adviser and the director of undergraduate studies approximately one month before the final draft is due. Essays are normally thirty-five pages long (one term) or fifty pages (two terms).

* **FILM 493a and FILM 494b, The Senior Project** Katerina Clark

For students making a film or video, either fiction or nonfiction, as their senior project. Senior projects require the approval of the Film and Media Studies Committee and are based on proposals submitted at the end of the junior year. An interim project review takes place at the end of the fall term, and permission to complete the senior project can be withdrawn if satisfactory progress has not been made. For guidelines, consult the director of undergraduate studies. Does not count toward the fourteen courses required for the major when taken in conjunction with FILM 455, 456 or FILM 483, 484.

First-Year Seminar Program

The First-Year Seminar program offers a diverse array of courses open only to first-year students and designed with first-year students in mind. Enrollment in seminars is limited to fifteen or eighteen students, depending on the nature of the course. Most seminars meet twice each week and do not, unless otherwise noted, presume any prior experience in the field. Students must apply and preregister for first-year seminars before the beginning of each term. To ensure that all applicants share an equal chance at enrolling in a seminar, students are admitted by lottery from among those who apply. Students who do not preregister may be considered for placement at the instructor's discretion if space is available. Information regarding application procedures may be found on the program's website.

Courses

- * **AMST 025b / WGSS 025b, The American Essay Tradition** Greta LaFleur
 Exploration of the American essay tradition, from some of its earliest moments to more recent iterations. Consideration of the essay as a rhetorical form, a political tool, and a literary tradition. Authors include Thomas Paine, Claudia Rankine, Benjamin Franklin, Virginia Woolf, James Baldwin, Cherrie Moraga, Sherman Alexie, and Hilton Als. Students will write political essays, as well as develop competencies in literary analysis. Enrollment limited to first-year students. Preregistration required; see under First-Year Seminar Program. HU
- * **APHY 050a / PHYS 050a, Science of Modern Technology and Public Policy** Daniel Prober
 Examination of the science behind selected advances in modern technology and implications for public policy, with focus on the scientific and contextual basis of each advance. Topics are developed by the participants with the instructor and with guest lecturers, and may include nanotechnology, quantum computation and cryptography, renewable energy technologies, optical systems for communication and medical diagnostics, transistors, satellite imaging and global positioning systems, large-scale immunization, and DNA made to order. Enrollment limited to first-year students. Preregistration required; see under First-Year Seminar Program. SC RP
- * **ART 004b, Words and Pictures** Halsey Rodman
 Introduction to visual narration, the combination of words and pictures to tell a story. Narrative point of view, counternarrative and counterculture, visual satire, personal history, depictions of space and time, and strategies and politics of representation. Sources include illuminated manuscripts, biblical paintings, picture-stories, comic strips, and graphic novels. Enrollment limited to first-year students. Preregistration required; see under First-Year Seminar Program. HU RP
- * **ART 006b, Art of the Printed Word** Richard Rose
 Introduction to the art and historical development of letterpress printing and to the evolution of private presses. Survey of hand printing; practical study of press operations using antique platen presses and the cylinder proof press. Material qualities of printed matter, connections between content and typographic form, and word/image relationships. Enrollment limited to first-year students. Preregistration required; see under First-Year Seminar Program. HU

* **ART 007b, Art of the Game** Sarah Stevens-Morling

Introduction to interactive narrative through video game programming, computer animation, and virtual filmmaking. Topics include interactive storytelling, video game development and modification, animation, and virtual film production. Students produce a variety of works including web-based interactive narratives, collaboratively built video games, and short game-animated film production (machinima). Enrollment limited to first-year students. Preregistration required; see under First-Year Seminar Program.

* **ART 011a, New Voices in Photography** Matthew Leifheit

An introduction to the landscape of emerging and contemporary voices in the field of photography as contemporary art. Students are exposed to relevant conversations through visits by new and emerging curators, writers, publishers, and dealers as well as rising artists. The program of guests and visits to exhibitions is interlaced with a series of focused discussions and short lectures in the classroom, based on a schedule of assigned and recommended readings by new voices in art criticism and theory. Students read critical responses to photographs in publications both online and in print, and bring sources to share with the class. The course concludes with the production and circulation of a publication on a topic chosen by the class for the community at Yale and perhaps beyond. Enrollment limited to first-year students. Preregistration required; see under First-Year Seminar Program. HU RP

* **ART 012b, On Activism: The Visual Representation of Protest and Disruption**

Pamela Hovland

An introduction to the visual representations of protest, struggle, and revolution in this country from the Vietnam War to the present moment. The course explores a range of historically significant social and political movements, visual (communication) and dissemination strategies, and working methods. The primary goal of this studio-based course is to investigate and expand the designer/artist's ability to express a point of view, transform contemporary understanding of local and national issues through a series of exercises, iterative making and experiments in distribution methods via solo and collaborative work. The students' practice is supported by close readings, independent research, case studies, field trips, and presentations from a diverse collection of people directly involved in activism. Enrollment limited to first-year students. Preregistration required; see under First-Year Seminar Program. HU

* **ART 013a, Temperamental Spaces** Staff

Spaces can sometimes appear as idiosyncratic as the people within them, taking on characteristics we usually ascribe to ourselves. They can appear erratic, comforting, uncanny—even threatening. Working like a therapy session for architecture, the body, and the objects around us, this seminar analyzes a diverse collection of readings and works, ranging from Renaissance mysticism to conceptual art and film, to explore how the visual arts have utilized a productive, but skeptical, relationship with space. Enrollment limited to first-year students. Preregistration required; see under First-Year Seminar Program. HU

* **ASTR 030b, Search for Extraterrestrial Life** Michael Faison

Introduction to the search for extraterrestrial life. Review of current knowledge on the origins and evolution of life on Earth; applications to the search for life elsewhere in the universe. Discussion of what makes a planet habitable, how common these worlds are in the universe, and how we might search for them. Survey of past, current, and future

searches for extraterrestrial intelligence. Enrollment limited to first-year students. Preregistration required; see under First-Year Seminar Program. WR, SC

* **CLCV 052a, The Myths of Oedipus** Staff

Study of different versions of the Oedipus myth, beginning with Sophocles' three plays (*Oedipus the King*, *Antigone*, and *Oedipus at Colonus*) and including modern adaptations such as those by Cocteau (*The Infernal Machine*), Fugard (*The Island*), and Dove (*The Darker Face of the Earth*); we also consider filmed adaptations such as Martha Grahame's "Night Journey" (1947), *The Gospel at Colonus* (1984), and *Oedipo alcalde* (1996). Secondary material, including works by cultural, psychological, and literary critics, provide background for the literary works. Readings, writing exercises, and discussion aim both to elucidate the original context of the plays in fifth-century Athens and to understand their contested and still vigorous place in the canon and in the western humanities. All readings in English. Enrollment limited to first-year students. Preregistration required; see under First-Year Seminar Program. HU

* **CPSC 035b, Twenty-First Century Electronic and Computer Music Techniques**

Scott Petersen

Exploration of twenty-first century electronic and computer music through the diverse subjects and issues at the intersection of technology and new music. How computers have changed and challenged the analysis, composition, production, and appreciation of music over the last fifty years. Knowledge of basic music theory and the ability to read Western musical notation is assumed. Enrollment limited to first-year students. Preregistration required; see under First-Year Seminar Program.

[**E&EB 050, The Evolution of Beauty**]

* **ENGL 010b, Jane Austen** Staff

Close study of Austen's novels, with special attention to the critique of social and literary convention. Enrollment limited to first-year students. Preregistration required; see under First-Year Seminar Program. WR, HU

* **ENGL 015a / AFAM 016 / AFST 015a, South African Writing after Apartheid**

Stephanie Newell

An introduction to creative writing published in South Africa from the end of Apartheid in 1994 to the present. Close readings of contemporary fiction with additional material drawn from popular culture, including films, magazines, and music. Enrollment limited to first-year students. Preregistration required; see under First-Year Seminar Program.

WR, HU

* **ENGL 021b, Fiction and Consciousness** Jonathan Kramnick

Study of literature and the representation of consciousness, focusing in particular on the novel, from Jane Austen to the present. What literature can tell us about the way minds work; how novels represent the felt experience of people going about their lives; how literature partners with other ways of understanding the mind, such as psychology and neuroscience. Enrollment limited to first-year students. Preregistration required; see under First-Year Seminar Program. WR, HU

* **ENGL 023b / HUMS 072b, Reading Recent North American Short Fiction** Joseph

Gordon

The short story is generally considered to be North American in origin. As one of its goals, the course examines the ways in which the genre has developed in recent decades into a vehicle for storytelling from marginalized or subaltern voices such

as those of people of color, women, LGBT people, immigrants and refugees, war veterans, students, and children. The course also explores how collections of stories gathered by a single author may resemble but yet be distinguishable from novels, and examines some very recent short stories that are influenced by nontraditional forms of imaginative writing, such as graphic fiction, self-help manuals, and social media. Authors are likely to include: Grace Paley, Alice Munro, Raymond Carver, Rohinton Mistry, ZZ Packer, Sherman Alexie, Tao Lin, Jhumpa Lahiri, Edward P. Jones, Elizabeth Strout, Junot Diaz, Phil Klay, Viet Thanh Nguyen, Alison Bechdel, Lorrie Moore, Jennifer Egan, and Teju Cole. Enrollment limited to first-year students. Preregistration required; see under First-Year Seminar Program. WR, HU

* **ENGL 025a / LITR 023a / SAST 059a, Modern South Asian Literature, 1857-2017**
Staff

Exploration of literary texts from South Asia, 1857 to the present. Close reading of literary texts from India, Pakistan, Bangladesh, and Sri Lanka, alongside political speeches, autobiographies, and oral narratives. Topics include colonialism, history writing, migration, language, caste, gender and desire, translation, politics and the novel. Enrollment limited to first-year students. Preregistration required; see under First-Year Seminar Program. WR, HU

* **EVST 007a, The New England Forest** Marlyse Duguid

Exploration of the natural history of southern New England, with specific focus on areas in and around New Haven. Pertinent environmental issues, such as climate change, endangered species, and the role of glacial and human history in shaping vegetative patterns and processes, are approached from a multi-disciplinary framework and within the context of the surrounding landscape. Enrollment limited to freshmen. Preregistration required; see under Freshman Seminar Program.

* **EVST 020a / F&ES 020a, Sustainable Development in Haiti** Gordon Geballe

The principles and practice of sustainable development explored in the context of Haiti's rich history and culture, as well as its current environmental and economic impoverishment. Enrollment limited to first-year students. Preregistration required; see under First-Year Seminar Program. WR

* **FREN 096b, Women's Narratives of Self in Modern French Literature** Maryam Sanjabi

The course explores women's autobiographical literature, demonstrating their uniqueness from an individual perspective and capturing the social, economic, religious, and ethnic themes of the period and their authors' intellectual standpoints. The selected books represent a variety of literary genres ranging from memoir to journal, graphic novel, and film scripts with a focus on the 20th and 21st centuries as they appear in the works of: Colette, Simone de Beauvoir, Nathalie Sarraute, Lucie Aubrac, Hélène Berr, Assia Djebar, Ken Bugul, Agnès Varda, Marjane Satrapi, Marguerite Duras, Annie Ernaux, and Camille Laurens among others. This course thus aims at a critical awareness of what modernity has meant in women's experiences and why debate about its consequences often revolves around women's lives. While some authors explore the coming of age of European gender awareness, others deal with the war and resistance and more recent non-Western voices in French pose the question of identity of the "Other." Course readings include short theoretical essays and a number

of secondary works. Enrollment limited to first-year students. Preregistration required; see under First-Year Seminar Program. HU

* **FILM 099a / LITR 099a, Film and the Arts** Dudley Andrew

A study of cinema as it developed into a significant art form, including its interactions with fiction, theater, and painting. Focus on André Bazin's reflections on cinema in response to Chaplin, Welles, and Cocteau, as well as to writers such as Faulkner, Sartre, and Malraux. Enrollment limited to first-year students. Preregistration required; see under First-Year Seminar Program. WR, HU RP

* **G&G 010a / EVST 010a, Earth, Resources, Energy, and the Environment** Mary-Louise Timmermans

Humankind's interactions with, and place within, the natural world. Plate tectonics and natural disasters, biological evolution and mass extinction, human evolution, population growth and ecology, industrial resources, groundwater and pollution, fossil fuels and energy transitions, the carbon cycle and greenhouse gases, paleoclimates, current global warming, alternative energies, and a planetary perspective on the Earth as a singular oasis in space. Enrollment limited to first-year students. Preregistration required; see under First-Year Seminar Program. SC

* **HIST 015b, History of Food and Cuisine** Paul Freedman

The history of food from the Middle Ages to the present, with a focus on the United States and Europe. How societies gathered and prepared food; culinary tastes of different times and places. The influence of taste on trade, colonization, and cultural exchange. The impact of immigration, globalization, and technology on food. Enrollment limited to freshmen. Preregistration required; see under Freshman Seminar Program. HU

* **HIST 022a, What History Teaches** John Gaddis

An introduction to the discipline of history. History viewed as an art, a science, and something in between; differences between fact, interpretation, and consensus; history as a predictor of future events. Focus on issues such as the interdependence of variables, causation and verification, the role of individuals, and to what extent historical inquiry can or should be a moral enterprise. WR, HU

* **HIST 033a / WGSS 033a, Fashion in London and Paris, 1750 to the Present** Staff
Introduction to the history of Western fashion from the mid-eighteenth century to the present, with a focus on Paris and London. Approaches, methods, and theories scholars have historically employed to study fashion and dress. Enrollment limited to first-year students. Preregistration required; see under First-Year Seminar Program. WR, HU

* **HIST 040a, Comparative Women's History** Rebecca Tannenbaum

Comparative perspective on the lives of women and their experiences, the ways in which historical forces shaped gender roles in different cultures, and the similarities and differences in gender roles across different time periods and around the world. Topics include work, family roles, political participation, health and sexuality, religious roles, and global feminisms. WR, HU

* **HIST 041a, The Americas in the Age of Revolutions** Staff

The connections, contrasts, and legacies of revolutions in the British, French, and Spanish Atlantic empires in the eighteenth and nineteenth centuries. Interactions between liberalism, black politics and antislavery, indigenous autonomy and citizenship, and revolutions in the Atlantic world between the 1760s and 1880s.

Topics include the foundations of the Atlantic empires, strands of anticolonialism across the Americas, social aspects of the revolutionary movements, abolitionism and emancipation processes, and relations between the emergent American nations. Enrollment limited to first-year students. Preregistration required; see under First-Year Seminar Program. WR, HU

* **HIST 042a / MMES 042a, Oil and Empire** Rosie Bsheer

The political and social history of oil since the late nineteenth century, including global trends and processes. Oil's impact on the rise and fall of empires and the fates of nation-states; its role in war and its impact on social and cultural life. Focus on the Middle East, with some attention to Venezuela, Indonesia, and the Niger Delta. Enrollment limited to first-year students. Preregistration required; see under First-Year Seminar Program. WR, HU

* **HIST 052b, Latin America from the Nineteenth Century to the Present** Marcela Echeverri Munoz

Introduction to Latin American history, beginning with the independence processes that led to the creation of the region's nations in the nineteenth century. Focus on nationalism, race, revolution, and development. Exploration of ideas, technology, economic forces, and people that have transformed Latin American landscapes and politics. WR, HU

* **HIST 055b, A History of Modern London** Staff

Chronological and thematic exploration of modern London as a metropolitan and imperial center from the late-nineteenth-century to the present day. Topics include race, gay rights, women's rights, consumer culture, the experience of war, and the development of a multi-racial society. The fashion, food, and popular music of London emerge as important components of the city's global identity in the twentieth century. Enrollment limited to first-year students. Preregistration required; see under First-Year Seminar Program. WR, HU

* **HIST 089b / HUMS 090b, Thinking about History** Stuart Semmel

An introduction to the discipline of history. Exploration of influential historical narratives; the philosophy of history; the emergence of historical subdisciplines including history from below, microhistory, the new cultural history, and Big History; and interdisciplinary engagement with anthropology, literary criticism, art history, and psychology. Enrollment limited to first-year students. Preregistration required; see under First-Year Seminar Program. WR, HU

* **HIST 080a, The Vietnam Wars** Staff

Exploration of the history of twentieth-century wars in Vietnam, including but not limited to the "American War." Through course readings and independent research, students examine the nature of Vietnamese colonial experience, the post-World War II settlement, and the growing anti-colonial conflict that had a dramatic impact on Vietnam, the United States, and the world. Students use fictional accounts, documentaries, and news reports as well as historians' writings to deepen their knowledge of the Vietnam Wars, at the same time using these sources to contemplate how historians write history – and how all of us understand the past. Enrollment limited to first-year students. Preregistration required; see under First-Year Seminar Program. WR, HU

* **HSAR 007a, Art and Science** Carol Armstrong

The historical relationship between art and science in the West, from the Renaissance to the present. Case studies illustrate the similarities and differences between the way artists and scientists each model the world, in the studio and the laboratory. *Enrollment limited to freshmen. Preregistration required. Please go to the following website to enter preferences for seminars: <https://students.yale.edu/ocs-preference/select/select?id=2041>* WR, HU

* **HSAR 010b / HSAR 417, The Classical Tradition: from Roman to Renaissance Art**
Felicity Harley

The influence of classical Greco-Roman antiquity on early Christian, medieval, and Italian Renaissance art explored through study of objects in the Yale Art Gallery (statuary, coins, textiles, gems, and paintings). Topics include: the lure of antiquities; collecting and birth of the museum; naturalism and nudity; sculpture and iconophobia; religion and iconoclasm; iconographic models of paradise, beauty, power, and authority; and patronage and propaganda. HU

* **HSAR 015a / SAST 060, Ten Indian Objects** Staff

A 5000-year-old stone seal, a 20th century comic book, an emperor's painted portrait, a processional bronze god, a miniature temple, an inscribed pillar, a rock crystal reliquary, a serene Buddha, an animated film, and a towering female figure. Through rigorous explorations of these ten objects from South Asia this seminar teaches close looking, vivid writing, and narrating history through things. It considers both the biographies of the objects and their involvement in the wider social, political, artistic, and cultural histories of the Indian subcontinent. Students engage some of the most exciting scholarship in the field of South Asian art, and observe, draw, and write about things in museums and art collections on a weekly basis. Enrollment limited to first-year students. Preregistration required; see under First-Year Seminar Program. HU

* **HUMS 071a, Intellectual Circles** Charles Hill

Study of the creative interactions produced by informal associations of innovative minds in literature, philosophy, politics, science, psychology, the arts, war, and law. Courtiers, advisors, disciples, and disputers around Confucius, Socrates, Lincoln, Freud, Wittgenstein, and Niebuhr are among the circles considered. Groups include American Founders, quantum physicists, computer scientists, Gertrude Stein's "Lost Generation" of Americans in Paris, "The Georgetown Set" of Cold War friends and rivals, and the Supreme Court. HU

* **HUMS 075a, Mastering the Art of Watercolor** Adam Van Doren

An introductory course on the art of watercolor as a humanistic discipline within the liberal arts tradition. Readings, discussions, and studio work emphasize critical, creative thinking through a tactile, "learning by doing" study of the watercolor medium. Students analyze and imitate the classic techniques of J. M.W. Turner, John Singer Sargent, Georgia O'Keeffe, and Edward Hopper, among others. Studio components include painting *en plein air* to understand color, form, perspective, composition, and shade and shadow. Basic drawing skills recommended. Enrollment limited to first-year students. Preregistration required; see under First-Year Seminar Program. HU RP

* **HUMS 078b, Shakespeare and Music** Judith Malafronte

The use of music in Shakespeare's plays, from the original stagings and seventeenth-century adaptations to modern productions. Consideration of operatic versions of the

plays from the nineteenth, twentieth, and twenty-first centuries. Includes a field trip to New York City. Enrollment limited to first-year students. Preregistration required; see under First-Year Seminar Program. HU

* **HUMS 080a, Transforming Literature into Opera** Judith Malafrente
Examination of ten operatic masterpieces and their literary source material, with consideration of the roles of the composer and the librettist in fashioning poems, short stories, and plays into operatic works. Enrollment limited to first-year students. Preregistration required; see under First-Year Seminar Program. HU

* **HUMS 092b / RLST 012b, Divine Law in Historical Perspective** Christine Hayes
Exploration of the divergent notions of divine law in Greco-Roman antiquity and biblical Israel; the cognitive dissonance their historical encounter engendered and attempts by Jewish, Christian, and contemporary secular thinkers to negotiate competing claims. Topics include: debates over the attributes and nature of divine law versus human law; the grounds of divine law's authority; law as a religious expression versus law as debasement of the divine-human relationship; the impact of divine law debates on secular legal theory. Enrollment limited to first-year students. Preregistration required; see under First-Year Seminar Program. HU

* **MB&B 050b, Topics in Cancer Biology** Sandy Chang
Introduction to cancer as a genetic disease, with a focus on major discoveries in cancer biology that offer mechanistic insights into the disease process. A brief history of cancer; influence of the genomic revolution on cancer diagnostics; molecular defects underlying specific cancers; current and future cancer therapeutics. Patient case studies highlight specific molecular pathways and treatment strategies. Enrollment limited to first-year students with a strong background in biology and/or chemistry, typically demonstrated by a score of 5 on Advanced Placement examinations. Preregistration required; see under First-Year Seminar Program. SC

* **MATH 077b, Math as a Creative Art** Patrick Devlin
This course focuses on the creative process central to mathematical reasoning rather than mechanical manipulation of symbols. Unlike a typical math class, this course deals entirely with the aesthetics of math, and no prior mathematical background is required or assumed. Topics include puzzles, strategy games, social networks, symmetries, number theory, infinity, and beyond. Enrollment limited to first-year students. Preregistration required; see under First-Year Seminar Program. QR

* **MB&B 060a, Molecular Medicine** Sandy Chang
The main purpose of this course is to use benign and malignant hematological disorders to introduce fundamental concepts in molecular and cellular biology. Students emerge from this course with a firm understanding of the molecular pathways perturbed in various hematological disorders and the therapeutics currently used to exploit these pathways for disease treatment. Through lectures and reading of primary scientific literature, students learn about landmark discoveries in hematology and how these discoveries contribute to understanding of the normal hematopoietic system, and when perturbed, how diseases arise. Students also learn to (1) read primary scientific literature, (2) synthesize this material to present to the class and (3) learn how to write a short grant proposal. These skills are essential for any successful scientist or physician, and it's important to master them early. Enrollment limited to first-year students.

Preregistration required; see under First-Year Seminar Program. Prerequisite: score of 5 on the AP Biology exam or AP Chemistry exam. SC

* **MCDB 040b, The Science and Politics of Cancer** Robert Bazell

Fundamentals of cell biology, Darwinian evolution, immunology, and genetics that underlie cancer; the history of cancer science and treatment; historical and current policy issues. Enrollment limited to first-year students. Preregistration required; see under First-Year Seminar Program. SC

* **MCDB 050a or b, Immunology and Microbes** Paula Kavathas

Introduction to the immune system and its interaction with specific microbes. Attention both to microbes that cause illness, such as influenza, HIV, and HPV, and to microbes that live in harmony with humans, collectively called the microbiome. Readings include novels and historical works on diseases such as polio and AIDS. Enrollment limited to first-year students. Preregistration required; see under First-Year Seminar Program.

SC RP

* **MCDB 065a, The Science and Politics of HIV/AIDS** Robert Bazell

Study of the basic virology and immunology of HIV/AIDS, along with its extraordinary historical and social effects. Issues include the threat of new epidemics emerging from a changing global environment; the potential harm of conspiracy theories based on false science; and how stigmas associated with poverty, gender inequality, sexual preference, and race facilitate an ongoing epidemic. For all first-year students regardless of whether they are considering a science major. Prerequisite: AP Biology or equivalent. Enrollment limited to first-year students. Preregistration required; see under First-Year Seminar Program. SC

* **MUSI 007a, Noise** Brian Kane

The topic of noise as an introduction to the problems of sound and signification. The surplus of information in white noise, and the meaning perceived when noise is filtered. Contexts in which noise has become filtered for political and aesthetic ends. Topics include sound poetry, literature, electronic music, noise pollution, and consumption. *Enrollment limited to freshmen. Preregistration required. Please go to the following website to enter preferences for seminars: <https://students.yale.edu/ocs-preference/select/select?id=2041>* WR, HU

* **NELC 001b / AFST 001b / ARCG 001b, Egypt and Northeast Africa: A Multidisciplinary Approach** John Darnell

Examination of approximately 10,000 years of Nile Valley cultural history, with an introduction to the historical and archaeological study of Egypt and Nubia. Consideration of the Nile Valley as the meeting place of the cultures and societies of northeast Africa. Various written and visual sources are used, including the collections of the Peabody Museum and the Yale Art Gallery. Enrollment limited to first-year students. Preregistration required; see under First-Year Seminar Program. WR, HU

* **NELC 003a / HUMS 077a, Medieval Travel and Exploration** Shawkat Toorawa
Introduction to the motivations for travel and exploration in the Middle Ages. For adventure, for commerce, on pilgrimage, and for conquest, travelers include Christian, Jewish, and Muslim merchants, ambassadors, scholars, geographers, explorers, sailors, and soldiers. All material in English translation. Enrollment limited to freshmen. Preregistration required; see under Freshman Seminar Program. HU

* **PHYS 040a / ASTR 040, Expanding Ideas of Time and Space** C. Megan Urry

Discussions on the nature of time and space. Topics include the shape and contents of the universe, special and general relativity, dark and light matter, and dark energy. Observations and ideas fundamental to astronomers' current model of an expanding and accelerating four-dimensional universe. Enrollment limited to first-year students. Preregistration required; see under First-Year Seminar Program. SC

* **PLSC 030a, Law and the Limits of Freedom** Alexander Rosas

This course evaluates the desired role of law in free and modern societies and dissects, more broadly, the relationship between law, the state, and the individual in such societies. Particularly, this course considers when, if ever, it is appropriate to use law to limit freedom in the name of equality, security, community, utility, and/or morality. Enrollment limited to freshmen. Preregistration required; see under Freshman Seminar Program. SO

* **RLST 017a, Authenticity** Noreen Khawaja

The origins of personal authenticity in Western thought and the impact of this idea on modern notions of truth, sincerity, and identity. The "true" self as a historical idea and as a social performance. Readings in philosophy, literature, and religious thought from antiquity to the present. Enrollment limited to first-year students. Preregistration required; see under First-Year Seminar Program. HU

* **SCIE 030a and SCIE 031b, Current Topics in Science** Douglas Kankel

A series of modules in lecture and discussion format addressing scientific issues arising in current affairs. Topics are selected for their scientific interest and contemporary relevance, and may include global warming, human cloning, and the existence of extrasolar planets. Credit for SCIE 030 upon completion of SCIE 031; one course credit is awarded for successful completion of the year's work. Enrollment limited to freshmen. Preregistration required; see under Freshman Seminar Program. SC

½ Course cr per term

* **SPAN 060a, First-Year Colloquium: Literary Studies in Spanish** Noël Valis

Introduction to the study of literature in general and to some of the most important texts in Hispanic literature. Selected texts in Spanish include short stories, essays, lyric, and theater. Open to students who have placed into L5 courses. Counts toward the requirements of the Spanish major with permission of the director of undergraduate studies. Enrollment limited to first-year students. Preregistration required; see under First-Year Seminar Program. L5, HU

* **THST 097a, Anatomy in Motion** Bronwen MacArthur

The connection between advances in human anatomy and kinesiology—the science of human movement—and dance practices from the early 1900s to the present. Study of seminal texts and practical exercises that drove the research of Frederick M. Alexander, Mabel Elsworth Todd, Barbara Clark, and Lulu Sweigard and the application of their ideas in contemporary movement practices today. Topics include the synthesis of dance and science; the reeducation of alignment, posture and balance; the use of imagery; and the unification of mind and body. No prior dance experience required. Enrollment limited to freshmen. Preregistration required; see under Freshman Seminar Program.

HU

* **THST 098a, Composing and Performing the One Person Play** Hal Brooks

First-year actors, playwrights, directors, and even students who have never considered taking a theater class, create their own work through a combination of reading, analysis, writing, and on-your-feet exercises. Students read texts and view performances that are generated by one actor in an attempt to discover the methodology that works best for their own creations. The course culminates with a midterm and final presentation created and performed by the student. Enrollment limited to freshmen. Preregistration required; see under Freshman Seminar Program.

* **THST 099b / FILM 045b, Dance on Film** Emily Coates

An examination of dance on film from c. 1920 to the present, including early Hollywood pictures, the rise of Bollywood, avant-garde films of the postwar period, translations of stage choreography to screen, music videos, and dance film festivals. The impact of industry, circulation and audience, aesthetic lineages, and craft in the union of the two mediums. Students develop an original short film for a final class project. No prior dance or filmmaking experience necessary. Enrollment limited to first-year students. Preregistration required; see under First-Year Seminar Program. WR, HU

* **WGSS 030a, Neoliberalism and Sexuality** Evren Savci

Sexuality is often imagined as a private and intimate affair, experienced individually, marked by personal histories and preferences. This course argues otherwise. Specifically, we consider the intersections between the current dominant political economic mode, referred to as neoliberal capitalism, and sexuality as a field of power. We analyze how subjectivities are formed under this current system, how desires are produced and discourses incited, and how the particular *moralization* of economic behavior has implications for a range of issues including reproductive justice, definitions of kinship, sexual liberation movements, and contemporary states of war and emergency. Thinking of sexuality as a field of power that is predicated on notions of normality and abnormality enables us to see what other “undesirable” subjects are produced under conditions of neoliberal capitalist modernity with whom sexual others are always in kinship. Enrollment limited to first-year students. Preregistration required; see under First-Year Seminar Program. SO

* **WGSS 032b, History of Sexuality** Maria Trumpler

Exploration of scientific and medical writings on sexuality over the past century. Focus on the tension between nature and culture in shaping theories, the construction of heterosexuality and homosexuality, the role of scientific studies in moral discourse, and the rise of sexology as a scientific discipline. Enrollment limited to first-year students. Preregistration required; see under First-Year Seminar Program. WR, HU

Forestry and Environmental Studies

Program adviser: John Wargo, 124 KRN, 432-5123, john.wargo@yale.edu

The School of Forestry & Environmental Studies is primarily a graduate and professional program designed to train leaders to solve worldwide environmental problems and to provide new understanding of local and global environments through interdisciplinary research in the natural and social sciences. The School offers numerous courses to undergraduates in Environmental Studies, and undergraduates from any major can take courses in the School. Those undergraduates with significant interest should contact the School's undergraduate program adviser to discuss a joint degree program that allows Yale College students to earn both a bachelor's degree from Yale College and an M.E.M. degree from the School of Forestry & Environmental Studies in five years. For more information on the joint program, see the School's Website. Most graduate-level courses are open to qualified undergraduates. Listings and detailed descriptions of these courses are available in the bulletin of the School of Forestry & Environmental Studies, and most also appear in the online bulletin of the Graduate School of Arts and Sciences. Information about the programs of the School of Forestry & Environmental Studies may be found on the School's Website. Most lectures and symposia are open to undergraduates, and a calendar of events is also posted on the School's Website.

* **F&ES 020a / EVST 020a, Sustainable Development in Haiti** Gordon Geballe
The principles and practice of sustainable development explored in the context of Haiti's rich history and culture, as well as its current environmental and economic impoverishment. Enrollment limited to first-year students. Preregistration required; see under First-Year Seminar Program. WR

F&ES 255b / EVST 255b / PLSC 215b, Environmental Politics and Law John Wargo
Exploration of the politics, policy, and law associated with attempts to manage environmental quality and natural resources. Themes of democracy, liberty, power, property, equality, causation, and risk. Case histories include air quality, water quality and quantity, pesticides and toxic substances, land use, agriculture and food, parks and protected areas, and energy. SO

* **F&ES 290b / EVST 290b, Geographic Information Systems** Charles Tomlin
A practical introduction to the nature and use of geographic information systems (GIS) in environmental science and management. Applied techniques for the acquisition, creation, storage, management, visualization, animation, transformation, analysis, and synthesis of cartographic data in digital form.

F&ES 315a / E&EB 115a, Conservation Biology Linda Puth
An introduction to ecological and evolutionary principles underpinning efforts to conserve Earth's biodiversity. Efforts to halt the rapid increase in disappearance of both plants and animals. Discussion of sociological and economic issues. SC

* **F&ES 422a / ANTH 409a / ER&M 394a / EVST 422a, Climate and Society from Past to Present** Michael Dove

Discussion of the major traditions of thought—both historic and contemporary—regarding climate, climate change, and society; focusing on the politics of knowledge

and belief vs disbelief; and drawing on the social sciences and anthropology in particular. so

French

Director of undergraduate studies: Morgane Cadieu, Rm. 424, 82–90 Wall St., 436-2596, morgane.cadieu@yale.edu; language program director: Ruth Koizim, Rm. 319, 82–90 Wall St., 432-4904, ruth.koizim@yale.edu; french.yale.edu

The Department of French has two distinct but complementary missions: to provide instruction in the French language at all levels of competence, and to lead students to a broad appreciation and deep understanding of the literatures and cultures of France and other French-speaking countries.

The major in French is a liberal arts major, designed for those who wish to study one of the world's richest cultures in depth. The department offers courses devoted to authors, works, and literary and cultural movements that span ten centuries and four continents. The curriculum also includes interdisciplinary courses on relations between literature and other areas of study such as history, law, religion, politics, and the arts. Majors are encouraged to explore all periods and genres of literature in French, as well as a wide variety of critical approaches.

Excellent knowledge of a foreign language and a mature, informed appreciation of a foreign literature open doors to many professions. The French major provides ideal preparation for careers in a wide range of fields from law and diplomacy to journalism, academia, and the arts. Recent graduates have gone on to selective law schools and graduate programs in French and comparative literature. Others work in business, government, primary and secondary education, and a variety of nongovernmental agencies and international organizations.

French can be taken either as a primary major or as one of two majors, in consultation with the director of undergraduate studies. Appropriate majors to combine with French might include, but are not limited to, African American Studies, African Studies, English, Film and Media Studies, Global Affairs, History, History of Art, Humanities, Literature, Music, Philosophy, Political Science, Theater Studies, and Women's, Gender, and Sexuality Studies. Regulations concerning the completion of two majors can be found under Section K, Special Arrangements, (p. 64) in the Academic Regulations.

COURSE NUMBERING

Group A courses (FREN 110–159) This group consists of language courses that lead directly to courses counting toward the major. Preregistration is required for all Group A courses except FREN 125 and 145. FREN 121 (the stand-alone L2) is only offered during the fall term. For this reason, students placed into L1 or L2 who were not enrolled in a fall-term course will have to wait until the next fall to enroll. For further details, students should consult the language program director (ruth.koizim@yale.edu). (ruth.koizim@yale.edu)

Group B courses (FREN 160–449, not including Group C courses) This group contains more advanced courses that are taught in French and count toward the major. FREN 160 and 170 are gateway courses that prepare students for courses numbered FREN 200 and above. Courses in the FREN 180–199 range are advanced language courses. Courses numbered 200–449 are advanced courses in literature and culture. The 200–299 range contains courses devoted to broad, general fields defined

by century or genre; the 300–449 range contains courses devoted to specific topics within or across those general fields.

Group C courses This group comprises courses taught in English; readings may be in French or English. Two term courses from this group may be counted for credit toward the major.

PREREQUISITES

Candidates for the major should take FREN 150 or the equivalent during the first or second year. Prospective majors are strongly encouraged to take at least one literature course numbered 170 or above before the end of the sophomore year.

PLACEMENT PROCEDURES

The departmental placement exam in French is accessible online over the summer. Dates and information for the exam will be available on the French Department Website, in the *Calendar for the Opening Days of College*, and on the Center for Language Study Website.

All students who have not yet studied French at Yale (except those who have had no previous exposure to French whatsoever) are expected to take the departmental placement exam. Students who studied abroad over the summer with non-Yale programs must take the placement exam to be eligible to receive credit for their work.

Students who earned superior scores on standardized tests may be able to enroll in a course designated L5. The department strongly recommends, however, that advanced students of French take the departmental placement exam in order to be directed to the most appropriate courses. Students who earned a score of 5 on the Advanced Placement exam, a score of 6 or 7 on the advanced-level International Baccalaureate (IB) exam, a rating of C1 on the CEFR European test, or an A or B on the GCE A-level exam are normally placed into a course at the 150 level and above.

Students who wish to begin taking French in the spring are advised to take the placement exam over the summer. Placement exam results remain valid for one year.

REQUIREMENTS OF THE MAJOR

The major for the Class of 2020 and previous classes With DUS approval, the following changes, through the addition of a translation track, to the requirements of the major may be fulfilled by students who declared their major under previous requirements.

The major for the Class of 2021 and subsequent classes Changes to the requirements of the major, through the addition of a translation track, are described below.

The standard major The standard major consists of ten term courses numbered 160 or above, including a one-term senior essay (see below). One of these ten courses must be FREN 170 or the equivalent, which should be completed early in a candidate's studies; at least four must be Group B courses numbered 200 or above. Students may count no more than two courses in the FREN 180–199 range and no more than two courses conducted in English (Group C) toward the major. With prior approval of the director of undergraduate studies, a maximum of four term courses taught outside the Yale Department of French but bearing directly on the student's principal interest may be counted toward the major. Up to two of these may be taken in other departments at

Yale, and up to four may be taken as part of a Year or Term Abroad or summer study abroad program. However, the combined number of courses from other departments and from study abroad may not exceed four. (The director of undergraduate studies may grant exceptions to this limit for students who spend two academic terms in an approved study abroad program.) Relevant first-year seminars may count toward the major, with permission of the director of undergraduate studies.

Translation track Students may elect to pursue the translation track within the French Major. Translation track majors are expected to take a minimum of two courses in French translation as two of the ten credits required for the standard major, or twelve credits required for the intensive major. Within the department, this requirement can be fulfilled by taking FREN 191 and FREN 192. Students who opt for the translation track may take up to four courses numbered 180–199, rather than the standard two courses.

The intensive major The intensive major is designed for students who wish to undertake a more concentrated study of literature in French. It is recommended for students considering graduate study in French or in comparative literature. The intensive major consists of twelve term courses numbered 160 or above, including a one-term or two-term senior essay (see below). At least five courses must be from Group B and numbered 200 or above. The requirement of FREN 170 and the stipulations for courses in the 180–199 range, courses conducted in English, and courses taken outside the department are identical to those for the standard major.

Credit/D/Fail Courses taken Credit/D/Fail may not be counted toward the requirements of the major.

SENIOR REQUIREMENT

All majors must write a senior essay showing evidence of careful reading and research and substantial independent thought. Essays may be written in either French or English and must be prepared under the direction of a ladder faculty member in the Department of French. Students planning to pursue advanced work in French after graduation are encouraged to write their senior essay in French.

Students writing a one-term essay enroll in FREN 491 in the senior year. A one-term essay may be written in either the fall or the spring term and should be approximately thirty pages in length. A preliminary statement indicating the general area to be addressed and the name of the adviser must be submitted to the director of undergraduate studies by April 20, 2018 (fall-term essay) or November 9 (spring-term essay). A one-page prospectus and bibliography are due September 21 (fall term) or January 25 (spring term). A rough draft must be submitted to the adviser by November 2 (fall term) or March 29 (spring term). Two copies of the final essay are due in the department by December 3, 2018 (fall term) or April 22, 2019 (spring term).

Students electing a two-term essay for the intensive major must select their subject and adviser by the end of the junior year and enroll in FREN 493 and 494 during the senior year. The essay should be approximately sixty pages in length. A preliminary statement indicating the general area to be addressed and the name of the adviser must be submitted to the director of undergraduate studies by April 20, 2018. A one-page prospectus and bibliography are due September 21. Students must submit an initial

rough draft to their adviser by January 25 and a complete draft by March 29. Two copies of the final essay are due in the department by April 22.

In place of the thirty-page senior essay for the standard major or the sixty-page senior essay for the intensive major, translation track majors undertake a literary translation of similar length to the senior essay, working with a member of the French Department ladder faculty. The senior essay translation should include a critical introduction, of a length to be determined by the student, in consultation with the directing faculty member. The same submission dates as the one-term essay and the two-term essay apply to the translation track essay.

ADVISING

Students in the major are encouraged to take as many advanced courses as possible in all historical periods from the Middle Ages to the present. Candidates for the major should consult the DUS as early as the beginning of the sophomore year and no later than the fall term of the junior year. Schedules must be approved and signed by the DUS. Students planning to study abroad or to petition for completion of two majors should contact the DUS during the sophomore year.

Special Divisional Major The department will support the application of qualified students who wish to pursue an interdisciplinary course in French studies. Under the provisions of the Special Divisional Major, students may combine courses offered by the French department with subjects elected from other departments. Close consultation with departmental advisers is required; candidates for a Special Divisional Major should consult the DUS in French by the fall term of the junior year. For further information, see under Special Divisional Majors (p. 708).

STUDY ABROAD

Students are encouraged to spend a term or a year abroad, for which appropriate course credit is granted. Summer study abroad may also, in some cases, receive course credit. Further information may be obtained from the Center for International and Professional Experience and from (ruth.koizim@yale.edu)Ruth Koizim (ruth.koizim@yale.edu), the study abroad adviser for the Department of French.

REQUIREMENTS OF THE MAJOR

Prerequisite FREN 150 or equivalent

Number of courses *Standard major and translation track*—10 term courses numbered 160 or above (inc senior req); *Intensive major*—12 term courses numbered 160 or above (inc senior req)

Specific course required FREN 170 or equivalent

Distribution of courses *Standard major*—at least 4 courses in Group B numbered 200 or above; no more than 2 courses numbered FREN 180–199; no more than 2 courses conducted in English; *Translation track*— same as standard, except no more than 4 courses numbered FREN 180–199; *Intensive major*— same as standard, plus 1 addtl Group B course numbered 200 or above

Substitution permitted With prior approval of DUS, up to 4 term courses outside French dept, as specified

Senior requirement *Standard major*—one-term senior essay in French or English (FREN 491); *Translation track*—one-term literary translation essay (FREN 492); *Intensive major*—two-term (FREN 493, 494) senior essay in French or English; *Translation track, Intensive major*—two-term literary translation essay (FREN 495, 496)

FACULTY OF THE DEPARTMENT OF FRENCH

Professors R. Howard Bloch, Edwin M. Duval, Marie-Hélène Girard (*Visiting*), Alice Kaplan, Christopher L. Miller, Pierre Saint-Amand, Maurice Samuels

Assistant Professors Morgane Cadieu, Thomas C. Connolly, Jill Jarvis

Senior Lecturers Lauren Pinzka, Maryam Sanjabi, Alyson Waters

Senior Lectors Kathleen Burton, Ruth Koizim, Soumia Koundi, Matuku Ngame, Françoise Schneider, Constance Sherak, Candace Skorupa, Vanessa Vysosias

Lectors Jessica DeVos, Julie Hugonny

Group A Courses

* **FREN 110a, Elementary and Intermediate French I** Staff

Intensive training and practice in all the language skills, with an initial emphasis on listening and speaking. Emphasis on communicative proficiency, self-expression, and cultural insights. Extensive use of audio and video material. Conducted entirely in French. Mandatory weekly tests given on Mondays at 30-minute intervals from 5 to 8:30 p.m. To be followed by FREN 120. For students with no previous experience of French. Daily classroom attendance is required. Credit only on completion of FREN 120. L1 RP 1½ Course cr

* **FREN 120b, Elementary and Intermediate French II** Staff

Continuation of FREN 110. Open only to students who took FREN 110 (L1) at Yale. Conducted entirely in French. Only after FREN 110. To be followed by FREN 130. L2 RP 1½ Course cr

* **FREN 121a, Intermediate French** Staff

Designed for initiated beginners, this course develops all the language skills with an emphasis on listening and speaking. Activities include role playing, self-expression, and discussion of cultural and literary texts. Emphasis on grammar review and acquisition of vocabulary. Frequent audio and video exercises. Conducted entirely in French. Daily classroom attendance is required. Placement according to placement test score. Online preregistration required; see french.yale.edu for details. L2 RP 1½ Course cr

* **FREN 125a, Intensive Elementary French** Constance Sherak

An accelerated course that covers in one term the material taught in FREN 110 and 120. Practice in all language skills, with emphasis on communicative proficiency. Admits to FREN 145. Conducted entirely in French. For students of superior linguistic ability. No preregistration required. L1, L2 RP 2 Course cr

* **FREN 130a or b, Intermediate and Advanced French I** Staff

The first half of a two-term sequence designed to develop students' proficiency in the four language skill areas. Prepares students for further work in literary, language, and cultural studies, as well as for nonacademic use of French. Oral communication skills, writing practice, vocabulary expansion, and a comprehensive review of fundamental

grammatical structures are integrated with the study of short stories, novels, and films. Admits to FREN 140. Conducted entirely in French. After FREN 120, 121, or a satisfactory placement test score. L3 RP 1½ Course cr

* **FREN 140a or b, Intermediate and Advanced French II** Staff

The second half of a two-term sequence designed to develop students' proficiency in the four language skill areas. Introduction of more complex grammatical structures. Films and other authentic media accompany literary readings from throughout the francophone world, culminating with the reading of a longer novel and in-class presentation of student research projects. Admits to FREN 150. Conducted entirely in French. After FREN 130 or a satisfactory placement test score. L4 RP 1½ Course cr

* **FREN 145b, Intensive Intermediate and Advanced French** Candace Skorupa

An accelerated course that covers in one term the material taught in FREN 130 and 140. Emphasis on speaking, writing, and the conversion of grammatical knowledge into reading competence. Admits to FREN 150. For students of superior linguistic ability. Conducted entirely in French. After FREN 120, 121, or 125. No preregistration required.

L3, L4 RP 2 Course cr

* **FREN 150a or b, Advanced Language Practice** Staff

An advanced language course intended to improve students' comprehension of spoken and written French as well as their speaking and writing skills. Modern fiction and nonfiction texts familiarize students with idiomatic French. Special attention to grammar review and vocabulary acquisition. Conducted entirely in French. After FREN 140, 145, or a satisfactory placement test score. May not be taken after FREN 151. Online preregistration required; see <http://french.yale.edu/academics/placement-and-registration> for details. L5 RP

Group B Courses

Group B courses are conducted entirely in French. Courses numbered from 160 to 199 are open to students who have passed FREN 150 or the equivalent, and to others with consent of the department. Courses numbered from 200 to 449 are open to students who have passed FREN 170, or with permission of the instructor. Students who have taken a course at the 200 level or higher may not ordinarily take a 100-level course for credit, with the exception of advanced language courses numbered 185 or higher. Students may take 200-, 300-, and 400-level courses in any order. Courses in the 200–299 range are devoted to general fields; courses in the 300–449 range are devoted to specific topics.

GATEWAY COURSES

* **FREN 096b, Women's Narratives of Self in Modern French Literature** Maryam Sanjabi

The course explores women's autobiographical literature, demonstrating their uniqueness from an individual perspective and capturing the social, economic, religious, and ethnic themes of the period and their authors' intellectual standpoints. The selected books represent a variety of literary genres ranging from memoir to journal, graphic novel, and film scripts with a focus on the 20th and 21st centuries as they appear in the works of: Colette, Simone de Beauvoir, Nathalie Sarraute, Lucie Aubrac, Hélène Berr, Assia Djebar, Ken Bugul, Agnès Varda, Marjane Satrapi, Marguerite Duras, Annie Ernaux, and Camille Laurens among others. This course thus

aims at a critical awareness of what modernity has meant in women's experiences and why debate about its consequences often revolves around women's lives. While some authors explore the coming of age of European gender awareness, others deal with the war and resistance and more recent non-Western voices in French pose the question of identity of the "Other." Course readings include short theoretical essays and a number of secondary works. Enrollment limited to first-year students. Preregistration required; see under First-Year Seminar Program. HU

*** FREN 160a or b, Advanced Culture and Conversation** Staff

Intensive oral practice designed to further skills in listening comprehension, speaking, and reading through the use of videos, films, fiction, and articles. Emphasis on contemporary French and francophone cultures. Conducted entirely in French. Prerequisites: FREN 150, 151, or a satisfactory placement test score, or with permission of the course director. May be taken concurrently with or after FREN 170. L5 RP

*** FREN 170a or b, Introduction to the Study of Literature in French** Staff

Introduction to close reading and analysis of literary texts written in French. Works by authors such as Marie de France, Molière, Balzac, Hugo, Baudelaire, Duras, Proust, and Genet. May not be taken after FREN 171. L5, HU

ADVANCED LANGUAGE COURSES

*** FREN 181a, Applied Advanced French Grammar** Françoise Schneider

In-depth study of grammar and discourse strategies. Advanced grammar exercises, linguistic analysis of literary selections, and English-to-French translation. Intended to improve students' written command of French and to prepare them for upper-level courses; recommended for prospective majors. After FREN 150 or higher, or a satisfactory placement test score. May be taken after courses in the 200–449 range. L5

*** FREN 182b, Advanced Writing Workshop** Lauren Pinzka

An advanced writing course for students who wish to work intensively on perfecting their written French. Frequent compositions of varying lengths, including creative writing, *rédactions* (compositions on concrete topics), and *dissertations* (critical essays). Recommended for prospective majors. Conducted entirely in French. After FREN 150 or higher, or a satisfactory placement test score. May be taken after courses in the 200–449 range. L5

*** FREN 183a, Medical French: Conversation and Culture** Staff

An advanced language course emphasizing verbal communication and culture. Designed to foster the acquisition of the linguistic and cultural skills required to evolve within a Francophone medical environment. Discussions, in-class activities, and group projects in simulated professional situations. Topics such as the hospital, family physicians and nurse practitioners, medicine in Francophone Africa, humanitarian NGOs are explored through a medical textbook, articles, video clips, radio shows, films, documentaries, and excerpts from essays and literary texts. Conducted entirely in French. Prerequisite: FREN 150 or a satisfactory placement test score, or with permission of instructor. May be taken concurrently with or after FREN 160 and FREN 170. L5

*** FREN 184b, Business French: Communication and Culture** Staff

An advanced language course emphasizing verbal communication and culture. Designed to foster the acquisition of the linguistic and cultural skills required to evolve within a French business environment. Discussions, in-class activities, and group

projects in simulated professional situations. Topics such as the liberalization of the French economy, trading in the European Union, new forms of business organizations, and globalization are explored through a business textbook, articles, video clips, radio shows, films, documentaries, and excerpts from essays and literary texts. Conducted entirely in French. Prerequisite: FREN 150 or a satisfactory placement test score, or with permission of instructor. May be taken concurrently with or after FREN 160 and FREN 170. L5

* **FREN 191a / FREN 185, Translation** Alyson Waters

An introduction to the practice and theory of literary translation, conducted in workshop format. Stress on close reading, with emphasis initially on grammatical structures and vocabulary, subsequently on stylistics and aesthetics. Translation as a means to understand and communicate cultural difference in the case of French, African, Caribbean, and Québécois authors. Texts by Benjamin, Beckett, Borges, Steiner, and others. Readings in French and in English. After FREN 150 and 151 or with permission of instructor. Preference to juniors and seniors. L5, HU

* **FREN 192b / FREN 186, Intermediate Literary Translation** Alyson Waters

A continuation of FREN 191 for students who wish to work on a longer project and to deepen their reading in translation theory.

Prerequisite: FREN 191. L5, HU

GENERAL FIELDS

* **FREN 211a, French Poetry: The First Five Hundred Years** Edwin Duval

A survey of the first half-millennium of French poetry, from courtly love songs by the *Trouvères* of the late twelfth century to satirical verse by the *Libertins* of the early seventeenth. Special focus on the great flowering of lyric poetry during the Renaissance. The musical origins and aspirations of lyric poetry in France. Emphasis on close readings of representative works by major poets. L5, HU

FREN 240a / HUMS 201a / LITR 214a, The Modern French Novel Maurice Samuels and Alice Kaplan

A survey of major French novels, considering style and story, literary and intellectual movements, and historical contexts. Writers include Balzac, Flaubert, Proust, Camus, and Sartre. Readings in translation. One section conducted in French. HU TR

* **FREN 247b, Experimental Literature, Theory and Manifestoes** Morgane Cadieu

A survey of the French experimental prose of the 20th and 21st centuries. Corpus includes novels and plays, literary and political manifestoes, and landmark articles on literary theory, structuralism, and poststructuralism. Topics include: inspiration and creativity; the aesthetics of manifestoes and the politics of literature; automatic writing and constrained prose; feminist and queer writings; urban spaces in avant-garde literary movements. Works by: Bataille, Beauvoir, Beckett, Breton, Perec, Sarraute, Wittig. Theoretical excerpts by: Barthes, Deleuze, Derrida, Foucault, Glissant, Malabou. L5, HU

SPECIAL TOPICS

* **FREN 321b, Passions and Politics in the Theater of the Ancien Régime** Pierre Saint-Amand

This course consists in close readings of the major political tragedies of the classical period (17th–18th century), starting with Corneille who leads the genre and creates

imitators. We consider how the language of passions intersects with the language of politics, the dialectics of hero and state. Study of the recurring major passions: love, jealousy, hate, and how they are dealt with, sometimes repaired. Readings in Pierre Corneille, Jean Racine, Voltaire, and Houdar de La Motte. L5, HU

* **FREN 345a, The Prose Poem** Thomas Connolly

An examination of the *poème en prose*, from its beginnings as a response to the inadequacy of French verse forms through its emergence as an independent genre. L5, HU

* **FREN 347a / HSAR 280a, Ekphrasis** Thomas Connolly

An exploration of ekphrasis, understood both as the verbal representation of visual representation and, more broadly, as the way in which one artistic discourse represents, critiques, or transgresses another. Manifestations of this rhetorical device in both Western and non-Western cultures from antiquity to the present. Readings and discussion in English. HU TR

* **FREN 410b / AFAM 379b / LITR 299b, Colonial Narrative, Postcolonial Counternarrative** Christopher Miller

Readings of paradigmatic, colonial era texts that have provoked responses and rewritings from postcolonial writers and filmmakers. In some cases the rewriting is explicit and direct, in other cases the response is more oblique. Both profound differences of perspective and unexpected convergences will emerge. Readings may include: Aimé Césaire's *A Tempest* after Shakespeare's *Tempest*, Kamel Daoud's *The Meursault Investigation* after Camus's *The Stranger*, and Claire Denis's film *Chocolat* after Ferdinand Oyono's *Houseboy*.

* **FREN 414a / AFST 414a / LITR 269 / MMES 261a, Afterlives of Algeria's Revolution** Jill Jarvis

The Algerian War for Independence from France was the longest and most violent decolonizing war of the 20th century. This war and its aftermath transformed political, social, intellectual, and artistic life on both sides of the Mediterranean—and it became a model for other decolonizing and civil rights movements across the world. Memory of this war continues to shape current debates in Europe and North Africa about state violence, terrorism, racism, censorship, immigration, feminism, human rights, and justice. Through study of fiction, film, testimonies, graphic novels, and theater, this seminar charts the war's surprising and enduring legacies. Films may include Pontecorvo's *The Battle of Algiers*, Haneke's *Caché*, and Panijel's *Octobre à Paris*. Literary works by Djébar, Camus, Sebbar, Etcherelli, Dib, Cixous, Kateb, Fanon, De Beauvoir, Mechakra. The course is conducted in French. If you have any questions about your French ability, contact the instructor. L5, HU

* **FREN 416b, Social Mobility and Migration** Morgane Cadieu

Exploration of mobility in the French social landscape and its representations in contemporary French and Francophone texts and films; the intersectionality of class, race, gender, and sexuality; emancipation, migration, demotion, and precarity; labor and the workplace; the interaction between social class and literary style. Works by: Angot, Erignon, Ernaux, Kechiche, Louis, Mukasonga, NDiaye, Taïa. Theoretical excerpts by: Berlant, Bourdieu, Delphy, Fraser, Rancière, Piketty. Students have the possibility to put the corpus in dialogue with the literature of other countries. L5, HU

* **FREN 421a / AFAM 440a, Intercultural Literary Hoaxes** Christopher Miller
 Study of literary works that test the bounds of propriety by borrowing or stealing an alien identity and passing the imposture off as authentic. Cases in Anglo-American and French-Francophone literature, ranging from the hilarious to the reprehensible. Attention to issues in the ethics of representation. Works include Diderot, Mérimée, George Eliot, pseudo-slave narratives, Camara Laye, Romain Gary, Forrest Carter, JT LeRoy, Paul Smail, Margaret B. Jones, and Misha Defonseca. Prerequisite: Reading knowledge of French at the L4 level. HU

FREN 425b / MMES 360b, North African French Poetry Thomas Connolly
 Introduction to North African poetry composed in French during the twentieth and twenty-first centuries. Works explored within the broader context of metropolitan French, Arabic, and Berber cultures; juxtaposition with other modes of expression including oral poetry, painting, dance, music, the Internet, and film. The literary, aesthetic, political, religious, and philosophical significance of poetic discourse. L5, HU

Special Tutorial and Senior Courses

* **FREN 470a and FREN 471b, Special Tutorial for Juniors and Seniors** Staff
 Special projects set up by the student in an area of individual interest with the help of a faculty adviser and the director of undergraduate studies. Intended to enable the student to cover material not offered by the department. The project must terminate with at least a term paper or its equivalent and must have the approval of the director of undergraduate studies. Only one term may be offered toward the major, but two terms may be offered toward the bachelor's degree. For additional information, consult the director of undergraduate studies.

* **FREN 471b, Special Tutorial for Juniors and Seniors** Staff
 Special projects set up by the student in an area of individual interest with the help of a faculty adviser and the director of undergraduate studies. Intended to enable the student to cover material not offered by the department. The project must terminate with at least a term paper or its equivalent and must have the approval of the director of undergraduate studies. For additional information, consult the director of undergraduate studies.

* **FREN 491a or b, The Senior Essay** Staff
 A one-term research project completed under the direction of a ladder faculty member in the Department of French and resulting in a substantial paper in French or English. For additional information, consult the director of undergraduate studies.

* **FREN 493a and FREN 494b, The Senior Essay in the Intensive Major** Staff
 A yearlong research project completed under the direction of a ladder faculty member in the Department of French and resulting in a paper of considerable length, in French or English. For additional information, consult the director of undergraduate studies.

Group C Courses

Courses in this group are conducted in English; readings may be in French or English. Group C courses numbered above 100 are open to all students in Yale College.

* **FREN 320b, The Existentialist Café** Alice Kaplan
 The Existentialist Café examines a moment (post-war France), a condition (liberation from Nazi occupation), a school of thought (existentialism) and a group of writers

in conversation with one another (Sartre, Beauvoir, Camus, Vian, Leduc, Duras, Sagan, Guilloux, Kofman). Specific themes include the memory of collaboration and resistance; the shorn women; de Gaulle and his critics; the surviving Jewish community; youth culture; and existentialist culture in Saint-Germain des Près. In addition to novels and memoirs (*The Plague*; *Ok, Joel!*; *The Bastard*, *Bonjour Tristesse*) students also explore representations of the period in films (*Rendez-vous de juillet*; *Hiroshima mon amour*; *La guêpe*). A research component of the seminar involves primary source work in newspapers and magazines of the period (*Combat*, *Lettres françaises*, *Paris-Match*). Reading knowledge of French at the L5 level is required and students should be comfortable doing research using French sources.

HU

Reading Course

* **FREN 109a, French for Reading** Maryam Sanjabi

Fundamental grammar structures and basic vocabulary are acquired through the reading of texts in various fields (primarily humanities and social sciences, and others as determined by student interest). Intended for students who either need a reading knowledge of French for research purposes or are preparing for French reading examinations and who have had no (or minimal) prior study of French. No preregistration required. Conducted in English. Does not satisfy the language requirement.

Geology and Geophysics

Director of undergraduate studies: Mary-Louise Timmermans, 111 KGL, 432-3167, mary-louise.timmermans@yale.edu; (mary-louise.timmermans@yale.edu) earth.yale.edu

The Geology and Geophysics program prepares students for the application of scientific principles and methods to the understanding of Earth, the environment, and life on a regional and a planetary scale. Subjects range from the history of Earth and life to present-day environmental processes; integrating the study of Earth's deep interior, tectonic plates, oceans, atmosphere, climate, land surface, natural resources, and biota. The emphasis of the curriculum is on employing basic principles from the core sciences (physics, chemistry, and biology) to further an understanding of Earth's past and present, and addressing issues relating to its future. Students gain a broad background in the natural sciences, and also select a specific track to focus their work on planetary or environmental phenomena of particular interest. The four B.S. tracks emphasize hands-on research experience in fieldwork, in laboratories, or in computer modeling. While some graduates continue on to research, consulting, or industrial careers in Earth, environmental, and planetary sciences, the major's broad scientific training prepares students for a wide variety of other paths, including medicine, law, public policy, and teaching. There is also a B.A. degree, which is most suitable for students who wish to study geoscience as a second major, complementing other majors in, for example, Mathematics, Economics, Physics, Biology, or Engineering, and do so in preparation for a career in law, business, government, or environmental fields.

PREREQUISITES

With permission of the director of undergraduate studies (DUS), acceleration credits awarded at matriculation for high scores on national or international examinations (such as Advanced Placement subject tests) may be used to satisfy prerequisites, even if the student does not choose to accelerate. Higher-level courses may, with the permission of the DUS, be substituted for prerequisites and for specific required courses. For prerequisites specific for each degree and track, see below under Requirements of the Major.

REQUIREMENTS OF THE MAJOR

B.S. degree program Majors in the B.S. program in Geology and Geophysics choose from four tracks: Atmosphere, Ocean, and Climate; Environmental and Energy Geoscience; Paleontology and Geobiology; and Solid Earth Science. The tracks are suggested pathways to professional careers and major areas of research in geology and geophysics. Students may change tracks during their course of study with guidance from the DUS.

1. The Atmosphere, Ocean, and Climate track provides a comprehensive understanding of the theory, observation, and prediction of the atmosphere-ocean-climate system. Topics range from past climate changes, including the ice ages, to present-day storms and weather, to forecasting climate change and global warming. The prerequisites are CHEM 165 or CHEM 167; PHYS 180, 181 and PHYS 205L, 206L; ENAS 130 or equivalent; and mathematics through differential equations (MATH 120 or ENAS 151, and ENAS 194). The major requirements

consist of at least eleven term courses, for ten and one-half course credits, beyond the prerequisites, including either the senior essay or the senior thesis. To begin study of Earth processes, majors take an introductory course in G&G, with any accompanying laboratory, selected from G&G 100; 110 or 115, and 111L; or 125 and 126L. A higher-level course in G&G can be substituted with the permission of the director of undergraduate studies. Six core courses, totaling five and one-half course credits, introduce students to Earth's climate system (G&G 140 and 141L), meteorology (G&G 322), physical oceanography (G&G 335), fluid mechanics (MENG 361), and statistics or linear algebra (S&DS 230 or 238 or MATH 222). Three electives are chosen from topics in the environment and in processes that govern the atmosphere, ocean, and land surface; physics; and statistics. A list of suggested electives is available from the office of the director of undergraduate studies or on the departmental website. At least one elective must be from G&G.

2. The Environmental and Energy Geoscience track provides a scientific understanding of the natural and anthropogenic processes that shape the Earth-atmosphere-biosphere system, including energy and material flows among its components. It emphasizes comparative studies of past and current Earth processes to inform models of humankind's role within the environment's future. The prerequisites are broad and flexible and include CHEM 165 or CHEM 167 and mathematics through multivariate calculus (MATH 120 or ENAS 151). Depending on their area of focus, students may choose a prerequisite in physics (PHYS 170, 171; or 180, 181; or 200, 201), or they may choose cellular biology (BIOL 101 and 102, or MCDB 120) and evolutionary biology (BIOL 103 and 104, or E&EB 122, or G&G 125 and 126L). The major requirements consist of at least eleven term courses, for eleven course credits, beyond the prerequisites, including either the senior essay or the senior thesis. To begin study of the Earth system, majors take two introductory courses in G&G, with any accompanying laboratories, selected from G&G 100; 110 or 115, and 111L; or 140 and 141L (G&G 125 and 126L may count toward this requirement if not selected as the evolutionary biology prerequisite). Higher-level courses in G&G can be substituted with the permission of the director of undergraduate studies. Four core courses are chosen from topics in general resource use and sustainability (G&G 205), Earth's surface processes (G&G 232), the microbiology of surface and near-surface environments (G&G 255), fossil fuels and energy transitions (G&G 274), renewable energies (G&G 275), geochemical principles (G&G 301), structural geology (G&G 312), meteorology (G&G 322), and satellite-based image analysis (G&G 362). Four electives chosen from Geology and Geophysics, Environmental Studies (p. 336), Ecology and Evolutionary Biology (p. 261), Engineering, or related fields provide a broad approach to scientific study of the environment. A list of suggested electives is available from the office of the director of undergraduate studies or on the departmental website. Electives may be chosen from the core courses, and at least two must be from G&G.
3. The Paleontology and Geobiology track focuses on the fossil record of life and evolution, geochemical imprints of life, and interactions between life and Earth. Topics range from morphology, function, relationships, and biogeography of the fossils themselves, through the contexts of fossil finds in terms of stratigraphy, sediment geochemistry, paleoecology, paleoclimate, and geomorphology, to analysis of the larger causes of paleontological, geobiological, and evolutionary patterns. Integrative approaches are emphasized that link fossil evidence with

the physical and chemical evolution of Earth. The prerequisites are college-level biology (BIOL 101–104; or MCDB 120 and E&EB 122); CHEM 165 or CHEM 167; and mathematics through multivariate calculus (MATH 120 or ENAS 151). The major requirements consist of at least thirteen term courses, for twelve course credits, beyond the prerequisites, including either the senior essay or the senior thesis. Students take G&G 100; G&G 110 or 115, and 111L, to gain geological and environmental context, and they are introduced to the fossil record and evolution in G&G 125 and 126L; higher-level courses in G&G can be substituted with the permission of the director of undergraduate studies. Four core courses give majors a comprehensive background in sedimentary rocks and rock correlation (G&G 232 or equivalent), the study of evolution (G&G 250 or equivalent), microbiology in past and present environments (G&G 255 or equivalent), Earth's carbon cycle (G&G 308 or equivalent), and statistical data analysis as applied to the life sciences (S&DS 101 or equivalent). Four electives selected from Geology and Geophysics, Ecology and Evolutionary Biology (p. 261), Molecular, Cellular, and Developmental Biology (p. 558), and related fields offer students flexibility in pursuing their specific interests. A list of suggested electives is available from the office of the DUS or on the departmental website. At least one elective must be from G&G.

4. The Solid Earth Science track emphasizes an integrated geological, geochemical, and geophysical approach to the study of processes operating within Earth and their manifestation on the surface. It includes the structure, dynamics, and kinetics of Earth's interior and their impacts on our environment both in the long term (e.g., the evolution of the land surface) and in the short term (e.g., the causes for natural disasters such as earthquakes, tsunamis, and volcanic eruptions). Students acquire a fundamental understanding of the solid Earth system, both as it exists today and as it has evolved over geologic time scales. The prerequisites are CHEM 165 or CHEM 167; physics (PHYS 170, 171; or 180, 181; or 200, 201); and mathematics through multivariate calculus (MATH 120 or ENAS 151). The major requirements consist of at least eleven courses, for eleven course credits, beyond the prerequisites, including either the senior essay or the senior thesis. To begin study of the Earth system, majors take two introductory courses in G&G, with any accompanying laboratories, selected from G&G 100; 110 or 115, and 111L; 125 and 126L; or 140 and 141L. Higher-level courses in G&G can be substituted with the permission of the director of undergraduate studies. The core of the track consists of four courses chosen from topics in mountain building and global tectonics (G&G 212), rocks and minerals (G&G 220), sedimentary rocks and processes (G&G 232 or equivalent), geochemical principles (G&G 301), and structural geology (G&G 312). Students also select four electives in geology, geochemistry, geophysics, or related topics. A list of suggested electives is available from the office of the director of undergraduate studies or on the departmental website. Electives may be chosen from core courses, and at least two must be from G&G.

B.A. degree program The B.A. degree in Geology and Natural Resources requires fewer upper-level courses than the B.S. degree. It may be more appropriate for students who wish to major in two separate Yale programs, who study geoscience in preparation for a career in law, business, government, or environmental fields, or who decide to pursue a science major only after the first year. The prerequisites include mathematics (MATH 115), biology (BIOL 101 and 102, or MCDB 120, or G&G 255), and a lecture

course in chemistry. The major requirements consist of at least nine term courses beyond the prerequisites. These include two courses in G&G numbered 100–150, with any accompanying laboratories; courses in natural resources (G&G 205) and geochemical processes (G&G 220 or 232 or 280 or 301); and five additional courses at the 200 level or higher in Geology and Geophysics or related fields, approved by the DUS and including either the senior essay or the senior thesis. Course selections can be guided by any of the B.S. tracks described above.

Credit/D/Fail Geology and Geophysics majors may not employ the Credit/D/Fail option for prerequisites or for courses in the major.

SENIOR REQUIREMENT

Seniors in both degree programs must prepare either a senior essay based on one term of library, laboratory, or field research (G&G 492) or, with the consent of the faculty, a two-term senior thesis (G&G 490, 491), which involves innovative field, laboratory, or theoretical research. Students electing to do a senior thesis must first select a topic and obtain the consent of a faculty member to act as an adviser. They must then petition the faculty through the DUS for approval of the thesis proposal. The petition should be submitted by the end of the junior year. If the two-term senior thesis is elected, G&G 491 may count as an elective toward the major. A copy of each senior thesis or senior essay is made available on the departmental website.

ADVISING

Qualified juniors and seniors are encouraged to enroll in graduate courses, with permission of the instructor and of the directors of graduate and undergraduate studies. Descriptions of graduate courses are available at the office of the director of undergraduate studies.

Practical experience In addition to prerequisites and required courses in Geology and Geophysics, candidates for the B.A. and B.S. degrees are strongly encouraged to gain practical experience in the Earth sciences. This can be done in two ways: (1) by attending a summer field course at another academic institution, or (2) by participating in summer research opportunities offered by the Department of Geology and Geophysics, by other academic institutions, or by certain government agencies and private industries. Consult the DUS or see the departmental website for further information.

Combined B.S./M.S. degree program Exceptionally able and well-prepared students may complete a course of study leading to the simultaneous award of the B.S. and M.S. degrees after eight terms of enrollment. See “Simultaneous Award of the Bachelor’s and Master’s Degrees” under section K, Special Arrangements (p. 64), in the Academic Regulations. Interested students should consult the director of undergraduate studies prior to the sixth term of enrollment for specific requirements in Geology and Geophysics.

Physics and Geosciences major The Department of Geology and Geophysics also offers a combined major with the Department of Physics. For more information, see under Physics and Geosciences (p. 623).

REQUIREMENTS OF THE MAJOR

Prerequisites *B.A.* – MATH 115; BIOL 101 and 102, or MCDB 120, or G&G 255; a lecture course in chem; *B.S.* – *All tracks* – CHEM 165 or CHEM 167; MATH 120 or ENAS 151; *Atmosphere, Ocean, and Climate track* – ENAS 130 or equivalent; ENAS 194; PHYS 180, 181, 205L, 206L; *Environmental and Energy Geoscience track* – physics (PHYS 170, 171, or 180, 181, or 200, 201) or biology (BIOL 101 and 102, or MCDB 120; and BIOL 103 and 104, or E&EB 122, or G&G 125 and 126L); *Paleontology and Geobiology track* – BIOL 101–104, or MCDB 120 and E&EB 122; *Solid Earth Science track* – PHYS 170, 171, or 180, 181, or 200, 201

Number of courses *B.A.* – at least 9 courses beyond prereqs for letter grades (incl senior req); *B.S.* – *Atmosphere, Ocean, and Climate track* – at least 11 courses, for 10½ credits, beyond prereqs for letter grades (incl senior req); *Environmental and Energy Geoscience and Solid Earth Science tracks* – at least 11 courses beyond prereqs for letter grades (incl senior req); *Paleontology and Geobiology track* – at least 13 courses, for 12 credits, beyond prereqs for letter grades (incl senior req)

Specific courses required *B.A.* – G&G 205; 1 from G&G 220, or 232, or 280, or 301; *B.S.* – *Atmosphere, Ocean, and Climate track* – G&G 140, 141L, 322, 335; MENG 361; S&DS 230 or 238 or MATH 222; *Environmental and Energy Geoscience track* – 4 from G&G 205, 232, 255, 274, 275, 301, 312, 322, 362; *Paleontology and Geobiology track* – G&G 100, 110 or 115, and 111L, G&G 125, 126L, 4 from G&G 232, 250, 255, 308, S&DS 101 or equivalents; *Solid Earth Science track* – 4 from G&G 212, 220, 232 or equivalent, 301, 312

Distribution of courses *B.A.* – 2 intro courses in G&G, with labs, as specified; 5 addtl courses at 200 level or higher in G&G or related fields; *B.S.* – *Atmosphere, Ocean, and Climate track* – 1 intro course in G&G, with lab, as specified; 3 electives as specified; *Environmental and Energy Geoscience and Solid Earth Science tracks* – 2 intro courses in G&G, with labs, as specified; 4 electives as specified; *Paleontology and Geobiology track* – 4 electives as specified

Substitution permitted *All programs* – with DUS permission, higher-level courses for prereqs or required courses

Senior requirement *All programs* – senior essay (G&G 492) or, with permission of faculty, two-term senior thesis (G&G 490, 491)

FACULTY OF THE DEPARTMENT OF GEOLOGY AND GEOPHYSICS

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

Associate Professor Kanani Lee

Assistant Professors Bhart-Anjun Bhullar, Pincelli Hull, Noah Planavsky, Alan Rooney

Lecturers Marilyn Fox, Michael Oristaglio, Frank Robinson, Lawrence Schwartz, Ellen Thomas

Courses

* **G&G 010a / EVST 010a, Earth, Resources, Energy, and the Environment** Mary-Louise Timmermans

Humankind's interactions with, and place within, the natural world. Plate tectonics and natural disasters, biological evolution and mass extinction, human evolution, population growth and ecology, industrial resources, groundwater and pollution, fossil fuels and energy transitions, the carbon cycle and greenhouse gases, paleoclimates, current global warming, alternative energies, and a planetary perspective on the Earth as a singular oasis in space. Enrollment limited to first-year students. Preregistration required; see under First-Year Seminar Program. SC

* **G&G 105b / APHY 100b / ENAS 100b / EVST 100b / PHYS 100b, Energy**

Technology and Society Daniel Prober, Michael Oristaglio, and Julie Paquette
The technology and use of energy. Impacts on the environment, climate, security, and economy. Application of scientific reasoning and quantitative analysis. Intended for non-science majors with strong backgrounds in math and science. QR, SC

G&G 110a, Dynamic Earth David Evans and Danny Rye

An introduction to the processes that shape Earth's environment through the interactions of rocks, soils, the atmosphere, and the hydrosphere. Field trips and practical sessions in the properties of natural materials. Topics include evolution of landscapes; hydrologic and tectonic cycles; extreme geologic events such as earthquakes, floods, volcanism, and landslides; society's economic dependence on natural materials such as soils, minerals, and fossil fuels; and human influences on the natural environment. SC

G&G 111La, Dynamic Earth Laboratory and Field Methods Danny Rye and David Evans

Practical exercises in the laboratory and in the field to complement G&G 110 or 115. Identification of minerals and rocks; construction of geologic maps and cross sections to determine Earth-system processes and histories. Includes a field trip to the northern Appalachians during the October recess. After or concurrently with G&G 110, or after G&G 115. SC ½ Course cr

* **G&G 115b / EVST 200b, Earth System Science** Jeffrey Park

A survey of geoscience. Interaction of lithosphere, hydrosphere, atmosphere, and Earth's deep interior; natural controls on environment and climate in past, present, and future; rocks, minerals, glaciers, earthquakes, and volcanoes; natural hazards and natural resources. (Formerly G&G 200) SC

G&G 120a / EVST 125a, Earth's Changing Climate Jeffrey Park

The science of contemporary climate change or "global warming." Historical and contemporary methods used by scientists to draw conclusions concerning Earth's complex climate system and human influences on it, and to predict future climates. Risk assessment, response options. SC

* **G&G 125b / E&EB 125b, History of Life** Derek Briggs, Pincelli Hull, and Bhart-Anjan Bhullar

Examination of fossil and geologic evidence pertaining to the origin, evolution, and history of life on Earth. Emphasis on major events in the history of life, on what the

fossil record reveals about the evolutionary process, on the diversity of ancient and living organisms, and on the evolutionary impact of Earth's changing environment. SC

G&G 126Lb, Laboratory for the History of Life Derek Briggs, Pincelli Hull, and Bhart-Anjan Bhullar

A survey of the diversification of life using suites of fossils and related modern organisms drawn from critical evolutionary stages. Emphasis on direct observation and description of specimens, the solution of problems posed by the instructor, and the generation and testing of hypotheses by the students. To be taken concurrently with or following G&G 125. SC ½ Course cr

G&G 140a, Atmosphere, Ocean, and Climate Change Ronald Smith

Physical processes that control Earth's atmosphere, ocean, and climate. Quantitative methods for constructing energy and water budgets. Topics include clouds, rain, severe storms, regional climate, the ozone layer, air pollution, ocean currents and productivity, the seasons, El Niño, the history of Earth's climate, global warming, energy, and water resources. QR, SC

* **G&G 207b, The Science of Water** Kanani Lee

A study of water in its physical, chemical, biological, astronomical, geological, and environmental aspects. Topics include water's role in food and energy production, conservation and pollution, magnetic field generation, plate tectonics and volcanism, climate, and security. SC

[**G&G 215, Global Warming: The Carbon Cycle**]

* **G&G 216b, Global Warming: Climate Physics** John Wettlaufer

Lectures on the basics of global warming and presentations and discussions of some of the classic papers that combined have led to our current understanding of global warming. The knowns and the unknowns of global warming; the paper trail of cutting-edge climate science through time, from the late 1800s to the present. Recommended preparation: basic calculus and physics. SC

[**G&G 220, Petrology and Mineralogy**]

G&G 232b, Earth Surface Processes Mark Brandon and Noah Planavsky

Introduction to sedimentary rocks as paleoenvironmental archives. Reconstruction of depositional environments and paleoclimatic conditions using geochemical and sedimentological tools. Topics include sedimentology, stratigraphy, basin analysis, diagenesis, and sedimentary geochemistry. Prerequisite: G&G 100, 110, or 115, or permission of instructor. SC

* **G&G 240b, Forensic Geoscience** Maureen Long

Approaches and technologies developed for geoscience that have been adapted and applied in criminal, environmental, historical, and archaeological investigations. Methods related to seismology, geophysics, geomorphology, geochemistry, and radiometric dating. Case studies include nuclear treaty verification, detection of unexploded ordnance and clandestine graves, military history, soil and groundwater contamination, archaeological controversies, art and antiquities fraud, and narcotics provenance. SC

G&G 247b / AMTH 247b / MATH 247b, Partial Differential Equations Jeremy Hoskins

Introduction to partial differential equations, wave equation, Laplace's equation, heat equation, method of characteristics, calculus of variations, series and transform methods, and numerical methods. Prerequisites: MATH 222 or 225, MATH 246, and ENAS 194, or equivalents. QR

G&G 274a, Fossil Fuels and World Energy Michael Oristaglio

The origins, geologic settings, exploration, distribution, and extraction of coal, oil, and natural gas as finite Earth resources. The role of fossil fuels in the world's energy systems; environmental impacts of fossil fuels, including climate change; the transition to low-carbon energy sources. Prerequisites: high school chemistry, mathematics, and Earth science. Recommended preparation: G&G 110 or 205. SC

* **G&G 275b, Renewable Energy** Ronald Smith and Michael Oristaglio

Introduction to renewable energy, including physical principles, existing and emerging technologies, and interaction with the environment. Energy demand; transmission and storage; generation by hydroelectric, wind, solar, biofuel, and geothermal sources, as well as waves and tidal generation. Includes field trips to conventional, hydroelectric, and wind power facilities in Connecticut. Prerequisites: high school physics, chemistry, and mathematics; college-level science, engineering, and mathematics recommended. SC

[**G&G 280, Organic Geochemistry**]

[**G&G 290, Earthquakes and Volcanoes**]

G&G 310a, Isotope Geochemistry Alan Rooney

An overview of the fundamental principles of stable and radiogenic isotope geochemistry. Emphasis is placed on applications of such systems to the evolution of the planet and life on Earth. Specific topics include marine geochemistry, geochronology, and biogeochemistry. Prerequisites: CHEM 115, MATH 120, and PHYS 171 or equivalents, or with permission of instructor. QR, SC

G&G 312b, Structural Geology 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. QR, SC

G&G 322a, Physics of Weather and Climate Alexey Fedorov

The climatic system; survey of atmospheric behavior and climatic change; meteorological measurements and analysis; formulation of physical principles governing weather and climate with selected applications to small- and large-scale phenomena. After PHYS 181 and MATH 120 or equivalents. QR, SC

[**G&G 323, Climate Dynamics**]

G&G 325a, Vertebrate Paleontology 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. Prerequisite: E&EB 225, or with permission of instructor. SC 1½ Course cr

G&G 326a, 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 181b and MATH 120a or b, or equivalents. QR, SC

G&G 355a, Extraordinary Glimpses of Past Life Derek Briggs

Study of exceptionally well-preserved fossil deposits (*lagerstaetten*) that contain nonmineralized animal skeletons and casts of the soft parts of organisms. Examples such as the Burgess Shale and Solnhofen limestones; what they can reveal about the history and evolution of life, ancient lifestyles and environments, and preservational processes. After G&G 230. SC

*** G&G 362b / ARCG 362b / EVST 362b, 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. Prerequisites: college-level physics or chemistry, two courses in geology and natural science of the environment or equivalents, and computer literacy. QR, SC

[G&G 370, Regional Perspectives on Global Geoscience]**G&G 421b, Geophysical Fluid Dynamics** David Bercovici

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. QR, SC

G&G 428a / AMTH 428a / E&EB 428a / PHYS 428a, 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. Prerequisite: PHYS 301, MATH 247, or equivalent. QR, SC

[G&G 450, Deformation of Earth Materials]**G&G 456a, Introduction to Seismology** Maureen Long

Earthquakes and seismic waves, P and S waves, surface waves and free oscillations. Remote sensing of Earth's deep interior and faulting mechanisms. Prerequisites: MATH 120, 222, and PHYS 181, or equivalents. QR, SC

*** G&G 487a or b, Individual Study in Geology and Geophysics** Staff

Individual study for qualified undergraduates under faculty supervision. To register for this course, each student must submit a written plan of study, approved by the

adviser, to the director of undergraduate studies. May be taken more than once for credit. ½ Course cr

*** G&G 488a and G&G 489b, Research in Geology and Geophysics** Staff

Individual study for qualified juniors and seniors under faculty supervision. To register for this course, each student must submit a written plan of study, approved by the adviser, to the director of undergraduate studies.

*** G&G 490a and G&G 491b, Research and Senior Thesis** Staff

Two terms of independent library, laboratory, field, or modeling-based research under faculty supervision. To register for this course, each student must submit a written plan of study, approved by a faculty adviser, to the director of undergraduate studies by the end of the junior year. The plan requires approval of the full G&G faculty.

*** G&G 492a or b, The Senior Essay** Staff

One term of independent library, laboratory, field, or modeling-based research under faculty supervision. To register for this course, each student must submit a written plan of study, approved by a faculty adviser, to the director of undergraduate studies at the beginning of the term in which the essay is to be written.

German Studies

Director of undergraduate studies: Katrin Truedstedt, 305 WLH, 432-0711, katrin.truedstedt@yale.edu; (katrin.truedstedt@yale.edu) language program director: Theresa Schenker, 323 WLH, 432-6401, theresa.schenker@yale.edu; german.yale.edu

The major in German Studies covers a broad tradition of more than five centuries in Germany, Austria, Switzerland, and neighboring lands. Students gain deep competence in the German language while also reading celebrated literature, analyzing distinctive artworks in many media, deducing intensive theories, and exploring political, linguistic, and cultural histories. The German faculty works closely with undergraduates to develop their special areas of interest within the rich currents of German culture.

German language courses emphasize listening, speaking, reading, and writing in interaction with authentic cultural materials. The curriculum also introduces students to the basic questions and methods of literary criticism, with a focus on rigorous reading practices for a wide range of works from different genres, disciplines, and historical moments.

German Studies courses are diverse in their topics and highly relevant to other fields of study today. Pioneers in philosophy, political theory, sociology, psychology, history, classical philology, the visual arts, architecture, and music wrote and thought in German, as did founders of the modern natural and practical sciences. Majors discover Kant, Goethe, Beethoven, Einstein, Freud, Kafka, Arendt, and many other thinkers and writers who laid the groundwork for modernity and still hold keys to understanding it.

Germany is the fourth-largest economy in the world, and German is the first language of over 95 million people worldwide. Students with a foundation in the language, literature, history, and intellectual revolutions of Germany are prepared to enter a wide variety of vocations. Majors have gone on to postgraduate study in Germany and the United States, and many have entered top-tier law schools and graduate programs. Recent graduates work in fields as diverse as environmental policy, journalism, arts management, consulting, and engineering, as well as in governmental and nongovernmental organizations and businesses.

PREREQUISITES

Prerequisite to the major are first- and second-year German or the equivalent.

COURSE NUMBERING

Group A courses Courses in Group A (GMAN 110–159) correspond to Yale's L1 to L5 designation of elementary, intermediate, and advanced language courses.

Group B courses Courses in Group B (GMAN 160-level and 170-level) are advanced L5 courses. Readings are in German, and the language of instruction is German. There is no restriction on the number of Group B courses that may count toward the major, provided all requirements are met.

Group C courses Courses in Group C (above GMAN 200) are all other courses. The language of instruction is typically English, but readings may be in German and/or English. Course level and prerequisites vary according to the expectations of the instructors.

PLACEMENT PROCEDURES

An online placement examination will be accessible July 1 through August 15, 2018. See the departmental website for details. Students wishing to take the placement exam in January should sign up with the language director by December 1, 2018. Students may also consult with the director of undergraduate studies or the language director for advice about placement and about language study. Regardless of previous German study, students without a score of 5 on the German Advanced Placement test must take the departmental placement exam in order to enroll in any course above GMAN 110 or 125.

REQUIREMENTS OF THE MAJOR

The major in German Studies consists of ten term courses, including three advanced language courses, four courses in an area of concentration, two electives, and the senior essay. All majors must complete at least one GMAN course numbered in the 150s, one in the 160s, and one in the 170s, plus six additional courses—four in the area of concentration and two electives—from Groups B and C, numbered GMAN 160 and above. With permission of the director of undergraduate studies, some substitutions and exceptions may be possible.

Areas of concentration Each German Studies major selects an area of concentration from five possible choices: (1) literature, (2) media and media theory, (3) history and politics, (4) critical thought, and (5) aesthetics and the arts. The *literature* concentration gives students access to worlds of thought and action. Students learn to read critically poetry, novels, plays, short stories, aphorisms, songs, and other genres. Courses fulfilling the literature concentration include at least one course each in nineteenth- and twentieth-century literature. The concentration in *media and media theory* explores a vibrant tradition of experimentation in new cultural forms and media in the nineteenth and twentieth centuries. Students investigate photography, radio, film, television, and computer media alongside landmark works in media theory. The *history and politics* concentration focuses on world-altering historical events and thought-altering theories of history from the Germanic tradition. Students become familiar with explosive political and social events, including the emancipation of the Jews and the Holocaust, the world wars, unification and reunification, and concepts and models for development in economy, social welfare, law, and environmental policies. The concentration in *critical thought* focuses on traditions of theoretical reflection on society, history, art, and language. Students become familiar with authors such as Kant, Hegel, Marx, Nietzsche, Freud, Benjamin, and Habermas. The *aesthetics and the arts* concentration surveys the rich Germanic traditions in the visual and musical arts, as well as the philosophical study of art beginning in eighteenth-century Germany.

Credit/D/Fail A maximum of two courses taken Credit/D/Fail may count toward the major, with permission of the DUS.

SENIOR REQUIREMENT

Seniors in the standard German Studies major enroll in GMAN 492, a guided senior essay tutorial course. Students meet biweekly with the DUS and staff, and work under the direction of a faculty adviser. The culmination of the tutorial is an essay of approximately thirty pages that gives evidence of careful reading and substantial independent thought. The essay may be written in either English or German, although

only native speakers are encouraged to write an essay in German. Seniors typically write the essay during the fall term. A preliminary statement indicating the general area to be addressed and the choice of adviser should be submitted to the DUS by September 8, 2018; a three-page prospectus and a bibliography are due by September 22. A rough draft must be submitted to the adviser by November 3. The completed essay, due on December 8, 2018, is judged by the faculty adviser and a second reader.

Intensive major Requirements for the intensive major are the same as for the standard major, except that the intensive major replaces one advanced seminar with a second term of the senior essay. In the fall term seniors in the intensive major enroll in GMAN 492 and begin work on their project under the guidance and supervision of a faculty adviser. A significant portion of the research for the essay should involve materials in German. The essay may be written in either English or German, although only native speakers are encouraged to write an essay in German. A detailed prospectus, no longer than three pages, and a bibliography must be submitted to the DUS by October 20, 2018. The student must submit a draft of at least fifteen pages of the essay by December 1, 2018 to receive credit for the first term of the course. The second term, GMAN 493, is devoted to completing the essay, which should be substantial (between fifty and sixty pages); the completed essay must be submitted by April 13, 2019. The senior essay is judged by the faculty adviser and a second reader.

ADVISING

Candidates for the major in German Studies should consult the DUS.

Graduate courses Courses in the Graduate School are open to undergraduates with permission of the instructor and of the directors of undergraduate and graduate studies. Course descriptions may be obtained on the German department website or from the office of the director of graduate studies.

STUDY ABROAD

Students are strongly encouraged to study in Germany for a summer, or for one or two terms on the Year or Term Abroad program. Appropriate course credit toward the major is granted for work in approved programs in Germany. Study abroad is valuable not only for achieving comfortable fluency in German, but also for gaining firsthand knowledge of the German cultural context. The department offers diverse opportunities for study abroad and a scholarship program for summer courses at German universities. Members of the faculty advise and consult with any students wishing to plan study in Germany. Students who have been approved to study abroad and who receive financial aid from Yale are eligible for aid while abroad. For information about the Year or Term Abroad program, see section K, Special Arrangements (p. 64), in the Academic Regulations. Students who study abroad for one term may count up to two courses toward the major, with approval of the DUS. Students who study abroad for an academic year may count up to four courses toward the major, with approval of the DUS.

REQUIREMENTS OF THE MAJOR

Prerequisites First- and second-year German or equivalent

Number of courses 10 (incl senior req)

Distribution of courses At least 1 GMAN course in the 150s, at least 1 in the 160s, and at least 1 in the 170s; 4 courses in area of concentration and 2 electives (numbered

GMAN 160 and above) from Groups B and C; *Literature concentration* – at least 1 course each in 19th- and 20th-century literature

Substitution permitted With DUS approval, some substitutions and exceptions may be possible

Senior requirement Senior essay tutorial (GMAN 492)

Intensive major Two-term senior essay (GMAN 492 and 493)

FACULTY OF THE DEPARTMENT OF GERMANIC LANGUAGES AND LITERATURES

Professors Rüdiger Campe, Carol Jacobs (*Emerita*), Rainer Nägele (*Emeritus*), Paul North, Brigitte Peucker, Kirk Wetters (*Chair*)

Assistant Professor Katrin Truedstedt

Senior Lectors II Marion Gehlker, Theresa Schenker

Affiliated Faculty Jeffrey Alexander (*Sociology*), Jennifer Allen (*History*), Seyla Benhabib (*Political Science*), David Cameron (*Political Science*), Paul Franks (*Philosophy, Judaic Studies*), Gundula Kreuzer (*Music*), Patrick McCreless (*Music*), Steven Smith (*Political Science*), David Sorkin (*History*), Nicola Suthor (*History of Art*), Katie Trumpener (*Comparative Literature, English*), Jay Winter (*History*)

Group A Courses

*** DUTC 130a, Intermediate Dutch I** Staff

Continued development of reading, writing, and speaking proficiency in Dutch. Students review and improve grammar skills, expand their vocabulary, read newspaper articles, and watch and listen to Dutch newscasts. Prerequisite: DUTC 120 or equivalent. Course taught through distance learning using videoconferencing technology from Columbia University. Enrollment limited; interested students should e-mail minjin.hashbat@yale.edu for more information. L3 RP 1½ Course cr

*** DUTC 140b, Intermediate Dutch II** Staff

Use of authentic Dutch texts to expand proficiency in the language and familiarity with the culture. Focus on Dutch cultural themes that reflect students' interests and fields of study. Readings include a novel and news articles on current events. Prerequisite: DUTC 130. Course includes students from Cornell University via videoconference. L4 1½ Course cr

*** DUTC 150a, Advanced Dutch** Staff

Continuation of DUTC 140. Focus on improvement of grammatical knowledge; proficiency in reading, writing, and speaking Dutch; and cultural insight and knowledge of Amsterdam and the Netherlands. Prerequisite: DUTC 140 or equivalent. Course taught through distance learning using videoconferencing technology from Columbia University. Enrollment limited; interested students should e-mail minjin.hashbat@yale.edu for more information. L5

*** GMAN 110a or b, Elementary German I** Staff

A beginning content- and task-based course that focuses on the acquisition of spoken and written communication skills, as well as on the development of cultural awareness and of foundations in grammar and vocabulary. Topics such as school, family life, and housing. Course materials include a variety of authentic readings, a feature film, and shorter video clips. Tutors are available for extra help. To be followed by

GMAN 120. Enrollment limited to 14 per section. Credit only on completion of GMAN 120. Students must preregister through Preference Selection during the online preregistration period. Details and a link to Preference Selection are provided on the German department Web site at <http://german.yale.edu>. L1 1½ Course cr

GMAN 120a or b, Elementary German II Staff

Continuation of GMAN 110. A content- and task-based course that focuses on the acquisition of communicative competence in speaking and writing and on the development of strong cultural awareness. Topics such as multiculturalism, food, childhood, and travel; units on Switzerland and Austria. Course materials include a variety of authentic readings, a feature film, and shorter video clips. Tutors are available for extra help. To be followed by GMAN 130. Enrollment limited to 14 per section. Students must preregister through Preference Selection during the online preregistration period. Details and a link to Preference Selection are provided on the German department Web site at <http://german.yale.edu>. L2 1½ Course cr

GMAN 125a, Intensive German I Staff

Intensive training in speaking, reading, writing, and comprehending the language. Focus on the mastery of formal grammar. For beginning students of superior linguistic ability. L1, L2 2 Course cr

GMAN 130a or b, Intermediate German I Staff

Builds on and expands knowledge acquired in GMAN 120. A content- and task-based course that helps students improve their oral and written linguistic skills and their cultural awareness through a variety of materials related to German literature, culture, history, and politics. Course materials include authentic readings, a feature film, and shorter video clips. Tutors are available for extra help. After GMAN 120 or according to placement examination. Followed by GMAN 140. Enrollment limited to 14 per section. Students must preregister through Preference Selection during the online preregistration period. Details and a link to Preference Selection are provided on the German department Web site at <http://german.yale.edu>. L3 1½ Course cr

GMAN 140a or b, Intermediate German II Staff

Builds on and expands knowledge acquired in GMAN 130. A content- and task-based course that helps students improve their oral and written linguistic skills and their cultural awareness through a variety of materials related to German literature, culture, history, and politics. Course materials include authentic readings, a feature film, and shorter video clips. Tutors are available for extra help. After GMAN 130 or according to placement examination. Normally followed by GMAN 150 or, with permission of the director of undergraduate studies, by GMAN 171. Enrollment limited to 14 per section. Students must preregister through Preference Selection during the online preregistration period. Details and a link to Preference Selection are provided on the German department Web site at <http://german.yale.edu>. L4 1½ Course cr

GMAN 145b, Intensive German II Staff

Continuation of GMAN 125. Focus on speaking, writing, and the conversion of grammatical knowledge into reading competence for literary and scholarly purposes. Prerequisite: GMAN 125. L3, L4 RP 2 Course cr

* **GMAN 150a, Advanced German, Contemporary Germany** Marion Gehlker

An advanced language and culture course focusing on contemporary Germany. Analysis and discussion of current events in Germany and Europe through the

lens of German media, including newspapers, books, TV, film radio, and modern electronic media formats. Focus on oral and written production to achieve advanced linguistic skills. After GMAN 140 or 145. For entering students with a score of 5 on the German Advanced Placement test, or according to results of the placement examination. Students must preregister through Preference Selection during the online preregistration period. Details and a link to Preference Selection are provided on the German department Web site at <http://german.yale.edu>. L5

* **GMAN 151b, Exploring Contemporary German Culture** Marion Gehlker
Advanced German course focusing on vocabulary expansion through reading practice; stylistic development in writing; and development of conversational German. Critical analysis of selected aspects of contemporary German culture, such as Green Germany, social movements from the 60s to today, the changing "Sozialstaat," and current events. Prerequisite: GMAN 140 or equivalent. L5

Group B Courses

* **DUTC 160b, Advanced Dutch II** Staff
Continuation of DUTC 150. Focus on improvement of grammatical knowledge; proficiency in reading, writing, and speaking Dutch; and cultural insight and knowledge of Amsterdam and the Netherlands. Prerequisite: DUTC 150 or equivalent. Course taught through distance learning using videoconferencing technology from Columbia University. Enrollment limited; interested students should e-mail minjin.hashbat@yale.edu for more information.

* **GMAN 160b, German Culture, History, and Politics in Text and Film** Theresa Schenker
Advanced language course about the history, politics, and culture of East Germany from 1945 to reunification. Analysis of life in the German Democratic Republic with literary and nonliterary texts and films. Includes oral and written assignments, with an emphasis on vocabulary building and increased cultural awareness. Taught in German. After GMAN 140, 145, or 150, or with permission of instructor. L5, HU

* **GMAN 165a, The German Fairy Tale and its Legacy** Theresa Schenker
Once upon a time, long before Tolkien, Disney, or Rowling, two brothers named Grimm published a collection of fairy tales that went on to have an immense cultural impact throughout the world. German children grow up with these fairy tales and they play a huge part in German culture even today. The Grimm fairy tales are the textual point of departure for a multi-faceted, integrative exploration of this popular and influential genre through time. Students explore fairy tales by Wilhelm Hauff and Ludwig Bechstein, as well as traditional cultural theories of the German fairy tale, psychoanalytic and pedagogical interpretive approaches, and contextualization of this genre in cultural and social history. The focus is on the role that the literary fairy tale played in German culture throughout history and the impact German fairy tales still have today. Prerequisite: Successful completion of L4 German, or appropriate level on the German placement test. L5, HU

* **GMAN 171b, Introduction to German Prose Narrative** Ole Hinz
Study of key authors and works of the German narrative tradition, with a focus on the development of advanced reading comprehension, writing, and speaking skills. Readings from short stories, novellas, and at least one novel. Writings by exemplary

storytellers of the German tradition, such as Goethe, Kleist, Hebel, Hoffmann, Stifter, Keller, Kafka, Mann, Musil, Bachmann, and Bernhard. L5, HU

* **GMAN 177a, Introduction to German Literature and Film** Susan Morrow
Study of key films and works of the twentieth-century around problems of the state, with focus on development of advanced reading comprehension, writing, and speaking skills. Films from the Weimar period to recent Berlin School realism by directors Wiene, Lang, Kluge, Haneke, Petzold, and Farocki. Readings from short stories, novellas, and essays by Kafka, Kracauer, Arendt, Böll, Wolf, Schlögel, and Passig. Prerequisite: GMAN 150 or L5 placement. L5

Group C Courses

Unless otherwise indicated, courses in this group are conducted in English with both readings and discussion in English. The courses are open to all students in Yale College.

* **GMAN 225b / FILM 346b / LITR 362b, Intermediality in Film** Brigitte Peucker
Film is a hybrid medium, the meeting point of several others. This course focuses on the relationship of film to theater, painting, and video, suggesting that where two media are in evidence, there is usually a third. Topics include space, motion, framing, color, theatricality, tableau vivant, ekphrasis, spectatorship, and new media. Readings feature art historical and film theoretical texts as well as essays pertinent to specific films. Films by Fassbinder, Bergman, von Trier, Jarman, Godard, Haneke, Antonioni, Greenaway and others. HU

* **GMAN 254a / JDST 335a / PHIL 274a / RLST 249a, Jewish Philosophy** Paul Franks
Introduction to Jewish philosophy, including classical rationalism of Maimonides, classical kabbalah, and Franz Rosenzweig's inheritance of both traditions. Critical examination of concepts arising in and from Jewish life and experience, in a way that illuminates universal problems of leading a meaningful human life in a multicultural and increasingly globalized world. No previous knowledge of Judaism is required. WR, HU

GMAN 311a / LITR 215a, The Age of Goethe Kirk Wetters
Introduction to Germany's classical period, from the 1780s to the 1810s, with attention to the varied forms of literature, philosophy, art, music, and culture. The close connection between literature and philosophy; the theoretical foundations of European Romanticism. Some attention to twentieth-century theory. HU

* **GMAN 314a / PHIL 472a / PLSC 309a, Contemporary Critical Theory** Seyla Benhabib
Frankfurt School and Critical Theory focuses on a number of unresolved questions such as pragmatic Kantianism; modernity and post-colonial theory; the idea of progress in critical theory; and judgment as amoral, political, aesthetic. Readings from: Habermas, McCarthy, Baynes, Honneth, A. Allen, Ferrara, and Zerilli. Prerequisite: Directed Studies or two or more advanced courses in modern political philosophy. SO

* **GMAN 326a / LITR 248a, Franz Kafka and Thomas Mann: Two Modernisms** Jan Hagens
Comparison of Kafka's radical modernism and Mann's neoclassical realism as fundamentally different modes of responding to the challenges of twentieth-century culture. Close reading of short stories by both writers, with attention to the authors'

themes, literary techniques, and worldviews. Discussion in English; readings in German or English. HU

* **GMAN 368b / FILM 419b / LITR 382b, German New Waves in Cold War Europe**

Katie Trumpener

Comparative study of New Wave cinema in East and West Germany, with a focus on aesthetic ferment, institutional barriers, and transformation. Berlin as the best place to follow Europe's emerging cinematic New Waves before 1961. Distinctive approaches developed by young filmmakers in East and West Germany to political and documentary filmmaking, to the Nazi past and the Cold War, and to class, gender, and social transformation. Knowledge of German helpful but not necessary. WR, HU

* **GMAN 371a / HUMS 353a / LITR 442a, Kafka and the Philosophers** Rüdiger

Campe

The notion of the “Kafkaesque” is testimony to the exceptional place and impact of Kafka’s work and writing in world literature. In fact, Kafka has not only been extensively imitated by other writers and read by literary critics but his narratives and novels became the place of intense engagement by philosophers. More often than not, Kafka is not just another example for a theoretical concept but offers the possibility for new concepts or even requires new ways of thinking. An introduction into Kafka’s world of writing is offered by the reading of pieces from his early work (*Description of a Struggle*), the novel *The Trial* (with Orson Welles’s movie), and the late narrative *Josephine, the Singer*. The philosophers to read on Kafka (and in their own context) are Albert Camus, Walter Benjamin, Theodor W. Adorno, Maurice Blanchot, Gilles Deleuze, Jacques Derrida, Claudio Agamben, and, in conjunction with Kafka, Stanley Cavell and Richard Rorty. HU

* **GMAN 372b / JDST 355b / LITR 228, Reflections on the Holocaust** Katrin Truedstedt

Reflections on how the Holocaust has shaken our understanding of modern Western culture. We focus especially on literary and theoretical reflections on the Holocaust as undermining the very possibility of experience, representation, and of inhabiting a shared world. The course aims to give perspective on the complex factors conditioning the Holocaust; the rise of nationalism, fascism, and racism; the relationship between modernity and barbarism; inclusion and exclusion; law and bare life, World War II and the emergence of the Camp System in Eastern Europe; collaboration, resistance, and survival. Readings by Primo Levi, Hannah Arendt, Theodor W. Adorno, Giorgio Agamben, and others. HU

GMAN 381a / PHIL 204a, Kant's Critique of Pure Reason Paul Franks

An examination of the metaphysical and epistemological doctrines of Kant's *Critique of Pure Reason*. Prerequisite: PHIL 126 or DRST 004. HU

* **GMAN 418b / LITR 453b, Being a Person** Rüdiger Campe and Staff

In Western experience, the social and legal notion of a “person” has been deeply informed by how “persons” are formed and performed onstage and in narration, and vice versa. Readings focus on three areas: (1) basic texts on the history of the notion of “person” and “character” in legal, poetical, and philosophical contexts from Aristotle to modernity; (2) the performance of personhood in the rebirth of modern theater in early modern times; and (3) the narrative evocation of a new modern character in the rise of the modern novel. In order to bring into view the performative and aesthetic dimensions of personhood we discuss questions such as: What does it mean to appear

as a person on a stage? What does it take to appear as a certain character (e.g. as reflected in *Commedia dell'Arte*; Shakespeare; Racine; Lessing)? What is a main and what is a supporting character (e.g. as reflected in Defoe, Richardson, Goethe, Kleist, Mary Shelley)? How can a protagonist of a novel be constituted and how is her or his identity defined and secured? Gender, race, and social class are of relevance throughout, as well as the question of being a non-person (a madman, an animal, a monster, an outcast). HU

* **GMAN 422b / CPLT 562 / GMAN 654 / HUMS 250b / LITR 439b / PHIL 476b, Living Form: Organicism in Society and Aesthetics** Kirk Wetters

Starting with Kant, the organic is defined as a processual relation of the part and the whole, thereby providing a new model of the individual as a self-contained totality. Students explore the implications of this conception in Goethe's writings on morphology (*The Metamorphosis of Plants*, "Orphic Primal Words"), the Romantics' *Atheneum*, Hanslick's *On the Beautiful in Music*, Oswald Spengler's cultural morphology, the concept of autopoiesis in Maturana and Varela, Luhmann's systems theory, and Canguilhem's critique of the analogy of organic life and society. HU

Reading Courses

* **GMAN 100a, German for Reading** Marion Gehlker

Students learn the skills with which to read German-language texts of any difficulty with some fluency. Study of syntax and grammar; practice in close reading and translation of fiction and expository prose in the humanities and sciences. Conducted in English. Does not satisfy the language distributional requirement.

* **GMAN 102a / JDST 416a, Reading Yiddish** Joshua Price

This course is designed to build literacy in Yiddish, the vernacular of Ashkenazi Jewry. With focus on the accelerated treatment of Yiddish grammar, regularly supplemented with simple primary texts (poems, songs, folktales), and followed by close readings of (modern) Yiddish literature, students will be able to navigate most Yiddish texts with the aid of a dictionary. May not be taken concurrently with elementary or intermediate German.

* **GMAN 103b / JDST 418b, Reading Yiddish II** Joshua Price

Intermediate study of Yiddish literary language with annotated readings from classic authors including: Mendele, Sholem Aleichem, Peretz, Bergelson, Der Nister, Bashevis, as well as American and Soviet Yiddish poetry. Secondary readings in English will offer a broader introduction to the modern Yiddish canon. Continuation of GMAN 102/ JDST 416. Previous knowledge of German or Hebrew-Aramaic recommended but not required.

Senior Courses

* **GMAN 478a or b, Directed Readings or Individual Research in Germanic Languages and Literatures** Staff

Individual study under faculty supervision. Applicants must submit a prospectus and bibliography approved by the faculty adviser to the director of undergraduate studies. The student meets with the adviser at least one hour each week and takes a final examination or writes a term paper. No credit granted without prior approval of the director of undergraduate studies.

* **GMAN 492a and GMAN 493b, The Senior Essay Tutorial** Staff
Preparation of an original essay under the direction of a faculty adviser.

Global Affairs

Director of undergraduate studies: Sigga Benediktsdottir, 202 Horchow Hall, 432-3418; jackson.yale.edu/ba-degree

The Global Affairs major, administered by the Jackson Institute for Global Affairs, prepares Yale students for global citizenship and service by enhancing their understanding of the world around them. Students in this interdisciplinary major develop expertise in contemporary global affairs that is strongly grounded in the social sciences.

Students in the Global Affairs major have the flexibility to shape their own curriculum according to their interests and ambitions. In the past, students have concentrated their course work on economic development and poverty; global health; global climate policy; international relations; and foreign policy and diplomacy, with topics relevant to national and human security.

COURSES FOR NONMAJORS

Most Global Affairs courses are open to both majors and nonmajors. If a Global Affairs course requires an application, the application will be posted on the Jackson Institute Website.

PREREQUISITES

There are no prerequisites for the Global Affairs major. However, students interested in applying to the major are encouraged to complete the introductory economics sequence (ECON 108, 110, or 115 and ECON 111 or 116) and work toward the foreign language requirement early in their course planning. An introductory analysis course, such as GLBL 121, ECON 131, or S&DS 100-106 is suggested.

REQUIREMENTS OF THE MAJOR

Requirements of the major for the Class of 2020 and prior classes With DUS approval, the following changes to the requirements of the major may be fulfilled by students who declared their major under previous requirements.

Requirements of the major for the Class of 2021 and subsequent classes Thirteen term courses are required for the major in addition to a foreign language requirement. Introductory courses in microeconomics (ECON 108, 110, or 115) and macroeconomics (ECON 111 or 116) are required, as is ECON 121 or 125. All majors must take the core courses GLBL 225 and 275, and three courses in quantitative and other methods, including GLBL 121 and GLBL 122. Majors also take four electives chosen from an approved group of courses in Global Affairs, History (p. 434), Political Science (p. 626), Economics (p. 272), and other social science departments; and GLBL 499 Senior Capstone Project.

For information about which courses qualify as electives, see the Jackson Institute Website and the course listings in this bulletin.

Language requirement Global Affairs majors are required to take a course designated L5 in a modern language other than English. In exceptional cases, a demonstration of proficiency can fulfill this requirement.

Credit/D/Fail Courses taken Credit/D/Fail may not be applied to the requirements of the major, with the exception that a grade of Credit in an L5 language course may be used to demonstrate proficiency in a foreign language.

Roadmap See visual roadmap of the requirements.

SENIOR REQUIREMENT

In the fall term of the senior year, majors must complete a capstone project in GLBL 499. Small groups of students are each assigned to a policy task force in which they apply their academic training in the social sciences to a specific problem relevant to global affairs. Each task force presents its findings and recommendations to a real-world client such as a government agency, a nongovernmental organization or nonprofit group, or a private-sector organization in the United States or abroad.

ADVISING AND APPLICATION TO THE MAJOR

Students apply to the Global Affairs major in the fall of the sophomore year. The number of students accepted into the major is limited, and selection is competitive. The call for applications is posted each year on the Jackson Institute Website, circulated through the residential college deans' offices, and noted on the Advising Resources Website. For application information, visit the Jackson Institute Website.

Internships Students in the major are encouraged to take a summer internship in the field of global affairs after their junior year. The Jackson Institute's Career Services Office can help students find appropriate internships.

STUDY ABROAD

Global Affairs majors who plan to study abroad should consult the Director of Student Affairs, Lily Sutton (lily.sutton@yale.edu), to devise a course of study prior to the term abroad.

REQUIREMENTS OF THE MAJOR

Prerequisites None

Number of courses 13 (incl senior req; excluding lang req)

Specific courses required ECON 108, 110, or 115; ECON 111 or 116; ECON 121 or 125; GLBL 225; 275

Distribution of courses 3 quantitative and other methods courses, incl GLBL 121; 4 approved electives

Language requirement Advanced ability (L5) in 1 modern lang other than English

Senior requirement Senior capstone project in GLBL 499

FACULTY ASSOCIATED WITH THE PROGRAM OF GLOBAL AFFAIRS

Professors Konstantinos Arkolakis (*Economics*), David Engerman (*History*), John Gaddis (*History*), Jacob Hacker (*Political Science*), Oona Hathaway (*Law*), Stathis Kalyvas (*Political Science*), Paul Kennedy (*History*), James Levinsohn (*Director*) (*School of Management*), A. Mushfiq Mobarak (*School of Management*), Samuel Moyn (*Law*), Catherine Panter-Brick (*Anthropology*), Peter Schott (*Economics*; *School of Management*), Ian Shapiro (*Political Science*), Timothy Snyder (*History*), Jing Tsu (*East Asian Languages and Literatures*), Aleh Tsyvinski (*Economics*), Steven Wilkinson (*Political Science*), Ernesto Zedillo (*International Economics & Politics*)

Associate Professors 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 Kate 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 Marnix Amand, Sigga Benediktsdottir, Charles Hill (*International Security Studies*), Asha Rangappa, Justin Thomas, Isaiah Wilson

Lecturers Jeff Bandman, Michael Boozer (*Economics*), Michael Brenes, Elaine Dezenski (*Ethics, Politics and Economics*), Christopher Fussell, Robert Hecht, William Casey King, Nicholas Lotito (*Political Science*), Alice Miller (*Public Health; Law*), Julie O'Brien, Daniel Steinmetz-Jenkins, Kristina Talbert-Slagle (*Global Health*), Catherine Tejada, John Weigold, Edward Wittenstein, Lauren Young

Senior Fellows Susan Biniiaz, Eric Braverman, David Brooks, Ryan Crocker, Howard Dean, Janine di Giovanni, Robert Ford, Clare Lockhart, Stanley McChrystal, George Parker, David Rank, Bill Richardson, Stephen Roach, Emma Sky, Harry Thomas, Margaret Warner

Visiting Assistant Professor: Rafael Dix-Carneiro (*Economics*)

Courses

GLBL 101a, Gateway to Global Affairs Emma Sky

Collaboration between faculty and practitioners to discuss key topics and themes related to diplomacy, development, and defense. SO

GLBL 121a, Applied Quantitative Analysis Justin Thomas

Mathematical fundamentals that underlie analytical approaches in public policy and the social sciences. Development of mathematical skills in areas such as linear functions, single and multiple variable differentiation, exponential functions, and optimization. Statistical approaches include descriptive statistics, principles of sampling, hypothesis tests, simple linear regression, multiple regression, and models for analyzing categorical outcomes. QR

GLBL 180a / EP&E 231a / PLSC 346a, Game Theory and International Relations

Alexandre Debs

Introduction to game theory and its applications in political science and economics, with a focus on international relations. Standard solution concepts in game theory; case studies from important episodes in the history of international relations, including World War II, the Cuban missile crisis, and the 2003 U.S.-led invasion of Iraq. Recommended preparation: introductory microeconomics. QR, SO

* **GLBL 191a, Research Design and Survey Analysis** Justin Thomas

Introduction to research design through the analysis of survey data. Policy and management issues explored using data from the United States as well as from several developing countries. A bridge between the theory of statistics/econometrics and the practice of social science research. Use of the statistical package Stata. Prerequisites: GLBL 121 or equivalent, and an introductory course in statistics or econometrics. SO

GLBL 203a / PLSC 186a, Introduction to International Political Economy Didac Queralt

Examination of the political and institutional conditions that explain why some politicians and interest groups (e.g. lobbies, unions, voters, NGOs) prevail over others in crafting foreign policy. Consideration of traditional global economic exchange (trade, monetary policy and finance) as well as new topics in the international political economy (IPE), such as migration and environmental policy.

* **GLBL 215a / LAST 386a / MGRK 237a / PLSC 375a / SOCY 389a, Populism from Chavez to Trump** Paris Aslanidis

Investigation of the nature of the populist phenomenon and its impact on politics, society, and the economy in various regions of the world. Conceptual and methodological analyses are supported by comparative assessments of various empirical instances, from populist politicians such as Hugo Chavez and Donald Trump, to populist social movements such as the Tea Party and Occupy Wall Street. SO

GLBL 217a / EVST 202a / PLSC 149a, Sustainability in the Twenty-First Century Daniel Esty

Sustainability as a guiding concept for addressing twenty-first century tensions between economic, environmental, and social progress. Using a cross-disciplinary set of materials from the “sustainability canon,” students explore the interlocking challenges of providing abundant energy, reducing pollution, addressing climate change, conserving natural resources, and mitigating the other impacts of economic development. SO

GLBL 219a / ECON 375a, Monetary Policy William English

Introduction to modern macroeconomic models and how to use the models to examine some of the key issues that have faced monetary policymakers during and after the global financial crisis of 2008–2009. Prerequisites: Intermediate level macroeconomics (ECON 122 or 126) and introductory econometrics (ECON 131 or 135). WR, SO

* **GLBL 225b, Approaches to International Development** Staff

The unique set of challenges faced by households in developing countries, and the economic theories that have been developed to understand them. Health, education, and discrimination against women in the household; income generation, savings, and credit; institutions, foreign aid, and conflict. Recent econometric techniques applied to investigate the underlying causes of poverty and the effectiveness of development programs. Enrollment limited to sophomores, juniors, and seniors. Prerequisite: GLBL 121. QR, SO

* **GLBL 233b / ECON 470b / EP&E 232b, 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 234b / ECON 184b, International Economics Peter Schott

Introduction to conceptual tools useful for understanding the strategic choices made by countries, firms, and unions in a globalized world. After two terms of introductory economics. SO

*** GLBL 238b / ECON 408b, International Trade Policy** Giovanni Maggi

Analysis of issues concerning international trade policy and agreements, including recent academic research. Welfare analysis of trade policy; the political economy of trade policy; international trade agreements. Attention to both theoretical methods and empirical research. Prerequisites: intermediate microeconomics and ECON 184. SO

*** GLBL 244a, The Politics of Fascism** Lauren Young

Study of the rise of fascism in Europe in the 1930s and its deployment during the Second World War as a road map to understanding the resurgence of nationalism and populism in today's political landscape, both in Europe and the United States.

GLBL 247a / PLSC 128a, Development Under Fire Jason Lyall

The recent emergence of foreign assistance as a tool of counterinsurgency and post-conflict reconciliation. Evaluation of the effects of aid in settings such as Afghanistan, Iraq, Colombia, and the Philippines. Examination of both theory and practice of conducting development work in the shadow of violence. Strengths and weaknesses of different evaluation methods, including randomized control trials (RCTs) and survey experiments. SO

*** GLBL 250a, Archival Methods in International History and Global Affairs** Staff

This course provides an overview of archival research and historical methods for students of global affairs and international history. In addition to reviewing readings on historical methods for political scientists and historians, we also discuss the process of archival research, the use (and abuse) of archival findings in scholarship, and the limitations of archival evidence. Moreover, we explore the vast holdings of the Yale Library in diplomatic and international history. Students are introduced to materials from the Henry Kissinger Papers, Dean Acheson Papers, Henry Stimson Papers, and the Cyrus Vance Papers, and are expected to use these collections – and others – in their assignments. HU

*** GLBL 251b / EALL 256b / EAST 358b / HUMS 272b / LITR 265b, China in the World** Jing Tsu

Recent headlines about China in the world, deciphered in both modern and historical contexts. Interpretation of new events and diverse texts through transnational connections. Topics include China and Africa, Mandarinization, labor and migration, Chinese America, nationalism and humiliation, and art and counterfeit. Readings and discussion in English. HU

*** GLBL 253b / ARCH 341b / LAST 318b, Globalization Space** Keller Easterling

Infrastructure space as a primary medium of change in global polity. Networks of trade, energy, communication, transportation, spatial products, finance, management, and labor, as well as new strains of political opportunity that reside within their spatial disposition. Case studies include free zones and automated ports around the world, satellite urbanism in South Asia, high-speed rail in Japan and the Middle East, agripoles in southern Spain, fiber optic submarine cable in East Africa, spatial products of tourism in North Korea, and management platforms of the International Organization for Standardization. HU

* **GLBL 259b / HIST 469Jb / PLSC 391b, State Formation** Didac Queralt

Study of the domestic and international determinants of functional states from antiquity to date. Analysis of state-formation in Europe in pre-modern and outside Europe from colonial times to date. Topics include centralization of power, capacity to tax, and contract enforcement. SO

GLBL 260b / PLSC 130b, Nuclear Politics Alexandre Debs

The pursuit, use, and non-use of nuclear weapons from the Manhattan Project to the present. The effect of the international system, regional dynamics, alliance politics, and domestic politics in the decision to pursue or forgo nuclear weapons. The role of nuclear weapons in international relations, the history of the Cold War, and recent challenges in stemming nuclear proliferation. SO

* **GLBL 261a or b / PLSC 409a or b, Civil Conflict** Bonnie Weir

Forms of civil conflict and political violence and theories about reasons for and implications of these types of violence. Natural and philosophical foundations of political violence; the potential roles of ethnicity, economic factors, territory, and political institutions and structures in the onset and dynamics of civil conflict; problems of conflict termination.

GLBL 263b / PLSC 439b, Challenges of Young Democracies Ana De La O

Challenges faced by young democracies, such as organizing free and fair elections, controlling government corruption, building an accountable system of governance, sustaining development, and curtailing conflict and violence. Factors that lead to the consolidation of democratic politics or to stagnation and a return to nondemocratic political systems. SO

GLBL 268b / PLSC 111b, Introduction to International Relations Jason Lyall

Survey of key debates and concepts in international relations. Exploration of historical and contemporary issues using Western and non-Western cases and evidence. Topics include the rise of states; causes, conduct, and outcomes of wars; the emergence of new actors and forms of conflict; and evolution of global economy. SO

* **GLBL 271a, Middle East Politics** Emma Sky

Exploration of the international politics of the Middle East through a framework of analysis that is partly historical and partly thematic. How the international system, as well as social structures and political economy, shape state behavior. Consideration of Arab nationalism; Islamism; the impact of oil; Cold War politics; conflicts; liberalization; the Arab-spring, and the rise of the Islamic State. SO

* **GLBL 274a or b / PLSC 137a or b, Terrorism** Bonnie Weir

Theoretical and empirical literature used to examine a host of questions about terrorism. The definition(s) of terrorism, the application of the term to individuals and groups, the historical use and potential causes of terrorism, suicide and so-called religious terrorism, dynamics within groups that use terrorism, and counterterrorism strategies and tactics. Theoretical readings supplemented by case studies. SO

* **GLBL 275a, Approaches to International Security** Nuno Monteiro

Introduction to major approaches and central topics in the field of international security, with primary focus on the principal man-made threats to human security: the use of violence among and within states, both by state and non-state actors. Priority to Global Affairs majors. Non-majors require permission of the instructor. SO

GLBL 281b / HIST 221b, Military History of the West since 1500 Paul Kennedy

A study of the military history of the West since 1500, with emphasis on the relationship between armies and navies on the one hand, and technology, economics, geography, and the rise of the modern nation-state on the other. The coming of airpower in its varied manifestations. Also meets requirements for the Air Force and Naval ROTC programs. HU

* **GLBL 306a / AFST 306a, Social Enterprise in Developing Economies II** Robert Hopkins

Summer research developed into a case-study project on a topic related to the use of social enterprise in regional economic development. Prerequisite: GLBL 305

* **GLBL 307b / ECON 467b, Economic Evolution of the Latin American and Caribbean Countries** Ernesto Zedillo

Economic evolution and prospects of the Latin American and Caribbean (LAC) countries. Topics include the period from independence to the 1930s; import substitution and industrialization to the early 1980s; the debt crisis and the "lost decade"; reform and disappointment in the late 1980s and the 1990s; exploration of selected episodes in particular countries; and speculations about the future. Prerequisites: intermediate microeconomics and macroeconomics. SO

GLBL 308b / ECON 424b, Central Banking William English

Introduction to the different roles and responsibilities of modern central banks, including the operation of payments systems, monetary policy, supervision and regulation, and financial stability. Discussion of different ways to structure central banks to best manage their responsibilities. Prerequisites: Intermediate Microeconomics, Intermediate Macroeconomics, and Introductory Econometrics. SO

GLBL 309a / EAST 310a / PLSC 357a, The Rise of China Daniel Mattingly

Analysis of contemporary Chinese politics, with focus on how the country has become a major power and how the regime has endured. Topics include China's recent history, state, ruling party, economy, censorship, elite politics, and foreign policy. SO

* **GLBL 310a / ECON 407a, International Finance** Staff

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. SO

* **GLBL 312b / EAST 454b / ECON 474b, Economic and Policy Lessons from Japan** Stephen Roach

An evaluation of modern Japan's protracted economic problems and of their potential implications for other economies, including the United States, Europe, and China. Policy blunders, structural growth impediments, bubbles, the global economic crisis of 2008, and Abenomics; risks of secular stagnation and related dangers to the global economy from subpar post-crisis recoveries. Focus on policy remedies to avert similar problems in other countries. Prerequisite: an introductory course in macroeconomics. SO

* **GLBL 315b, Economics of the EU** Marnix Amand

The functioning of the economy of the European Union, both from a theoretical perspective (trade theory, monetary union, etc.) and from a practical perspective. Particular emphasis on the recent crises of the last ten years with effort to put these

crises in a larger geostrategic context. Prerequisites: ECON 110 or 115 and ECON 111 or 116. SO

GLBL 318a / EAST 338a / ECON 338a, The Next China Stephen Roach

Economic development in China since the late 1970s. Emphasis on factors pushing China toward a transition from its modern export- and investment-led development model to a pro-consumption model. The possibility of a resulting identity crisis, underscored by China's need to embrace political reform and by the West's long-standing misperceptions of China. Prerequisite: introductory macroeconomics. SO

* **GLBL 330a / ECON 465a / EP&E 224a, Debating Globalization** Ernesto Zedillo
Facets of contemporary economic globalization, including trade, investment, and migration. Challenges and threats of globalization: inclusion and inequality, emerging global players, global governance, climate change, and nuclear weapons proliferation. Prerequisite: background in international economics and data analysis. Preference to seniors majoring in Economics or EP&E. SO RP

* **GLBL 331a / ECON 454a / EP&E 254a, 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. Prerequisite: ECON 122. SO

* **GLBL 332b / ECON 403b, Trade and Development** Guillermo Noguera
Comparison of selected developing countries, where international trade has brought about rapid growth and large-scale reductions in poverty, with other countries, where global trade has increased inequality and brought little growth. Both theoretical models and empirical evidence are used. Prerequisites: intermediate microeconomics and an econometrics or statistics course. SO

* **GLBL 336a / EP&E 243a / LAST 423a / PLSC 423a, Political Economy of Poverty Alleviation** Ana De La O

Overview of classic and contemporary approaches to the question of why some countries have done better than others at reducing poverty. Emphasis on the role of politics. SO

* **GLBL 376a / GLBL 552a, Asia Now: Human Rights, Globalization, Cultural Conflicts** Jing Tsu

This course examines contemporary and global issues in Asia (east, southeast, northeast, south), in a historical and interdisciplinary context, that include international law, policy debates, cultural issues, security, military history, media, science and technology, and cyber warfare. Course is co-taught with a guest professor. HU, SO

* **GLBL 386a, The Politics of Human Rights Law** Thania Sanchez

The effects of international efforts to promote respect for human rights. Analysis of policy tools used by states, international organizations, and nongovernmental organizations to promote human rights work, including advocacy, law, sanctions, trade,

aid, justice mechanisms, and diplomacy. Focus on issues such as genocide, torture, women's rights, children's rights, and civil and political rights. WR, SO

*** GBLB 387a / GBLB 712a, Insurgency and Counterinsurgency** Isaiah Wilson

This course examines the dynamics of insurgency (a distinct variant of guerrilla warfare) and counterinsurgency (the government response), and has been crafted with America's recent and current involvement in both Afghanistan and Iraq in mind. This course seeks to acquaint students with the nature, dimensions, and history of insurgency and counterinsurgency both past and present and establish a solid foundation upon which expertise and analytical capabilities can be developed for future application. The course also considers a wide range of questions to provide students with a deeper understanding of the evolution of insurgent strategy and tactics over time and the development of government counterinsurgency doctrine. Questions include: What is insurgency and how does it differ from guerrilla warfare and terrorism? Why and how do insurgencies develop? How have strategies and tactics of insurgents changed over time? Who are the foremost ideological and doctrinal proponents of insurgency and why? Who are the foremost counterinsurgency practitioner-theorists? Why does insurgency succeed or fail? How can insurgency best be fought? Why the wheel is seemingly always "reinvented" in counterinsurgency? Finally, the course aims to analyze both the effectiveness of insurgency as a means to achieve political change and the challenges faced by the liberal democratic state in responding to insurgent campaigns and challenges. SO

*** GBLB 388a, The Politics of American Foreign Policy** Howard Dean

This seminar addresses the domestic political considerations that have affected American foreign policy in the post-World War II world. The goals of the course are to (1) give historical context to the formation of major existing global governance structures, (2) give students an opportunity to research how major foreign policy decisions in the past were influenced by contemporary political pressure, and (3) assess what effect those pressures have had on today's global issues. Case studies include, but are not limited to: Truman and the Marshall Plan; Johnson and the Vietnam War; Nixon and the opening of China; Reagan and the collapse of the Soviet Union, George HW Bush and Iraq, Clinton and the Balkans, and Obama and the development of a multipolar foreign policy for a multipolar world. SO

GLBL 392a, 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 policymakers. Case studies of intelligence successes and failures from World War II to the present.

*** GBLB 393a / ANTH 386a, Humanitarian Interventions: Ethics, Politics, and Health** Catherine Panter-Brick

Analysis of humanitarian interventions from a variety of social science disciplinary perspectives. Issues related to policy, legal protection, health care, morality, and governance in relation to the moral imperative to save lives in conditions of extreme adversity. Promotion of dialogue between social scientists and humanitarian practitioners. WR, SO

*** GLBL 460a, Turning Points in American Foreign Policy** Robert Ford

Examination of American policy decisions and strategies from the founding of the republic to modern day. Topics include American engagement with France and Britain during the American Revolution; post-WWII construction of the modern international order; the breakdown of the Communist system; and the failed states in Yugoslavia and Syria; as well as America's responses to the current challenges of modern world order, emerging multipolarism, and climate change.

*** GLBL 499a, Senior Capstone Project** Staff

Students work in small task-force groups and complete a one-term public policy project under the guidance of a faculty member. Clients for the projects are drawn from government agencies, nongovernmental organizations and nonprofit groups, and private sector organizations in the United States and abroad. Projects and clients vary from year to year. Fulfills the capstone project requirement for the Global Affairs major.

Global Health Studies

Program director, Global Health Studies: Kristina Talbert-Slagle (kristina.talbert-slagle@yale.edu)

GLOBAL HEALTH STUDIES ADVISORY COMMITTEE

Rene Almeling (*Sociology*), Gretchen Berland (*Medicine*), Leslie Curry (*Public Health*), Jane Edwards (*Yale College Dean's Office*), Kaveh Khoshnood (*Public Health*), Catherine Panter-Brick (*Anthropology*), Joanna Radin (*History of Medicine*), Mark Saltzman (*Biomedical Engineering*), Michael Skonieczny (*Public Health*), Stephen Stearns (*Ecology & Evolutionary Biology*), Kristina Talbert-Slagle (*Public Health*), John Wargo (*Forestry & Environmental Studies*), Marney White (*Public Health*)

Issues related to health are among the most important challenges facing societies, both domestically and globally. Finding solutions to health-related problems requires multidisciplinary comprehension of all dimensions of health, including biological and social determinants, economics and politics of health care systems and health care delivery, and ways in which health is understood by individuals, societies, and cultures.

The Global Health Studies program facilitates global health education for undergraduates at Yale, offering interdisciplinary courses that bring together the natural sciences, social sciences, and the humanities. Students choose a major in another department or program and expand their education with courses offered by Global Health Studies.

Students desiring greater depth in the field are encouraged to apply to be a Global Health Scholar. Global Health Scholars are usually selected in the fall of their sophomore year although, in exceptional cases, juniors may also be accepted. Scholars complete an interdisciplinary course of study that includes four required and two elective courses and fieldwork (e.g., internships with NGOs, or field-based research either with faculty or independently with faculty guidance). In the summer after the junior year, Scholars conduct their own independent global health fieldwork, for which they receive support in the form of course work, designated funding, and mentorship from an assigned global health faculty adviser. During their senior year, Scholars are expected to incorporate their global health fieldwork and classroom experiences into their senior requirement and to develop a publication-worthy written product.

To assist students in connecting classroom knowledge and skills with practical work in global health, the Global Health Studies program supports fellowships such as the Global Health Field Experience Award, the Yale-Collaborative Action Project (Y-CAP), and the Yale College Fellowships for Research in Global Health Studies.

Qualified students may take graduate courses at the School of Public Health, subject to restrictions on graduate and professional school enrollment (p.) described in the Academic Regulations. Further information about these courses and other graduate offerings can be found in the School of Public Health bulletin. For information about the five-year B.A.–B.S./M.P.H. degree program offered jointly with the School of Public Health, see Public Health (p. 658).

Global Health Studies Courses

*** HLTH 155a / E&EB 106a / MCDB 106a, Biology of Malaria, Lyme, and Other Vector-Borne Diseases** Alexia Belperron

Introduction to the biology of pathogen transmission from one organism to another by insects; special focus on malaria, dengue, and Lyme disease. Biology of the pathogens including modes of transmission, establishment of infection, and immune responses; the challenges associated with vector control, prevention, development of vaccines, and treatments. Intended for non-science majors; preference to freshmen and sophomores. Prerequisite: high school biology. SC

HLTH 170a / AMST 247a / FILM 244a / HIST 147a / HSHM 202a, Media and Medicine in Modern America John Warner and Gretchen Berland

Relationships between medicine, health, and the media in the United States from 1870 to the present. The changing role of the media in shaping conceptions of the body, creating new diseases, influencing health and health policy, crafting the image of the medical profession, informing expectations of medicine and constructions of citizenship, and the medicalization of American life. HU

*** HLTH 250a / E&EB 235a, Evolution and Medicine** Stephen Stearns

Introduction to the ways in which evolutionary science informs medical research and clinical practice. Diseases of civilization and their relation to humans' evolutionary past; the evolution of human defense mechanisms; antibiotic resistance and virulence in pathogens; cancer as an evolutionary process. Students view course lectures on line; class time focuses on discussion of lecture topics and research papers. Prerequisite: BIOL 101–104. WR, SC

*** HLTH 370b / ER&M 360b / HSHM 432b / SOCY 390b / WGSS 390b, Politics of Reproduction** Rene Almeling

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

Related Courses

*** ANTH 386a / GLBL 393a, Humanitarian Interventions: Ethics, Politics, and Health** Catherine Panter-Brick

Analysis of humanitarian interventions from a variety of social science disciplinary perspectives. Issues related to policy, legal protection, health care, morality, and governance in relation to the moral imperative to save lives in conditions of extreme adversity. Promotion of dialogue between social scientists and humanitarian practitioners. WR, SO

*** ANTH 455b / WGSS 459b, Masculinity and Men's Health** Staff

Ethnographic approaches to masculinity and men's health around the globe. Issues of ethnographic research design and methodology; interdisciplinary theories of masculinity; contributions of men's health studies from Western and non-Western sites to social theory, ethnographic scholarship, and health policy. SO RP

* **BENG 405b / EVST 415b, Biotechnology and the Developing World** Anjelica Gonzalez

Study of technological advances that have global health applications. Ways in which biotechnology has enhanced quality of life in the developing world. The challenges of implementing relevant technologies in resource-limited environments, including technical, practical, social, and ethical aspects. Prerequisite: MCDB 120, or BIOL 101 and 102.

ECON 170b, Health Economics and Public Policy Howard Forman

Application of economic principles to the study of the U.S. health care system. Emphasis on basic principles about the structure of the U.S. system, current problems, proposed solutions, and the context of health policy making and politics. After introductory microeconomics. SO

ECON 325a or b, Economics of Developing Countries: Focus on South Asia Staff

This class addresses the economics of poverty and development with a particular focus on South Asia. Why do some countries appear to belong to radically different economic systems? What historical legacies have contributed to poverty in South Asia? And what work is currently being done to address persistent underdevelopment and poverty in the region? Prerequisites: ECON 115 or equivalent; ECON 121; ECON 131. SO

* **ECON 461b, Economics, Addiction, and Public Policy** Jody Sindelar

Smoking, alcoholism, illicit drugs, and obesity studied from economic and policy perspectives. Focus on causes of and solutions to problems. After introductory microeconomics. SO

ENVE 441a, Biological Processes in Environmental Engineering Jordan Peccia

Fundamental aspects of microbiology and biochemistry, including stoichiometry, kinetics, and energetics of biochemical reactions, microbial growth, and microbial ecology, as they pertain to biological processes for the transformation of environmental contaminants; principles for analysis and design of aerobic and anaerobic processes, including suspended- and attached-growth systems, for treatment of conventional and hazardous pollutants in municipal and industrial wastewaters and in groundwater. Prerequisites: CHEM 161, 165, or 163, 167 (or CHEM 112, 113, or 114, 115, or 118); MCDB 290 or equivalent; or with permission of instructor. SC

EVST 255b / F&ES 255b / PLSC 215b, Environmental Politics and Law John Wargo

Exploration of the politics, policy, and law associated with attempts to manage environmental quality and natural resources. Themes of democracy, liberty, power, property, equality, causation, and risk. Case histories include air quality, water quality and quantity, pesticides and toxic substances, land use, agriculture and food, parks and protected areas, and energy. SO

* **GLBL 306a / AFST 306a, Social Enterprise in Developing Economies II** Robert Hopkins

Summer research developed into a case-study project on a topic related to the use of social enterprise in regional economic development. Prerequisite: GLBL 305

* **MCDB 050a or b, Immunology and Microbes** Paula Kavathas

Introduction to the immune system and its interaction with specific microbes. Attention both to microbes that cause illness, such as influenza, HIV, and HPV, and to microbes that live in harmony with humans, collectively called the microbiome. Readings include novels and historical works on diseases such as polio and AIDS. Enrollment limited to

first-year students. Preregistration required; see under First-Year Seminar Program.

SC RP

MCDB 290b, Microbiology Christine Jacobs-Wagner and Stavroula Hatzios
Cell structure of bacteria, bacterial genetics, microbial evolution and diversity, bacterial development, microbial interaction, chemotaxis and motility, gene regulation, microbial genomics and proteomics, CRISPR, metabolism, infectious diseases, mechanisms of pathogenesis, host defense systems, viruses, gut microbiota in health and disease. Prerequisites: BIOL 101, 102, and 103, or equivalent performance on the corresponding biological sciences placement examinations; or one term of biochemistry, or cell biology, or genetics; or with permission of instructor. SC

* **PSYC 355a / EDST 355a, Clinical Psychology in the Community** Kristi Lockhart
Mental disorders as they are treated within a community setting. Students participate in a fieldwork placement, working either one-on-one or in groups with the psychiatrically disabled. Seminar meetings focus on such topics as the nature of severe mental disorders, the effects of deinstitutionalization, counseling skills, and social policy issues related to mental health. Prerequisite: PSYC 180 or permission of instructor.

Hellenic Studies

Chair: John Geanakoplos, 30 Hillhouse Ave., 432-3397, john.geanakoplos@yale.edu; **Director:** George Syrimis, 34 Hillhouse Ave., 432-9342, george.syrimis@yale.edu; <http://hsp.macmillan.yale.edu/>

Hellenic Studies is a program of the European Studies Council. The core of the program is the teaching of modern Greek, supplemented with other courses and events related to the study of postantiquity Greece, as well as the society and culture of modern Greece and its interaction with the rest of Europe and the world. Related courses can be found in the listings of Anthropology, History, History of Art, Literature, Political Science, Religious Studies, and Russian and East European Studies. A major in Ancient and Modern Greek is described under Classics (p. 202). Students who have an interest in postantiquity Greek language, society, or culture are advised to consult with the program administrator of the Hellenic Studies program.

FACULTY ASSOCIATED WITH THE PROGRAM OF HELLENIC STUDIES

Professors John Geanakoplos (*Economics*)

Lecturers Paris Aslanidis, George Syrimis

Senior Lector Maria Kaliambou

Courses

MGRK 110a, Elementary Modern Greek I Maria Kaliambou

An introduction to modern Greek, with emphasis on oral expression. Use of communicative activities, graded texts, written assignments, grammar drills, audiovisual material, and contemporary documents. In-depth cultural study. Credit only on completion of MGRK 120. L1 1½ Course cr

MGRK 120b, Elementary Modern Greek II Maria Kaliambou

Continuation of MGRK 110. Prerequisite: MGRK 110. L2 1½ Course cr

* **MGRK 130a, Intermediate Modern Greek I** Maria Kaliambou

Further development of oral and written linguistic skills, using authentic readings and audiovisual materials. Continued familiarization with contemporary Greek culture. Prerequisite: MGRK 120 or equivalent. L3 1½ Course cr

* **MGRK 140b, Intermediate Modern Greek II** Maria Kaliambou

Further development of listening, speaking, reading, and writing skills in modern Greek. Presentation of short research projects related to modern Greece. Prerequisite: MGRK 130 or equivalent. L4 1½ Course cr

* **MGRK 151a, Advanced Modern Greek** Maria Kaliambou

Advanced language course intended to further develop reading, writing, speaking, and listening skills, while sharpening students' sensitivity toward modern Greek culture. MGRK 140 or permission of instructor. L5

* **MGRK 215a / CLCV 209a / LITR 230a, Nikos Kazantzakis: From Revolution to Nihilism** George Syrimis

The Greek poet, novelist, essayist, philosopher, playwright, and travel writer Nikos Kazantzakis. The philosophical influence of Darwin, Nietzsche, and Bergson on Kazantzakis; his fascination with the figures of Christ and Odysseus. Questions of

fiction and autobiography, history and revolution, travel writing, twentieth-century existentialism, and the reception of the Homeric tradition. WR, HU TR

* **MGRK 216a / CLCV 216a / LITR 239a / WGSS 209a, Dionysus in Modernity**

George Syrimis

Modernity's fascination with the myth of Dionysus. Questions of agency, identity and community, and psychological integrity and the modern constitution of the self. Manifestations of Dionysus in literature, anthropology, and music; the Apollonian-Dionysiac dichotomy; twentieth-century variations of these themes in psychoanalysis, surrealism, and magical realism. HU TR

* **MGRK 218b / FILM 243b / WGSS 245b, Family in Greek Literature and Film**

George Syrimis

The structure and multiple appropriations of the family unit, with a focus on the Greek tradition. The influence of aesthetic forms, including folk literature, short stories, novels, and film, and of political ideologies such as nationalism, Marxism, and totalitarianism. Issues related to gender, sibling rivalry, dowries and other economic factors, political allegories, feminism, and sexual and social violence both within and beyond the family. WR, HU TR

* **MGRK 222b / HIST 237Jb, History of Modern Greece** Paris Aslanidis

This seminar studies the history of modern Greece since the early 19th century. Greece's contested position between East and West, both geopolitically and symbolically, functions as the ideational backdrop for the study of the country's historical trajectory and the development of its main institutions. Discussion of the future of the Greek state vis-à-vis the ongoing sociopolitical crisis it has been facing since its near bankruptcy in 2010 is also considered. HU

* **MGRK 236a / PLSC 138a / SOCY 221a, The Euro Crisis** Paris Aslanidis

Examination of how Europe continues to struggle with repercussions of the Great Recession and the impact of the Eurozone crisis in countries such as Portugal, Ireland, Spain, and, especially, Greece. Topics include the euro as a viable common currency; why and how the Eurozone crisis erupted and spread; and whether this catastrophe could have been averted. SO

* **MGRK 237a / GBL 215a / LAST 386a / PLSC 375a / SOCY 389a, Populism from Chavez to Trump** Paris Aslanidis

Investigation of the nature of the populist phenomenon and its impact on politics, society, and the economy in various regions of the world. Conceptual and methodological analyses are supported by comparative assessments of various empirical instances, from populist politicians such as Hugo Chavez and Donald Trump, to populist social movements such as the Tea Party and Occupy Wall Street. SO

* **MGRK 300b / CLCV 319b / HIST 242Jb / WGSS 293b, The Olympic Games, Ancient and Modern** George Syrimis

Introduction to the history of the Olympic Games from antiquity to the present. The mythology of athletic events in ancient Greece and the ritual, political, and social ramifications of the actual competitions. The revival of the modern Olympic movement in 1896, the political investment of the Greek state at the time, and specific games as they illustrate the convergence of athletic cultures and sociopolitical transformations in the twentieth century. HU

* **MGRK 482a or b, Independent Tutorial** Staff

For students with advanced language skills in modern Greek who wish to engage in individual study or concentrated reading and research on material not otherwise offered in courses. Applicants submit a detailed project proposal to the associate program chair. The student must meet with the instructor for at least one hour each week, and the work must terminate in a term paper or its equivalent.

History

Director of undergraduate studies: Edward Rugemer (edward.rugemer@yale.edu), edward.rugemer@yale.edu; history.yale.edu/

The History major is for students who understand that shaping the future requires knowing the past. History courses explore many centuries of human experimentation and ingenuity, from the global to the individual scale. History majors learn to be effective storytellers and analysts, and to craft arguments that speak to broad audiences. They make extensive use of Yale's vast library resources to create pioneering original research projects. Students of history learn to think about politics and government, sexuality, the economy, cultural and intellectual life, war and society, and other themes in broadly humanistic—rather than narrowly technocratic—ways.

History is one of Yale College's most popular and intellectually diverse majors, encompassing nearly every region and time period of the global past. The study of history is excellent preparation for careers in many fields, including law, journalism, business and finance, education, politics and public policy, social activism, and the arts.

COURSE NUMBERING

Courses numbered HIST 001 to 099 are first-year seminars, with enrollment limited to eighteen. Courses numbered in the 100s explore the history of the United States or Canada; those in the 200s, Europe, Russia, and Britain; and those in the 300s, Africa, Asia, Latin America, and the Middle East. Courses numbered in the 400s address global topics. Courses whose numbers end with the letter "J" are departmental seminars; all departmental seminars are available for preregistration by History majors and are capped at fifteen students.

PREREQUISITE

The prerequisite for the major is two term courses in History. Courses completed in fulfillment of the prerequisite may be applied toward the requirements of the major.

REQUIREMENTS OF THE MAJOR

Ten term courses in History are required, including prerequisites, and in addition to the senior essay. No specific courses are required.

Upon declaration, all History majors select either the global or the specialist track. The global track is designed for students seeking a broad understanding of major trends in the history of human societies throughout the world. The specialist track is for students seeking to focus in a particular geographic region, such as the United States, or in a thematic pathway, such as empires and colonialism. Majors may change tracks until the end of the course selection period in the second term of the junior year.

The global track requires one course in each of five different geographic regions (see below). Students must also take two preindustrial courses, covering material before the year 1800, and two departmental seminars, identified by a "J" suffix to the course number (e.g., HIST 136J).

The specialist track requires at least five (and up to eight) courses in a particular geographic region or in a thematic pathway (see list below). Courses appropriate for each region and pathway are listed on the department website. Students must also

take at least two courses outside their area of specialization, and their overall course work must include at least three geographic regions. Like students in the global track, students in the specialist track must take two preindustrial courses, covering material before the year 1800, and at least two departmental seminars, identified by a "J" suffix to the course number (e.g., HIST 136J). Students in the specialist track may design an area of specialization with the approval of a faculty adviser and the DUS.

Regions: United States; Europe; Latin America; Asia; Middle East and Africa.

Pathways: cultural history; empires and colonialism; environmental history; ideas and intellectuals; international history; politics and law; race, gender, and sexuality; religion in context; science, technology, and medicine; social change and social movements; war and society; the world economy.

Students in either track may count the same courses toward geographical, preindustrial, and seminar requirements. For instance, a departmental seminar on premodern Japan simultaneously fulfills the preindustrial, seminar, and Asia geographical requirements.

Departmental seminars All students who declare the History major are entitled to preregister for two departmental seminars (designated by a course number ending in J, such as HIST 136J). Many seminars are popular and fill up quickly. Students may use their preregistration privileges at any time after declaring the major, in their sophomore, junior, or senior years. Sophomores contemplating study abroad are urged to consider taking at least one seminar in the sophomore year. Residential college seminars, study-abroad courses, and courses in other departments that count toward the History major do not fulfill the departmental seminar requirement.

Distinction in the major Students who receive an A or A- on the two-term senior essay and who receive the requisite grades in their remaining course work are awarded Distinction in the Major. (See under Honors (p. 31) in the (p. 19) Undergraduate Curriculum (p. 19) (p. 19) section of this bulletin.) Students who do not complete the two-term senior essay are not eligible for Distinction.

Roadmap See visual roadmap of the requirements.

SENIOR REQUIREMENT

Students in the History major are not passive consumers of historical knowledge: they create original works of history themselves. As seniors, History majors complete a work of original research in close consultation with a faculty adviser. The range of acceptable topics and methodological approaches are wide. The aim is to take on study of a significant historical subject through research in accessible primary source materials.

Most students choose to complete a two-term independent senior essay, for a total of twelve course credits in the major. The two-term essay is required to earn Distinction in the Major. A smaller number of students choose to write an independent one-term essay, for a total of eleven course credits in the major.

The one-term senior essay History majors may choose to write a one-term independent senior essay during the fall term under the guidance of a faculty adviser; however, students who choose the one-term option are not eligible for Distinction in the Major or history prizes. The one-term essay is a substantial research paper

(roughly half the length of the two-term senior essay) based on primary sources, along with a bibliographic essay. Seniors receive course credit for their departmental essays by enrolling in HIST 497 during the fall of senior year. In rare circumstances, with permission of the adviser and Senior Essay Director, a student enrolled in HIST 497 during the fall term may withdraw from the course in accordance with Yale College regulations on course withdrawal and enroll in HIST 497 during the spring term. Additional details about the senior essay are provided in the Senior Essay Handbook, available on the History Website.

The two-term senior essay History majors seeking to earn Distinction in the Major must complete a two-term independent senior essay under the guidance of a faculty adviser. The typical senior essay is 40–50 pages (no more than 12,500 words), plus a bibliography and bibliographical essay. Seniors receive course credit for their departmental essays by enrolling in HIST 495 (first term of senior year) and HIST 496 (second term of senior year). The grade for the final essay, determined by an outside reader in consultation with the faculty adviser, is applied retroactively to both terms. Additional details about the senior essay are provided in the Senior Essay Handbook, available on the History Website. History majors graduating in December may begin their two-term senior essay in the spring term and complete the senior essay during fall term.

Additional option for the senior essay Some students embark on the two-term essay but discover that their choice is not a good fit. Students who enroll in HIST 495 during the first term may opt out in consultation with their faculty adviser and the senior essay director. This decision must be made in accordance with Yale College regulations on course withdrawal. Instead, the student will enroll in HIST 497 in the spring term to write a one-term senior essay. Students who opt out will not be eligible for Distinction in the Major or History prizes. Additional details about the senior essay are provided in the Senior Essay Handbook, available on the History Website.

ADVISING

All students who declare the History major are assigned an adviser from among the departmental faculty. The adviser is available throughout the year for consultation about courses and the major. Students in the global track are assigned an adviser from the general History faculty. Students in the specialist track are assigned an adviser in their area of specialization. At the beginning of each term, students majoring in History must have their schedule signed and approved by their departmental adviser or by the DUS. Students may request a specific adviser in consultation with the DUS, though the department cannot always accommodate such requests.

Course substitution History majors are permitted to include up to two courses taught outside the department toward fulfillment of the major, with the approval of the DUS. Nondepartmental courses may fulfill geographic, region/pathway, and preindustrial distribution requirements. They may not fulfill departmental seminar or senior requirements.

Combined B.A./M.A. degree program Exceptionally able and well-prepared students may complete a course of study leading to the simultaneous award of the B.A. and M.A. degrees after eight terms of enrollment. See "Simultaneous Award of the Bachelor's and Master's Degrees" under Special Arrangements, section K (p. 64), in the Academic

Regulations (p. 33). Interested students should consult the DUS prior to the sixth term of enrollment for specific requirements in History.

REQUIREMENTS OF THE MAJOR

Prerequisites 2 term courses in History

Number of courses 10 term courses (incl prereqs, not incl senior essay)

Distribution of courses *Both tracks*—2 courses in preindustrial hist as specified; 2 departmental sems; *Global track*—1 course in each of 5 geographical regions (U.S., Europe, Latin America, Asia, Africa/Middle East); *Specialist track*—5 courses in specific region or pathway; at least 2 courses outside region or pathway; overall course work must include 3 regions

Substitution permitted 1 or 2 nondepartmental courses approved by DUS

Senior requirement Two-term senior essay (HIST 495 and 496) or one-term senior essay (HIST 497)

FACULTY OF THE DEPARTMENT OF HISTORY

Professors Abbas Amanat, Ned Blackhawk, David Blight, Daniel Botsman, Paul Bushkovitch, Deborah Coen, Carolyn Dean, Fabian Drixler, Carlos Eire, David Engerman, 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, Bentley Layton, Noel Lenski, Kathryn Lofton, Mary Lui, Daniel Magaziner, Joseph Manning, Ivan Marcus, John Merriman, Joanne Meyerowitz (*Acting Chair* [F]), Alan Mikhail (*Chair* [Sp]), Samuel Moyn, Nicholas Parrillo, Peter Perdue, Mark Peterson, Stephen Pitti, Naomi Rogers, Paul Sabin, Lamin Sanneh, Stuart Schwartz, Timothy Snyder, David Sorkin, Harry Stout, John Warner, Anders Winroth, John Witt, Keith Wrightson

Associate Professors Paola Bertucci, Crystal Feimster, Andrew Johnston, Joanna Radin, Edward Rugemer, Marci Shore, Eliyahu Stern

Assistant Professors Jennifer Allen, Sergei Antonov, Rohit De, Marcela Echeverri, Anne Eller, Denise Ho, Isaac Nakhimovsky, William Rankin, Carolyn Roberts, Jonathan Wyrzten

Senior Lecturers Becky Conekin, Jay Gitlin, Stuart Semmel, Rebecca Tannenbaum

Lecturers Sakena Aedin, Ivano Dal Prete, Rachel Elder, Jay Gitlin, Amelia Hintzen, Ian Johnson, Maria Jordan, George Levesque, Julia Mansfield, Jess Melvin, Gunther Peck, Chitra Ramalingam, Terence Renaud

First-Year Seminars

* **HIST 015b, History of Food and Cuisine** Paul Freedman

The history of food from the Middle Ages to the present, with a focus on the United States and Europe. How societies gathered and prepared food; culinary tastes of different times and places. The influence of taste on trade, colonization, and cultural exchange. The impact of immigration, globalization, and technology on food.

Enrollment limited to freshmen. Preregistration required; see under Freshman Seminar Program. HU

* **HIST 022a, What History Teaches** John Gaddis

An introduction to the discipline of history. History viewed as an art, a science, and something in between; differences between fact, interpretation, and consensus; history as a predictor of future events. Focus on issues such as the interdependence of variables, causation and verification, the role of individuals, and to what extent historical inquiry can or should be a moral enterprise. WR, HU

* **HIST 033a / WGSS 033a, Fashion in London and Paris, 1750 to the Present** Staff

Introduction to the history of Western fashion from the mid-eighteenth century to the present, with a focus on Paris and London. Approaches, methods, and theories scholars have historically employed to study fashion and dress. Enrollment limited to first-year students. Preregistration required; see under First-Year Seminar Program. WR, HU

* **HIST 040a, Comparative Women's History** Rebecca Tannenbaum

Comparative perspective on the lives of women and their experiences, the ways in which historical forces shaped gender roles in different cultures, and the similarities and differences in gender roles across different time periods and around the world. Topics include work, family roles, political participation, health and sexuality, religious roles, and global feminisms. WR, HU

* **HIST 041a, The Americas in the Age of Revolutions** Staff

The connections, contrasts, and legacies of revolutions in the British, French, and Spanish Atlantic empires in the eighteenth and nineteenth centuries. Interactions between liberalism, black politics and antislavery, indigenous autonomy and citizenship, and revolutions in the Atlantic world between the 1760s and 1880s. Topics include the foundations of the Atlantic empires, strands of anticolonialism across the Americas, social aspects of the revolutionary movements, abolitionism and emancipation processes, and relations between the emergent American nations. Enrollment limited to first-year students. Preregistration required; see under First-Year Seminar Program. WR, HU

* **HIST 042a / MMES 042a, Oil and Empire** Rosie Bsheer

The political and social history of oil since the late nineteenth century, including global trends and processes. Oil's impact on the rise and fall of empires and the fates of nation-states; its role in war and its impact on social and cultural life. Focus on the Middle East, with some attention to Venezuela, Indonesia, and the Niger Delta. Enrollment limited to first-year students. Preregistration required; see under First-Year Seminar Program. WR, HU

* **HIST 052b, Latin America from the Nineteenth Century to the Present** Marcela Echeverri Munoz

Introduction to Latin American history, beginning with the independence processes that led to the creation of the region's nations in the nineteenth century. Focus on nationalism, race, revolution, and development. Exploration of ideas, technology, economic forces, and people that have transformed Latin American landscapes and politics. WR, HU

* **HIST 055b, A History of Modern London** Staff

Chronological and thematic exploration of modern London as a metropolitan and imperial center from the late-nineteenth-century to the present day. Topics include race, gay rights, women's rights, consumer culture, the experience of war, and the development of a multi-racial society. The fashion, food, and popular music of London

emerge as important components of the city's global identity in the twentieth century. Enrollment limited to first-year students. Preregistration required; see under First-Year Seminar Program. WR, HU

* **HIST 089b / HUMS 090b, Thinking about History** Stuart Semmel

An introduction to the discipline of history. Exploration of influential historical narratives; the philosophy of history; the emergence of historical subdisciplines including history from below, microhistory, the new cultural history, and Big History; and interdisciplinary engagement with anthropology, literary criticism, art history, and psychology. Enrollment limited to first-year students. Preregistration required; see under First-Year Seminar Program. WR, HU

Lecture Courses

HIST 107a / AMST 133a / ER&M 187a, Introduction to American Indian History

Ned Blackhawk

Survey of American Indian history, beginning with creation traditions and migration theories and continuing to the present day. Focus on American Indian nations whose homelands are located within the contemporary United States. Complexity and change within American Indian societies, with emphasis on creative adaptations to changing historical circumstances. HU

HIST 115a / AMST 188a, The Colonial Period of American History Staff

Significant themes in American life, 1607-1750: politics and imperial governance, social structure, religion, ecology, race relations, gender, popular culture, the rhythms of everyday life. HU

HIST 119b / AFAM 172b, The Civil War and Reconstruction Era, 1845-1877 David

Blight

The causes, course, and consequences of the American Civil War. A search for the multiple meanings of a transformative event, including national, sectional, racial, constitutional, social, gender, intellectual, and individual dimensions. HU

HIST 135b / ECON 182b, American Economic History Staff

The growth of the American economy since 1790, both as a unique historical record and as an illustration of factors in the process of economic development. The American experience viewed in the context of its European background and patterns of industrialization overseas. After introductory microeconomics. WR, SO

HIST 147a / AMST 247a / FILM 244a / HLTH 170a / HSHM 202a, Media and Medicine in Modern America John Warner and Gretchen Berland

Relationships between medicine, health, and the media in the United States from 1870 to the present. The changing role of the media in shaping conceptions of the body, creating new diseases, influencing health and health policy, crafting the image of the medical profession, informing expectations of medicine and constructions of citizenship, and the medicalization of American life. HU

HIST 165b / AMST 199b, The American Century Beverly Gage

United States politics, political thought, and social movements in the 20th century. Pivotal elections and political figures (Wilson, Roosevelt, Nixon, Reagan) as well as politics from below (civil rights, labor, women's activism). Emphasis on political ideas such as liberalism, conservatism, and radicalism, and on the intersection between domestic and foreign affairs. Primary research in Yale archival collections. Students who

have already completed HIST 136J must have the instructor's permission to enroll in this course, and will perform alternate readings during some weeks. WR, HU

HIST 166b / AMST 299b, The History of Right Now Matthew Jacobson
 Historiographic narrative of United States history over the past century and critical/methodological practices of thinking historically and of identifying ways in which our present has been conditioned by historical legacies, both momentous and subtle. Topics include the New Deal, WWII, the arms race, Reaganomics, and 9/11 in terms of their lasting influence on American conditions in the present. HU RP

HIST 169b, Early National America Joanne Freeman
 An introduction to America's first decades as a nation. Topics include the creation of a national politics, partisan conflict in the states and on a national level, the logistics of democratic politicking, and changes in American society and culture. HU

HIST 183a / AMST 272a / ER&M 282a / WGSS 272a, Asian American History, 1800 to the Present Mary Lui
 An introduction to the history of East, South, and Southeast Asian migrations and settlement to the United States from the late eighteenth century to the present. Major themes include labor migration, community formation, U.S. imperialism, legal exclusion, racial segregation, gender and sexuality, cultural representations, and political resistance. HU

HIST 184a / AFAM 160a / AFST 184a / AMST 160a, The Rise and Fall of Atlantic Slavery Staff
 The history of peoples of African descent throughout the Americas, from the first African American societies of the sixteenth century through the century-long process of emancipation. HU

HIST 187b / AFAM 162b / AMST 162b, African American History from Emancipation to the Present Staff
 An examination of the African American experience since 1861. Meanings of freedom and citizenship are distilled through appraisal of race and class formations, the processes and effects of cultural consumption, and the grand narrative of the civil rights movement. WR, HU

HIST 188b / AMST 234b / ER&M 243b / RLST 342b, Spiritual But Not Religious Zareena Grewal
 Study of the historical and contemporary “unchurching” trends in American religious life in a comparative perspective and across different scales of analysis in order to think about the relationship between spirituality, formal religion, secular psychology and the self-help industry. HU, SO

HIST 202a, European Civilization, 1648–1945 John Merriman
 An overview of the economic, social, political, and intellectual history of modern Europe. Topics include the rise of absolute states, the scientific revolution, the Enlightenment, the French Revolution and Napoleon, the industrial revolution, the revolutions of 1848, nationalism and national unifications, Victorian Britain, the colonization of Africa and Asia, fin-de-siècle culture and society, the Great War, the Russian Revolution, the Europe of political extremes, and World War II. HU

HIST 199b / AMST 236b / EVST 318b / HSHM 207b, American Energy History Paul Sabin

The history of energy in the United States from early hydropower and coal to present-day hydraulic fracturing, deepwater oil, wind, and solar. Topics include energy transitions and technological change; energy and democracy; environmental justice and public health; corporate power and monopoly control; electricity and popular culture; labor struggles; the global quest for oil; changing national energy policies; the climate crisis. HU

HIST 205a / CLCV 205a / HUMS 143a, Introduction to Ancient Greek History Staff

Introduction to Greek history, tracing the development of Greek civilization as manifested in the political, military, intellectual, and creative achievements from the Bronze Age through the end of the Classical period. Students read original sources in translation as well as secondary scholarship to better understand the rise and fall of the ancient Greeks—the civilization at the very heart of Western Civilization. HU

HIST 215b / RLST 283b, Reformation Europe, 1450–1650 Carlos Eire

Examination of a series of religious revolutions in Europe between 1450 and 1650. The causes and nature of the reformations that changed the religious, political, social, and economic landscapes of early modern Europe and shaped the course of Western civilization as a whole. HU

HIST 217a / CLCV 206a / HUMS 144a, The Roman Republic Staff

The origins, development, and expansion of Rome from the earliest times to the deaths of Caesar and Cicero. Cultural identity and interaction; slavery, class, and the family; politics, rhetoric, and propaganda; religion; imperialism; monumentality and memory; and the perception and writing of history. Application of literary and archaeological evidence. HU

HIST 218b / CLCV 207b, The Roman Empire Staff

The history of the Roman Empire from its establishment by Augustus to the reign of Justinian. Attention to social, intellectual, and religious changes, as well as to the framework of historical events within which these changes took place, and to the processes by which the Roman Empire was replaced by the institutions of the Western Middle Ages and the Byzantine Empire. HU

HIST 220b / JDST 201b / RLST 149b, Introduction to Modern Jewish History Staff

A broad introduction to the history of Jewish culture from the late Middle Ages until the present. Emphasis on the changing interaction of Jews with the larger society as well as the transformation of Judaism in its encounter with modernity. HU

HIST 221b / GLBL 281b, Military History of the West since 1500 Paul Kennedy

A study of the military history of the West since 1500, with emphasis on the relationship between armies and navies on the one hand, and technology, economics, geography, and the rise of the modern nation-state on the other. The coming of airpower in its varied manifestations. Also meets requirements for the Air Force and Naval ROTC programs. HU

HIST 275a, Revolutionary France, 1789–1871 John Merriman

Dimensions of political, social, and economic change in France during its most turbulent period. The causes and impact of the revolutions of 1789, 1830, 1848, and

1871; demographic change and large-scale industrialization; shifting political elites, republican and socialist alternatives to monarchy, and urbanization. HU

HIST 276b, France since 1871 John Merriman

The emergence of modern France since the Paris Commune of 1871 and the beginnings of the Third Republic. The social, economic, political, and cultural transformation of France; the impact of France's revolutionary heritage, of industrialization, and of the dislocation wrought by two world wars and decolonialization; and the political response of the Left and the Right to changing French society, including the impact of immigration and the emergence and challenges of the European Union. One discussion section conducted in French; students in this section may count the course toward the French major. HU

HIST 280a / ITAL 315a / RLST 160a, The Catholic Intellectual Tradition Carlos Eire

Introductory survey of the interaction between Catholicism and Western culture from the first century to the present, with a focus on pivotal moments and crucial developments that defined both traditions. Key beliefs, rites, and customs of the Roman Catholic Church, and the ways in which they have found expression; interaction between Catholics and the institution of the Church; Catholicism in its cultural and sociopolitical matrices. Close reading of primary sources. HU

HIST 290a, Russia from the Ninth Century to 1801 Paul Bushkovitch

The mainstream of Russian history from the Kievan state to 1801. Political, social, and economic institutions and the transition from Eastern Orthodoxy to the Enlightenment. HU

HIST 300b / CLCV 204b, Alexander the Great and the Hellenistic World Joseph Manning

The history and culture of the ancient world between the rise of Macedonian imperialism in the fourth century B.C.E. and the annexation of Egypt by Augustus in 30 B.C.E. Particular attention to Alexander, one of the most important figures in world history, and to the definition of "Hellenism." HU

HIST 321b, China from Present to Past, 2015–600 Valerie Hansen

Underlying causes of current issues facing China traced back to their origins in the premodern period. Topics include economic development, corruption, environmental crises, gender, and Pacific island disputes. Selected primary-source readings in English, images, videos, and Web resources. HU

HIST 332a / AFST 333a, African Encounters with Colonialism Daniel Magaziner

How African societies and peoples encountered, engaged, and endured the colonial and postcolonial world, from the arrival of Kiswahili-speaking traders at the shores of Lake Victoria in the 1840s through the rise and fall of European colonialism and the resulting forms of neocolonialism. Transformations and continuities in African religious life; gendered sociability; popular culture. HU

HIST 344a / MMES 346a, Making of the Modern Middle East Rosie Bsheer

Introduction to narratives and debates in the history of the Middle East from the mid-eighteenth century to the present. Local, regional, and global events and processes; political, social, cultural, and intellectual realities. Readings from the fields of history, anthropology, politics, and literature. HU

HIST 346a / MMES 144a, The Making of Modern Iran Abbas Amanat

The political, socioreligious, and cultural history of modern Iran from the Shi'ite revolution and the rise of the Safavid Empire to the present. Discussion of Shi'ism and the state, relations with neighboring countries (the Ottoman Empire and India), Russia and Britain in Qajar Iran, the Babi-Baha'i religion, the constitutional revolution, the Pahlavi dynasty, oil, nationalism and relations with the United States, the causes and the consequences of the Islamic revolution, and Iran in the contemporary Middle East.

HU

HIST 361a / LAST 361a, History of Brazil Stuart Schwartz

Brazilian history from European contact to the reestablishment of civilian government in the 1990s. Focus on the multiethnic nature of Brazilian society, the formation of social and political patterns, and the relationship of people to the environment. HU

HIST 396b / SAST 224b, India and Pakistan since 1947 Staff

Introduction to the history of the Indian subcontinent from 1947 to the present. Focus on the emergence of modern forms of life and thought, the impact of the partition on state and society, and the challenges of democracy and development. Transformations of society, economy, and culture; state building; economic policy. HU

Departmental Seminars

All History majors must take at least two departmental seminars. Seminars on the history of the United States or Canada are numbered 100J to 199J; seminars on Britain and Europe are 200J to 299J; and seminars on Africa, Asia, Latin America, and the Middle East are 300J to 399J. Seminars numbered in the 400s address global topics; students must apply to the director of undergraduate studies in History to count a 400-level seminar toward a particular geographical distribution category. Each departmental seminar aims to acquaint students in a substantial and professional way with the literature of a period in history; to train them as far as possible in the use of primary source materials; to introduce them to problems of bibliography, historiography, and historical method; and to give them training in the writing of history. The relative importance of these objectives in any particular seminar depends on its subject matter, the previous preparation of its students, and the availability of materials.

Each term declared History majors should apply for departmental seminars for the following term using the online seminar preregistration site. Preregistration begins after midterm in the fall for seminars offered in the spring term, and after spring recess for seminars offered in the subsequent fall term. All students who wish to preregister must declare their major beforehand.

During the course selection period, application for admission should be made directly to the instructors of the seminars, who will admit students to remaining vacancies in their seminars. Priority is given to applications from juniors, then seniors, majoring in History, but applications are also accepted from qualified sophomores and from students majoring in other disciplines or programs. The department seeks wherever possible to accommodate students' preferences; for their part, students should recognize that limitations imposed by the size of seminars (normally fifteen students) make accommodation impossible in some instances. HIST 494 and residential college seminars that count toward the History major do not fulfill the departmental seminar requirement.

- * **HIST 127Jb / WGSS 427b, Witchcraft in Colonial America** Rebecca Tannenbaum
The social, religious, economic, and gender history of British North America as manifested through witchcraft beliefs and trials. WR, HU
- * **HIST 133Jb, The Creation of the American Politician, 1789–1820** Joanne Freeman
The creation of an American style of politics: ideas, political practices, and self-perceptions of America's first national politicians. Topics include national identity, the birth of national political parties, methods of political combat, early American journalism, changing conceptions of leadership and citizenship, and the evolving political culture of the early republic. WR, HU
- * **HIST 134Jb, Yale and America: Selected Topics in Social and Cultural History** Jay Gitlin
Relations between Yale and Yale people—from Ezra Stiles and Noah Webster to Cole Porter, Henry Roe Cloud, and Maya Lin—and American society and culture. Elihu Yale and the global eighteenth century; Benjamin Silliman and the emergence of American science; Walter Camp, Dink Stover, and the all-American boy; Henry Luce and the information age; faith and ideology in postwar Yale and America. WR, HU RP
- * **HIST 135Ja, The Age of Hamilton and Jefferson** Joanne Freeman
The culture and politics of the revolutionary and early national periods of American history, using the lives, ideas, and writings of Thomas Jefferson and Alexander Hamilton as a starting point. Topics include partisan conflict, political culture, nation building, the American character, and domestic life. WR, HU
- * **HIST 142Ja / HSHM 445a / WGSS 453a, Women and Medicine in America from the Colonial Era to the Present** Naomi Rogers
American women from the colonial era to the present as midwives, patients, healers, reformers, revolutionaries, innovators, and entrepreneurs. Ways that women have shaped American health care and medical research. WR, HU
- * **HIST 143Jb, Cultural History of Mental Illness in America** Staff
Exploration of the meanings attributed to black-white differences in health from the late-nineteenth century to the present with an emphasis on the mutual construction of race and health/disease. Topics include specific diseases, (cancer, heart disease, tuberculosis, HIV) as well as health activism, 'health disparities' research, and genomics. HU
- * **HIST 150Ja / HSHM 406a, Healthcare for the Urban Poor** Sakena Abedin
Exploration of the institutions, movements, and policies that have attempted to provide healthcare for the urban poor in America from the late nineteenth century to the present, with emphasis on the ideas (about health, cities, neighborhoods, poverty, race, gender, difference, etc) that shaped them. Topics include hospitals, health centers, public health programs, the medical civil rights movement, the women's health movement, and national healthcare policies such as Medicare and Medicaid.
- * **HIST 151Ja / AMST 422a / ER&M 435a, Writing Tribal Histories** Staff
Historical overview of American Indian tribal communities, particularly since the creation of the United States. Challenges of working with oral histories, government documents, and missionary records. WR, HU

* **HIST 158Jb / AMST 398b / ER&M 308b, American Indian Law and Policy** Ned Blackhawk

Survey of the origins, history, and legacies of federal Indian law and policy during two hundred years of United States history. The evolution of U.S. constitutional law and political achievements of American Indian communities over the past four decades.

WR, HU

* **HIST 164Ja, Foxes, Hedgehogs, and History** John Gaddis

Application of Isaiah Berlin's distinction between foxes and hedgehogs to selected historical case studies extending from the classical age through the recent past.

WR, HU

* **HIST 168Jb, Quebec and Canada from 1791 to the Present** Jay Gitlin

The history of Quebec and its place within Canada from the Constitutional Act of 1791 to the present. Topics include the Rebellion of 1837, confederation, the Riel Affair, industrialization and emigration to New England, French-Canadian nationalism and culture from Abbé Groulx to the Parti Québécois and Céline Dion, and the politics of language. Readings include plays by Michel Tremblay and Antonine Maillet in translation.

WR, HU

* **HIST 174Ja / AMST 451a / RLST 260a, Religion, War, and the Meaning of America**

Harry Stout

The relationship between religion and war in American history from colonial beginnings through Vietnam. The religious meanings of Americans at war; the mutually reinforcing influences of nationalism and religion; war as the norm of American national life; the concept of civil religion; biblical and messianic contexts of key U.S. conflicts.

HU

* **HIST 179Jb / HSHM 415b, Historical Perspectives on Science and Religion** Ivano

Dal Prete

The engagement between science and religion from a historical standpoint and a multicultural perspective. The Islamic, Jewish, Buddhist, and Christian traditions; the roots of modern creationism; salvation expectations and the rise of modern science and technology. General knowledge of western and world history is expected.

WR, HU

* **HIST 203Jb / BRST 153b, Anglo-Saxons and Vikings** Anders Winroth

The intertwined history of the Vikings and the Anglo-Saxons in the period between the first raids in c. 790 and the Norman conquest of 1066. Study of the almost constant warfare between the two groups, as well as the ways in which they negotiated peaceful interactions leading to large groups of Scandinavians being integrated into English society and culture. Examination of the culture that flourished in this period in literature, languages, and art.

WR, HU

* **HIST 215Jb, The Art of Biography** John Gaddis

A comparative examination of successful as well as unsuccessful biographies, intended to identify both principles and pitfalls.

WR, HU

* **HIST 221Ja, Russia in the Age of Tolstoy and Dostoevsky, 1850-1905** Sergei

Antonov

Russian politics, culture, and society ca. 1850 to 1905. Tsars' personalities and ruling styles, political culture under autocracy. Reform from above and revolutionary terror. Serfdom and its abolition, problem of "traditional" Russian culture. Growth of industrial and financial capitalism, middle-class culture, and daily life. Foreign policy

and imperial conquest, including the Caucasus and the Crimean War (1853–56). Readings combine key scholarly articles, book chapters, and representative primary sources. All readings and discussions in English. WR, HU

* **HIST 220Jb, Grand Strategy and the Origins of the Second World War** Paul Kennedy

A survey of the most important literature and debates concerning the coming of the Second World War in both Europe and the Pacific. Emphasis on the comparative approach to international history and on the interplay of domestic politics, economics, and strategy. Counts toward only European distributional credit within the History major. WR, HU RP

* **HIST 222Jb, Russia and the Eurasian Steppe** Paul Bushkovitch

A study of Russia's interaction with the nomads of the Eurasian steppe. Topics include the Mongol invasion, the Mongol Empire in Asia and the Golden Horde, Islam, nomadic society, and the Russian state. Focus on conquest and settlement. May count toward either European or Asian distributional credit within the History major, upon application to the director of undergraduate studies. WR, HU

* **HIST 229Ja, London, 1560–1760** Keith Wrightson

A study of London's growth between 1560 and 1760 from a modest city of perhaps 50,000 people to a metropolis with over 700,000 inhabitants. Themes include the dynamics of growth; birth and death, with particular reference to the plague; migration; household life; villages within the city; London as the center of print culture; the royal court; polite society in the late seventeenth and early eighteenth centuries; the "middle sort of people" and consumerism; the world of the poor; and vice and criminality. In September and in January, application for admission should be made directly to the instructors of the seminars, who will admit students to remaining vacancies in their seminars. Priority is given to applications from juniors, then seniors, majoring in History, but applications are also accepted from qualified sophomores and from students majoring in other disciplines or programs. Seminars on the history of the United States or Canada are numbered 100J to 199J; seminars on Britain and Europe are 200J to 299J; and seminars numbered 300J to 399J cover the rest of the world. Seminars numbered in the 400s address global topics; students must apply to the director of undergraduate studies in History to count a 400-level seminar toward a particular geographical distribution category. WR, HU

* **HIST 231Jb, The Dark Years: Collaboration and Resistance in Vichy France** John Merriman

The concomitants of collaboration and resistance during Vichy France, 1940–44. Topics include the fall of France in 1940; the return of Pétain's "National Revolution" and its continuities with the French Right during the Third Republic; the extent and nature of resistance (in the context of pre–World War II politics); and the memory of the Vichy years and its influence on subsequent French political life. WR, HU

* **HIST 232Ja / HUMS 443a / JDST 270a / MMES 342a / RLST 201a, Medieval Jews, Christians, and Muslims In Conversation** Ivan Marcus

How members of Jewish, Christian, and Muslim communities thought of and interacted with members of the other two cultures during the Middle Ages. Cultural grids and expectations each imposed on the other; the rhetoric of otherness—humans or devils, purity or impurity, and animal imagery; and models of religious community

and power in dealing with the other when confronted with cultural differences. Counts toward either European or Middle Eastern distributional credit within the History major, upon application to the director of undergraduate studies. WR, HU RP

* **HIST 242Jb / CLCV 319b / MGRK 300b / WGSS 293b, The Olympic Games, Ancient and Modern** George Syrimis

Introduction to the history of the Olympic Games from antiquity to the present. The mythology of athletic events in ancient Greece and the ritual, political, and social ramifications of the actual competitions. The revival of the modern Olympic movement in 1896, the political investment of the Greek state at the time, and specific games as they illustrate the convergence of athletic cultures and sociopolitical transformations in the twentieth century. HU

* **HIST 260Ja / HSHM 468a, Sex, Life, and Generation** Ivano Dal Prete

Theories and practices of life, sex, and generation in Western civilization. Politics and policies of conception and birth; social control of abortion and infanticide in premodern societies; theories of life and gender; the changing status of the embryo; the lure of artificial life. HU

* **HIST 262Ja / ENGL 262a / HUMS 410a, Modernities: Nineteenth-Century Historical Narratives** Stefanie Markovits and Stuart Semmel

British historical narratives in the nineteenth century, an age often cited as the crucible of modern historical consciousness. How a period of industrialization and democratization grounded itself in imagined pasts—whether recent or distant, domestic or foreign—in both historical novels and works by historians who presented programmatic statements about the nature of historical development. WR, HU

* **HIST 267Jb, War at Sea in the Age of Sail** Evan Wilson

A study of European warfare at sea from 1500 to 1815. Themes include: the relationship between navies and societies; the experience of life at sea; the role of navies in the development of science, industry, and the state; the nature and limitations of sea power; theories of sea power; the emergence of British naval supremacy. Examination of different approaches to naval and military history. WR, HU

* **HIST 269Ja, History and Holocaust Testimony** Carolyn Dean

The history and memoirs of Holocaust testimony. How victims' experiences are narrated and assessed by historians. Questions regarding memory and history. WR, HU

* **HIST 334Jb / ER&M 364b / LAST 334b, Ethnicity, Nationalism, and the Politics of Knowledge in Latin America** Marcela Echeverri Munoz

Examination of ethnicity and nationalism in Latin America through the political lens of social knowledge. Comparative analysis of the evolution of symbolic, economic, and political perspectives on indigenous peoples, peasants, and people of African descent from the nineteenth century to the present. Consideration of the links between making ethnic categories in the social sciences and in literature and the rise of political mechanisms of participation and representation that have characterized the emergence of cultural politics. WR, HU RP

* **HIST 342Jb / MMES 345b, The Middle East and the West: A Cultural Encounter** Abbas Amanat

Cultural dialogues and confrontation between the modern Middle East and the West (Europe and North America) and their significance for our time. Western images of the Orient and discourse of Orientalism, Middle East as a modern construct, Muslim

knowledge of Western modernity, impact of colonialism and territorial conflicts, and cultural roots of Islamic Jihadism and nonstate terrorist entities. WR, HU

* **HIST 372Ja / ER&M 342a / LAST 372a, Revolutionary Change and Cold War in Latin America** Gilbert Joseph

Analysis of revolutionary movements in Latin America against the backdrop of the Cold War. Critical examination of popular images and orthodox interpretations. An interdisciplinary study of the process of revolutionary change and cold war at the grassroots level. WR, HU

* **HIST 382Ja, Vietnamese History from Earliest Times to 1920** Benedict Kiernan
Evolution of a Vietnamese national identity, from Chinese colonization to medieval statehood, to French conquest and capitalist development. The roles of Confucianism, Buddhism, gender, and ethnicity in the Southeast Asian context. WR, HU

* **HIST 385Jb / MMES 347b, Reformers and Revolutionaries in the Arab World**
Rosie Bsheer

Major social and intellectual trends of the Arab world and their relation to major events and movements of the twentieth century. The influence of colonial, postcolonial, and neocolonial thought; issues faced by activists, lawyers, feminists, leftists, nationalists, Islamists, secularists, liberals, and unionists; ways in which such struggles shaped people's social lives and futures; the causes and implications of current uprisings. WR, HU

* **HIST 387Ja / AFST 487a, West African Islam: Jihad Tradition and Its Pacifist Opponents** Staff

The influence of Islam on state and society, and the encounters of Muslim Africans first with non-Muslim societies in Africa and then with the modern West in the colonial and postcolonial periods. Focus on Muslim religious attitudes and responses to the secular national state and to the Western tradition of the separation of church and state. WR, HU

* **HIST 429Jb / HSHM 412b, Laboratory Life** Chitra Ramalingam

The laboratory is the iconic space of modern science, where unruly nature is tamed and controlled, and scientific facts are made. Through historical, ethnographic, and sociological approaches to lab science, this course explores how an obscure, secretive site for managing alchemical labor in medieval Europe became the globally dominant mode of producing universal experimental knowledge across the modern sciences. We consider issues of labor, skill and class; gender and race; pedagogy and the politics of profession; state, industrial, and corporate laboratories; secrecy and openness; place and geography; and the implication of labs in geopolitical webs of power, inequality, and exploitation. Undergraduate enrollment limited to juniors and seniors. WR, HU

* **HIST 482Jb / PLSC 321b, Studies in Grand Strategy I** Beverly Gage

The study of grand strategy, of how individuals and groups can accomplish large ends with limited means. The spring term focuses on key moments in history that illustrate strategic thinking in action. During the summer, students undertake research projects or internships analyzing strategic problems or aspects of strategy. The following fall, students put their ideas into action by applying concepts of grand strategy to present day issues. Admission is by application only; the cycle for the current year is closed. This course does not fulfill the history seminar requirement, but may count toward geographical distributional credit within the History major

for any region studied, upon application to the director of undergraduate studies. Previous study courses in political science, history, global affairs, or subjects with broad interdisciplinary relevance encouraged. HU, SO

* **HIST 483Ja / PLSC 161a, Studies in Grand Strategy II** Beverly Gage

The study of grand strategy, of how individuals and groups can accomplish large ends with limited means. During the fall term, students put into action the ideas studied in the spring term by applying concepts of grand strategy to present day issues. Admission is by application only; the cycle for the current year is closed. This course does not fulfill the history seminar requirement, but may count toward geographical distributional credit within the History major for any region studied, upon application to the director of undergraduate studies. Prerequisite: PLSC 321. Previous study courses in political science, history, global affairs, or subjects with broad interdisciplinary relevance encouraged. SO

Writing Tutorial and Senior Essay Courses

* **HIST 494a or b, Individual Writing Tutorial** Edward Rugemer

For students who wish, under the supervision of a member of the faculty, to investigate an area of history not covered by regular departmental offerings. The course may be used for research or for directed reading. It is normally taken only once. The emphasis of the tutorial is on writing a long essay or several short ones. To apply for admission, a student should present the following materials to the director of undergraduate studies on the Friday before schedules are due: a prospectus of the work proposed, a bibliography, and a letter of support from a member of the History department faculty who will direct the tutorial. A form to simplify this process is available from the office of the director of undergraduate studies.

* **HIST 495a or b and HIST 496a or b, The Senior Essay** Carolyn Dean

All senior History majors should attend the mandatory senior essay meeting in early September at a time and location to be announced in the online Senior Essay Handbook. The senior essay is a required one- or two-term independent research project conducted under the guidance of a faculty adviser. As a significant work of primary-source research, it serves as the capstone project of the History major. Students writing the one-term senior essay enroll in HIST 497 (see description), not HIST 495 and 496. The two-term essay takes the form of a substantial article, not longer than 12,500 words (approximately forty to fifty double-spaced typewritten pages). This is a maximum limit; there is no minimum requirement. Length will vary according to the topic and the historical techniques employed. Students writing the two-term senior essay who expect to graduate in May enroll in HIST 495 during the fall term and complete their essays in HIST 496 in the spring term. December graduates enroll in HIST 495 in the spring term and complete their essays in HIST 496 during the following fall term; students planning to begin their essay in the spring term should notify the senior essay director by early December. Each student majoring in History must present a completed Statement of Intention, signed by a department member who has agreed to serve as adviser, to the History Department Undergraduate Registrar by the dates indicated in the Senior Essay Handbook. Blank statement forms are available from the History Undergraduate Registrar and in the Senior Essay handbook. Students enrolled in HIST 495 submit to the administrator in 237 HGS a two-to-three-page analysis of a single primary source, a draft bibliographic essay, and at least ten pages of

the essay by the deadlines listed in the Senior Essay Handbook. Those who meet these requirements receive a temporary grade of SAT for the fall term, which will be changed to the grade received by the essay upon its completion. Failure to meet any requirement may result in the student's being asked to withdraw from HIST 495. Students enrolled in HIST 496 must submit a completed essay to 211 HGS no later than 5 p.m. on the dates indicated in the Senior Essay Handbook. Essays submitted after 5 p.m. will be considered as having been turned in on the following day. If the essay is submitted late without an excuse from the student's residential college dean, the penalty is one letter grade for the first day and one-half letter grade for each of the next two days past the deadline. No essay that would otherwise pass will be failed because it is late, but late essays will not be considered for departmental or Yale College prizes. All senior departmental essays will be judged by members of the faculty other than the adviser. In order to graduate from Yale College, a student majoring in History must achieve a passing grade on the departmental essay.

*** HIST 497a or b, One-Term Senior Essay** Carolyn Dean

All senior History majors should attend the mandatory senior essay meeting in early September at a time and location to be announced in the online Senior Essay Handbook. The senior essay is a required one- or two-term independent research project conducted under the guidance of a faculty adviser. As a significant work of primary-source research, it serves as the capstone project of the History major. Seniors writing a two-term senior essay do not register for HIST 497; instead, they register for HIST 495 and HIST 496 (see description). History majors may choose to write a one-term independent senior essay in the first term of their senior year and register for HIST 497; however, students who choose the one-term senior essay option are not eligible for Distinction in the Major. The one-term essay must include a substantial research paper of no more than 6,250 words (approximately twenty-five pages) based on primary sources, along with a bibliographic essay and bibliography. Seniors enroll during the fall term of senior year; only History majors graduating in December may enroll during the spring term (or seventh term of enrollment). In rare circumstances, with the permission of the adviser and the Senior Essay Director, a student enrolled in HIST 497 during the fall term may withdraw from the course according to Yale College regulations on course withdrawal and enroll in the spring term. Each student enrolled in HIST 497 must present a completed Statement of Intention, signed by a department member who has agreed to serve as adviser, to the History Department Undergraduate Registrar by the dates indicated in the Senior Essay Handbook. Blank statement forms are available from the History Undergraduate Registrar and in the Senior Essay Handbook, available on the History department Web site. Additional details about the senior essay, including the submission deadlines are included in the Senior Essay Handbook. Essays submitted after 5 p.m. on the due date will be considered as having been turned in on the following day. If the essay is submitted late without an excuse from the student's residential college dean, the penalty is one letter grade for the first day and one-half letter grade for each of the next two days past the deadline. No essay that would otherwise pass will be failed because it is late. All senior departmental essays will be judged by members of the faculty other than the adviser. In order to graduate from Yale College, a student majoring in History must achieve a passing grade on the departmental essay. Permission of the departmental Senior Essay Director and of the student's faculty adviser is required for enrollment.

History of Art

Director of undergraduate studies: Marisa Bass, 752 Yale Ave., 432-2666, marisa.bass@yale.edu; (marisa.bass@yale.edu) arthistory.yale.edu

Art history is the study of all forms of art, architecture, and visual culture in their social and historical contexts. The History of Art major can serve either as a general program in the humanities or as the groundwork for more specialized training. Unless otherwise indicated, all courses in History of Art are open to all students in Yale College.

COURSE NUMBERING

100-level courses are broad introductory surveys that address basic art history from a number of regional and thematic perspectives. Prospective majors are encouraged to take the surveys as early in their course of study as possible. Under certain circumstances, students who have taken the Advanced Placement test in art history may earn acceleration credit and, in consultation with the director of undergraduate studies, may place out of one required 100-level course.

Intermediate and advanced courses, numbered above 200, encompass more specialized surveys and themes in art history.

REQUIREMENTS OF THE MAJOR

Twelve course credits are required to complete the major: two introductory courses at the 100 level; four intermediate and advanced courses at the 200 and 300 levels; two seminars at the 400 level; a methods seminar, HSAR 401; two electives; and the senior essay, HSAR 499.

The major requires that the six courses numbered above 200, of which two must be seminars numbered above 400, must satisfy both a geographical and a chronological distributional requirement. The geographical requirement is divided into five areas: Africa and the Pacific; the Americas; Asia and the Near East; Europe; and transregional. The chronological requirement is similarly divided into five segments: earliest times to 800; 800–1500; 1500–1800; 1800 to the present; and transchronological. These six intermediate and advanced courses must be chosen from four different geographical areas and four different time periods; a single course can fulfill both a geographical and a chronological requirement.

Only classes originating in the History of Art department can fulfill the distributional requirements.

Junior seminar The methods seminar HSAR 401, *Critical Approaches to Art History*, is a wide-ranging introduction to the practices of the art historian and the history of the discipline. It is to be taken during the fall or spring term of the junior year.

Credit/D/Fail courses Courses taken Credit/D/Fail may not be counted toward the requirements of the major.

Roadmap See visual roadmap of the requirements.

SENIOR REQUIREMENT

The senior essay is a research paper written usually in one term in HSAR 499. Students choose their own topics, which may derive from research done in an earlier course. The

essay is planned during the previous term in consultation with a qualified instructor and/or with the DUS. It is also possible to write a two-term senior essay; students wishing to do so must submit a petition to the DUS and the prospective adviser, normally by the first week after spring break of the junior year.

ADVISING

Electives may include courses from other departments if they have direct relevance to the major program of study. Approval of the DUS is required.

History of Art majors are urged to study foreign languages. Students considering graduate work should discuss with their advisers the appropriate language training for their field of interest.

Graduate courses Courses in the Graduate School are open to undergraduates with permission of the instructor and of the director of graduate studies. Course descriptions are available in the History of Art office in the Jeffrey Loria Center, 190 York Street.

REQUIREMENTS OF THE MAJOR

Prerequisites None

Number of courses 12 course credits

Distribution of courses 2 courses at 100 level; 6 courses numbered above 200, 2 of which must be 400-level seminars, fulfilling distributional requirements in 4 geographical and 4 chronological categories; 2 electives

Specific course required HSAR 401

Substitution permitted With DUS permission, 2 electives from related depts

Senior requirement Senior essay (HSAR 499)

FACULTY OF THE DEPARTMENT OF HISTORY OF ART

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 Yiengpruksawan

Associate Professors Milette Gaifman, Jacqueline Jung, Kishwar Rizvi

Assistant Professors Marisa Bass, Craig Buckley, Erica James, Jennifer Raab

Lecturers Monica Bravo, Molly Brunson (*Affiliated Faculty*), Karen Foster, Ian McClure, Margaret Olin (*Senior Research Scholar*)

Courses

* **HSAR 007a, Art and Science** Carol Armstrong

The historical relationship between art and science in the West, from the Renaissance to the present. Case studies illustrate the similarities and differences between the way artists and scientists each model the world, in the studio and the laboratory. *Enrollment limited to freshmen. Preregistration required. Please go to the following website to enter preferences for seminars:* <https://students.yale.edu/ocs-preference/select/select?id=2041>
WR, HU

* **HSAR 010b / HSAR 417, The Classical Tradition: from Roman to Renaissance Art**

Felicity Harley

The influence of classical Greco-Roman antiquity on early Christian, medieval, and Italian Renaissance art explored through study of objects in the Yale Art Gallery

(statuary, coins, textiles, gems, and paintings). Topics include: the lure of antiquities; collecting and birth of the museum; naturalism and nudity; sculpture and iconophobia; religion and iconoclasm; iconographic models of paradise, beauty, power, and authority; and patronage and propaganda. HU

*** HSAR 015a / SAST 060, Ten Indian Objects** Staff

A 5000-year-old stone seal, a 20th century comic book, an emperor's painted portrait, a processional bronze god, a miniature temple, an inscribed pillar, a rock crystal reliquary, a serene Buddha, an animated film, and a towering female figure. Through rigorous explorations of these ten objects from South Asia this seminar teaches close looking, vivid writing, and narrating history through things. It considers both the biographies of the objects and their involvement in the wider social, political, artistic, and cultural histories of the Indian subcontinent. Students engage some of the most exciting scholarship in the field of South Asian art, and observe, draw, and write about things in museums and art collections on a weekly basis. Enrollment limited to first-year students. Preregistration required; see under First-Year Seminar Program. HU

HSAR 112a, Introduction to the History of Art: Prehistory to the Renaissance

Jacqueline Jung

Form as meaning in architecture, sculpture, and painting. Selected studies in these arts from prehistory to the Renaissance. Source readings in translation. HU

HSAR 206b / EALL 206b / LITR 175b, Japan's Classics in Text and Image Edward

Kamens

An introduction to the Japanese classics (poetry, narrative fiction, drama) in their manifestations in multiple media, especially in the visual and material realm. Special reference to and engagement with a simultaneous Yale University Art Gallery installation of rare books, paintings, and other works of art from Japan. No knowledge of Japanese required. Formerly JAPN 200. WR, HU

HSAR 213a, American Photojournalism Jennifer Raab

The history of American photojournalism from the Civil War to Vietnam. Issues of violence, poverty, politics, race, gender, and celebrity; questions of ethics, aesthetics, and authorship; the relationship between photography and truth; ways in which images communicate differently when they appear with a printed text. HU

HSAR 219b / AMST 197b / ARCH 280b, American Architecture and Urbanism Elihu

Rubin

Introduction to the study of buildings, architects, architectural styles, and urban landscapes, viewed in their economic, political, social, and cultural contexts, from precolonial times to the present. Topics include: public and private investment in the built environment; the history of housing in America; the organization of architectural practice; race, gender, ethnicity and the right to the city; the social and political nature of city building; and the transnational nature of American architecture. HU

HSAR 221a / RUSS 220a, Russian and Soviet Art, 1757 to the Present Molly Brunson

The history of Russian and Soviet art from the foundation of the Academy of the Arts in 1757 to the present. Nineteenth-century academicism, romanticism, and realism; the Russian avant-garde and early Soviet experimentation; socialist realism and late- and post-Soviet culture. Readings and discussion in English. HU TR

HSAR 237a / ARCG 237a / NELC 108a, Ancient Painting and Mosaics Karen Foster
Developments in wall painting, vase painting, and mosaics as seen in ancient Egypt, the Aegean Bronze Age, and the Greek, Etruscan, and Roman world. HU

HSAR 247a / ARCG 161a / CLCV 161a, Art and Myth in Greek Antiquity Milette Gaifman

Visual exploration of Greek mythology through the study of ancient Greek art and architecture. Greek gods, heroes, and mythological scenes foundational to Western culture; the complex nature of Greek mythology; how art and architecture rendered myths ever present in ancient Greek daily experience; ways in which visual representations can articulate stories. Use of collections in the Yale University Art Gallery. WR, HU

HSAR 252a / ARCG 252a / CLCV 175a, Roman Architecture Diana Kleiner

The great buildings and engineering marvels of Rome and its empire. Study of city planning and individual monuments and their decoration, including mural painting. Emphasis on developments in Rome, Pompeii, and central Italy; survey of architecture in the provinces. HU

* **HSAR 266a / ARCH 271a / MMES 126a / SAST 266a, Introduction to Islamic Architecture** Kishwar Rizvi

Introduction to the architecture of the Islamic world from the seventh century to the present, encompassing regions of Asia, North Africa, and Europe. A variety of sources and media, from architecture to urbanism and from travelogues to paintings, are used in an attempt to understand the diversity and richness of Islamic architecture. Field trip to the Metropolitan Museum of Art in New York. HU

HSAR 273b, Art of Gothic Cathedrals Jacqueline Jung

European Gothic churches (1140–1400) explored as multimedia architectural environments in which stained glass, sculpture, textiles, and liturgical furnishings are integral aspects of design and meaning. Buildings considered for their formal and material qualities and as sites of ritual performance and signs of political and social power. Recommended preparation: HSAR 112. HU

* **HSAR 280a / FREN 347a, Ekphrasis** Thomas Connolly

An exploration of ekphrasis, understood both as the verbal representation of visual representation and, more broadly, as the way in which one artistic discourse represents, critiques, or transgresses another. Manifestations of this rhetorical device in both Western and non-Western cultures from antiquity to the present. Readings and discussion in English. HU TR

HSAR 312b, Modern Architecture, 1890–1980 Craig Buckley

Architects, movements, and buildings central to the development of modern architecture from the late nineteenth century through the 1970s. Common threads and differing conceptions of modern architecture. The relationship of architecture to urban transformation; the formulation of new typologies; architects' responses to new technologies and materials; changes in regimes of representation and media. Architects include Adolf Loos, Frank Lloyd Wright, Le Corbusier, Ludwig Mies van der Rohe, and Louis Kahn. HU

HSAR 326a / ARCH 260a, History of Architecture I: Antiquity to the Baroque Kyle Dugdale

The first half of a two-term sequence in the history of architecture. Architecture and urbanism from ancient Egypt through Greek and Roman classical traditions to the Enlightenment. The formal expression – organizational, structural, and ornamental – and social context of specific buildings and urban areas. Architecture as a form of social expression that builds on its own stylistic development, articulating a response to changes in history and culture. Emphasis on Western architecture, with selections from other parts of the world. HU

* **HSAR 329b / AFAM 256b / FILM 399b, The Migrant Image** Rizvana Bradley
Cinematic as well as post-cinematic representation of both the migrant and the immigrant body; authorship of the anticolonial struggle. Focus on migrants, refugees, and immigrants, and the emergence of the "global citizen" with respect to digital artistic practices. Prerequisites: FILM 150 or 160; or permission of instructor. HU

HSAR 383b / SAST 374, Sacred Space in South Asia Staff

"Sacred" space in the Indian subcontinent was at the epicenter of human experience. This course presents Buddhist, Hindu, Islamic, and Jain monuments and the gamut of social meanings and activities associated with them. Moving from the ritual spaces of the Indus Valley Culture to nineteenth-century colonial India, we learn how the organization and imagery of these spaces supported devotional activity and piety. We learn too how temples, monasteries, and shrines supported the pursuit of pleasure, amusement, sociability, and other worldly interests. We also explore the symbiotic relationship between Indian kingship and religion, and the complex ways in which politics and court culture shaped sacred environments. The course concludes with European imaginings of Indian religion and religious places. HU

* **HSAR 401a or b, Critical Approaches to Art History** Staff

A wide-ranging introduction to the methods of the art historian and the history of the discipline. Themes include connoisseurship, iconography, formalism, and selected methodologies informed by contemporary theory. WR, HU

* **HSAR 414a / SAST 469, Visual Storytelling in South Asia** Staff

This seminar explores the polyglot variety of visual narration in South Asia. We examine the lives of exemplary individuals like the Buddha, the epic story of Rama, and royal biography and autobiography. We consider stories told through stone, in the medium of paint, and in print, film, graphic books, and contemporary media. We experience story telling in sumptuous courtly settings and in temples, monasteries, and other sacred spaces. Weekly readings and discussions analyze the handling of narrative ambiguity and absence, double meaning and punning, the treatment of space and place, representations of sex, desire, and love, and the visual construction of political persona, power, and nation. The course is ultimately interested in how South Asian narratives unsettle and expand the notion of representation.

Prerequisite: one introductory course in Art History. HU

* **HSAR 415a, Aztec Art & Architecture** Barbara Mundy

The Aztecs of Mexico were the last of the great indigenous empires of the Americas. This course studies how they used art and architecture to align themselves to the larger cosmos and to connect their empire to past Mesoamerican civilizations and project it

into the future. Students gain experience analyzing and writing about Aztec art works in Yale collections.

* **HSAR 431a / HUMS 238, Portraiture and Selfhood in the Renaissance** Marisa Bass
Long before “the age of the selfie,” portraiture and identity construction were closely intertwined. The rise of portraiture during the Renaissance is often said to coincide with the moment when the notion of the individual emerged for the first time. This course reconsiders the relationship between portraits and concepts of selfhood as they developed from the late Middle Ages through early modernity. Looking across media, we explore examples of portraiture in painting, sculpture, and print and address how works within the genre speak to both individual and communal identity, to issues of gender, race, and class, and reflect the exploration of social mobility from the late fourteenth to the late sixteenth century. Close reading of biographies, autobiographies, and other literary genres of self-fashioning are also considered, alongside artists including Jan van Eyck, Albrecht Dürer, Leonardo da Vinci, Michelangelo, Hans Holbein, and Titian. Several class sessions include visits to collections on campus. HU

* **HSAR 454a, Glass in America** John Gordon

This seminar surveys the rich history of glass-making in America, from colonial manufacturing to contemporary studio work, paying particular attention to the progression of styles and new technologies. Topics for exploration include the material’s role in housewares, scientific equipment, architecture, and fine art. In addition to hands-on study sessions at the Gallery, students are expected to participate in visits to repositories across campus and at least one field trip. As part of the course requirements, students work closely with the instructor to develop, select objects for, and mount an exhibition of American glass that will be held at the Art Gallery in the spring of 2019. HU

* **HSAR 459a / ER&M 459, Contested Monuments** Jennifer Raab

Following the events in Charlottesville last year, and the national discussions and actions regarding Confederate monuments that followed, this course examines issues surrounding the agency of art in public spaces, race and representation, memory and memorialization. We examine the legal, ethical, and political questions raised by these sculptures and their sites while also considering a longer history of controversial public monuments. HU

* **HSAR 460a / ENGL 247a, Writing about Contemporary Figurative Art** Margaret Spillane

A workshop on journalistic strategies for looking at and writing about contemporary paintings of the human figure. Practitioners and theorists of figurative painting; controversies, partisans, and opponents. Includes field trips to museums and galleries in New York City. WR, HU

* **HSAR 466a, The Technical Examination of Art** Ian McClure

Introduction to methods used in the technical examination of works of art, including critical assessment of the information such methods provide. What technical examination can reveal about the materials and techniques used in a particular work’s creation and about its subsequent history.

* **HSAR 471a / AFAM 346a, Black Atlantic Photography** Kobena Mercer

Introduction to the social and artistic history of photography in Black Atlantic contexts from the mid-nineteenth century to the present. Uses of the photographic

image in shaping understandings of race relations and black identities. Codes and conventions by which photographs are evaluated in terms of truth, reflection, testimony, expressivity, and construction. HU

* **HSAR 472b / AFAM 353b, Black British Art and Culture** Kobena Mercer

Introduction to black British visual artists and cultural theorists, with a focus on those of African, Caribbean, and South Asian descent. Postcolonial perspectives on diaspora identities and cross-cultural aesthetics in art, film, and photography from 1945 to the present. HU

* **HSAR 473a, Abstract Expressionism** Staff

Consideration of the expanded field of Abstract Expressionism relative to both domestic and international cultural politics at mid-century as well as monographic studies of its pivotal artists and critics. Topics include: modernism and existentialism; transnational avant-gardes; interdisciplinary approaches to the visual image; the ideologies of formalism and autonomous art; cold war aesthetics; race and gender. Artists: Pollock, de Kooning, Guston, Mitchell, Newman, Rothko, Krasner, Still, Gorky, Lewis, others. Close readings of Greenberg, Rosenberg, and other critics associated with *Partisan Review* and little magazines. Enrollment limited and by application only. Junior and senior art history majors given priority. Prerequisite: one introductory art history course.

* **HSAR 493b / AMST 484b / WGSS 462b, Visual Kinship, Families, and Photography** Laura Wexler

Exploration of the history and practice of family photography from an interdisciplinary perspective. Study of family photographs from the analog to the digital era, from snapshots to portraits, and from instrumental images to art exhibitions. Particular attention to the ways in which family photographs have helped establish gendered and racial hierarchies and examination of recent ways of reconceiving these images. HU

* **HSAR 498a, Independent Tutorial** Marisa Bass

For students who wish to pursue a subject in the history of art not otherwise covered by departmental offerings. May be used for research or directed reading under faculty supervision. A term paper or its equivalent and regular meetings with the adviser are required. To apply for admission, a student should present a prospectus and a bibliography, signed by the adviser, to the director of undergraduate studies. Enrollment limited to History of Art majors.

* **HSAR 499a or b, The Senior Essay** Staff

Preparation of a research paper (30-35 pages in length) on a topic of the student's choice, under the direction of a qualified instructor, to be written in the fall or spring term of the senior year. In order to enroll in HSAR 499, the student must submit a project statement on the date that their course schedule is due during the term that they plan to undertake the essay. The statement, which should include the essay title and a brief description of the subject to be treated, must be signed by the student's adviser and submitted to the DUS. All subsequent deadlines are also strict, including for the project outline and bibliography, complete essay draft, and the final essay itself. Failure to comply with any deadline will be penalized by a lower final grade, and no late essay will be considered for a prize in the department. Senior essay workshops that will meet periodically throughout the term are also mandatory. Permission may be given to write a two-term essay after consultation with the student's adviser and the DUS. Only those

who have begun to do advanced work in a given area and whose project is considered to be of exceptional promise are eligible. The requirements for the one-term senior essay apply to the two-term essay, except that the essay should be 50–75 pages in length.

History of Science, Medicine, and Public Health

Director of undergraduate studies: Ivano Dal Prete, HGS 300B,
ivano.dalprete@yale.edu; hshm.yale.edu

History of Science, Medicine, and Public Health is an interdisciplinary program that focuses on how different forms of knowledge and technology have been created in various times, places, and cultures, and how they have shaped the modern world. The major explores a wide range of questions. For example, is science universal, or does each culture have its own approach to trustworthy knowledge? What is the relationship between medical expertise, social structure, and everyday life? What is the nature of technology and its relationship to political, economic, and military power. Why do even the best public health campaigns have unintended consequences?

Course topics include the Scientific Revolution, medicine and media in modern America, health activism and public health, global health and epidemics, biotechnology, predictions of planetary catastrophe, scientific collections and material culture, and the historical development of the physical, environmental, biological, and human sciences.

A major in History of Science, Medicine, and Public Health offers excellent preparation for a wide range of careers. Premedical students and others interested in health-related fields can combine preprofessional training with a broad humanistic education. The major also provides a solid foundation for any career at the intersection of the sciences, technology, and public life, including law, business, journalism, museum work, public policy, and government.

REQUIREMENTS OF THE MAJOR

The major in History of Science, Medicine, and Public Health requires twelve term courses, including the two-term senior requirement. Students select a pathway of seven courses that guides them through an area of specialization. The seven pathway courses must include two courses in History of Science, Medicine, and Public Health; one seminar numbered 100 or above in History of Science, Medicine, and Public Health or in History; one science course; and three electives chosen from relevant courses in any department.

Pathways The five standard pathways in the major are Medicine and Public Health; Global Health; Science, Technology, and Society; Gender, Reproduction, and the Body; and Media, Knowledge, and Visual Cultures. Students may also design customized pathways in consultation with the director of undergraduate studies. No later than the beginning of the junior year, students in the major must select a standard pathway or indicate that they wish to design their own.

Electives Beyond the seven pathway courses, students must complete three additional electives in History of Science, Medicine, and Public Health. One of the electives must be a seminar, and one must be chosen from a pathway other than the one selected for the major. All courses for the major are chosen in collaboration with the student's adviser.

Credit/D/Fail courses A maximum of one History of Science, Medicine, and Public Health course taken Credit/D/Fail before the fifth term of enrollment may be counted toward the requirements of the major.

Roadmap See visual roadmap of the requirements.

SENIOR REQUIREMENT

By the end of reading period in the spring term of the junior year, students choose whether they will work toward a yearlong or a one-term senior project. Yearlong senior projects are completed in HSHM 490, 491; one-term projects are completed in HSHM 492. Students who choose a one-term project must take an additional HSHM-listed course to complete the major. Only students who complete a yearlong senior project are eligible for Distinction in the Major.

For both the one-term and yearlong senior projects, students select a project adviser, propose a tentative topic and title, and submit a proposal to the senior project director. The final product of the senior requirement may be a written essay or an alternative project such as a film, exhibition, catalog, atlas, or historical data reconstruction. In the case of an alternative project, the student must identify a second reader in addition to the adviser before the project is approved by the senior project director. Either the adviser or the second reader must be a member of the faculty in History of Science, Medicine, and Public Health. A written component to the senior project must illustrate sources and the intellectual significance of the project. For more details about requirements and deadlines, majors should consult the HSHM Senior Project Handbook; copies are available from the senior project director and on the program's website.

REQUIREMENTS OF THE MAJOR

Prerequisites None

Number of courses 12 term courses (incl senior req)

Distribution of courses 7 courses in pathway, incl 2 HSHM courses, 1 sem in HSHM or Hist numbered 100 or above, 1 science course, and 3 electives; 3 addtl HSHM electives, incl 1 sem and 1 course outside major pathway

Senior requirement Yearlong project (HSHM 490, 491), or one-term project (HSHM 492) and 1 addtl HSHM elective

FACULTY ASSOCIATED WITH THE PROGRAM OF HISTORY OF SCIENCE, MEDICINE, AND PUBLIC HEALTH

Professors Deborah Coen, Naomi Rogers, John Warner

Associate Professors Paola Bertucci, Joanna Radin, William Rankin

Assistant Professor Carolyn Roberts

Lecturers Sakena Abedin, Rachel Elder, Ivano Dal Prete, Chitra Ramalingam

Affiliated Faculty Rene Almeling (*Sociology*), Toby Appel (*Yale University Library*), Melissa Grafe (*Yale University Library*), Dimitri Gutas (*Near Eastern Languages & Civilizations*), Ann Hanson (*Classics*), Jessica Helfand (*School of Art*), Marcia Inhorn (*Anthropology*), Kathryn James (*Yale University Library*), Amy Kapczynski (*Law School*), Gundula Kreuzer (*Music*), Amy Meyers (*Yale Center for British Art*), Alan Mikhail (*History*), Ayesha Ramachandran (*Comparative Literature*), Paul Sabin (*History*), Jason Schwartz (*School of Medicine*), Gordon Shepherd (*School of Medicine*), Frank Snowden (*History*), Rebecca Tannenbaum (*History*), R. John Williams (*English*)

Courses

HSHM 202a / AMST 247a / FILM 244a / HIST 147a / HLTH 170a, Media and Medicine in Modern America John Warner and Gretchen Berland

Relationships between medicine, health, and the media in the United States from 1870 to the present. The changing role of the media in shaping conceptions of the body, creating new diseases, influencing health and health policy, crafting the image of the medical profession, informing expectations of medicine and constructions of citizenship, and the medicalization of American life. HU

HSHM 207b / AMST 236b / EVST 318b / HIST 199b, American Energy History Paul Sabin

The history of energy in the United States from early hydropower and coal to present-day hydraulic fracturing, deepwater oil, wind, and solar. Topics include energy transitions and technological change; energy and democracy; environmental justice and public health; corporate power and monopoly control; electricity and popular culture; labor struggles; the global quest for oil; changing national energy policies; the climate crisis. HU

HSHM 234b / HIST 471b, Medicine and Health in Society Rachel Elder

The history of Western medical knowledge and practice from antiquity to the present. Focusing on the role of medicine in daily life, this course considers patients and practitioners, various approaches to healing, as well as changing understandings of health, disease, and the body across time and place. HU

* **HSHM 406a / HIST 150Ja, Healthcare for the Urban Poor** Sakena Abedin

Exploration of the institutions, movements, and policies that have attempted to provide healthcare for the urban poor in America from the late nineteenth century to the present, with emphasis on the ideas (about health, cities, neighborhoods, poverty, race, gender, difference, etc) that shaped them. Topics include hospitals, health centers, public health programs, the medical civil rights movement, the women's health movement, and national healthcare policies such as Medicare and Medicaid.

* **HSHM 412b / HIST 429Jb, Laboratory Life** Chitra Ramalingam

The laboratory is the iconic space of modern science, where unruly nature is tamed and controlled, and scientific facts are made. Through historical, ethnographic, and sociological approaches to lab science, this course explores how an obscure, secretive site for managing alchemical labor in medieval Europe became the globally dominant mode of producing universal experimental knowledge across the modern sciences. We consider issues of labor, skill and class; gender and race; pedagogy and the politics of profession; state, industrial, and corporate laboratories; secrecy and openness; place and geography; and the implication of labs in geopolitical webs of power, inequality, and exploitation. Undergraduate enrollment limited to juniors and seniors. WR, HU

* **HSHM 415b / HIST 179Jb, Historical Perspectives on Science and Religion** Ivano Dal Prete

The engagement between science and religion from a historical standpoint and a multicultural perspective. The Islamic, Jewish, Buddhist, and Christian traditions; the roots of modern creationism; salvation expectations and the rise of modern science and technology. General knowledge of western and world history is expected. WR, HU

* **HSHM 416a / HIST 414Ja, Engineering the Modern Body** Rachel Elder

Exploring the human body in relationship to technology and the larger cultural processes of industrialization, medicalization, and most recently, the digital age. From Victorians who sought restoration from illness with electric belts, to the popularization of cosmetic surgery and gene therapy after World War II, students examine how the body became a canvas for a variety of personal, civic, and national goals. HU

* **HSHM 432b / ER&M 360b / HLTH 370b / SOCY 390b / WGSS 390b, Politics of Reproduction** Rene Almeling

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

* **HSHM 438b / HIST 473Jb, The Neurological Condition** Rachel Elder

Exploration of how science, medicine, and technology have shaped understanding the brain and nervous system as the center of human identity. Consideration of the theories of diminishing “nerve force,” the electric cures of the Victorian era, fMRIs, and the current Century of the Brain research. Topics include the rise of professional neurology and neuroscience, cultural meanings of nerves and the brain, and the intimate role of patients and human subjects in formulating this science from the nineteenth century to the present. WR, HU

* **HSHM 445a / HIST 142Ja / WGSS 453a, Women and Medicine in America from the Colonial Era to the Present** Naomi Rogers

American women from the colonial era to the present as midwives, patients, healers, reformers, revolutionaries, innovators, and entrepreneurs. Ways that women have shaped American health care and medical research. WR, HU

* **HSHM 468a / HIST 260Ja, Sex, Life, and Generation** Ivano Dal Prete

Theories and practices of life, sex, and generation in Western civilization. Politics and policies of conception and birth; social control of abortion and infanticide in premodern societies; theories of life and gender; the changing status of the embryo; the lure of artificial life. HU

* **HSHM 471a or b, Directed Reading** Ivano Dal Prete

Readings directed by members of the faculty on topics in the history of science, medicine, or public health not covered by regular course offerings. Subjects depend on the interests of students and faculty. Weekly conferences; required papers.

* **HSHM 479b / EVST 368b / HIST 491Jb / RLST 368b, The History of the Earth from Noah to Darwin** Ivano Dal Prete

Young earth creationism and flood geology have long been among the most divisive features of American culture and politics. Yet a basic postulate is shared across the spectrum: for better or worse, the old age of the Earth is regarded as the recent product of a secular science, consistently rejected by traditional Christianity. This seminar challenges this long-established narrative, by uncovering the surprising boldness, complexity, and societal diffusion of pre-modern debates on the history of the Earth, and of humankind itself. Students have opportunity to explore the nature, assumptions, and methods of Earth sciences before the advent of modern geology,

to question ingrained assumptions about their relation to religion and society, and to place outstanding issues into historical perspective. How have the great monotheistic religions dealt with the possibility of an ancient Earth? Was a young creation always important in traditional Christianity? If not, what led to the emergence of young Earth creationism as a force to be reckoned with? What are the intellectual roots of American preadamism, which claims that the black and white races were created at different times and do not descend from the same ancestor? These and other questions are addressed not only through scholarly literature in the field, but also with the analysis of literary, visual, and material sources available on campus. WR, HU

* **HSHM 481a / AFAM 213a / HIST 383Ja, Medicine and Race in the Slave Trade**
Carolyn Roberts

Examination of the interconnected histories of medicine and race in the slave trade. Topics include the medical geography of the slave trade from slave prisons in West Africa to slave ships; slave trade drugs and forced drug consumption; mental and physical illnesses and their treatments; gender and the body; British and West African medicine and medical knowledge in the slave trade; eighteenth-century theories of racial difference and disease; medical violence and medical ethics. WR, HU

* **HSHM 483b, Health, Disease, and Racial Difference in Modern America** Sakena Abedin

Exploration of the meanings attributed to black-white differences in health from the late-nineteenth century to the present with an emphasis on the mutual construction of race and health/disease. Topics include specific diseases, (cancer, heart disease, tuberculosis, HIV) as well as health activism, 'health disparities' research, and genomics. HU

* **HSHM 487a / HIST 479Ja, Disability, Science, and Society** Rachel Elder

Science and disability are inextricably linked. Since at least the nineteenth century, medical science and technology have helped to define disability as a 'problem' in need of intervention rather than as the product of increasingly stringent social norms. The medical gaze, systems of quantification, rubrics of 'normality,' eugenics, intelligence testing—each of these tools of science have reinforced hierarchies of difference while devaluing the experiences of persons with non-conforming bodies and brains. In this course we explore this fairly recent history, focusing on the experiences of people with a range of disabilities through the prism of modern science, medicine, and technology. From prosthetic limbs to neuro-enhancing drugs, we examine how nineteenth and twentieth century sciences have shaped definitions and experiences of disability. Course topics include the nineteenth-century 'invention' of disability, medicalization and eugenics, access and infrastructure, social versus medical models of disability, notions of control and able-bodiedness, and the rise of disability activism in the final quarter of the twentieth century. HU

* **HSHM 490a or b and HSHM 491a or b, Yearlong Senior Project** Carolyn Roberts

Preparation of a yearlong senior project under the supervision of a member of the faculty. There will be a mandatory meeting at the beginning of the term for students who have chosen the yearlong senior project; students will be notified of the time and location by e-mail before classes begin. Majors planning to begin their projects who do not receive this notice should contact the senior project director. Students expecting to graduate in May enroll in HSHM 490 during the fall term and complete their projects in HSHM 491 in the spring term. December graduates enroll in HSHM 490 in the

spring term and complete their projects in HSHM 491 during the following fall term. Majors planning to begin their projects in the spring term should notify the senior project director by the last day of classes in the fall term. Students must meet progress requirements by specific deadlines throughout the first term to receive a temporary grade of SAT for HSHM 490, which will be changed to the grade received by the project upon the project's completion. Failure to meet any requirement may result in the student's being asked to withdraw from HSHM 490. For details about project requirements and deadlines, consult the HSHM Senior Project Handbook. Students enrolled in HSHM 491 must submit a completed project to 211 HGS no later than 5 p.m. on April 6, 2018, in the spring term, or no later than 5 p.m. on December 1, 2017, in the fall term. Projects submitted after 5 p.m. on the due date without an excuse from the student's residential college dean will be subject to grade penalties. Credit for HSHM 490 only on completion of HSHM 491.

*** HSHM 492a or b, One-Term Senior Project** Carolyn Roberts

Preparation of a one-term senior project under the supervision of an HSHM faculty member, or of an affiliated faculty member with approval of the director of undergraduate studies. There will be a mandatory meeting at the beginning of the term for students who have chosen the one-term senior project; students will be notified of the time and location by e-mail before classes begin. Majors planning to begin their projects who do not receive this notice should contact the senior project director. Students expecting to graduate in May enroll in HSHM 492 during the fall term. December graduates enroll in HSHM 492 in the preceding spring term. Students planning to begin their project in the spring should notify the senior essay director by the last day of classes in the fall term. Majors must submit a completed Statement of Intention form signed by the faculty member who has agreed to supervise the project to the HSHM administrator in 207 HGS no later than September 15, 2017 (HSHM 492a), or January 19, 2018 (HSHM 492b). Blank statement forms are available in 207 HGS and in the HSHM Senior Project Handbook. Students enrolled in HSHM 492 must submit a completed senior project to 211 HGS no later than 5 p.m. on December 8, 2017, in the fall term, or no later than 5 p.m. on May 4, 2018, in the spring term. Projects submitted after 5 p.m. on the due date without an excuse from the student's residential college dean will be subject to grade penalties.

Human Rights Studies

Program director: James Silk, L39 SLB, 432-1729,
humanrights.program@yale.edu; humanrights.yale.edu

ADVISORY COMMITTEE FOR THE MULTIDISCIPLINARY ACADEMIC PROGRAM IN HUMAN RIGHTS STUDIES

Seyla Benhabib (*Political Science, Philosophy*), Ned Blackhawk (*History*), Amity Doolittle (*Environmental Studies*), Crystal Feimster (*African American Studies, American Studies*), Moira Fradinger (*Comparative Literature*), Inderpal Grewal (*Women's, Gender, & Sexuality Studies*), Benedict Kiernan (*History*), Louisa Lombard (*Anthropology*), Hope Metcalf (*Law School*), Alice Miller (*Law School, Public Health*), Jill Richards (*English*), Thania Sanchez (*Political Science*), James Silk (*Law School*), David Simon (*Political Science*), Elisabeth Wood (*Political Science*), Jonathan Wyrzzen (*Sociology*)

The Multidisciplinary Academic Program in Human Rights Studies presents human rights as a rich and interdisciplinary field of study. The program provides students with the analytical, conceptual, and practical skills necessary for human rights study; connects students to affiliate faculty and peers; supports student research projects and internships; and offers career guidance in the field.

Students apply to the Multidisciplinary Academic Program in Human Rights Studies during the fall term of the sophomore year. They also complete the requirements of a Yale College major. Yale College does not offer a major in human rights.

To fulfill the requirements of the program, students complete a gateway course (HMRT 100), four electives, and a capstone project. The gateway course equips students with the theoretical tools necessary for studying human rights, their evolution, and their justification. It introduces a number of contemporary issues such as gender disparities, racial discrimination, climate change, global health, human trafficking, refugees, world poverty, and humanitarian intervention. Students select four electives from a list of eligible courses provided at the start of each term. A capstone project, informed by extracurricular experience, is developed in consultation with the program director. Additional information is available at the Human Rights Website.

Courses

HMRT 100b / PLSC 148b, Theories, Practices, and Politics of Human Rights Thania Sanchez

Introduction to core human-rights issues, ideas, practices, and controversies. The concept of human rights as a philosophical construct, a legal instrument, a political tool, an approach to economic and equity issues, a social agenda, and an international locus of contestation and legitimation. Required for students in the Multidisciplinary Academic Program in Human Rights. SO

* **HMRT 400a, Advanced Human Rights Colloquium** Staff

This course is the culminating seminar for Yale College seniors in the Multidisciplinary Academic Program in Human Rights (Human Rights Scholars). The goal of the colloquium is to help students conceive and produce a meaningful capstone project as a culmination of their work in the program. It is a singular opportunity for students

to pursue in-depth research in human rights. Open only to Human Rights Scholars in their senior year and a requirement for completing the program.

Humanities

Director of undergraduate studies: Norma Thompson, Whitney Humanities Center, 53 Wall St., 432-1313, norma.thompson@yale.edu; chair: Bryan Garsten, 53 Wall St., 432-0670, bryan.garsten@yale.edu; humanities.yale.edu

The undergraduate program in Humanities provides students the opportunity to integrate courses from across the humanistic disciplines into intellectually coherent and personally meaningful courses of study. Works of literature, music, history, philosophy, and the visual arts are brought into conversation with one another and with the history of ideas.

The major in Humanities asks students to begin with broad surveys of foundational works in at least two different cultural traditions, including at least one course on classical Western European texts. All majors take two specially-commissioned core seminars, each co-taught by two faculty members from different, but complementary fields of study. After taking these core seminars, students in the major share a broad grounding in several cultural traditions, the experience of having grappled with the question of what "modernity" is, and the experience of having spent a term interpreting a single work (or small corpus of works) in great depth. Students then craft an area of concentration according to their interests and with the help of appropriate faculty members. The major offers breadth and interdisciplinary scope even as it encourages depth and intellectual coherence.

COURSES FOR NONMAJORS

Students in all classes can find options in the varied course offerings, from special seminars for first-year students to the Franke and Shulman Seminars for seniors. Many courses are open to nonmajors.

REQUIREMENTS OF THE MAJOR

Fourteen term courses are required for the major, including three "foundational works" surveys, two core seminars, one course in each of four areas of study in the humanities (which may include the Franke and Shulman Seminars), four additional electives selected to complement the student's area of concentration (with approval of the director of undergraduate studies), and a one- or two-term senior essay. Majors in Humanities are strongly encouraged to enroll in at least one term course in literature in a foreign language.

Foundations Three broad surveys of foundational works in any cultural tradition are required, such as HIST 280, EALL 200, or RLST 189. One or two foundations courses must be in the classical tradition of Western Europe, such as Directed Studies, or ENGL 129 or CLCV 256.

Core seminars The major requires two core seminars, one in "Modernities" and one in "Interpretations." Each core seminar is taught by a pair of faculty members from complementary disciplines. The two broad themes of the seminars remain consistent from year to year, but the material studied and the faculty members teaching change, allowing each class of students to explore the themes in different ways.

Areas of study in the humanities One course is required in each of four areas: literature; visual, musical, or dramatic arts; science in the humanities; and intellectual

history and historical analysis. Courses may be drawn from any department or program in Yale College, with the approval of the DUS.

SENIOR REQUIREMENT

A one- or two-term senior essay is required of each Humanities major (HUMS 491).

ADVISING

Students are expected to declare their intent to major in Humanities in a meeting with the DUS before their junior year.

UNIQUE TO THE MAJOR

The Franke Seminar and the Shulman Seminar Sponsored by the Whitney Humanities Center and designed to speak across disciplinary lines to broad public and intellectual issues, the Franke Seminar and the Shulman Seminar each include a series of coordinated public lectures. The seminars are for enrolled students; the lecture series are open to the Yale and local communities. Humanities majors may enroll in a Franke or a Shulman Seminar with permission of the DUS and the instructor.

Summer program in Rome Humanities majors who take the spring-term course HUMS 444, *The City of Rome*, (or its equivalent, with instructor approval) and develop individual research topics to be pursued in Rome may apply for enrollment in a two-credit summer course offered by Yale Summer Session. Museums, archaeological sites, churches, piazzas, libraries, and the city itself are part of the classroom for the summer course. Further information is available on the Humanities program website and the Yale Summer Session Website.

REQUIREMENTS OF THE MAJOR

Prerequisites None

Number of courses 14 term courses (incl senior essay)

Distribution of courses 3 foundations courses; 2 core sems, as specified; 1 course in each of 4 disciplinary areas; 4 electives in concentration

Senior requirement Senior essay (HUMS 491)

FACULTY ASSOCIATED WITH THE PROGRAM OF HUMANITIES

Professors Jeffrey Alexander (*Sociology*), R. Howard Bloch (*French*), Harold Bloom (*Humanities*), Edyta Bojanowska (Slavic Languages & Literatures), Leslie Brisman (*English*), David Bromwich (*English*), Rüdiger Campe (*German*), Hazel Carby (African American Studies, American Studies), Francesco Casetti (*Humanities*), Deborah Coen (*History of Science and Medicine, History*), Stephen Davis (*Religious Studies, History*), Wai Chee Dimock (*English*), Carlos Eire (*History, Religious Studies*), Benjamin Foster (*Near Eastern Languages & Civilizations*), Paul Freedman (*History*), Kirk Freudenburg (*Classics*), Johanna Fridriksdottir (Humanities), Paul Fry (*English*), Bryan Garsten (*Political Science*), Marie-Helen Girard (*French*), Phyllis Granoff (*Religious Studies*), Emily Greenwood (*Classics*), David Grewal (*School of Law, Political Science*), Inderpal Grewal (Women's, Gender, and Sexuality Studies, American Studies), Frank Griffel (*Religious Studies*), Christine Hayes (*Religious Studies, Judaic Studies*), Edward Kamens (*East Asian Languages & Literatures*), Alice Kaplan (*French*), Anthony Kronman (*School of Law*), Tina Lu (*East Asian Languages & Literatures*), Ivan Marcus (*History, Religious Studies*), Stefanie Markovits (*English*), Giuseppe Mazzotta (*Italian*), Samuel Moyn (*History, School of Law*), Paul North (*German*), John Durham Peters (*English, Film*)

& Media Studies), Brigitte Peucker (*German*), Steven Pincus (*History*), Pierre Saint-Amand (*French*), Maurice Samuels (*French*), William Sledge (*Psychiatry*), Steven Smith (*Political Science, Philosophy*), Nicola Suthor (*History of Art*), Gary Tomlinson (*Music, Humanities*), Shawkat Toorawa (*Near Eastern Languages and Civilizations*), Francesca Trivellato (*History*), Katie Trumpener (*Comparative Literature*), Jing Tsu (*East Asian Languages & Literatures*), Miroslav Volf (*Divinity School*), Anders Winroth (*History*), Ruth Yeazell (*English*)

Associate Professors Paola Bertucci (*History, History of Science, Medicine, and Public Health*), Toni Dorfman (*Adjunct*) (*Theater Studies*), Moira Fradinger (*Comparative Literature*), Milette Gaifman (*History of Art and Classics*), Martin Hägglund (*Comparative Literature, Humanities*), Jacqueline Jung (*History of Art*), Pauline LeVen (*Classics*), Karuna Mantena (*Political Science*), Marci Shore (*History*), Kirk Wetters (*German*)

Assistant Professors Rebekah Ahrendt (*Music*), Marisa Bass (*History of Art*), Lucas Bender (*East Asian Languages and Literatures, Humanities*), Marijeta Bozovic (*Slavic Languages & Literatures*), Molly Brunson (*Slavic Languages & Literatures*), Thomas C. Connolly (*French*), Emily Erikson (*Sociology*), Marta Figlerowicz (*Comparative Literature, English*), Seth Jacobowitz (*East Asian Languages and Literatures*), Isaac Nakhimovsky (*History*), Joseph North (*English*), Christiana Purdy Moudarres (*Italian*), Ayesha Ramachandran (*Comparative Literature*), Christopher Semk (*French*), Katrin Truedstedt (*German*)

Senior Lecturers Peter Cole (*Judaic Studies*), Charles Hill (*Humanities*), William Klein (*Humanities*), Pauline Lin (*East Asian Languages & Literatures*), Stuart Semmel (*History, Humanities*), Kathryn Slanski (*Humanities, Near Eastern Languages & Civilizations*), Norma Thompson (*Humanities*)

Lecturers Maria Baffi (*Humanities, Spanish & Portuguese*), Karla Britton (*Divinity School*), Drew Collins (*School of Divinity*), Matthew Croasmun (*Divinity School*), Igor De Souza (*English*), Jonathan Fine (*Humanities*), Karen Foster (*Near Eastern Languages & Civilizations*), Joseph Gordon (*English*), Angela Gorrell (*Center for Faith and Culture*), Virginia Jewiss (*Humanities*), Katja Lindskog (*English*), Camille Lizarribar (*Humanities*), Judith Malafronte (*Music*), Giulia Oskian (*Humanities*), Karin Roffman (*Humanities, English*), Francey Russell (*Humanities*), Adam Stern (*Humanities*), George Syrimis (*Hellenic Studies*), Adam Van Doren (*Undergraduate Education*)

Seminars for First Years

Directed Studies (p. 241) is an interdisciplinary introduction to influential texts that have shaped Western civilization.

* HUMS 071a, **Intellectual Circles** Charles Hill

Study of the creative interactions produced by informal associations of innovative minds in literature, philosophy, politics, science, psychology, the arts, war, and law. Courtiers, advisors, disciples, and disputers around Confucius, Socrates, Lincoln, Freud, Wittgenstein, and Niebuhr are among the circles considered. Groups include American Founders, quantum physicists, computer scientists, Gertrude Stein's "Lost

Generation” of Americans in Paris, “The Georgetown Set” of Cold War friends and rivals, and the Supreme Court. HU

* **HUMS 072b / ENGL 023b, Reading Recent North American Short Fiction** Joseph Gordon

The short story is generally considered to be North American in origin. As one of its goals, the course examines the ways in which the genre has developed in recent decades into a vehicle for storytelling from marginalized or subaltern voices such as those of people of color, women, LGBT people, immigrants and refugees, war veterans, students, and children. The course also explores how collections of stories gathered by a single author may resemble but yet be distinguishable from novels, and examines some very recent short stories that are influenced by nontraditional forms of imaginative writing, such as graphic fiction, self-help manuals, and social media. Authors are likely to include: Grace Paley, Alice Munro, Raymond Carver, Rohinton Mistry, ZZ Packer, Sherman Alexie, Tao Lin, Jhumpa Lahiri, Edward P. Jones, Elizabeth Strout, Junot Diaz, Phil Klay, Viet Thanh Nguyen, Alison Bechdel, Lorrie Moore, Jennifer Egan, and Teju Cole. Enrollment limited to first-year students. Preregistration required; see under First-Year Seminar Program. WR, HU

* **HUMS 075a, Mastering the Art of Watercolor** Adam Van Doren

An introductory course on the art of watercolor as a humanistic discipline within the liberal arts tradition. Readings, discussions, and studio work emphasize critical, creative thinking through a tactile, “learning by doing” study of the watercolor medium. Students analyze and imitate the classic techniques of J. M.W. Turner, John Singer Sargent, Georgia O’Keeffe, and Edward Hopper, among others. Studio components include painting *en plein air* to understand color, form, perspective, composition, and shade and shadow. Basic drawing skills recommended. Enrollment limited to first-year students. Preregistration required; see under First-Year Seminar Program. HU RP

* **HUMS 077a / NELC 003a, Medieval Travel and Exploration** Shawkat Toorawa
Introduction to the motivations for travel and exploration in the Middle Ages. For adventure, for commerce, on pilgrimage, and for conquest, travelers include Christian, Jewish, and Muslim merchants, ambassadors, scholars, geographers, explorers, sailors, and soldiers. All material in English translation. Enrollment limited to freshmen. Preregistration required; see under Freshman Seminar Program. HU

* **HUMS 078b, Shakespeare and Music** Judith Malafrente

The use of music in Shakespeare’s plays, from the original stagings and seventeenth-century adaptations to modern productions. Consideration of operatic versions of the plays from the nineteenth, twentieth, and twenty-first centuries. Includes a field trip to New York City. Enrollment limited to first-year students. Preregistration required; see under First-Year Seminar Program. HU

* **HUMS 080a, Transforming Literature into Opera** Judith Malafrente

Examination of ten operatic masterpieces and their literary source material, with consideration of the roles of the composer and the librettist in fashioning poems, short stories, and plays into operatic works. Enrollment limited to first-year students. Preregistration required; see under First-Year Seminar Program. HU

* **HUMS 090b / HIST 089b, Thinking about History** Stuart Semmel

An introduction to the discipline of history. Exploration of influential historical narratives; the philosophy of history; the emergence of historical subdisciplines

including history from below, microhistory, the new cultural history, and Big History; and interdisciplinary engagement with anthropology, literary criticism, art history, and psychology. Enrollment limited to first-year students. Preregistration required; see under First-Year Seminar Program. WR, HU

* **HUMS 092b / RLST 012b, Divine Law in Historical Perspective** Christine Hayes
Exploration of the divergent notions of divine law in Greco-Roman antiquity and biblical Israel; the cognitive dissonance their historical encounter engendered and attempts by Jewish, Christian, and contemporary secular thinkers to negotiate competing claims. Topics include: debates over the attributes and nature of divine law versus human law; the grounds of divine law's authority; law as a religious expression versus law as debasement of the divine-human relationship; the impact of divine law debates on secular legal theory. Enrollment limited to first-year students. Preregistration required; see under First-Year Seminar Program. HU

Core Seminars

* **HUMS 409a / FREN 403a / LITR 224a, Proust Interpretations: Reading *Remembrance of Things Past*** R. Howard Bloch and Pierre Saint-Amand
A close reading (in English) of Marcel Proust's masterpiece, *Remembrance of Things Past*, with emphasis upon major themes: time and memory, desire and jealousy, social life and artistic experience, sexual identity and personal authenticity, class and nation. Portions from *Swann's Way*, *Within a Budding Grove*, *Cities of the Plain*, *Time Regained* considered from biographical, psychological/psychoanalytic, gender, sociological, historical, and philosophical perspectives. WR, HU

* **HUMS 410a / ENGL 262a / HIST 262Ja, Modernities: Nineteenth-Century Historical Narratives** Stefanie Markovits and Stuart Semmel
British historical narratives in the nineteenth century, an age often cited as the crucible of modern historical consciousness. How a period of industrialization and democratization grounded itself in imagined pasts – whether recent or distant, domestic or foreign – in both historical novels and works by historians who presented programmatic statements about the nature of historical development. WR, HU

Humanities Electives

* **HUMS 130a / LITR 130a, How to Read** Katie Trumpener
Introduction to techniques, strategies, and practices of reading through study of lyric poems, narrative texts, plays and performances, films, new and old, from a range of times and places. Emphasis on practical strategies of discerning and making meaning, as well as theories of literature, and contextualizing particular readings. Topics include form and genre, literary voice and the book as a material object, evaluating translations, and how literary strategies can be extended to read film, mass media, and popular culture. Junior seminar; preference given to juniors and majors. HU

* **HUMS 139a, Old Norse Mythology** Johanna Fridriksdottir
The Norse mythological world from creation to its terrifying end in Ragnarök. This course explores the myths, religious beliefs, and social values of the Vikings and other people in pre-Christian Scandinavia, as well as the image and reception of this mythology in later times. The properties and functions of Odin, Thor, Loki, Freyja, and other deities studied through written and visual sources. HU

*** HUMS 142b / LITR 184b / WGSS 146b, Women and the Supernatural in Medieval Literature** Johanna Fridriksdottir

Study of medieval texts from a wide geographic and chronological range, all of which prominently feature female characters that exhibit supernatural features or practice magic. Narratives about fairies, witches, hags, and monstrous women analyzed in order to explore intersections of gender and sexuality, Otherness, ethics, violence, fantasy, and related themes in medieval culture. HU

HUMS 143a / CLCV 205a / HIST 205a, Introduction to Ancient Greek History Staff

An introductory course in Greek history tracing the development of Greek civilization as manifested in political, intellectual, and creative achievements from the Bronze Age to the end of the classical period. Students read original sources in translation as well as the works of modern scholars. HU

HUMS 144a / CLCV 206a / HIST 217a, The Roman Republic Staff

The origins, development, and expansion of Rome from the earliest times to the deaths of Caesar and Cicero. Cultural identity and interaction; slavery, class, and the family; politics, rhetoric, and propaganda; religion; imperialism; monumentality and memory; and the perception and writing of history. Application of literary and archaeological evidence. HU

*** HUMS 150a, Shakespeare and the Canon: Histories, Comedies, and Poems** Harold Bloom

A reading of Shakespeare's histories, comedies, and poems, with an emphasis on their originality in regard to tradition and their influence on Western representation since the seventeenth century. Secondary readings included. HU

*** HUMS 151b, Shakespeare and the Canon: Tragedies and Romances** Harold Bloom

A reading of Shakespeare's tragedies and romances, with an emphasis on their originality in regard to tradition: *Hamlet*, *Othello*, *King Lear*, *Macbeth*, and *Antony and Cleopatra*, *The Winter's Tale*, and *The Tempest*. HU

*** HUMS 152a, Poetic Influence from Shakespeare to Keats** Harold Bloom

The complexities of poetic influence in the traditions of the English language, from Shakespeare to Keats. HU

*** HUMS 153b, Poetic Influence from Shakespeare to Hart Crane** Harold Bloom

The complexities of poetic influence in the tradition of the English language. Works by Shakespeare, Milton, Wordsworth, Shelley, Keats, Tennyson, Robert Browning, and Yeats, followed by an American sequence of Whitman, Dickinson, Wallace Stevens, and Hart Crane. HU

*** HUMS 178b / THST 388b, Revenge Tragedy and Moral Ambiguity** Toni Dorfman

A study of plays and films variously construed as revenge tragedy that raise aesthetic and ethical issues, including genre, retribution, "just wars," public vs. private justice, and the possibility of resolution. How questions of crime, punishment, and justice have been posed in drama, from classical Greece through the twentieth century. HU

HUMS 180a / ITAL 310a / LITR 183a, 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. No knowledge of Italian required. Course conducted in English. HU

* **HUMS 184b, Experiments in Twentieth-Century Literary Biography** Karin Roffman

The history and practice of literary biography explored through groundbreaking experiments in form and theory. Ethics and responsibilities in the shifting relationship between biographer and subject. Complexities in research and writing, including multiple perspectives on the same event, contradictory archival evidence, and conflicting narrative truth. Focus on modern biographies and recent novels that examine the process of writing a life. HU

* **HUMS 193b / HIST 265Jb, Screening the Past** Stuart Semmel

An interdisciplinary study of cinematic representations of the historical past. Films that treat historical events realistically; others that deliberately present history as it did not happen. Standards that can be applied to judge history on the screen; lessons for evaluating history on the page. HU

HUMS 201a / FREN 240a / LITR 214a, The Modern French Novel Maurice Samuels and Alice Kaplan

A survey of major French novels, considering style and story, literary and intellectual movements, and historical contexts. Writers include Balzac, Flaubert, Proust, Camus, and Sartre. Readings in translation. One section conducted in French. HU TR

* **HUMS 203b / JDST 358b / WGSS 210b, Feminism and Judaism** Igor De Souza

The impact of feminism in three key areas of contemporary Jewish life: religion, Zionism, and identity. The critique of Zionism, in a trend known as post-Zionism, from feminist lenses. Feminism and Zionism in the construction of sexualized and racialized Jewish identities (LGBT Jews/Jews of color).

* **HUMS 205a, Boundaries of the Body in Law and Literature** Staff

The representation of the human body in law and literature. Bodies as physical structures that inhabit multiple realms, including material, cultural, historical, and symbolic. Ways in which humans think about and give meaning to their bodies in relationship to themselves and to others. Additional sources include film, television, and journalism. WR, HU

* **HUMS 228a / EVST 228a / HIST 459Ja / LITR 345a, Climate Change and the Humanities** Katja Lindskog

What can the Humanities tell us about climate change? The Humanities help us to better understand the relationship between everyday individual experience, and our rapidly changing natural world. To that end, students read literary, political, historical, and religious texts to better understand how individuals both depend on, and struggle against, the natural environment in order to survive. HU

* **HUMS 247b / SOCY 352b, Material Culture and Iconic Consciousness** Jeffrey Alexander

How and why contemporary societies continue to symbolize sacred and profane meanings, investing these meanings with materiality and shaping them aesthetically. Exploration of "iconic consciousness" in theoretical terms (philosophy, sociology, semiotics) and further exploration of compelling empirical studies about food and

bodies, nature, fashion, celebrities, popular culture, art, architecture, branding, and politics. HU, SO

* **HUMS 250b / CPLT 562 / GMAN 422b / GMAN 654 / LITR 439b / PHIL 476b, Living Form: Organicism in Society and Aesthetics** Staff

Starting with Kant, the organic is defined as a processual relation of the part and the whole, thereby providing a new model of the individual as a self-contained totality. Students explore the implications of this conception in Goethe's writings on morphology (*The Metamorphosis of Plants*, "Orphic Primal Words"), the Romantics' *Athenaeum*, Hanslick's *On the Beautiful in Music*, Oswald Spengler's cultural morphology, the concept of autopoiesis in Maturana and Varela, Luhmann's systems theory, and Canguilhem's critique of the analogy of organic life and society. HU TR

* **HUMS 252a / AMST 346a / ENGL 235a, Poetry and Objects** Karin Roffman

This course on 20th and 21st century poetry studies the non-symbolic use of familiar objects in poems. We meet alternating weeks in the Beinecke library archives and the Yale Art Gallery objects study classroom to discover literary, material, and biographical histories of poems and objects. Additionally, there are scheduled readings and discussions with contemporary poets. Assignments include both analytical essays and the creation of online exhibitions. WR, HU

* **HUMS 253a / ENGL 346a / RLST 233a, Poetry and Faith** Christian Wiman

Issues of faith examined through poetry, with a focus on modern Christian poems from 1850 to the present. Some attention to poems from other faith traditions, as well as to secular and antireligious poetry. HU

* **HUMS 268a / RLST 274a, Analyzing Antisemitism** Adam Stern

Analysis of the "longest hatred" from a historical as well as theoretical point of view; and the development of antisemitism and key manifestations from the ancient world to the present moment. Topics include how hatred of Jews relates to other forms of bigotry and prejudice; how antisemitism mutates in different times and places; antisemitism before the modern period; why antisemitism exists in countries that have no Jews; why antisemitism is once again on the rise around the world and how it can be combated.

* **HUMS 269a / EALL 230a, Poetry and Ethics Amidst Imperial Collapse** Lucas Bender

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

HUMS 270a / CHNS 200 / EALL 200a, The Chinese Tradition Tina Lu and Yongtao Zhang

An introduction to the literature, culture, and thought of premodern China, from the beginnings of the written record to the turn of the twentieth century. Close study of textual and visual primary sources, with attention to their historical and cultural backdrops. Students enrolled in CHNS 200 join a weekly Mandarin-language discussion section. No knowledge of Chinese required for students enrolled in EALL 200. Students enrolled in CHNS 200 must have L5 proficiency in Mandarin or permission of the course instructor. HU TR

* **HUMS 272b / EALL 256b / EAST 358b / GLBL 251b / LITR 265b, China in the World** Jing Tsu

Recent headlines about China in the world, deciphered in both modern and historical contexts. Interpretation of new events and diverse texts through transnational connections. Topics include China and Africa, Mandarinization, labor and migration, Chinese America, nationalism and humiliation, and art and counterfeit. Readings and discussion in English. HU

* **HUMS 276b / PHIL 366b, The Concept of Recognition** Francey Russell

This course introduces students to canonical figures in the history of philosophy as well as ongoing contemporary philosophical debates. Students analyze the moral, political, and existential significance of *recognition*. What is the normative difference between cognizing an object and recognizing another subject? What is the ethical and political significance of being recognized *as* a moral subject by a moral equal? What are the ethical and political risks of this kind of relationship? We study Enlightenment figures Rousseau, Kant, Fichte, and Hegel, before turning to the contemporary reception of this tradition of thought, including critic, to include Jean-Paul Sartre, Frantz Fanon, Axel Honneth, Nancy Fraser, and Judith Butler. To conclude, we may explore the idea of "aesthetic recognition:" is the way we relate to works of art anything like the way we relate to persons? Prerequisite: one philosophy course. WR, HU TR

* **HUMS 290a / EALL 286a / LITR 285a / PORT 360a, The Modern Novel in Brazil and Japan** Seth Jacobowitz

Brazilian and Japanese novels from the late nineteenth century to the present. Representative texts from major authors are read in pairs to explore their commonalities and divergences. Topics include nineteenth-century realism and naturalism, the rise of mass culture and the avant-garde, and existentialism and postmodernism. No knowledge of Portuguese or Japanese required. HU TR

* **HUMS 295b, Trials of Uncertainty** Norma Thompson

Is the demise of the trial at hand? The trial as cultural achievement, considered as the *epitome* of humanistic inquiry, where all is brought to bear on a crucial matter in an uncertain context. Truth may be hammered out or remain elusive, but the expectation in the court case has been that the adversarial mode works best for sorting out evidentiary conundrums. Inquiries into issues of meaning of the trial, its impartiality, and challenges to its endurability. The role of character, doubt, and diagnosis explored in Sophocles, Plato, Cicero, Burke, Jane Austen, Tocqueville, and Kafka, as well as in twentieth-century trials, films, documentaries, and twenty-first-century medical narratives. HU TR

* **HUMS 310b, Aristotelian Statecraft** Charles Hill

Connections between working practices and governance from Aristotle to Aquinas to Arendt. Statecraft as a practical art to be understood and informed by the structures and methods of agriculture, navigation, fishing, hunting, cooking, mountaineering, flying, athletics, and shipbuilding. Ways in which actions produce ideas transferable to such matters of statecraft as law and diplomacy. HU

* **HUMS 316b, World Order in Liberal Arts** Charles Hill

International security as humanity's primary problem beyond policy methodologies. America's unique place for and against world order seen in classical literature and

intellectual forays into Japan, Africa, Palestine, Persia, etc. Kissinger Papers at Yale provide case studies. HU

* **HUMS 325a / EP&E 401a / RLST 370a, Law, Morality, and Religion** Andrew Forsyth

The relationship—if any—between law, morality, and religion. Topics include the twentieth-century jurisprudential debate on law and morality; debates on law’s relationship to reason and will, flourishing and restraint, in the “Western” tradition from antiquity to early modernity; and the U.S. Constitution and debates over free exercise and establishment of religion. HU

* **HUMS 353a / GMAN 371a / LITR 442a, Kafka and the Philosophers** Rüdiger Campe

The notion of the “Kafkaesque” is testimony to the exceptional place and impact of Kafka’s work and writing in world literature. In fact, Kafka has not only been extensively imitated by other writers and read by literary critics but his narratives and novels became the place of intense engagement by philosophers. More often than not, Kafka is not just another example for a theoretical concept but offers the possibility for new concepts or even requires new ways of thinking. An introduction into Kafka’s world of writing is offered by the reading of pieces from his early work (*Description of a Struggle*), the novel *The Trial* (with Orson Welles’s movie), and the late narrative *Josephine, the Singer*. The philosophers to read on Kafka (and in their own context) are Albert Camus, Walter Benjamin, Theodor W. Adorno, Maurice Blanchot, Gilles Deleuze, Jacques Derrida, Claudio Agamben, and, in conjunction with Kafka, Stanley Cavell and Richard Rorty. HU TR

* **HUMS 411b, Life Worth Living** Staff

Comparative exploration of the shape of the life advocated by several of the world’s normative traditions, both religious and nonreligious. Concrete instantiations of these traditions explored through contemporary exemplars drawn from outside the professional religious or philosophical spheres. Readings from the founding texts of Buddhism, Judaism, Christianity, Islam, Marxism, and utilitarianism. Admission by application. HU

* **HUMS 427a / ENGL 456a / JDST 316a / LITR 348a, The Practice of Literary Translation** Robyn Creswell

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). HU

HUMS 438b / NELC 101b, Origins of Western Civilization: The Near East from Alexander to Muhammad Benjamin Foster

Cultural and historical survey of Hellenistic, eastern Roman, Parthian, Byzantine, and Sassanian empires in the Near East. Emphasis on mutual influences of Near Eastern and classical worlds, the rise of Christianity and Islam in Near Eastern contexts, and the division of East and West between conflicting ideas of unity. HU

* **HUMS 443a / HIST 232Ja / JDST 270a / MMES 342a / RLST 201a, Medieval Jews, Christians, and Muslims In Conversation** Ivan Marcus

How members of Jewish, Christian, and Muslim communities thought of and interacted with members of the other two cultures during the Middle Ages. Cultural

grids and expectations each imposed on the other; the rhetoric of otherness – humans or devils, purity or impurity, and animal imagery; and models of religious community and power in dealing with the other when confronted with cultural differences. Counts toward either European or Middle Eastern distributional credit within the History major, upon application to the director of undergraduate studies. WR, HU RP

* **HUMS 444b, The City of Rome** Virginia Jewiss

An interdisciplinary study of Rome from its legendary origins through its evolving presence at the crossroads of Europe and the world. Exploration of the city's rich interweaving of history, theology, literature, philosophy, and the arts in significant moments of Roman and world history. HU

The Franke Seminars

* **HUMS 445a / GMAN 227 / LITR 330a or b / PHIL 402, Heidegger's Being and Time**
Martin Hägglund

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

* **HUMS 448b / AFAM 476 / WGSS 480, Race & Caste** Hazel Carby and Inderpal Grewal

The seminar, as an interdisciplinary course in cultural studies, puts into conversation the fields of African American studies; South Asian Studies; Ethnicity, Race & Migration Studies; and Women's Gender and Sexuality Studies. It draws from the social sciences, sciences, and humanities. Ideas of race and caste and the social practices that have evolved from these forms of differentiation are seen as disconnected, belonging to divergent spaces and times. This course examines how race and caste are intimately related and, indeed, co-constitutive within British colonial and imperial regimes of power. Drawing on examples from the Caribbean, India, North America, South Africa, and the UK, we examine the production of knowledge and systems of classification through political theory, political economy, representational practices, and the history of science. The course focuses on the consequences of economic, political, and social differentiation not only in terms of oppression and exploitation, but also through understanding how race and caste have been foundations for mobilizing and organizing for rights, resistance, and liberation. HU, SO

The Shulman Seminar

Individual Research and Senior Essay Courses

* **HUMS 470a and HUMS 471b, Special Studies in the Humanities** Norma Thompson

For students who wish to pursue a topic in Humanities not otherwise covered. May be used for research or for directed reading under the guidance of one or more faculty advisers. In either case a term paper or its equivalent is required, as are regular meetings with the adviser or advisers. To apply, a student should present a prospectus and a bibliography signed by the adviser or advisers to the director of undergraduate studies. Enrollment limited to juniors and seniors majoring in Humanities.

* **HUMS 471b, Special Studies in the Humanities** Norma Thompson

For students who wish to pursue a topic in Humanities not otherwise covered. May be used for research or for directed reading under the guidance of one or more faculty advisers. In either case a term paper or its equivalent is required, as are regular meetings with the adviser or advisers. To apply, a student should present a prospectus and a bibliography signed by the adviser or advisers to the director of undergraduate studies. Enrollment limited to juniors and seniors majoring in Humanities.

* **HUMS 491a or b, The Senior Essay** Norma Thompson

Independent library-based research under faculty supervision. To register, students must consult the director of undergraduate studies no later than the end of registration period in the previous term. A written plan of study approved by a faculty adviser must be submitted to the director of undergraduate studies by November 16, 2018, if the essay is to be submitted during the spring term, by May 1, 2019, for yearlong or fall-term essays. A rough draft of the essay is due at noon on March 25, 2019 for spring-term essays or on October 29, 2018 for fall-term essays. The final essay is due at noon on April 8, 2019 for spring-term essays or on December 3, 2018 for fall-term essays; late essays will be penalized by a lower grade. RP

Italian

Director of undergraduate studies: Christiana Purdy Moudarres, 82–90 Wall St., 432-0597, christiana.purdymoudarres (christiana.purdymoudarres@yale.edu); language program director: Anna Iacovella, 82–90 Wall St., 432-8299, anna.iacovella (anna.iacovella@yale.edu); italian.yale.edu

The major in Italian explores Italy's vital role in the formation of Western thought and culture. The core language courses bring students to a high level of aural, spoken, and written proficiency; provide a solid literary and historical background in the language; and prepare students for study in Italy. Other offerings build on the core courses to explore Italian literature, film, history, culture, and art. The Italian major is of particular relevance to the fields of art, economics, film and media studies, history, history of art, international relations, linguistics, literature, philosophy, and theology.

PREREQUISITE

Candidates for the major should have completed a course in Italian at the level of 130 (L3) or should have received credit for equivalent work by the end of their sophomore year. Exceptions may be made in the case of outstanding students who have not satisfied this requirement.

PLACEMENT PROCEDURES

All students who have not taken Italian at Yale are expected to take the departmental placement test, with the exception of students who have no previous knowledge of Italian. The placement examination is completed online during the summer; see the *Calendar for the Opening Days of College* and the departmental website for details.

REQUIREMENTS OF THE MAJOR

The major normally consists of eleven term courses beyond the prerequisite. Eight term courses in the Italian department numbered 140 or above (including graduate courses) are required, at least five of which must be conducted in Italian. The courses in the department must include either ITAL 150 or 151 and a course on Dante's *Divine Comedy* (ITAL 310 or equivalent), as well as four courses covering different periods in Italian literature: one in the Middle Ages (in addition to the course on Dante's *Divine Comedy*), one in the Renaissance, and two in Italian literature after 1600. The aim of these six foundation courses is to provide students with both a broad acquaintance with the major works of Italy's literary tradition and a more detailed knowledge of specific periods in Italian literature. Students are also strongly encouraged to use their elective courses to expand their knowledge of either the *Trecento* (fourteenth century) or the *Cinquecento* (sixteenth century). No more than three Italian department courses taught in English may count toward the major. Students intending to major in Italian should consult the DUS.

In completing their programs, students are required to elect two courses in other languages and literatures, history of art, history, or philosophy that are related to their field of study and approved by the DUS. Any graduate course in another national literature or in linguistics may be substituted for one of these two courses. Some knowledge of Latin is desirable.

SENIOR REQUIREMENT

In the fall or spring of the senior year, all students majoring in Italian must present a departmental essay written in Italian and completed under the direction of a faculty adviser in ITAL 491. The essay should demonstrate careful reading and research on a topic approved by the adviser in consultation with the DUS. A recommended length for the essay is thirty pages. Prospectus and draft deadlines are determined by the adviser; the final deadline is determined by the DUS. The senior requirement culminates in a meeting with department faculty to discuss the thesis and the student's overall experience of study in the major.

ADVISING

The department's course offerings vary greatly from year to year. Students interested in planning course work in Italian that extends beyond the current academic year should consult the DUS.

Related majors In addition to the major in Italian literature, the department supports the applications of qualified students who wish to pursue a course in Italian studies under the provisions of a Special Divisional Major. Majors can devise a broad program in social, political, economic, or intellectual history as related to and reflected in Italian literature, or pursue special interests in architecture, film, art, philosophy, music, history, linguistics, theater, political theory, or other fields especially well suited for examination from the perspective of Italian cultural history. Majors in Italian studies must design their programs in close consultation with the DUS and seek the guidance of an additional member of the department whose interests closely coincide with the proposed program of study. For further information, see under Special Divisional Majors (p. 708).

Combined B.A./M.A. degree program Exceptionally able and well-prepared students may complete a course of study leading to the simultaneous award of the B.A. and M.A. degrees after eight terms of enrollment. See "Simultaneous Award of the Bachelor's and Master's Degrees" under Special Arrangements in the Academic Regulations. Interested students should consult the DUS prior to the sixth term of enrollment for specific requirements in Italian.

STUDY ABROAD

For information about the Year or Term Abroad program, see under Special Arrangements (p. 64) in the Academic Regulations.

REQUIREMENTS OF THE MAJOR

Prerequisite ITAL 130 or equivalent

Number of courses 11 term courses beyond prereq (incl senior req)

Specific courses required ITAL 150 or 151; ITAL 310 or equivalent

Distribution of courses 8 term courses in Italian dept numbered 140 or above, incl 1 in Middle Ages (in addition to ITAL 310), 1 in Renaissance, and 2 in Italian lit after 1600, at least 5 of these conducted in Italian; 2 courses in other langs or lits, hist of art, hist, or phil approved by DUS

Substitution permitted Any grad course in another national lit or in linguistics for 1 of the 2 courses in other depts, with DUS permission

Senior requirement Senior essay (ITAL 491) and oral interview

FACULTY OF THE DEPARTMENT OF ITALIAN

Professors Millicent Marcus (*Chair*), Giuseppe Mazzotta, Jane Tylus

Assistant Professor Christiana Purdy Moudarres

Senior Lectors Michael Farina, Anna Iacovella

Lector Simona Lorenzini

Lecturer Serena Bassi

Affiliated Faculty Roberto González Echevarría (*Spanish & Portuguese*), Gundula Kreuzer (*Music*), Alastair Minnis (*English*), Frank Snowden (*History*), Gary Tomlinson (*Music, Humanities*), Francesca Trivellato (*History*)

Group A Courses

*** ITAL 110a, Elementary Italian I** Staff

A beginning course with extensive practice in speaking, reading, writing, and listening and a thorough introduction to Italian grammar. Activities include group and pairs work, role-playing, and conversation. Introduction to Italian culture through readings and films. Conducted in Italian. Credit only on completion of ITAL 120. L1
1½ Course cr

*** ITAL 120b, Elementary Italian II** Staff

Continuation of ITAL 110. L2 1½ Course cr

*** ITAL 125a or b, Intensive Elementary Italian** Staff

An accelerated beginning course in Italian that covers in one term the material taught in ITAL 110 and 120. Admits to ITAL 130 or 145. Enrollment limited to 15. L1, L2
2 Course cr

*** ITAL 130a, Intermediate Italian I** Staff

The first half of a two-term sequence designed to increase students' proficiency in the four language skills and advanced grammar concepts. Authentic readings paired with contemporary films. In-class group and pairs activities, role-playing, and conversation. Admits to ITAL 140. Conducted in Italian. ITAL 120 or equivalent. L3 1½ Course cr

*** ITAL 140b, Intermediate Italian II** Staff

Continuation of ITAL 130. Emphasis on advanced discussion of Italian culture through authentic readings (short stories, poetry, and comic theater) and contemporary films. Admits to Group B courses. Conducted in Italian. L4 1½ Course cr

*** ITAL 145a, Intensive Intermediate Italian** Staff

An accelerated intermediate course in Italian that covers in one term the material taught in ITAL 130 and 140. Continued practice in the four basic skills begun at the elementary level. Emphasis on grammar review, vocabulary enrichment, and appreciation of literary texts. Admits to Group B courses. Enrollment limited to 15. Prerequisite: ITAL 120 or 125. L3, L4 2 Course cr

Group B Courses

Group B courses have readings in Italian and are usually conducted in Italian. They are open to students who have passed ITAL 140 or 145 and to others with the consent of the director of undergraduate studies and the instructor.

ITAL 150a, Advanced Composition and Conversation Anna Marra

Discussion of social, political, and literary issues in order to improve active command of the language. Development of advanced reading skills through magazine and newspaper articles, essays, short stories, films, and a novel; enhancement of writing skills through experiments with reviews, essays, creative writing, and business and informal Italian. Classroom emphasis on advanced speaking skills and vocabulary building. L5

* **ITAL 151b, Advanced Italian Workshop: Translating, Writing, and Acting** Michael Farina

This workshop examines the intersection of translation and hermeneutics through praxis. Development of advanced writing and speaking skills. Individual and group work in translation, interpretation, and performance of short texts. Genres include the novella, opera, and film – with emphasis on the creation of a new translation for an opera being performed at Yale. Meaningful practice of creative writing and translation. L5

* **ITAL 159a, History and Culture of Naples** Anna Iacovella

Historical phenomena and literary and cultural movements that have shaped the city of Naples, Italy, from antiquity to the present. The linguistic richness and diversity that characterizes Naples; political, social, and cultural change; differences between standard Italian and the Neapolitan dialect in literature, film, and everyday life. Prerequisite: ITAL 140 or equivalent. L5, HU

* **ITAL 470a or b and ITAL 471a or b, Special Studies in Italian Literature** Christiana Purdy Moudarres

A series of tutorials to direct students in special interests and requirements. Students meet regularly with a faculty member.

* **ITAL 491a or b, The Senior Essay** Christiana Purdy Moudarres

A research essay on a subject selected by the student in consultation with the faculty adviser.

Group C Courses

Group C courses are conducted in English and are open to students without previous study of Italian. Majors in Italian are required to read the material and write their papers in Italian.

* **ITAL 303b / FILM 457b / LITR 359b, Italian Film from Postwar to Postmodern** Millicent Marcus

A study of important Italian films from World War II to the present. Consideration of works that typify major directors and trends. Topics include neorealism, self-reflexivity and metacinema, fascism and war, and postmodernism. Films by Fellini, Antonioni, Rossellini, De Sica, Visconti, Pasolini, Bertolucci, Wertmuller, Tornatore, and Moretti. Most films in Italian with English subtitles. WR, HU

* **ITAL 304a / FILM 406a / LITR 367a, Literature into Film** Millicent Marcus

Strategies employed by filmmakers who adapt literary works to the screen. Detailed comparisons between cinematic adaptations and the novels, plays, and short stories on which they are based. Case studies of literary works that pose a variety of challenges to filmmakers. HU

ITAL 310a / HUMS 180a / LITR 183a, 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. No knowledge of Italian required. Course conducted in English. HU TR

ITAL 315a / HIST 280a / RLST 160a, The Catholic Intellectual Tradition Carlos Eire
Introductory survey of the interaction between Catholicism and Western culture from the first century to the present, with a focus on pivotal moments and crucial developments that defined both traditions. Key beliefs, rites, and customs of the Roman Catholic Church, and the ways in which they have found expression; interaction between Catholics and the institution of the Church; Catholicism in its cultural and sociopolitical matrices. Close reading of primary sources. HU

*** ITAL 317b / HUMS 210 / LITR 180 / WGSS 317, 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. HU

Judaic Studies

Director of undergraduate studies: Elli Stern; eliyahu.stern@yale.edu; 451 College St., Rm. 403, 432-0841; judaicstudies.yale.edu

Judaic Studies enables students to develop a broad knowledge of the history, religion, literature, philosophy, languages, and politics of the Jews. Jewish society, texts, ideologies, material cultures, and institutions are studied from a comparative perspective in the context of histories, cultures, and intellectual traditions among which Jews have lived throughout the ages. As an interdisciplinary program, Judaic Studies employs historical, literary, political, social, and philosophical methods of analysis.

The Judaic Studies major—especially as a second major with Economics, Political Science, Literature, English, Philosophy, or History—offers a broad liberal arts background combined with intensive preparation in the historical and religious experience of Jewish culture from antiquity to contemporary times. The major epochs of Jewish history are the Persian and Hellenistic, classical, medieval, early modern, and modern periods.

Students considering the major in Judaic Studies should contact the director of undergraduate studies as early as possible.

REQUIREMENTS OF THE MAJOR

The major in Judaic Studies requires thirteen term courses, including three courses selected from a set of core requirements, a language or literature requirement, three courses selected from each of two areas of concentration, and the senior requirement.

Core requirements Each student must elect at least three from the following: (1) a course in Hebrew Bible, such as JDST 110; (2) a course in rabbinic literature or ancient Judaism, such as JDST 235; (3) JDST 200; (4) JDST 201; (5) a course in Jewish thought, such as JDST 281 or JDST 293; (6) a survey course in Hebrew and Jewish literature.

Language or literature requirements Students must complete either HEBR 110 and 120 or two courses in Hebrew literature in translation. Up to three Hebrew language courses may be counted toward the requirements of the major.

Areas of concentration Students must select two of the following areas of concentration: ancient Israel/Hebrew Bible; Judaism and Jewish history of Second Temple and Talmudic times; Jewish history and civilization of medieval and Renaissance times; modern Jewish history and civilization; Jewish/Hebrew literature (which requires the study of literature in Hebrew); and Jewish thought. With the approval of the DUS, students may design their own areas of concentration.

In each of the two areas of concentration, students choose three courses in consultation with the DUS. These are expected to comprise one introductory course; one seminar taken in the junior year, and one course requiring a final research paper. One relevant course should be in an area outside Judaic Studies, such as a course relating to the larger historical, literary, or philosophical context if the concentration is in a historical period, or a course in the theory or practice of literature if the concentration is in Jewish/Hebrew literature.

SENIOR REQUIREMENT

Students are required either to complete a two-term senior essay in JDST 491 and 492 related to both areas of concentration, or to complete a one-term senior essay in JDST 491 or 492 related to one area of concentration and an additional seminar related to the other. The senior essay may build on research conducted for one or both of the student's junior seminar papers.

STUDY ABROAD

Students majoring in Judaic Studies should be aware of the numerous opportunities for study abroad. Those interested in research and language-study opportunities in the Middle East, Europe, and South America should consult the DUS.

REQUIREMENTS OF THE MAJOR

Prerequisites None

Number of courses 13 term courses (incl senior req)

Distribution of courses 3 courses from (1) Hebrew Bible, (2) rabbinic lit or ancient Judaism, (3) JDST 200, (4) JDST 201, (5) Jewish thought, (6) survey of Hebrew and Jewish lit; HEBR 110 and 120, or 2 courses in Hebrew lit in translation; 2 areas of concentration, with 3 courses in each for a total of 6

Senior requirement Two-term senior essay (JDST 491, 492) or one-term senior essay (JDST 491 or 492), and additional seminar

FACULTY ASSOCIATED WITH THE PROGRAM OF JUDAIC STUDIES

Professors Joel Baden (*Divinity School*), Leslie Brisman (*English*), Steven Fraade (*Chair*) (*Religious Studies*), Paul Franks (*Philosophy*), Warren Zev Harvey (*Philosophy*) (*Visiting*), Christine Hayes (*Religious Studies*), Hannan Hever (*Literature*), Ivan Marcus (*History, Religious Studies*), Steven Smith (*Political Science, Philosophy*), David Sorkin (*History*), Laura Wexler (*Women's, Gender, & Sexuality Studies, American Studies*), Robert Wilson (*Religious Studies*)

Associate Professors Joseph David (*Law*) (*Visiting*), Marci Shore (*History*), Eliyahu Stern (*Religious Studies, History*)

Senior Lecturer Peter Cole (*Comparative Literature*)

Lecturers Asaf Angermann (*Philosophy*), Yair Assulin (*Comparative Literature*) (*Visiting*), Alessia Bellusci (*History*), Allyson Gonzalez (*Religious Studies*), Margaret Olin (*Divinity School, History of Art, Religious Studies*), Micha Perry (*Visiting*)

Senior Lector II Shiri Goren

Senior Lectors Josh Price, Dina Roginsky, Orit Yeret

Core Course

JDST 201b / HIST 220b / RLST 149b, Introduction to Modern Jewish History Staff
A broad introduction to the history of Jewish culture from the late Middle Ages until the present. Emphasis on the changing interaction of Jews with the larger society as well as the transformation of Judaism in its encounter with modernity. HU

Special Project and Senior Essay Courses

* JDST 471a or b, **Individual Tutorial** Staff

For students who wish, under faculty supervision, to investigate an area in Judaic Studies not covered by regular course offerings. May be used for research or for directed reading, but in either case a long essay or several short ones are required. To apply for admission, a student should present a prospectus with bibliography and a letter of support from the faculty member who will direct the work to the director of undergraduate studies.

* JDST 491a and JDST 492b, **The Senior Essay** Ivan Marcus

The essay, written under the supervision of a faculty member, should be a substantial paper between 6,500 and 8,000 words for one term and between 12,500 and 15,000 words for two terms.

Electives within the Major

BIBLICAL PERIOD

JDST 110a / HUMS 133 / RLST 145a, **The Bible** Staff

The writings common to both Jewish and Christian scripture examined as diverse and often conflicting expressions of the religious life and thought of ancient Israel. The works' cultural and historical setting in the ancient Near East; the interpretive history of selected passages influential in Western culture. Introduction to a wide range of critical and literary approaches to biblical studies. Students view course lectures, which survey the entire Bible, on line; class time focuses on specific biblical passages and their subsequent interpretation in Jewish and Christian culture. HU

* JDST 219a / PHIL 403 / RLST 450a, **Spinoza and the God of the Bible** Nancy Levene

This course considers Spinoza's metaphysics and social and political thought in light of a family of problems named religion: the concept of God, the relations among politics, divine law, and their institutions, the value of Judaism and Christianity, and the interpretation of the Bible. We read from Spinoza's principal works as well as from the Bible and a few other thinkers, medieval and modern, in conceptual proximity to Spinoza. HU

CLASSICAL PERIOD

* JDST 235b / MMES 235b / NELC 231b / RLST 147b, **Introduction to Judaism in the Ancient World** 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. No prior background in Jewish history assumed. HU

* JDST 392a / NELC 382a / RLST 405a, **Mishnah Seminar: Tractate Sanhedrin** Steven Fraade

Close study of a section of the Mishnah, the earliest digest of Jewish law, treating religious courts and their jurisprudential practice. Dual attention to the historical significance of the institutions of law represented and to the cultural significance of

the rhetoric of that representation. Consideration of the textual practices of rabbinic legal discourse in relation to its social function, as well as to the interplay of law and narrative. Prerequisite: reading fluency in ancient Hebrew. L5, HU

MEDIEVAL AND EARLY MODERN PERIODS

* **JDST 270a / HIST 232Ja / HUMS 443a / MMES 342a / RLST 201a, Medieval Jews, Christians, and Muslims In Conversation** Ivan Marcus

How members of Jewish, Christian, and Muslim communities thought of and interacted with members of the other two cultures during the Middle Ages. Cultural grids and expectations each imposed on the other; the rhetoric of otherness—humans or devils, purity or impurity, and animal imagery; and models of religious community and power in dealing with the other when confronted with cultural differences. Counts toward either European or Middle Eastern distributional credit within the History major, upon application to the director of undergraduate studies. WR, HU RP

MODERN PERIOD

* **JDST 281b / PHIL 405b, Jewish Philosophy in the Twentieth Century** Staff
Major figures in the tradition of Jewish philosophy during the twentieth century. Engagement with the Western philosophical tradition, especially in Europe and in postwar America. The impact of the Six-Day War and the Nazi Holocaust on American Jewish thinkers. HU

* **JDST 296a / MMES 256a, State and Religion in Israel** Hannan Hever
An exploration of culture, politics, and society in modern Palestine and Israel through the study of Israel. Topics include the city in Zionist ideology, immigration and cosmopolitanism, Hebrew culture and language, architecture and city planning, centers and peripheries, and the city as a site of political activism. HU

* **JDST 306b / MMES 157b / NELC 157b, Israeli Narratives** Shiri Goren
Close reading of major Israeli novels in translation with attention to how their themes and forms relate to the Israeli condition. Theories of war and peace, migration, nationalism, and gender. Authors include Yehoshua, Grossman, Matalon, Castel-Bloom, and Kashua. No knowledge of Hebrew required. HU TR

* **JDST 319a / HEBR 162a / MMES 161a, Israel in Ideology and Practice** Dina Roginsky
An advanced Hebrew class focusing on changing ideology and politics in Israel. Topics include right and left wing political discourse, elections, State-Religion dynamics, the Jewish-Arab divide, and demographic changes. Materials include newspapers, publications, on-line resources, speeches of different political and religious groups, and contemporary and archival footage. Comparisons to American political and ideological discourse. Prerequisite: HEBR 140 or permission of instructor. L5 RP

* **JDST 335a / GMAN 254a / PHIL 274a / RLST 249a, Jewish Philosophy** Paul Franks
Introduction to Jewish philosophy, including classical rationalism of Maimonides, classical kabbalah, and Franz Rosenzweig's inheritance of both traditions. Critical examination of concepts arising in and from Jewish life and experience, in a way that illuminates universal problems of leading a meaningful human life in a multicultural and increasingly globalized world. No previous knowledge of Judaism is required. WR, HU

* **JDST 355b / GMAN 372b / LITR 228, Reflections on the Holocaust** Katrin Truedstedt
Reflections on how the Holocaust has shaken our understanding of modern Western culture. We focus especially on literary and theoretical reflections on the Holocaust as undermining the very possibility of experience, representation, and of inhabiting a shared world. The course aims to give perspective on the complex factors conditioning the Holocaust; the rise of nationalism, fascism, and racism; the relationship between modernity and barbarism; inclusion and exclusion; law and bare life, World War II and the emergence of the Camp System in Eastern Europe; collaboration, resistance, and survival. Readings by Primo Levi, Hannah Arendt, Theodor W. Adorno, Giorgio Agamben, and others. HU

* **JDST 358b / HUMS 203b / WGSS 210b, Feminism and Judaism** Igor De Souza
The impact of feminism in three key areas of contemporary Jewish life: religion, Zionism, and identity. The critique of Zionism, in a trend known as post-Zionism, from feminist lenses. Feminism and Zionism in the construction of sexualized and racialized Jewish identities (LGBT Jews/Jews of color).

Language and Literature

* **JDST 213a / HEBR 150a / MMES 150a, Advanced Modern Hebrew: Daily Life in Israel** Orit Yeret
An examination of major controversies in Israeli society. Readings include newspaper editorials and academic articles as well as documentary and historical material. Advanced grammatical structures are introduced and practiced. Conducted in Hebrew. Prerequisite: HEBR 140 or equivalent. L5 RP

* **JDST 282b / LITR 437b / RLST 238b / SPAN 282b, Judeo-Spanish Culture, Language, and Literature** Allyson Gonzalez
This course explores the rich body of culture, language, and literature that emerged in the Sephardi (Judeo-Spanish) diaspora following the expulsion of Jews from Iberia in 1492, and continuing to the present. This course is taught in English. TR HU

* **JDST 316a / ENGL 456a / HUMS 427a / LITR 348a, The Practice of Literary Translation** Robyn Creswell
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). HU

* **JDST 391a / NELC 381a / RLST 407a, Midrash Seminar: The Exodus from Egypt** Steven Fraade
The Exodus from Egypt as seen through rabbinic eyes. Close readings of the early rabbinic commentary (midrash), Mekhilta, to the narrative of Exodus 13:17ff (the lection Beshallah). Particular attention to the methods and language of rabbinic exegesis and to the rhetorical interplay of tradition and scriptural commentary. Interpretations and interpretive strategies compared and contrasted with those of other ancient biblical exegetes (Jewish and non-Jewish), where available. Prerequisite: reading fluency in ancient Hebrew. L5, HU

*** JDST 401b / HEBR 152b, Reading Academic Texts in Modern Hebrew** Dina Roginsky

Reading of academic texts in modern Hebrew, for students with a strong background in Hebrew. Discussion of grammar and stylistics; special concentration on the development of accuracy and fluency. Prerequisite: HEBR 150 or permission of instructor. Conducted in Hebrew. L5 RP

JDST 407b / HEBR 161b / MMES 156b, 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; modern popular music and 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. Conducted in Hebrew. Prerequisite: HEBR 140 or equivalent. L5

*** JDST 416a / GMAN 102a, Reading Yiddish** Joshua Price

This course is designed to build literacy in Yiddish, the vernacular of Ashkenazi Jewry. With focus on the accelerated treatment of Yiddish grammar, regularly supplemented with simple primary texts (poems, songs, folktales), and followed by close readings of (modern) Yiddish literature, students will be able to navigate most Yiddish texts with the aid of a dictionary. May not be taken concurrently with elementary or intermediate German.

*** JDST 418b / GMAN 103b, Reading Yiddish II** Joshua Price

Intermediate study of Yiddish literary language with annotated readings from classic authors including: Mendele, Sholem Aleichem, Peretz, Bergelson, Der Nister, Bashevis, as well as American and Soviet Yiddish poetry. Secondary readings in English will offer a broader introduction to the modern Yiddish canon. Continuation of GMAN 102/ JDST 416. Previous knowledge of German or Hebrew-Aramaic recommended but not required.

Latin American Studies

Director of undergraduate studies: Ana De La O, C120, 77 Prospect St., 432-5234, ana.delao@yale.edu; (ana.delao@yale.edu) macmillan.yale.edu/academic-programs

The major in Latin American Studies is designed to further understanding of the societies and cultures of Latin America as viewed from regional and global perspectives. The Latin American Studies major builds on a foundation of language and literature, history, history of art, theater studies, humanities, and the social sciences; its faculty is drawn from many departments and professional schools of the University.

The major in Latin American Studies is interdisciplinary. With two goals in mind—intellectual coherence and individual growth—the student proposes a course of study that must satisfy the requirements listed below. The proposed course of study must be approved by the director of undergraduate studies. Though all students choose courses in both the humanities and the social sciences, they are expected to concentrate on one or the other.

PREREQUISITES

Prerequisite to the major is knowledge of the two dominant languages of the region, Spanish and Portuguese. Depending on their interests, students select one language for two years of instruction and the other for one. Other languages necessary for research may in appropriate circumstances be substituted for the second language with the consent of the DUS. Students are encouraged to meet the language requirements as early as possible. Courses used to satisfy the language prerequisite may not be counted toward the major.

REQUIREMENTS OF THE MAJOR

The major itself requires twelve term courses: one introductory course approved by the DUS; eight courses related to Latin America from departmental offerings or from a provided list of electives; two additional electives; and the senior essay, LAST 491. The eight Latin American content courses should include courses from the following categories: two courses in the social sciences (anthropology, economics, or political science); two courses in history; two courses in Spanish American or Brazilian literatures beyond the language requirement; one course in art, architecture, film and media studies, music, or theater studies; and one seminar in any area related to Latin American Studies. Students wishing to count toward the major courses that do not appear in the program's course offerings should consult with the DUS.

Students must enroll in three seminars or upper-level courses during their junior and senior years. Elective seminars must be approved by the DUS, who can provide a list of appropriate courses.

SENIOR REQUIREMENT

The senior essay is a research paper written usually in one term in LAST 491. Students choose their own topics, which may derive from research done in an earlier course. The essay is planned in advance in consultation with a qualified adviser and a second reader.

In preparing the senior essay, Latin American Studies majors may undertake field research in Latin America. Students are encouraged to apply for summer travel grants through the Council on Latin American and Iberian Studies to conduct field research

for their senior thesis. The Albert Bildner Travel Prize is awarded to an outstanding junior who submits an application in Spanish or Portuguese in addition to the English application essay. Information about these and other grants is available on Yale's Student Grants & Fellowships Website.

ADVISING

A list of courses intended as a guide to students in preparing their programs is available at the office of the DUS and on the Council on Latin American and Iberian Studies Website. Qualified students may also elect pertinent courses in the Graduate School and in some of the professional schools with permission of the director of graduate studies or professional school registrar and the DUS.

STUDY ABROAD

Students are strongly encouraged to take advantage of study abroad opportunities during summers or through the Year or Term Abroad program (p. 64).

REQUIREMENTS OF THE MAJOR

Prerequisites 2 years of 1 lang (Spanish or Portuguese), 1 year of the other

Number of courses 12 courses beyond prereqs (incl senior essay)

Distribution of courses 1 intro course approved by DUS; 8 courses related to Latin America in specified fields; 2 electives; 3 sems or upper-level courses in junior and senior years

Senior requirement Senior essay (LAST 491)

FACULTY ASSOCIATED WITH THE PROGRAM OF LATIN AMERICAN STUDIES

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*), Aníbal González (*Spanish & Portuguese*), Roberto González Echevarría (*Spanish & Portuguese*), K. David Jackson (*Spanish & Portuguese*), Gilbert Joseph (*History*), Stathis Kalyvas (*Political Science*), Daniel Markovits (*Law School*), Mary Miller (*History of Art*), Stephen Pitti (*History*), Susan Rose-Ackerman (*Law School, Political Science*), Alicia Schmidt Camacho (*American Studies*), Stuart Schwartz (*History*), Susan Stokes (*Political Science*), Robert Thompson (*History of Art*), Noël Valis (*Spanish & Portuguese*), Frederick Wherry (*Sociology*), Elisabeth Wood (*Political Science*)

Associate Professors Robert Bailis (*Forestry & Environmental Studies*), Susan Byrne (*Spanish & Portuguese*), Rodrigo Canales (*School of Management*), Ana De La O (*Political Science*), Moira Fradinger (*Comparative Literature*)

Assistant Professors Vanessa Agard-Jones (*Women's, Gender, & Sexuality Studies*), Ryan Bennett (*Linguistics*), Oswaldo Chinchilla (*Anthropology*), Marcela Echeverri (*History*), Anne Eller (*History*), Leslie Harkema (*Spanish & Portuguese*), Seth Jacobowitz (*East Asian Languages & Literatures*), Erica James (*History of Art, African American Studies*), Albert Laguna (*American Studies, Ethnicity, Race, & Migration*), Dixá Ramirez (*American Studies, Ethnicity, Race, & Migration*)

Senior Lectors II Margherita Tortora, Sonia Valle

Senior Lectors Sybil Alexandrov, Marta Almeida, Maria Pilar Asensio-Manrique, Mercedes Carreras, Ame Cividanes, Sebastián Díaz, María de la Paz García, María Jordán, Rosamaría León, Juliana Ramos-Ruano, Lissette Reymundi, Lourdes Sabé-Colom, Bárbara Saffile, Terry Seymour

Lector Selma Vital

Electives within the Major

Students wishing to count toward the major courses that do not appear on this list should consult with the director of undergraduate studies.

AFST 333a / HIST 332a, African Encounters with Colonialism Daniel Magaziner
How African societies and peoples encountered, engaged, and endured the colonial and postcolonial world, from the arrival of Kiswahili-speaking traders at the shores of Lake Victoria in the 1840s through the rise and fall of European colonialism and the resulting forms of neocolonialism. Transformations and continuities in African religious life; gendered sociability; popular culture. HU

* **AFST 353b / MUSI 375b, Topics in World Music** Marissa Moore
A critical introduction to selected cultures of world music. Specific cultures vary from year to year but generally include those of Native America, South Asia, Southeast Asia, sub-Saharan Africa, the Middle East, and the Caribbean. Preference to Music majors according to class. HU

* **ANTH 301b, Foundations of Modern Archaeology** Richard Burger
Discussion of how method, theory, and social policy have influenced the development of archaeology as a set of methods, an academic discipline, and a political tool. Background in the basics of archaeology equivalent to one introductory course is assumed. SO

ECON 325a or b, Economics of Developing Countries: Focus on South Asia Staff
This class addresses the economics of poverty and development with a particular focus on South Asia. Why do some countries appear to belong to radically different economic systems? What historical legacies have contributed to poverty in South Asia? And what work is currently being done to address persistent underdevelopment and poverty in the region? Prerequisites: ECON 115 or equivalent; ECON 121; ECON 131. SO

* **ECON 412b, International Environmental Economics** Joseph Shapiro
Introduction to international and environmental economics and to research that combines the two fields. Methods for designing and analyzing environmental policy when economic activity and pollution cross political borders. Effects of market openness on the environment and on environmental regulation; international economics and climate change. Prerequisites: intermediate microeconomics and econometrics. SO

* **ECON 465a / EP&E 224a / GLBL 330a, Debating Globalization** Ernesto Zedillo
Facets of contemporary economic globalization, including trade, investment, and migration. Challenges and threats of globalization: inclusion and inequality, emerging global players, global governance, climate change, and nuclear weapons proliferation. Prerequisite: background in international economics and data analysis. Preference to seniors majoring in Economics or EP&E. SO RP

*** ECON 467b / GBLB 307b, Economic Evolution of the Latin American and Caribbean Countries** Ernesto Zedillo

Economic evolution and prospects of the Latin American and Caribbean (LAC) countries. Topics include the period from independence to the 1930s; import substitution and industrialization to the early 1980s; the debt crisis and the "lost decade"; reform and disappointment in the late 1980s and the 1990s; exploration of selected episodes in particular countries; and speculations about the future. Prerequisites: intermediate microeconomics and macroeconomics. SO

ER&M 200a, Introduction to Ethnicity, Race, and Migration Alicia Camacho

Historical roots of contemporary ethnic and racial formations and competing theories of ethnicity, race, and migration. Cultural constructions and social practices of race, ethnicity, and migration in the United States and around the world. HU, SO

*** ER&M 300a or b, Comparative Ethnic Studies** Staff

Introduction to the methods and practice of comparative ethnic studies. Examination of racial formation in the United States within a transnational framework. Legacies of colonialism, slavery, and racial exclusion; racial formation in schools, prisons, and citizenship law; cultural politics of music and performance; social movements; and postcolonial critique. SO

*** EVST 422a / ANTH 409a / ER&M 394a / F&ES 422a, Climate and Society from Past to Present** Michael Dove

Discussion of the major traditions of thought—both historic and contemporary—regarding climate, climate change, and society; focusing on the politics of knowledge and belief vs disbelief; and drawing on the social sciences and anthropology in particular. SO

*** F&ES 020a / EVST 020a, Sustainable Development in Haiti** Gordon Geballe

The principles and practice of sustainable development explored in the context of Haiti's rich history and culture, as well as its current environmental and economic impoverishment. Enrollment limited to first-year students. Preregistration required; see under First-Year Seminar Program. WR

GLBL 247a / PLSC 128a, Development Under Fire Jason Lyall

The recent emergence of foreign assistance as a tool of counterinsurgency and post-conflict reconciliation. Evaluation of the effects of aid in settings such as Afghanistan, Iraq, Colombia, and the Philippines. Examination of both theory and practice of conducting development work in the shadow of violence. Strengths and weaknesses of different evaluation methods, including randomized control trials (RCTs) and survey experiments. SO

GLBL 263b / PLSC 439b, Challenges of Young Democracies Ana De La O

Challenges faced by young democracies, such as organizing free and fair elections, controlling government corruption, building an accountable system of governance, sustaining development, and curtailing conflict and violence. Factors that lead to the consolidation of democratic politics or to stagnation and a return to nondemocratic political systems. SO

*** HSAR 471a / AFAM 346a, Black Atlantic Photography** Kobena Mercer

Introduction to the social and artistic history of photography in Black Atlantic contexts from the mid-nineteenth century to the present. Uses of the photographic image in shaping understandings of race relations and black identities. Codes and

conventions by which photographs are evaluated in terms of truth, reflection, testimony, expressivity, and construction. HU

*** LAST 194a / ER&M 304a / HIST 194Ja, Hemisphere Divided, United States and Latin America** Staff

The history of U.S.-Latin American relations. Themes include imperialism and ideology, political economy, cultural exchange, environmental history, and issues of gender, race, nationhood, and indigeneity. WR, HU

LAST 214b / AFAM 186b / PLSC 378b / SOCY 170b, Contesting Injustice Elisabeth Wood

Exploration of why, when, and how people organize collectively to challenge political, social, and economic injustice. Cross-national comparison of the extent, causes, and consequences of inequality. Analysis of mobilizations for social justice in both U.S. and international settings. Intended primarily for freshmen and sophomores. SO

*** LAST 222a / SPAN 222a, Legal Spanish** Mercedes Carreras

An introduction to Spanish and Latin American legal culture with a focus on the specific traits of legal language and on the development of advanced language competence. Issues such as human rights, the death penalty, the jury, contracts, statutory instruments, and rulings by the constitutional courts are explored through law journal articles, newspapers, the media, and mock trials. Enrollment limited to 18. A maximum of one course in the 200-230 range may count as an elective toward the Spanish major. L5

*** LAST 223a / SPAN 223a, Spanish in Film: An Introduction to the New Latin American Cinema** Margherita Tortora

Development of proficiency in Spanish through analysis of critically acclaimed Latin American films. Includes basic vocabulary of film criticism in Spanish as well as discussion and language exercises. Enrollment limited to 18. L5

*** LAST 227a / SPAN 227a, Creative Writing** Staff

An introduction to the craft and practice of creative writing (fiction, poetry, and essays). Focus on the development of writing skills and awareness of a variety of genres and techniques through reading of exemplary works and critical assessment of student work. Emphasis on the ability to write about abstract ideas, sentiments, dreams, and the imaginary world. Enrollment limited to 18. A maximum of one course in the 200-230 range may count as an elective toward the Spanish major. L5

LAST 232a / ANTH 232a / ARCG 232a, Ancient Civilizations of the Andes Richard Burger

Survey of the archaeological cultures of Peru and Bolivia from the earliest settlement through the late Inca state. SO

*** LAST 243a / SPAN 243a, Advanced Spanish Grammar** Staff

A comprehensive, in-depth study of grammar intended to improve students' spoken and written command of Spanish. Linguistic analysis of literary selections; some English-to-Spanish translation. Enrollment limited to 18. L5

*** LAST 251b / EP&E 257b / PLSC 399b, Politics in Latin America** Ana De La O

Overview and analysis of politics in Latin America. The emergence of democracy and the forces that led to the unprecedented increase in inequality in the twentieth century.

Topics include institutional design, historical legacies, corruption, clientelism, and violence.

* **LAST 252a / PORT 356a, Experimental, Visual, and Concrete Poetry in Perspective**

K. David Jackson

Brazilian concrete poetry in international perspective; production and theory of concrete poetry, translation, and criticism during the second half of the twentieth century. Brazilian concrete poets in the context of visual and concrete poetics.

Representative works include 'Pilot Plan' and *Theory of Concrete Poetry*, graphic and spatial poems, and public expositions of works. Brazilian concrete poets were among the leaders of an international neo-vanguard movement in mid-twentieth century related to geometrical abstraction in painting. In the journals *Noigandres* and *Invenção*, and the *Theory of Concrete Poetry* the Brazilians link their poetics to Pound, Mallarmé, Cummings and other inventive figures in world poetry, while relating poetry to graphic arts through reference to painting and to semiotics, including Fenollosa's essay on use of the Chinese character. The exhibit in S. Paulo's Museum of Modern Art in December 1956 was the beginning of the public exhibition of concrete poetry, now the topic of anthologies, websites, criticism, and museum retrospectives. Concrete poetics dominated the production of poetry in Brazil for half a century with a major effect on cultural and intellectual life. Prerequisite: PORT 140 or equivalent. HU TR

* **LAST 254a or b / PORT 355a or b, Brazilian Modernist Poetry** K. David Jackson

The generation of major poets who were part of Brazilian modernism, centered on the "Modern Art Week" of 1922. Poetry written to express the individuality and character of Brazil's language and culture at the onset of modernization, urbanization, and industrialization. Points of analysis include form, use of language, themes of memory and modernization, cultural characterization, humor, and ethical and existential concerns. Prerequisite: PORT 140 equivalent. L5, HU

* **LAST 255b / ANTH 255b / ARCG 255b, Inca Culture and Society** Richard Burger

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

* **LAST 266a / SPAN 266a, Studies in Latin American Literature I** Rolena Adorno

Origins of Latin American literary tradition from preconquest Aztec poetry to Baroque poetry of the seventeenth century. Study of works that helped define the future Latin America, from the Caribbean, to Mexico, and to the Andes of South America. Readings from the works of fifteenth century Texcocan poet, prince Nezahualcoyotl, through to seventeenth century Mexican Baroque poet, Sor Juana Inés de la Cruz. L5, HU

LAST 267b / SPAN 267b, Studies in Latin American Literature II Rolena Adorno

An introduction to Latin American literature from the nineteenth century to the present. Works by Borges, García Márquez, Paz, Neruda, Cortázar, and others. L5, HU

* **LAST 318b / ARCH 341b / GLBL 253b, Globalization Space** Keller Easterling

Infrastructure space as a primary medium of change in global polity. Networks of trade, energy, communication, transportation, spatial products, finance, management, and labor, as well as new strains of political opportunity that reside within their spatial disposition. Case studies include free zones and automated ports around the world, satellite urbanism in South Asia, high-speed rail in Japan and the Middle East, agripoles

in southern Spain, fiber optic submarine cable in East Africa, spatial products of tourism in North Korea, and management platforms of the International Organization for Standardization. HU

* **LAST 334b / ER&M 364b / HIST 334Jb, Ethnicity, Nationalism, and the Politics of Knowledge in Latin America** Marcela Echeverri Munoz

Examination of ethnicity and nationalism in Latin America through the political lens of social knowledge. Comparative analysis of the evolution of symbolic, economic, and political perspectives on indigenous peoples, peasants, and people of African descent from the nineteenth century to the present. Consideration of the links between making ethnic categories in the social sciences and in literature and the rise of political mechanisms of participation and representation that have characterized the emergence of cultural politics. WR, HU RP

LAST 361a / HIST 361a, History of Brazil Stuart Schwartz

Brazilian history from European contact to the reestablishment of civilian government in the 1990s. Focus on the multiethnic nature of Brazilian society, the formation of social and political patterns, and the relationship of people to the environment. HU

* **LAST 372a / ER&M 342a / HIST 372Ja, Revolutionary Change and Cold War in Latin America** Gilbert Joseph

Analysis of revolutionary movements in Latin America against the backdrop of the Cold War. Critical examination of popular images and orthodox interpretations. An interdisciplinary study of the process of revolutionary change and cold war at the grassroots level. WR, HU

* **LAST 385b / LITR 260b / PORT 385b, Brazilian Novel of the 21st Century** K. David Jackson

Changing narratives, themes, styles, and aesthetic ideals in current Brazilian prose and poetry. The writers' attempts to express or define a personal, national, and global consciousness influenced by the return of political democracy to Brazil. Focus on readings published within the last five years. Readings and discussion in English; texts available in Portuguese. WR, HU

* **LAST 386a / GLBL 215a / MGRK 237a / PLSC 375a / SOCY 389a, Populism from Chavez to Trump** Paris Aslanidis

Investigation of the nature of the populist phenomenon and its impact on politics, society, and the economy in various regions of the world. Conceptual and methodological analyses are supported by comparative assessments of various empirical instances, from populist politicians such as Hugo Chavez and Donald Trump, to populist social movements such as the Tea Party and Occupy Wall Street. SO

* **LAST 391b / LITR 289b / SPAN 392b, Literature of the Americas, North and South** Rolena Adorno

Readings of U.S. and Latin American short stories and novels to explore related themes and narrative structures. Topics include the literary dialogue between Anglo and Latin American writers and their comparative treatments of history, myth, memory, and war. Paired readings of Poe and Cortázar; Bierce and Fuentes; Crane and Borges; and Faulkner's *Absalom, Absalom!* and García Márquez's *One Hundred Years of Solitude*. Conducted in English; a section in Spanish available depending on demand. Readings of Latin American texts in Spanish for Spanish and Literature majors. Prerequisite: SPAN 140, 142, 145, or equivalent. HU

* **LAST 392a / LITR 296a / PORT 392a, Brazil's Modern Art Movement** K. David Jackson

A study of Brazilian modernism in literature and the arts, centered on São Paulo's "Modern Art Week" of 1922 from the perspective of the European avant-gardes (cubism, futurism, surrealism). The *Cannibal Manifesto* and cultural independence from Europe; avant-garde practices in literature and the arts from the 1920s to the construction of Brasília. Reading knowledge of French and Portuguese helpful but not required. WR, HU TR

* **LAST 423a / EP&E 243a / GBL 336a / PLSC 423a, Political Economy of Poverty Alleviation** Ana De La O

Overview of classic and contemporary approaches to the question of why some countries have done better than others at reducing poverty. Emphasis on the role of politics. SO

PLSC 148b / HMRT 100b, Theories, Practices, and Politics of Human Rights Thania Sanchez

Introduction to core human-rights issues, ideas, practices, and controversies. The concept of human rights as a philosophical construct, a legal instrument, a political tool, an approach to economic and equity issues, a social agenda, and an international locus of contestation and legitimation. Required for students in the Multidisciplinary Academic Program in Human Rights. SO

* **PLSC 152a / EP&E 245a, Global Firms and National Governments** Joseph LaPalombara

Interactions between large-scale firms that make international investments and policy makers and government officials in the "host" countries. National and subnational officials who work to attract investments (or not) and who set policies regulating global firms and their investments. Focus on less-developed countries. Theories as to why firms "globalize"; case studies of controversies created by overseas corporate investments; the changing economic landscape associated with investments by countries such as China, Brazil, and India. SO

* **PLSC 399b / EP&E 257b / LAST 251b, Politics in Latin America** Ana De La O

Overview and analysis of politics in Latin America. The emergence of democracy and the forces that led to the unprecedented increase in inequality in the twentieth century. Topics include institutional design, historical legacies, corruption, clientelism, and violence.

* **PLSC 415a / SOCY 172a, Religion and Politics in the World** Katharine Baldwin

A broad overview of the relationship between religion and politics around the world, especially Christianity and Islam. Religions are considered to constitute not just theologies but also sets of institutions, networks, interests, and sub-cultures. The course's principal aim is to understand how religion affects politics as an empirical matter, rather than to explore moral dimensions of this relationship. SO

PLSC 439b / GBL 263b, Challenges of Young Democracies Ana De La O

Challenges faced by young democracies, such as organizing free and fair elections, controlling government corruption, building an accountable system of governance, sustaining development, and curtailing conflict and violence. Factors that lead to the consolidation of democratic politics or to stagnation and a return to nondemocratic political systems. SO

Directed Reading and Senior Essay Courses

* **LAST 471a, Directed Reading** Staff

For students who wish to investigate an area of Latin American Studies not covered by regular offerings. The project must terminate with a term paper or its equivalent. No more than one term of credit may be earned. To apply for admission, a student should present a prospectus and a bibliography to the director of undergraduate studies no later than one day before the course selection period concludes. Written approval from the faculty member who will direct the student's reading and writing must accompany the prospectus.

* **LAST 491a or b, The Senior Essay** Staff

Preparation of a research paper about forty pages long under the direction of a faculty adviser, in either the fall or the spring term. Students write on subjects of their own choice. During the term before the essay is written, students plan the project in consultation with a qualified adviser or the director of undergraduate studies. The student must submit a suitable project outline and bibliography to the adviser and the director of undergraduate studies by the third week of the term. The outline should indicate the focus and scope of the essay topic, as well as the proposed research methodology. Permission may be given to write a two-term essay after consultation with an adviser and the director of undergraduate studies and after submission of a project statement. Only those who have begun to do advanced work in a given area are eligible. The requirements for the one-term senior essay apply to the two-term essay, except that the two-term essay should be substantially longer.

Linguistics

Director of undergraduate studies: Raffaella Zanuttini, 209 DOW, 432-2452, raffaella.zanuttini@yale.edu; ling.yale.edu

Linguistics is the scientific study of language. The major in Linguistics offers a program of study leading toward an understanding of phonological, grammatical, and semantic structure and of various approaches to descriptive, experimental, and historical linguistics. Majors may concentrate on theoretical, experimental, or computational linguistics, on various aspects of comparative grammar, or on a particular family of languages. Interested students should consult the director of undergraduate studies.

COURSES FOR NONMAJORS AND MAJORS

Students with no previous background in linguistics are encouraged to approach the field by taking a 100-level course.

REQUIREMENTS OF THE MAJOR

The major requires twelve term courses in linguistics and related areas, distributed as follows:

1. Breadth requirement (four courses). All majors must take a course in each of the core areas of phonology (LING 232) and syntax (LING 253). In addition, at least one course must be taken in any two of the six remaining core areas of linguistics: phonetics, morphology, semantics/pragmatics, computational linguistics, language and mind/brain, and historical linguistics.
2. Depth requirement (two courses). In one of the eight core areas of linguistics, students must take two additional courses beyond the introductory level.
3. Electives (four courses). Four additional courses relating to linguistics are required, at least one of which must be at the 200 level or above. Electives may be chosen from courses offered by the Linguistics department or, with approval of the director of undergraduate studies, from related courses in programs such as Anthropology, Classics, Cognitive Science, Computer Science, English, Philosophy, Psychology, or foreign languages.
4. Research requirement (one course). LING 490, Research Methods in Linguistics, is required and is usually taken in the fall term of the senior year.

SENIOR REQUIREMENT

Senior requirement (one course). Students attend a research colloquium and write a senior essay in LING 491 during the spring term of the senior year.

ADVISING

Combined B.A./M.A. degree program Exceptionally able and well-prepared students may complete a course of study leading to the simultaneous award of the B.A. and M.A. degrees after eight terms of enrollment. See Simultaneous Award of the Bachelor's and Master's Degrees under Special Arrangements (p. 64) in the Academic Regulations. Interested students should consult the director of undergraduate studies prior to the sixth term of enrollment for specific requirements in Linguistics.

REQUIREMENTS OF THE MAJOR

Prerequisites None

Number of courses 12 term courses (incl senior req)

Specific courses required LING 232, 253, 490

Distribution of courses 1 course each in 2 addtl core areas, as specified; 2 addtl courses beyond intro level in 1 core area; 4 electives, at least 1 at the 200 level or above

Senior requirement LING 491

FACULTY OF THE DEPARTMENT OF LINGUISTICS

Professors Claire Bovern, Robert Frank (*Chair*), Laurence Horn (*Emeritus*), †Frank Keil, †Joshua Knobe, †Jason Stanley, †Zoltán Szabó, Petronella Van Deusen-Scholl (*Adjunct*), Raffaella Zanuttini

Associate Professors Maria Piñango, Kenneth Pugh (*Adjunct*)

Assistant Professors Jason Shaw, Natalie Weber, Jim Wood

Lector Jessica Tanner

Lecturer Hadas Kotek

†A joint appointment with primary affiliation in another department.

Introductory Courses

Courses in this group do not require previous study of linguistics.

ASL 110a, American Sign Language I Jessica Tanner

An introduction to American Sign Language (ASL), with emphasis on vocabulary, ASL grammar, Deaf Culture and Conversational skills. Use of visual material (DVD), communicative activities, grammar drills, classifiers and Deaf Culture study. ASL 120 is not required to earn credit for ASL 110 L1 1½ Course cr

ASL 120b, American Sign Language II Jessica Tanner

A continuation to American Sign Language (ASL) I, with emphasis on ASL grammar, expressive and receptive skills in storytelling and dialogues. Use of visual materials (DVD), grammar drills, proper use of non-manual markers and body language. Emphasis on character development, role shifting and story cohesion. Prerequisite: ASL 110. L2 1½ Course cr

LING 110a, Language: Introduction to Linguistics Jason Shaw

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 relation of linguistics to psychology, logic, and other disciplines. SO

LING 112a, Historical Linguistics Claire Bovern

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. WR, HU

*** LING 115a / SKRT 110a, Introductory Sanskrit I** Staff

An introduction to Sanskrit language and grammar. Focus on learning to read and translate basic Sanskrit sentences in Devanagari script. No prior background in Sanskrit assumed. L1 1½ Course cr

LING 116b / CGSC 216b, Cognitive Science of Language Robert Frank

The study of language from the perspective of cognitive science. Exploration of mental structures that underlie the human ability to learn and process language, drawing on studies of normal and atypical language development and processing, brain imaging, neuropsychology, and computational modeling. Innate linguistic structure vs. determination by experience and culture; the relation between linguistic and nonlinguistic cognition in the domains of decision making, social cognition, and musical cognition; the degree to which language shapes perceptions of color, number, space, and gender. SO

LING 125b / SKRT 120b, Introductory Sanskrit II Staff

Continuation of SKRT 110. Focus on the basics of Sanskrit grammar; readings from classical Sanskrit texts written in Devanagari script. After SKRT 110. L2 1½ Course cr

LING 138a / SKRT 130a, Intermediate Sanskrit I Staff

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*. After SKRT 120 or equivalent. L3

LING 148b / SKRT 140b, Intermediate Sanskrit II Staff

Continuation of SKRT 130, focusing on Sanskrit literature from the *kavya* genre. Readings include selections from the *Jatakamala* of Aryasura and the opening verses of Kalidasa's *Kumarasambhava*. After SKRT 130 or equivalent. L4

*** LING 150a / ENGL 150a, Old English** Staff

An introduction to the language, literature, and culture of earliest England. A selection of prose and verse, including riddles, heroic poetry, meditations on loss, a dream vision, and excerpts from *Beowulf*, which are read in the original Old English. HU

Intermediate Courses

Some courses in this group have prerequisites; others do not, and may be taken as a student's first course in linguistics.

*** LING 200b, Experimentation in Linguistics** Maria Piñango and Jason Shaw

Principles and techniques of experimental design and research in linguistics. Linguistic theory as the basis for framing experimental questions. The development of theoretically informed hypotheses, notions of control and confounds, human subject research, statistical analysis, data reporting, and dissemination. Prerequisite: LING 110, 117, 220, CGSC 110, or PSYC 110, or permission of instructor. SO

*** LING 211b, 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 non-standard 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"). SO

LING 217a / EDST 237a / PSYC 317a, Language and Mind Maria Piñango

The structure of linguistic knowledge and how it is used during communication. The principles that guide the acquisition of this system by children learning their first language and adults learning a second language. The processing of language in real-time. Language breakdown as a result of brain damage. SO

LING 219a / ANTH 380a, The Evolution of Language and Culture Claire Bowers

Introduction to cultural and linguistic evolution. How diversity evolves; how innovations proceed through a community; who within a community drives change; how changes can be "undone" to reconstruct the past. Methods originally developed for studying evolutionary biology are applied to language and culture. None WR, SO

LING 220b / PSYC 318b, General Phonetics Jason Shaw

Investigation of possible ways to describe the speech sounds of human languages. Acoustics and physiology of speech; computer synthesis of speech; practical exercises in producing and transcribing sounds. SO

LING 224a, Mathematics of Language Robert Frank

Study of formal systems that play an important role in the scientific study of language. Exploration of a range of mathematical structures and techniques; demonstrations of their application in theories of grammatical competence and performance including set theory, graphs and discrete structures, algebras, formal language, and automata theory. Evaluation of strengths and weaknesses of existing formal theories of linguistic knowledge. QR, SO

LING 227a / PSYC 327a, 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 instructor. QR, SO

LING 231b / PSYC 331b, Neurolinguistics Maria Piñango

The study of language as a cognitive neuroscience. The interaction between linguistic theory and neurological evidence from brain damage, degenerative diseases (e.g., Alzheimer's disease), mental illness (e.g., schizophrenia), neuroimaging, and neurophysiology. The connection of language as a neurocognitive system to other systems such as memory and music. SO

* **LING 232a, 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 220, or a grade of B or above in LING 110. SO

* **LING 235b, 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 the relationship of phonological theory to language

acquisition and learnability. Opacity, lexical phonology, and serial versions of optimality theory. Prerequisite: LING 232 or permission of instructor. SO RP

*** LING 241b, Field Methods** Claire Bower

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. Open to majors in Linguistics, and to others with permission of instructor. SO

LING 253a, Syntax I Raffaella Zanuttini

If you knew all the words of a language, would you be able to speak that language? No, because you'd still need to know how to put the words together to form all and only the grammatical sentences of that language. This course focuses on the principles of our mental grammar that determine how words are put together to form sentences. Some of these principles are shared by all languages, some differ from language to language. The interplay of the principles that are shared and those that are distinct allows us to understand how languages can be very similar and yet also very different at the same time. This course is mainly an introduction to syntactic theory: it introduces the questions that the field asks, the methodology it employs, some of the main generalizations that have been drawn and results that have been achieved. Secondly, this course is also an introduction to scientific theorizing: what it means to construct a scientific theory, how to test it, and how to choose among competing theories. SO

LING 254b, Syntax II Hadas Kotek

Recent developments in the principles and parameters approach to syntactic theory. In-depth exploration of theoretical and empirical issues in long-distance dependencies (island effects, dependency types, movement vs. binding), the character of syntactic structure (constituency, thematic mapping, functional categories), and the architecture of grammatical derivations (logical form, operations for structure building, anaphora). Prerequisite: LING 253. SO

LING 263a, Semantics I Hadas Kotek

Introduction to truth-conditional compositional semantics. Set theory, first- and higher-order logic, and the lambda calculus as they relate to the study of natural language meaning. Some attention to analyzing the meanings of tense/aspect markers, adverbs, and modals. QR, SO

LING 271a / PHIL 271a, Philosophy of Language Jason Stanley

An introduction to contemporary philosophy of language, organized around four broad topics: meaning, reference, context, and communication. Introduction to the use of logical notation. HU

Advanced Courses and Seminars

*** LING 372a, Meaning, Concepts, and Words** Maria Piñango

A cognitive approach to the structure of meaning from the perspective of the language system. The brain's finite collection of stored concepts, which are combined and recombined via predetermined principles. The system of associating combinations of concepts with combinations of words and sentences to produce an unlimited number of novel thoughts. Prerequisite: at least one course in linguistics, psychology, or cognitive science. SO

* **LING 378a, The Syntax of Speech Participants** Raffaella Zanuttini

This course focuses on grammatical elements that make salient the role of speaker and addressee: markers of politeness; pronouns that express the familiar and polite distinction; vocatives; as well as “presentatives,” including sentences whose function is to bring something to the attention of the addressee. On the empirical side, we discover, describe, and compare elements that convey information about the addressee, the speaker, or the speaker-addressee relation. On the theoretical side, we ask which aspects of the information that they convey should be encoded in the syntax, if any, and how it should be encoded. Prerequisite: LING 253, or permission of instructor. SO

Research Courses

* **LING 490a / PSYC 372a, Research Methods in Linguistics** Hadas Kotek

Development of skills in linguistics research, writing, and presentation. Choosing a research area, identifying good research questions, developing hypotheses, and presenting ideas clearly and effectively, both orally and in writing; methodological issues; the balance between building on existing literature and making a novel contribution. Prepares for the writing of the senior essay.

* **LING 491b, The Senior Essay** Raffaella Zanuttini

Research and writing of the senior essay under the guidance of a faculty adviser. Students present research related to their essays in a weekly colloquium. Prerequisite: LING 490.

Related Courses

* **CHLD 128b / EDST 128b / PSYC 128b, Language, Literacy, and Play** Nancy Close and Carla Horwitz

The complicated role of play in the development of language and literacy skills among preschool-aged children. Topics include social-emotional, cross-cultural, cognitive, and communicative aspects of play. WR, SO RP

CPSC 470b, Artificial Intelligence Brian Scassellati

Introduction to artificial intelligence research, focusing on reasoning and perception. Topics include knowledge representation, predicate calculus, temporal reasoning, vision, robotics, planning, and learning. After CPSC 201 and 202. QR

LATN 110a, Beginning Latin: The Elements of Latin Grammar Staff

Introduction to Latin. Emphasis on morphology and syntax within a structured program of readings and exercises. Prepares for LATN 120. No prior knowledge of Latin assumed. Preregistration, which is required, takes place at the Academic Fair. See the *Calendar for the Opening Days* or the departmental Web site for details about preregistration. L1 RP 1½ Course cr

CPSC 477b, 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. Prerequisites: CPSC 202 and CPSC 223, or permission of instructor. QR

* **LATN 390b, 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. L5, HU

PHIL 115a, First-Order Logic Elizabeth Miller

An introduction to formal logic. Study of the formal deductive systems and semantics for both propositional and predicate logic. Some discussion of metatheory. QR

PHIL 267a, Mathematical Logic Sun-Joo Shin

An introduction to the metatheory of first-order logic, up to and including the completeness theorem for the first-order calculus. Introduction to the basic concepts of set theory. Prerequisite: PHIL 115 or permission of instructor. QR

* **PHIL 427b, Computability and Logic** Sun-Joo Shin

A technical exposition of Gödel's first and second incompleteness theorems and of some of their consequences in proof theory and model theory, such as Löb's theorem, Tarski's undefinability of truth, provability logic, and nonstandard models of arithmetic. Prerequisite: PHIL 267 or permission of instructor. QR, HU

* **SLAV 202a, Church Slavonic** Harvey Goldblatt

A study of the long history of Church Slavonic, with special attention given to "New" or "Synodal" Church Slavonic, the language used in the "Elizabeth" or "Synodal" Bible (first published in 1751), which remains even today the authorized version of the Russian Orthodox Church. Special emphasis on the reading of representative New Testament excerpts from this "Synodal Bible," comparing them to equivalent textual portions written in both earlier forms of Russian Church Slavonic and Modern Russian. Conducted in English. Prerequisite: Knowledge of Modern Russian.

Literature

Director of undergraduate studies: Robyn Creswell, 451 College Street, 432-4751, robyn.creswell@yale.edu; (robyn.creswell@yale.edu)
 registrar: maryjane.stevens@yale.edu; complit.yale.edu/literature-major

The Literature and Comparative Cultures Major and the Comparative Literature Major allow students to address fundamental questions about the nature, function, and value of literature in a broadly comparative context. Students read and write about a wide variety of literary works across periods, genres, and national traditions. They investigate ancient and contemporary approaches to literary study, theories and methods of comparison, and the relationship of literature to film and other media. Majors have the freedom to construct a program of study that reflects their intellectual goals. All prospective majors should register with the director of undergraduate studies, who will work with them to develop a coherent sequence of courses suited to their individual interests.

The majors offer a number of their own courses, which constitute the core of the programs. Other courses are normally chosen from different language and literature programs, many of which offer courses on literature and film in translation. Among these programs are African American Studies (p. 95), Classics (p. 202), East Asian Languages and Literatures (p. 243), English Language and Literature (p. 313), Film and Media Studies (p. 365), French (p. 386), German Studies (p. 407), Italian (p. 479), Near Eastern Languages and Civilizations (p. 586), Portuguese (p. 642), Slavic Languages and Literatures (p. 673), and Spanish (p. 702). Students with a particular interest in film or literary translation may wish to elect the film track or translation track within the majors, as described below.

Prospective majors are strongly encouraged to begin the study of a foreign language as early as possible in their academic careers and to continue such study throughout their time at Yale. Students interested in graduate study in comparative literature should be aware that many programs require reading knowledge of two or three foreign languages.

REQUIREMENTS OF THE LITERATURE AND COMPARATIVE CULTURES MAJOR

Requirements of the Literature and Comparative Cultures major for the Class of 2019 With DUS approval, the following changes to the requirements of the major may be fulfilled by students who declared their major under previous requirements.

Requirements of the Literature and Comparative Cultures major for the Class of 2020 and subsequent classes This standard literature major requires twelve term courses, including the senior requirement. Prospective majors must take two junior seminars; LITR 130 and one of LITR 140, 143, or 348. Students in the film track must take LITR 143 and students in the translation track must take LITR 348. Beyond the two required courses and the senior essay, the major requires nine term courses. These include three courses in a foreign literature with readings in the original language, three courses that fulfill the period requirement, and three elective courses. One of the electives must involve a significant element of literary or cultural theory. All three

elective courses may be taken in any literature department and may include two courses in a related discipline that has direct bearing on the student's program of study in literature, such as history of art, philosophy, anthropology, music, or theater studies. One of the elective courses may be in creative writing or directed studies.

Foreign literature requirement All majors are required to take at least three courses, one of which may award the language distributional requirement (L5), in an ancient or modern foreign literature, in which the literature is read in the original language. Two courses can be taken at a basic literature level (normally equivalent to the third year of language study), but at least one course must be taken at an advanced level (normally equivalent to the fourth year of language study or higher).

A literature course in English translation is sometimes suitable as a foreign literature course. In such cases, majors are expected to request additional assignments from their instructors that demonstrate they have engaged with the texts in the original language. They should submit the appropriate form, signed by the instructor, attesting to their intent to do so. This form is available in the department office in Room 102, 451 College St.; students should submit it to the DUS along with their course schedule.

Nonnative speakers of English who are granted permission by Yale College to complete the foreign language distributional requirement by taking ENGL 114, 115, 120, 121, or 450 may take three additional English literature courses to fulfill the foreign literature requirement of the Literature and Comparative Cultures Major, or they may fulfill the major requirements in a third language.

Period requirement Students are required to take at least one course in three of five historical periods: 1) Antiquity; 2) The Middle Ages; 3) The Renaissance; 4) 17-18th Centuries; and 5) the Modern period (1800-present). Courses taken from other departments (excluding Directed Studies) may fulfill the period requirement with DUS permission.

Theory requirement All students must take one elective course that involves a significant component of literary or cultural theory. Students who wish to know if a particular course, particularly those offered in other departments, may count toward this requirement should consult the DUS.

Film track Students in the film track must take LITR 143, and they must take two foreign literature courses rather than three (neither course may be substituted with an advanced language course). In addition, students in the film track must take one course in film theory and must choose their three electives from courses in film and media studies.

Translation track Students in the translation track must take LITR 348 and must also choose two of their three electives from courses that engage with some aspect of translation studies; the office of the DUS maintains a list of qualifying courses.

Credit/D/Fail A maximum of two courses taken Credit/D/Fail may count toward the major, with permission of the DUS. None of the specific required courses may be taken Credit/D/Fail.

SENIOR REQUIREMENT

In the senior essay, required of all majors, students develop a research topic of their choice and work closely with a faculty adviser, preferably from the department. Normally, the essay makes use of texts in the language of their original composition. Any exceptions must be approved by the DUS. Deadlines for the prospectus, the rough draft, and the completed essay are listed in the course descriptions of the senior essay course (LITR 491, or 492, and 493).

The senior essay may be written over one term (LITR 491) or over two terms (LITR 492, 493). Students with an especially well-developed project may petition to write a yearlong senior essay. Interested juniors must apply to the DUS by the last day of classes in the spring term. Students may count the second term of the essay as one elective course toward the total number of courses required for the major. Students expecting to graduate in May enroll in LITR 492 during the fall term and complete their essays in 493 in the spring term. December graduates enroll in 492 in the spring term and complete their essays in 493 during the following fall term. Students planning to begin their essay in the spring term should notify the DUS by the last day of classes in the fall term.

REQUIREMENTS OF THE LITERATURE AND COMPARATIVE CULTURES MAJOR

Prerequisites None

Number of courses 12 term courses (incl senior essay)

Specific courses required LITR 130; one of LITR 140, 143, or 348; *Film track*—LITR 143; *Translation track*—LITR 348 or equivalent

Distribution of courses *Standard major*—3 period courses, as specified; 3 courses in 1 foreign lit, as specified; 3 electives, as specified; *Film track*—3 period courses, 2 courses in 1 foreign lit, as specified; 1 course in film theory; 3 electives in film & media studies; *Translation track*—3 period courses, 3 courses in 1 foreign lit, as specified; 2 of 3 electives in translation studies

Substitution permitted *Standard and translation tracks*—1 lit course in English translation for 1 of 3 req lit courses, with DUS permission

Senior requirement One-term senior essay (LITR 491); or two-term senior essay (LITR 492 and LITR 493)

REQUIREMENTS OF THE COMPARATIVE LITERATURE MAJOR

Requirements of the Comparative Literature major for Class of 2019 With DUS approval, the following changes to the requirements of the major may be fulfilled by students who declared their major under previous requirements.

Requirements of the Comparative Literature major for the Class of 2020 and subsequent classes This intensive literature major is similar to the standard major, with more specific foreign literature requirements, however unlike the standard major, Comparative Literature majors must take LITR 130 and 140 and the latter may not be substituted for by taking LITR 143 or 348. The major requires twelve term courses, including two required junior seminars, LITR 130 and 140, the senior essay, and nine term courses. The remaining requirements include three courses that fulfill the period requirement, one elective that involves a significant element of literary or cultural theory, three courses in one foreign literature (one of which may be an L5 course) and

two courses in a second foreign literature (one of which may be an L5 course). In all five of the foreign literature courses, the literature must be read in the original language.

Period requirement Students are required to take at least one course in three of five historical periods: 1) Antiquity; 2) The Middle Ages; 3) The Renaissance; 4) 17-18th Centuries; and 5) the Modern period (1800-present). Courses taken from other departments (excluding Directed Studies) may fulfill the period requirement with DUS permission.

Theory requirement All students must take one elective course that involves a significant component of literary or cultural theory. Students who wish to know if a particular course, particularly those offered in other departments, may count toward this requirement should consult the DUS.

Credit/D/Fail A maximum of two courses taken Credit/D/Fail may count toward the major, with permission of the DUS. None of the specific required courses may be taken Credit/D/Fail.

SENIOR REQUIREMENT

In the senior essay, required of all majors, students develop a research topic of their choice and work closely with a faculty adviser, preferably from the department. Normally, the essay makes use of texts in the language of their original composition. Any exceptions must be approved by the DUS. Deadlines for the prospectus, the rough draft, and the completed essay are listed in the course descriptions of the senior essay course (LITR 491, or 492, and 493).

The senior essay may be written over one term (LITR 491) or over two terms (LITR 492, 493). Students with an especially well-developed project may petition to write a yearlong senior essay. Interested juniors must apply to the DUS by the last day of classes in the spring term. Students may count the second term of the essay as one elective course toward the total number of courses required for the major. Students expecting to graduate in May enroll in LITR 492 during the fall term and complete their essays in 493 in the spring term. December graduates enroll in 492 in the spring term and complete their essays in 493 during the following fall term. Students planning to begin their essay in the spring term should notify the DUS by the last day of classes in the fall term.

REQUIREMENTS OF THE COMPARATIVE LITERATURE MAJOR

Prerequisites None

Number of courses 12 term courses (incl senior essay)

Specific courses required LITR 130, 140

Distribution of courses 3 period courses, as specified, 1 elective with literary or cultural theory element, as specified, 3 courses in one foreign litr, as specified, 2 courses in a second foreign litr, as specified

Senior requirement One-term senior essay (LITR 491); or two-term senior essay (LITR 491 and LITR 492)

STUDY ABROAD FOR BOTH MAJORS

Literature majors are encouraged to consider spending a summer, a term, or a year abroad. One course taken through international programs may, with permission of the DUS, be applied to the foreign literature requirement.

UNIQUE TO BOTH MAJORS

The following table lists languages in which advanced literature instruction is available at Yale, specifying courses that fulfill the basic and advanced literature requirements for the majors. Courses with numbers higher than those listed also normally fulfill the requirement, providing that they focus on literature (rather than language) and that the literature is read in the original language.

Other ancient and modern languages, including those from Africa, South Asia, and the Middle East, may be suitable for either major if a qualified faculty adviser is available to supervise the student.

Language	Basic Literature Course	Advanced Literature Course
Arabic	ARBC 150, 151	ARBC 161 or 165
Chinese	CHNS 150, 151	CHNS 170 or 171
French	FREN 170	Courses in French numbered 200 or higher
German	Courses in German numbered 170 or higher	Courses in German numbered 200 or higher
Ancient Greek	GREK 131 or 141	Ancient Greek courses numbered 400 or higher
Modern Hebrew	By arrangement with instructor	By arrangement with instructor
Italian	Courses in Italian numbered 200 or higher	Courses in Italian numbered 200 or higher
Japanese	JAPN 150, 151	JAPN 170 or 171
Korean	KREN 150, 151	EALL 470 or 471
Latin	LATN 131 or 141	Latin courses numbered 400 or higher
Persian	PERS 150	PERS 150
Portuguese	By arrangement with instructor	By arrangement with instructor
Russian	RUSS 150, 151	Courses in Russian numbered 170 or higher
Spanish	SPAN 261, 262, 266, or 267	Courses in Spanish numbered 300 or higher

FACULTY OF THE DEPARTMENT OF COMPARATIVE LITERATURE

Professors Dudley Andrew, Peter Brooks (*Emeritus*), Rüdiger Campe, Katerina Clark, Roberto González Echevarría, Martin Hägglund, Hannan Hever, Carol Jacobs (*Emeritus*), Pericles Lewis, Rainer Nägele (*Emeritus*), David Quint, Katie Trumpener, Jing Tsu, Jane Tylus

Associate Professors Moira Fradinger, Ayesha Ramachandran

Assistant Professors Robyn Creswell, Marta Figlerowicz

Senior Lecturer Peter Cole

Lecturers Jan Hagens, George Syrimis

Senior Lector Candace Skorupa

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 L. Miller (*French*), Joseph Roach (*English*), Maurice Samuels (*French*), Ruth Yeazell (*English*)

First-Year Seminar

* **LITR 023a / ENGL 025a / SAST 059a, Modern South Asian Literature, 1857-2017**
Staff

Exploration of literary texts from South Asia, 1857 to the present. Close reading of literary texts from India, Pakistan, Bangladesh, and Sri Lanka, alongside political speeches, autobiographies, and oral narratives. Topics include colonialism, history writing, migration, language, caste, gender and desire, translation, politics and the novel. Enrollment limited to first-year students. Preregistration required; see under First-Year Seminar Program. WR, HU

* **LITR 099a / FILM 099a, Film and the Arts** Dudley Andrew

A study of cinema as it developed into a significant art form, including its interactions with fiction, theater, and painting. Focus on André Bazin's reflections on cinema in response to Chaplin, Welles, and Cocteau, as well as to writers such as Faulkner, Sartre, and Malraux. Enrollment limited to first-year students. Preregistration required; see under First-Year Seminar Program. WR, HU RP

Prerequisites and Required Courses

* **LITR 130a / HUMS 130a, How to Read** Katie Trumpener

Introduction to techniques, strategies, and practices of reading through study of lyric poems, narrative texts, plays and performances, films, new and old, from a range of times and places. Emphasis on practical strategies of discerning and making meaning, as well as theories of literature, and contextualizing particular readings. Topics include form and genre, literary voice and the book as a material object, evaluating translations, and how literary strategies can be extended to read film, mass media, and popular culture. Junior seminar; preference given to juniors and majors. HU

* **LITR 140b, How To Compare** Robyn Creswell

Exploration of literary comparison. Study of different literary and aesthetic objects, as well as different means and ends that such comparisons can have. Topics range from theories of translation and ekphrasis to proper use of archives. Readings include works by Borges, Andre Breton, Chen Kaige, Hafiz, Dickinson, Ovid, Durrenmatt, Murasaki Shikubu, Mambety, and Segalen; the paintings of Mantegna, Rembrandt,

and Caravaggio; as well as the Pancatantra, Arabian Nights, and the oral epics of the Haida. Junior seminar; preference given to juniors and majors. HU

LITR 143b / ENGL 192b / FILM 240b, World Cinema Dudley Andrew

Development of ways to engage films from around the globe productively. Close analysis of a dozen complex films, with historical contextualization of their production and cultural functions. Attention to the development of critical skills. Includes weekly screenings, each followed immediately by discussion. HU

The Ancient World

* **LITR 154a / ENGL 395a, The Bible as a Literature** Leslie Brisman

Study of the Bible as a literature—a collection of works exhibiting a variety of attitudes toward the conflicting claims of tradition and originality, historicity and literariness. Pre-1800 with completion of supplementary assignments in the language of the King James Bible. If there is sufficient interest, a second section will be offered. WR, HU RP

* **LITR 165b / CLCV 119b, The Invention of the Classic** Irene Peirano

The discourse of classicism from antiquity to modern times. Contemporary debates over the value of the classics in education; the emergence of classics as a discipline; changing definitions of the classic across time; notions commonly associated with the classics such as timelessness, beauty, and canon. Readings from Cicero, Horace, Dionysius of Halicarnassus, Winckelmann, Eliot, Gadamer, Foucault, Kermodé, Calvino, and Nussbaum. HU

* **LITR 168a / ENGL 129a, Tragedy in the European Literary Tradition** Staff

The genre of tragedy from its origins in ancient Greece and Rome through the European Renaissance to the present day. Themes of justice, religion, free will, family, gender, race, and dramaturgy. Works include Homer's *Iliad* and plays by Aeschylus, Sophocles, Euripides, Seneca, Shakespeare, Racine, Ibsen, Chekhov, Brecht, Beckett, and Soyinka. Focus on textual analysis and on developing the craft of persuasive argument through writing. WR, HU

* **LITR 169b / ENGL 130b, Epic in the European Literary Tradition** Staff

The epic tradition traced from its foundations in ancient Greece and Rome to the modern novel. The creation of cultural values and identities; exile and homecoming; the heroic in times of war and of peace; the role of the individual within society; memory and history; politics of gender, race, and religion. Works include Homer's *Odyssey*, Vergil's *Aeneid*, Dante's *Inferno*, Cervantes's *Don Quixote*, and Joyce's *Ulysses*. Focus on textual analysis and on developing the craft of persuasive argument through writing. WR, HU

Medieval and Early Modern Literature to 1800

LITR 174a / EALL 211a / WGSS 405a, Women and Literature in Traditional China

Kang-i Sun Chang

A study of major women writers in traditional China, as well as representations of women by male authors. The power of women's writing; women and material culture; women in exile; courtesans; Taoist and Buddhist nuns; widow poets; cross-dressing women; the female body and its metaphors; footbinding; notions of love and death; the aesthetics of illness; women and revolution; 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. Formerly CHNS 201. HU

LITR 175b / EALL 206b / HSAR 206b, Japan's Classics in Text and Image Edward Kamens

An introduction to the Japanese classics (poetry, narrative fiction, drama) in their manifestations in multiple media, especially in the visual and material realm. Special reference to and engagement with a simultaneous Yale University Art Gallery installation of rare books, paintings, and other works of art from Japan. No knowledge of Japanese required. Formerly JAPN 200. WR, HU TR

LITR 183a / HUMS 180a / ITAL 310a, 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. No knowledge of Italian required. Course conducted in English. HU TR

* **LITR 184b / HUMS 142b / WGSS 146b, Women and the Supernatural in Medieval Literature** Johanna Fridriksdottir

Study of medieval texts from a wide geographic and chronological range, all of which prominently feature female characters that exhibit supernatural features or practice magic. Narratives about fairies, witches, hags, and monstrous women analyzed in order to explore intersections of gender and sexuality, Otherness, ethics, violence, fantasy, and related themes in medieval culture. HU

European Literature since 1800

LITR 214a / FREN 240a / HUMS 201a, The Modern French Novel Maurice Samuels and Alice Kaplan

A survey of major French novels, considering style and story, literary and intellectual movements, and historical contexts. Writers include Balzac, Flaubert, Proust, Camus, and Sartre. Readings in translation. One section conducted in French. HU TR

LITR 215a / GMAN 311a, The Age of Goethe Kirk Wetters

Introduction to Germany's classical period, from the 1780s to the 1810s, with attention to the varied forms of literature, philosophy, art, music, and culture. The close connection between literature and philosophy; the theoretical foundations of European Romanticism. Some attention to twentieth-century theory. HU

* **LITR 220b / CZEC 301b / RSEE 300b, Milan Kundera: The Czech Novelist and French Thinker** Karen von Kunes

Close reading of Kundera's novels, with analysis of his aesthetics and artistic development. Relationships to French, German, and Spanish literatures and to history, philosophy, music, and art. Topics include paradoxes of public and private life, the irrational in erotic behavior, the duality of body and soul, the interplay of imagination and reality, the function of literary metaphor, and the art of composition. Readings and discussion in English. HU TR

* **LITR 224a / FREN 403a / HUMS 409a, Proust Interpretations: Reading *Remembrance of Things Past*** R. Howard Bloch and Pierre Saint-Amand

A close reading (in English) of Marcel Proust's masterpiece, *Remembrance of Things Past*, with emphasis upon major themes: time and memory, desire and jealousy, social

life and artistic experience, sexual identity and personal authenticity, class and nation. Portions from *Swann's Way*, *Within a Budding Grove*, *Cities of the Plain*, *Time Regained* considered from biographical, psychological/psychoanalytic, gender, sociological, historical, and philosophical perspectives. WR, HU TR

* **LITR 230a / CLCV 209a / MGRK 215a, Nikos Kazantzakis: From Revolution to Nihilism** George Syrimis

The Greek poet, novelist, essayist, philosopher, playwright, and travel writer Nikos Kazantzakis. The philosophical influence of Darwin, Nietzsche, and Bergson on Kazantzakis; his fascination with the figures of Christ and Odysseus. Questions of fiction and autobiography, history and revolution, travel writing, twentieth-century existentialism, and the reception of the Homeric tradition. WR, HU TR

* **LITR 239a / CLCV 216a / MGRK 216a / WGSS 209a, Dionysus in Modernity** George Syrimis

Modernity's fascination with the myth of Dionysus. Questions of agency, identity and community, and psychological integrity and the modern constitution of the self. Manifestations of Dionysus in literature, anthropology, and music; the Apollonian-Dionysiac dichotomy; twentieth-century variations of these themes in psychoanalysis, surrealism, and magical realism. HU TR

* **LITR 248a / GMAN 326a, Franz Kafka and Thomas Mann: Two Modernisms** Jan Hagens

Comparison of Kafka's radical modernism and Mann's neoclassical realism as fundamentally different modes of responding to the challenges of twentieth-century culture. Close reading of short stories by both writers, with attention to the authors' themes, literary techniques, and worldviews. Discussion in English; readings in German or English. HU TR

* **LITR 287a / SPAN 387a, The Borges Effect** Roberto González Echevarría
Study of the decisive influence of Jorge Luis Borges on literature and literary theory; his recognizable and often acknowledged presence in the work of novelists and short-story writers, as well as in that of philosophers and literary theorists. A Borges "effect" is studied in the works of John Barth, Julio Cortázar, Gabriel García Márquez, Italo Calvino, and Umberto Eco, and in Maurice Blanchot, Michel Foucault, Gérard Genette, and Jacques Derrida, among others. Class discussions in English and readings in English or the French, Spanish or Italian originals. HU

* **LITR 299b / AFAM 379b / FREN 410b, Colonial Narrative, Postcolonial Counternarrative** Christopher Miller

Readings of paradigmatic, colonial era texts that have provoked responses and rewritings from postcolonial writers and filmmakers. In some cases the rewriting is explicit and direct, in other cases the response is more oblique. Both profound differences of perspective and unexpected convergences will emerge. Readings may include: Aimé Césaire's *A Tempest* after Shakespeare's *Tempest*, Kamel Daoud's *The Meursault Investigation* after Camus's *The Stranger*, and Claire Denis's film *Chocolat* after Ferdinand Oyono's *Houseboy*.

Non-European Literature since 1800

* **LITR 251b / EALL 265b, Japanese Literature after 1970** Stephen Poland
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. Enrollment limited to 20. No knowledge of Japanese required. HU TR

LITR 255a / EALL 289a, Crime and Detective Fiction in East Asian Literature and Film Stephen Poland

Exploration of East Asian literature, film, culture, and history through examination of the genre of "crime" or "detective" fiction. Topics include genre theory, as well as a variety of traveling themes in modernity, such as sexuality, surveillance, colonialism, scientific rationality, perversion, the urban, debt, violence, and transnational cultural flows. HU

* **LITR 260b / LAST 385b / PORT 385b, Brazilian Novel of the 21st Century** K. David Jackson

Changing narratives, themes, styles, and aesthetic ideals in current Brazilian prose and poetry. The writers' attempts to express or define a personal, national, and global consciousness influenced by the return of political democracy to Brazil. Focus on readings published within the last five years. Readings and discussion in English; texts available in Portuguese. WR, HU TR

* **LITR 265b / EALL 256b / EAST 358b / GBLB 251b / HUMS 272b, China in the World** Jing Tsu

Recent headlines about China in the world, deciphered in both modern and historical contexts. Interpretation of new events and diverse texts through transnational connections. Topics include China and Africa, Mandarinization, labor and migration, Chinese America, nationalism and humiliation, and art and counterfeit. Readings and discussion in English. HU

LITR 279b / ER&M 209b / VIET 220b, Introduction to Vietnamese Culture, Values, and Literature Staff

Introduction to Vietnamese culture and values. Topics include cultural and national identity, aesthetics, the meaning of life, war, and death. Selected readings from Zen poems, folklore, autobiographies, and religious and philosophical writings. Course is taught in English and is an alternative to Western perspectives. Readings in translation. No previous knowledge of Vietnamese required. HU

* **LITR 285a / EALL 286a / HUMS 290a / PORT 360a, The Modern Novel in Brazil and Japan** Seth Jacobowitz

Brazilian and Japanese novels from the late nineteenth century to the present. Representative texts from major authors are read in pairs to explore their commonalities and divergences. Topics include nineteenth-century realism and naturalism, the rise of mass culture and the avant-garde, and existentialism and postmodernism. No knowledge of Portuguese or Japanese required. HU

* **LITR 287a / SPAN 387a, The Borges Effect** Roberto González Echevarría
Study of the decisive influence of Jorge Luis Borges on literature and literary theory; his recognizable and often acknowledged presence in the work of novelists and short-story writers, as well as in that of philosophers and literary theorists. A Borges "effect"

is studied in the works of John Barth, Julio Cortázar, Gabriel García Márquez, Italo Calvino, and Umberto Eco, and in Maurice Blanchot, Michel Foucault, Gérard Genette, and Jacques Derrida, among others. Class discussions in English and readings in English or the French, Spanish or Italian originals. HU

* **LITR 289b / LAST 391b / SPAN 392b, Literature of the Americas, North and South**
 Rolena Adorno

Readings of U.S. and Latin American short stories and novels to explore related themes and narrative structures. Topics include the literary dialogue between Anglo and Latin American writers and their comparative treatments of history, myth, memory, and war. Paired readings of Poe and Cortázar; Bierce and Fuentes; Crane and Borges; and Faulkner's *Absalom, Absalom!* and García Márquez's *One Hundred Years of Solitude*. Conducted in English; a section in Spanish available depending on demand. Readings of Latin American texts in Spanish for Spanish and Literature majors. Prerequisite: SPAN 140, 142, 145, or equivalent. HU

* **LITR 296a / LAST 392a / PORT 392a, Brazil's Modern Art Movement** K. David Jackson

A study of Brazilian modernism in literature and the arts, centered on São Paulo's "Modern Art Week" of 1922 from the perspective of the European avant-gardes (cubism, futurism, surrealism). The *Cannibal Manifesto* and cultural independence from Europe; avant-garde practices in literature and the arts from the 1920s to the construction of Brasília. Reading knowledge of French and Portuguese helpful but not required. WR, HU TR

Literary Theory and Special Topics

* **LITR 301b / FILM 360b / RUSS 380b, Putin's Russia and Protest Culture** Marijeta Bozovic

Survey of Russian literature and culture since the fall of communism. The chaos of the 1990s; the solidification of power in Putin's Russia; the recent rise of protest culture. Sources include literature, film, and performances by art collectives. Readings and discussion in English; texts available in Russian. WR, HU

* **LITR 304a / SPAN 388a, Law and Literature in Modern Latin America** Roberto González Echevarría

A study of major modern narrative works in Latin America from the independence and post-independence period in the nineteenth century to the age of drug trafficking and the AIDS epidemic today. The course begins with the Cuban Cirilo Villaverde's antislavery novel *Cecilia Valdés* (1880), moves on to the regionalist classic *Doña Bárbara* (1929) by the Venezuelan Rómulo Gallegos, and the dictator novel *El señor presidente* (1946) by the Guatemalan Miguel Ángel Asturias; peaks with Gabriel García Márquez's total novel *Cien años de soledad* (1967), and finishes with the Colombian's Fernando Vallejo's *La virgen de los sicarios* (1994) and the Mexican Mario Bellatin's *Salón de Belleza* (2009). The course follows the thematics of the law, particularly Roman Law, and the way in which the characters are controlled or driven by civil and criminal law issues that constitute the plots of the novels. Prerequisite: SPAN 140, 142, 145 or equivalent. L5, HU

* **LITR 330a or b / GMAN 227 / HUMS 445a / PHIL 402, Heidegger's Being and Time**

Martin Hägglund

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

* **LITR 345a / EVST 228a / HIST 459Ja / HUMS 228a, Climate Change and the**

Humanities Katja Lindskog

What can the Humanities tell us about climate change? The Humanities help us to better understand the relationship between everyday individual experience, and our rapidly changing natural world. To that end, students read literary, political, historical, and religious texts to better understand how individuals both depend on, and struggle against, the natural environment in order to survive. HU

* **LITR 348a / ENGL 456a / HUMS 427a / JDST 316a, The Practice of Literary**

Translation Robyn Creswell

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). HU

HU

Film

* **LITR 359b / FILM 457b / ITAL 303b, Italian Film from Postwar to Postmodern**

Millicent Marcus

A study of important Italian films from World War II to the present. Consideration of works that typify major directors and trends. Topics include neorealism, self-reflexivity and metacinema, fascism and war, and postmodernism. Films by Fellini, Antonioni, Rossellini, De Sica, Visconti, Pasolini, Bertolucci, Wertmuller, Tornatore, and Moretti. Most films in Italian with English subtitles. WR, HU

* **LITR 362b / FILM 346b / GMAN 225b, Intermediality in Film** Brigitte Peucker

Film is a hybrid medium, the meeting point of several others. This course focuses on the relationship of film to theater, painting, and video, suggesting that where two media are in evidence, there is usually a third. Topics include space, motion, framing, color, theatricality, tableau vivant, ekphrasis, spectatorship, and new media. Readings feature art historical and film theoretical texts as well as essays pertinent to specific films. Films by Fassbinder, Bergman, von Trier, Jarman, Godard, Haneke, Antonioni, Greenaway and others. HU

* **LITR 367a / FILM 406a / ITAL 304a, Literature into Film** Millicent Marcus

Strategies employed by filmmakers who adapt literary works to the screen. Detailed comparisons between cinematic adaptations and the novels, plays, and short stories on which they are based. Case studies of literary works that pose a variety of challenges to filmmakers. HU

* **LITR 382b / FILM 419b / GMAN 368b, German New Waves in Cold War Europe**

Katie Trumpener

Comparative study of New Wave cinema in East and West Germany, with a focus on aesthetic ferment, institutional barriers, and transformation. Berlin as the best place to follow Europe's emerging cinematic New Waves before 1961. Distinctive approaches developed by young filmmakers in East and West Germany to political and

documentary filmmaking, to the Nazi past and the Cold War, and to class, gender, and social transformation. Knowledge of German helpful but not necessary. WR, HU

* **LITR 384a / EALL 252a / FILM 446a, Japanese Cinema before 1960** Aaron Gerow
The history of Japanese cinema to 1960, including the social, cultural, and industrial backgrounds to its development. Periods covered include the silent era, the coming of sound and the wartime period, the occupation era, the golden age of the 1950s, and the new modernism of the late 1950s. No knowledge of Japanese required. Formerly JAPN 270. HU TR

Advanced Seminars

Two seminars are required for Literature majors; nonmajors may be admitted with permission of the instructor.

* **LITR 412a / ENGL 426a, Modernism, Empire, World Crisis** Joseph Cleary
Drawing on recent scholarship on modernist studies, postcolonial studies, and literary world-systems, this seminar explores how some leading Anglophone writers produced bold new works that engaged with conceptions of European civilizational crisis, the transfer of political power and cultural capital from Europe to the United States, and a rapidly-changing world order. Readings include Pascale Casanova, Alexis de Tocqueville, Henry James, Ford Maddox Ford, Ezra Pound, James Joyce, D. H. Lawrence, T. S. Eliot, W. B. Yeats, Gertrude Stein, and F. Scott Fitzgerald. WR, HU

* **LITR 426a / ENGL 357a / WGSS 340a, Feminist and Queer Theory** Jill Richards
Historical survey of feminist and queer theory from the Enlightenment to the present, with readings from key British, French, and American works. Focus on the foundations and development of contemporary theory. Shared intellectual origins and concepts, as well as divergences and conflicts, among different ways of approaching gender and sexuality. WR, HU

* **LITR 431a / HUMS 229, 1968@50 Latin American Languages of liberation** Moira Fradinger

On the occasion of the 50th anniversary of the upheavals of 1968, this seminar looks at the Latin American cultural and political discourses of liberation throughout the sixties, with an eye at assessing their aftermath and their legacy today. While the language that characterized the foundation of the nation-states in the 19th century was emancipation, in the second part of the twentieth century, and particularly around 1968, Latin America embraced the world discourse of liberation. This seminar examines languages of liberation in an array of disciplines and artistic practices from South and Central America as well as the Caribbean. We explore regional debates that were also inserted in the larger discourse of the anti-colonial struggles of the global South. Topics include Philosophy of liberation (Dussel), Theology of liberation (the 1968 Council of Bishops in Medellín, Colombia), Theater of the oppressed (Boal), Pedagogy of the oppressed (Freire), Cinema of liberation (manifestos of third cinema), the New Song protest movements across the region (from Violeta Parra in Chile to Tropicalismo in Brazil), anti-colonialism in the Caribbean (Fanon), anti-neocolonialism (dependency theory, internal colonialism), Indigenous liberation (from the Barbados declarations to the Lacandon jungle declarations), experimental “boom” literature (Cortázar) etc. HU

* **LITR 437b / JDST 282b / RLST 238b / SPAN 282b, Judeo-Spanish Culture, Language, and Literature** Allyson Gonzalez

This course explores the rich body of culture, language, and literature that emerged in the Sephardi (Judeo-Spanish) diaspora following the expulsion of Jews from Iberia in 1492, and continuing to the present. This course is taught in English. TR HU

* **LITR 439b / CPLT 562 / GMAN 422b / GMAN 654 / HUMS 250b / PHIL 476b, Living Form: Organicism in Society and Aesthetics** Staff

Starting with Kant, the organic is defined as a processual relation of the part and the whole, thereby providing a new model of the individual as a self-contained totality. Students explore the implications of this conception in Goethe's writings on morphology (*The Metamorphosis of Plants*, "Orphic Primal Words"), the Romantics' *Atheneum*, Hanslick's *On the Beautiful in Music*, Oswald Spengler's cultural morphology, the concept of autopoiesis in Maturana and Varela, Luhmann's systems theory, and Canguilhem's critique of the analogy of organic life and society. HU TR

* **LITR 442a / GMAN 371a / HUMS 353a, Kafka and the Philosophers** Rüdiger Campe

The notion of the "Kafkaesque" is testimony to the exceptional place and impact of Kafka's work and writing in world literature. In fact, Kafka has not only been extensively imitated by other writers and read by literary critics but his narratives and novels became the place of intense engagement by philosophers. More often than not, Kafka is not just another example for a theoretical concept but offers the possibility for new concepts or even requires new ways of thinking. An introduction into Kafka's world of writing is offered by the reading of pieces from his early work (*Description of a Struggle*), the novel *The Trial* (with Orson Welles's movie), and the late narrative *Josephine, the Singer*. The philosophers to read on Kafka (and in their own context) are Albert Camus, Walter Benjamin, Theodor W. Adorno, Maurice Blanchot, Gilles Deleuze, Jacques Derrida, Claudio Agamben, and, in conjunction with Kafka, Stanley Cavell and Richard Rorty. HU TR

* **LITR 453b / GMAN 418b, Being a Person** Rüdiger Campe and Staff

In Western experience, the social and legal notion of a "person" has been deeply informed by how "persons" are formed and performed onstage and in narration, and vice versa. Readings focus on three areas: (1) basic texts on the history of the notion of "person" and "character" in legal, poetical, and philosophical contexts from Aristotle to modernity; (2) the performance of personhood in the rebirth of modern theater in early modern times; and (3) the narrative evocation of a new modern character in the rise of the modern novel. In order to bring into view the performative and aesthetic dimensions of personhood we discuss questions such as: What does it mean to appear as a person on a stage? What does it take to appear as a certain character (e.g. as reflected in *Commedia dell'Arte*; Shakespeare; Racine; Lessing)? What is a main and what is a supporting character (e.g. as reflected in Defoe, Richardson, Goethe, Kleist, Mary Shelley)? How can a protagonist of a novel be constituted and how is her or his identity defined and secured? Gender, race, and social class are of relevance throughout, as well as the question of being a non-person (a madman, an animal, a monster, an outcast). HU

* **LITR 488a or b, Directed Reading and/or Individual Research** Staff

Special projects in an area of the student's particular interest set up with the help of a faculty adviser and the director of undergraduate studies. Projects must cover material

not otherwise offered by the department, must terminate in at least a term paper or its equivalent, and must have the approval of the director of undergraduate studies. Enrollment limited to Literature majors.

Senior Courses

* **LITR 491a or b, The Senior Essay** Robyn Creswell

An independent writing and research project. The senior essay is due in the office of the director of undergraduate studies according to the following schedule: (1) by September 7 (for LITR 491a) or January 18 (for LITR 491b), a three-page prospectus signed by the student's adviser; (2) by October 12 (for LITR 491a) or March 8 (for LITR 491b), a full rough draft (not notes); (3) by November 30 (for LITR 491a) or April 12 (for LITR 491b), the completed essay. The minimum length for an essay is twenty-five pages. Students are urged to arrange a topic and adviser early in the term before the term in which the essay is to be written.

* **LITR 492a or b and LITR 493a or b, The Yearlong Senior Essay** Staff

An extended research project. Students must petition the curriculum committee for permission to enroll by the last day of classes in the term preceding enrollment in LITR 492. For students expecting to graduate in May, the senior essay is due in the office of the director of undergraduate studies according to the following schedule: (1) by September 7, a three-page prospectus signed by the student's adviser; (2) by February 15, a full rough draft (not notes); (3) by April 12, the completed essay. December graduates should consult the director of undergraduate studies for required deadlines. The minimum length for a yearlong senior essay is forty pages.

* **LITR 493a or b, The Yearlong Senior Essay** Robyn Creswell

An extended research project. Students must petition the curriculum committee for permission to enroll by the last day of classes in the term preceding enrollment in LITR 492. For students expecting to graduate in May, the senior essay is due in the office of the director of undergraduate studies according to the following schedule: (1) by September 8, a three-page prospectus signed by the student's adviser; (2) by February 16, a full rough draft (not notes); (3) by April 13, the completed essay. December graduates should consult the director of undergraduate studies for required deadlines. The minimum length for a yearlong senior essay is forty pages.

Mathematics

See also **Applied Mathematics** (p. 129).

Director of undergraduate studies: Andrew Casson, 216 LOM, 432-7056, andrew.casson@yale.edu; math.yale.edu

Mathematics has many aspects: it is the language and tool of the sciences, a cultural phenomenon with a rich historical tradition, and a model of abstract reasoning. The course offerings and the major in Mathematics reflect these multiple facets. The Mathematics major provides a broad education in various areas of mathematics in a program flexible enough to accommodate many ranges of interest.

PREREQUISITE

The prerequisite for both the B.A and B.S. degree programs is calculus through the level of MATH 120 or the equivalent.

PLACEMENT PROCEDURES

The department offers a three-term sequence in calculus, MATH 112, 115, and 120. Students who have not taken calculus at Yale and who wish to enroll in calculus must take the mathematics online placement examination; a link to the online examination and additional information are available on the departmental website. A calculus advising session will be held at the beginning of the fall term to answer student questions about placement.

MATH 112 is an introductory course that presupposes basic skills in high school algebra, geometry, and trigonometry. Enrolling students are expected to know the basic definitions of the trigonometric functions, synthetic division, factorization, and elementary area and volume formulas of plane and solid geometry. MATH 115 presupposes familiarity with the topics covered in MATH 112. MATH 120 presupposes familiarity with the topics covered in MATH 115.

MATH 230, 231 is an advanced course sequence in linear algebra and introductory analysis for students with exceptionally strong backgrounds in mathematics. Students who wish to enroll in MATH 230 should consult with the instructor of the course. After MATH 115, students with a strong interest in abstract mathematics should consider taking MATH 230, 231.

REQUIREMENTS OF THE MAJOR

B.A. degree program The B.A. degree program normally consists of ten term courses in Mathematics numbered 222 or higher, including MATH 480. These ten may include no more than five term courses from other institutions. Each student is expected to take vector calculus and linear algebra: either MATH 230 and 231, or either one of MATH 222 or 225 with MATH 250. To acquire both depth and breadth in the field, students are required to take at least two term courses in each of three of the following five categories: analysis, algebra and number theory, statistics and applied mathematics, geometry and topology, and logic and foundations.

B.S. degree program A candidate for the B.S. degree must take at least two advanced term courses in the physical sciences, such as CHEM 328, 332, 333, or PHYS 401, 402, in

addition to the ten term courses required for the B.A. degree. Such courses require the approval of the DUS; written approval is advised.

Both B.A. and B.S. degree programs Each major program must also include at least one course in at least two of the three core areas: real analysis, algebra, and complex analysis. Taking courses from all three core areas is strongly recommended.

Distinction in the major To be eligible for Distinction in the Major, a student must have completed at least one course from each of the three core areas. The categories and core areas to which each course belongs are indicated in the course listings.

The intensive major Candidates for a degree with an intensive major in Mathematics must take courses in all three of the core areas: real analysis, algebra, and complex analysis. Intensive majors are also expected to include at least two graduate term courses in the Mathematics department, or equivalent independent study, in their programs. Familiarity with the material of the following courses is prerequisite to graduate courses in each category: *algebra*: two courses between 350 and 399; *analysis*: MATH 301, 305, 310; *algebraic topology*: MATH 301, 350; *logic and foundations*: MATH 270.

Credit/D/Fail Courses taken Credit/D/Fail may not be counted toward the requirements of the major.

SENIOR REQUIREMENT

During the senior year students majoring in Mathematics normally take the senior seminar (MATH 480). Alternatively, with the consent of the DUS, highly qualified students may write a senior essay in MATH 475 under the guidance of a faculty member, and give an oral report to the department. Students wishing to write a senior essay should consult the DUS early in the fall term.

ADVISING

Any student interested in pursuing further study in pure mathematics should include MATH 301, 305, 310, 350, 370, and 430 in his or her program, and should consider taking one or more graduate-level courses. Students interested in applications of mathematics should include MATH 300 or 301, 310, 350, and a selection of courses from MATH 241, 242, 244, 246, 251, 260, and CPSC 440.

Courses related to mathematics Each Mathematics major is urged to acquire additional familiarity with the uses of mathematics by taking courses in Applied Mathematics (p. 129), Computer Science (p. 224), Engineering and Applied Science (p. 310), Economics (p. 272), Philosophy (p. 605), Physics (p. 613), Statistics & Data Science (p. 711), or other departments. In some instances a limited number of such courses may be counted among the ten courses required for the major in Mathematics, with the approval of the DUS.

Graduate work Each year the Mathematics and Statistics & Data Science departments offer a large number of graduate courses, some of which are accessible to undergraduates with advanced preparation in mathematics. Further information may be obtained from the directors of undergraduate studies whose permission, with that of the relevant director of graduate studies, is required for admission.

Combined B.S./M.S. degree program Students who, by the end of their senior year, complete the requirements of the department for the M.S. in Mathematics are eligible to receive this degree at their Senior Commencement. Required are: (1) eight term courses numbered 500 or higher, most of which must be completed with grades of B or better; (2) satisfactory performance on a general oral examination.

The master's program is in no sense a substitute for the B.A. or B.S. program; rather, it is designed to accommodate a very few exceptional students who, by means of accelerated or independent study, can satisfy the department as to their command of the content of the normal undergraduate program by the end of the junior year. Candidates must submit a proposal that foresees this level of achievement to the DUS no later than the last day of classes in their fifth term of enrollment in Yale College. If approved by the department, the proposal is forwarded to the Yale College Dean's Office. Students' status and progress are reviewed before they are permitted to continue in the program in the senior year. For more information on Yale College requirements for the program, see "Simultaneous Award of the Bachelor's and Master's Degrees" in Section K, Special Arrangements (p. 64), in the Academic Regulations.

Students take at least two graduate term courses in the junior year (normally courses in algebra or analysis are the first graduate courses taken). The general oral examination covers a list of topics available from the director of graduate studies and is accepted in lieu of the usual senior oral presentation. Details concerning the requirements for the master's degree may be obtained from the director of graduate studies.

REQUIREMENTS OF THE MAJOR

Prerequisite MATH 120 or equivalent

Number of courses *B.A.* – 10 term courses numbered 222 or higher, incl MATH 480;
B.S. – same, with 2 addtl adv courses in physical sciences approved by DUS

Specific courses required MATH 230 and 231; or MATH 222 or 225 with MATH 250

Distribution of courses *B.A. and B.S.* – 2 courses in each of 3 categories chosen from analysis, algebra and number theory, stat and applied math, geometry and topology, logic and foundations; courses from 2 of 3 core areas, as specified

Substitution permitted With DUS permission, certain courses in Applied Math, Comp Sci, Engineering & Applied Science, Econ, Phil, Physics, S&DS, or other depts

Intensive major Courses in all 3 core areas; 2 MATH grad courses or equivalent independent study counted among the required courses

Senior requirement Senior sem (MATH 480) or, with DUS permission, senior essay (MATH 475) and oral report

FACULTY OF THE DEPARTMENT OF MATHEMATICS

Professors Jeffrey Brock, Andrew Casson (*Emeritus*), Ronald Coifman, Igor Frenkel, Alexander Goncharov, Peter Jones, Gregory Margulis, Yair Minsky, Vincent Moncrief, Hee Oh, Sam Payne, *Nicholas Read, Vladimir Rokhlin, Wilhelm Schlag, *Daniel Spielman, Van Vu, *John S. Wettlaufer, Gregg Zuckerman

Assistant Professor Stefan Steinerberger

J. W. Gibbs Assistant Professors Asher Auel, Ross Berkowitz, Pat Devlin, Jeremy Hoskins, Max Kutler, Arie Levit, Yuchen Liu, Kalina Mincheva, Gal Mishne, Fei Qi,

Kirill Serkh, Gil Shabat, Oleksandr Tsymbaliuk, Caglar Uyanik, Tom VandenBoom, Anibal Velozo, Philsang Yoo

Adjunct Professors Gil Kalai, Alex Lubotzky

Senior Lecturer Marketa Havlickova

Lecturers Ian Adelstein, John Hall, Sudesh Kalyanswamy, Itziar Ochoa de Alaiza Gracia, Pam Sargent, Brett Smith, Sarah Vigliotta

Statistics Faculty Andrew Barron, Joseph Chang, John Hartigan (*Emeritus*), David Pollard

* A joint appointment with primary affiliation in another department.

Courses

* **MATH 077b, Math as a Creative Art** Patrick Devlin

This course focuses on the creative process central to mathematical reasoning rather than mechanical manipulation of symbols. Unlike a typical math class, this course deals entirely with the aesthetics of math, and no prior mathematical background is required or assumed. Topics include puzzles, strategy games, social networks, symmetries, number theory, infinity, and beyond. Enrollment limited to first-year students. Preregistration required; see under First-Year Seminar Program. QR

* **MATH 107a, Mathematics in the Real World** Erik Rosenthal

The use of mathematics to address real-world problems. Applications of exponential functions to compound interest and population growth; geometric series in mortgage payments, amortization of loans, present value of money, and drug doses and blood levels; basic probability, Bayes's rule, and false positives in drug testing; elements of logic. No knowledge of calculus required. Enrollment limited to students who have not previously taken a high school or college calculus course. QR

MATH 108b, Estimation and Error Staff

A problem-based investigation of basic mathematical principles and techniques that help make sense of the world. Estimation, order of magnitude, approximation and error, counting, units, scaling, measurement, variation, simple modeling. Applications to demographics, geology, ecology, finance, and other fields. Emphasis on both the practical and the philosophical implications of the mathematics. Does not count toward the requirements of a major in Mathematics. QR

* **MATH 110a, Introduction to Functions and Calculus I** Staff

Comprehensive review of precalculus, limits, differentiation and the evaluation of definite integrals, with applications. Precalculus and calculus topics are integrated. Emphasis on conceptual understanding and problem solving. Successful completion of MATH 110 and 111 is equivalent to MATH 112. No prior acquaintance with calculus is assumed; some knowledge of algebra and precalculus mathematics is helpful. QR

* **MATH 111b, Introduction to Functions and Calculus II** Staff

Continuation of MATH 110. Comprehensive review of precalculus, limits, differentiation and evaluation of definite integrals, with applications. Precalculus and calculus topics are integrated. Emphasis on conceptual understanding and problem solving. Successful completion of both MATH 110 and 111 is equivalent to MATH 112. Prerequisite: MATH 110. QR

*** MATH 112a or b, Calculus of Functions of One Variable I** Staff

Limits and their properties. Definitions and some techniques of differentiation and the evaluation of definite integrals, with applications. Use of the software package Mathematica to illustrate concepts. No prior acquaintance with calculus or computing assumed. May not be taken after MATH 110 or 111. QR

*** MATH 115a or b, Calculus of Functions of One Variable II** Staff

A continuation of MATH 112. Applications of integration, with some formal techniques and numerical methods. Improper integrals, approximation of functions by polynomials, infinite series. Exercises involve the software package Mathematica. After MATH 112 or equivalent; open to freshmen with some preparation in calculus. May not be taken after MATH 116. QR

*** MATH 116a or b, Mathematical Models in the Biosciences I: Calculus Techniques**

John Hall

Introduction to topics in mathematical modeling that are applicable to biological systems. Discrete and continuous models of population, neural, and cardiac dynamics. Stability of fixed points and limit cycles of differential equations. Applications include Norton's chemotherapy scheduling and stochastic models of tumor suppressor gene networks. After MATH 112 or equivalent. May not be taken after MATH 115. QR

*** MATH 118a or b, Introduction to Functions of Several Variables** Staff

A combination of linear algebra and differential calculus of several variables. Matrix representation of linear equations, Gauss elimination, vector spaces, independence, basis and dimension, projections, least squares approximation, and orthogonality. Three-dimensional geometry, functions of two and three variables, level curves and surfaces, partial derivatives, maxima and minima, and optimization. Intended for students in the social sciences, especially Economics. May not be taken after MATH 120 or 222. Prerequisite: MATH 112. QR

*** MATH 120a or b, Calculus of Functions of Several Variables** Staff

Analytic geometry in three dimensions, using vectors. Real-valued functions of two and three variables, partial derivatives, gradient and directional derivatives, level curves and surfaces, maxima and minima. Parametrized curves in space, motion in space, line integrals; applications. Multiple integrals, with applications. Divergence and curl. The theorems of Green, Stokes, and Gauss. After MATH 115, or with permission of instructor. May not be taken after MATH 121. QR

MATH 160b / AMTH 160b / S&DS 160b, The Structure of Networks Staff

Network structures and network dynamics described through examples and applications ranging from marketing to epidemics and the world climate. Study of social and biological networks as well as networks in the humanities. Mathematical graphs provide a simple common language to describe the variety of networks and their properties. QR

*** MATH 199a, Mathematical Problem Solving** Patrick Devlin

Study of a variety of techniques for solving challenging mathematical problems. Topics include the pigeon-hole principle, probabilities, congruences, generating functions, polynomials, and basic number theory. Open to students with beginning, intermediate, or advanced problem-solving skills. $\frac{1}{2}$ Course cr

MATH 222a or b / AMTH 222a or b, Linear Algebra with Applications Staff

Matrix representation of linear equations. Gauss elimination. Vector spaces. Linear independence, basis, and dimension. Orthogonality, projection, least squares approximation; orthogonalization and orthogonal bases. Extension to function spaces. Determinants. Eigenvalues and eigenvectors. Diagonalization. Difference equations and matrix differential equations. Symmetric and Hermitian matrices. Orthogonal and unitary transformations; similarity transformations. After MATH 115 or equivalent. May not be taken after MATH 225. QR

MATH 225a or b, Linear Algebra and Matrix Theory Staff

An introduction to the theory of vector spaces, matrix theory and linear transformations, determinants, eigenvalues, and quadratic forms. Some relations to calculus and geometry are included. After or concurrently with MATH 120. May not be taken after MATH 222. QR

*** MATH 230a, Vector Calculus and Linear Algebra I** Patrick Devlin

A careful study of the calculus of functions of several variables, combined with linear algebra. QR

*** MATH 231b, Vector Calculus and Linear Algebra II** Patrick Devlin

Continuation of MATH 230. Application of linear algebra to differential calculus. Inverse and implicit function theorems; the idea of a manifold; integration of differential forms; general Stokes' theorem. QR

*** MATH 235b, Reflection Groups** Igor Frenkel

Concepts of linear algebra are used to explore the algebraic and geometric properties of groups generated by reflections. Examples from reflection groups introduce elements of group theory, Lie algebras, and representation theory. Reflections in a real Euclidean space, groups generated by reflections, crystallographic groups, and Coxeter groups. Preference to sophomores majoring in mathematics or the sciences. Prerequisite: MATH 222 or 225. QR

MATH 241a / S&DS 241a, Probability Theory Yihong Wu

Introduction to probability theory. Topics include probability spaces, random variables, expectations and probabilities, conditional probability, independence, discrete and continuous distributions, central limit theorem, Markov chains, and probabilistic modeling. After or concurrently with MATH 120 or equivalent. QR

MATH 242b / S&DS 242b, Theory of Statistics Andrew Barron

Study of the principles of statistical analysis. Topics include maximum likelihood, sampling distributions, estimation, confidence intervals, tests of significance, regression, analysis of variance, and the method of least squares. Some statistical computing. After S&DS 241 and concurrently with or after MATH 222 or 225, or equivalents. QR

MATH 244a / AMTH 244a, Discrete Mathematics Ross Berkowitz

Basic concepts and results in discrete mathematics: graphs, trees, connectivity, Ramsey theorem, enumeration, binomial coefficients, Stirling numbers. Properties of finite set systems. Recommended preparation: MATH 115 or equivalent. QR

MATH 246a or b, Ordinary Differential Equations Staff

First-order equations, second-order equations, linear systems with constant coefficients. Numerical solution methods. Geometric and algebraic properties of

differential equations. After MATH 120 or equivalent; after or concurrently with MATH 222 or 225 or equivalent. QR

MATH 247b / AMTH 247b / G&G 247b, Partial Differential Equations Jeremy Hoskins

Introduction to partial differential equations, wave equation, Laplace's equation, heat equation, method of characteristics, calculus of variations, series and transform methods, and numerical methods. Prerequisites: MATH 222 or 225, MATH 246, and ENAS 194, or equivalents. QR

MATH 250a, Vector Analysis Staff

Calculus of functions of several variables, using vector and matrix methods. The derivative as a linear mapping. Inverse and implicit function theorems. Transformation of multiple integrals. Line and surface integrals of vector fields. Curl and divergence. Differential forms. Theorems of Green and Gauss; general Stokes' theorem. After MATH 120, and 222 or 225 or equivalent. QR

MATH 251b / EENG 434b / ENAS 496b / S&DS 351b, Stochastic Processes Yihong Wu

Introduction to the study of random processes including linear prediction and Kalman filtering, Poisson counting process and renewal processes, Markov chains, branching processes, birth-death processes, Markov random fields, martingales, and random walks. Applications chosen from communications, networking, image reconstruction, Bayesian statistics, finance, probabilistic analysis of algorithms, and genetics and evolution. Prerequisite: S&DS 241 or equivalent. QR

MATH 260a / AMTH 260a, Basic Analysis in Function Spaces Staff

Diagonalization of linear operators, with applications in physics and engineering; calculus of variations; data analysis. MATH 260 is a natural continuation of PHYS 301. Prerequisites: MATH 120, and 222 or 225. QR

MATH 270a, Set Theory Gregg Zuckerman

Algebra of sets; finite, countable, and uncountable sets. Cardinal numbers and cardinal arithmetic. Order types and ordinal numbers. The axiom of choice and the well-ordering theorem. After MATH 120 or equivalent. QR

MATH 300b, Topics in Analysis Staff

An introduction to analysis, with topics chosen from infinite series, the theory of metric spaces, and fixed-point theorems with applications. Students who have taken MATH 230, 231 should take MATH 301 instead of this course. After MATH 250 or with permission of instructor. QR

* **MATH 301a, Introduction to Analysis** Peter Jones

Foundations of real analysis, including metric spaces and point set topology, infinite series, and function spaces. After MATH 230, 231 or equivalent. QR

MATH 305b, Real Analysis Hee Oh

The Lebesgue integral, Fourier series, applications to differential equations. After MATH 301 or with permission of instructor. QR

MATH 310a, Introduction to Complex Analysis Ronald Coifman

An introduction to the theory and applications of functions of a complex variable. Differentiability of complex functions. Complex integration and Cauchy's theorem.

Series expansions. Calculus of residues. Conformal mapping. After MATH 231 or 250 or equivalent. QR

* **MATH 315b, Intermediate Complex Analysis** Richard Beals

Continuation of MATH 310. 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. After MATH 310. QR RP

* **MATH 320a, 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. After MATH 305 or equivalent. QR RP

* **MATH 325b, Introduction to Functional Analysis** Stefan Steinerberger

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 320. QR RP

MATH 330b / S&DS 400b, Advanced Probability Sekhar Tatikonda

Measure theoretic probability, conditioning, laws of large numbers, convergence in distribution, characteristic functions, central limit theorems, martingales. Some knowledge of real analysis assumed. QR

MATH 350a, Introduction to Abstract Algebra Marketa Havlickova

Group theory, structure of Abelian groups, and applications to number theory. Symmetric groups and linear groups including orthogonal and unitary groups; properties of Euclidean and Hermitian spaces. Some examples of group representations. Modules over Euclidean rings, Jordan and rational canonical forms of a linear transformation. After MATH 222 or equivalent. QR

MATH 353b, 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. After MATH 222 or equivalent.

* **MATH 354b, Number Theory** Staff

Prime numbers; quadratic reciprocity law, Gauss sums; finite fields, equations over finite fields; zeta functions. After MATH 350. QR

MATH 360a, Introduction to Lie Groups PhilSang Yoo

Lie groups as the embodiment of the idea of continuous symmetry. The exponential map on matrices and applications; spectral theory; examples and structure of Lie groups and Lie algebras; connections with geometry and physics. After MATH 231 or 250 or equivalent. MATH 300 or 301 and MATH 350 recommended. QR

MATH 370b, Fields and Galois Theory Asher Auel

Rings, with emphasis on integral domains and polynomial rings. The theory of fields and Galois theory, including finite fields, solvability of equations by radicals, and the fundamental theorem of algebra. Quadratic forms. After MATH 350. QR

MATH 373b, 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; adèles and ideles; zeta functions.

Prerequisites: MATH 310 and 370. QR

MATH 380a, Modern Algebra I Yuchen Liu

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. After

MATH 350 and 370. QR RP

MATH 381b, Modern Algebra II Staff

This course is the noncommutative counterpart to MATH 380. Abstract and concrete groups, rings and fields play a fundamental role. The main new concept is the notion of a left (right) module over a possibly noncommutative ring. The category $R\text{-mod}$ of all left modules over a ring R encodes important information about the isomorphism class of R . After MATH 380. QR RP

MATH 435b, Differential Geometry Vincent Moncrief

Applications of calculus to the study of the geometry of curves and surfaces in Euclidean space, intrinsic differential geometric properties of manifolds, and connections with non-Euclidean geometries and topology. After MATH 231 or 250 or equivalent. QR

MATH 440a, Introduction to Algebraic Geometry Alexander Goncharov

An introduction to algebraic geometry through the study of algebraic curves. Topics include curves in the projective plane and their intersection theory; Bezout's theorem; divisors and line bundles; the Riemann-Hurwitz formula; hyperelliptic curves; and the Riemann-Roch theorem. Prerequisites: MATH 310, 350, and some background in differential forms. QR

MATH 470a or b, Individual Studies Staff

Individual investigation of an area of mathematics outside of those covered in regular courses, involving directed reading, discussion, and either papers or an examination. A written plan of study approved by the student's adviser and the director of undergraduate studies is required. The course may normally be elected for only one term.

MATH 475a or b, Senior Essay Staff

Highly qualified students may write a senior essay under the guidance of a faculty member, and give an oral report to the department. Students wishing to write a senior essay should consult the director of undergraduate studies early in the fall term.

*** MATH 480a or b, Senior Seminar: Mathematical Topics** Staff

A number of mathematical topics are chosen each term—e.g., differential topology, Lie algebras, mathematical methods in physics—and explored in one section of the seminar. Students present several talks on the chosen topic. One section each year is devoted to topics of interest to Economics and Mathematics majors, and is co-taught by a member of the Economics department.

OTHER COURSES RELATED TO MATHEMATICS

CPSC 201a or b, Introduction to Computer Science Stephen Slade

Introduction to the concepts, techniques, and applications of computer science. Topics include computer systems (the design of computers and their languages); theoretical foundations of computing (computability, complexity, algorithm design); and artificial intelligence (the organization of knowledge and its representation for efficient search). Examples stress the importance of different problem-solving methods. After CPSC 112 or equivalent. QR

CPSC 365b, Algorithms James Glenn

Paradigms for algorithmic problem solving: greedy algorithms, divide and conquer, dynamic programming, and network flow. NP completeness and approximation algorithms for NP-complete problems. Algorithms for problems from economics, scheduling, network design and navigation, geometry, biology, and optimization. Provides algorithmic background essential to further study of computer science. Either CPSC 365 or CPSC 366 may be taken for credit. Prerequisites: CPSC 202 and 223. QR

PHIL 267a, Mathematical Logic Sun-Joo Shin

An introduction to the metatheory of first-order logic, up to and including the completeness theorem for the first-order calculus. Introduction to the basic concepts of set theory. Prerequisite: PHIL 115 or permission of instructor. QR

*** PHIL 427b, Computability and Logic** Sun-Joo Shin

A technical exposition of Gödel's first and second incompleteness theorems and of some of their consequences in proof theory and model theory, such as Löb's theorem, Tarski's undefinability of truth, provability logic, and nonstandard models of arithmetic. Prerequisite: PHIL 267 or permission of instructor. QR, HU

Mathematics and Philosophy

Directors of undergraduate studies: Andrew Casson (Mathematics), 216 LOM, 432-7056, andrew.casson@yale.edu; Daniel Greco (Philosophy), 106A C, 432-1687, daniel.greco@yale.edu

The Mathematics and Philosophy major allows students to explore those areas where philosophy and mathematics meet, in particular, mathematical and philosophical logic and the philosophy of mathematics.

PREREQUISITE

The prerequisite for the major is MATH 120.

REQUIREMENTS OF THE MAJOR

The major requires twelve term courses including the prerequisite and the senior seminar. Of the remaining courses, at least four must be in Mathematics at the 200 level or higher and five must be in Philosophy. All Philosophy courses are eligible for credit toward the major, with the exception of First-Order Logic (PHIL 115). Required courses include Set Theory (MATH 270), Mathematical Logic (PHIL 267), Computability and Logic (PHIL 427), an additional advanced Philosophy course with a substantive logical component, and one seminar in either Mathematics or Philosophy (other than PHIL 427) that fulfills the senior requirement (see below). Set Theory (MATH 270) and Mathematical Logic (PHIL 267) must be taken before the end of the junior year; it is strongly recommended that they be taken earlier.

SENIOR REQUIREMENT

Each year certain seminars offered by the Mathematics and Philosophy departments are designated as fulfilling the senior requirement of the combined major. If such a seminar is taken in order to fulfill the senior requirement, majors must consult with the instructor and agree upon additional work required. Typically, additional work includes a substantial class presentation and/or preparation of a series of drafts prior to submission of the final paper.

The Mathematics seminar MATH 480, Senior Seminar: Mathematical Topics, fulfills the senior requirement. For Philosophy seminars that fulfill the senior requirement, consult the director of undergraduate studies in Philosophy.

ADVISING

A typical program satisfying the major might consist of MATH 120, 222 or 225, 270, 300, 350, and a designated seminar; PHIL 126, 267, 427, a designated seminar (other than PHIL 427), and two additional electives.

REQUIREMENTS OF THE MAJOR

Prerequisite MATH 120

Number of courses 12 term courses (incl prereq and senior sem)

Specific courses required MATH 270, PHIL 267, 427

Distribution of courses At least 4 courses in Math at 200 level or higher; at least 5 courses in Phil, as specified

Senior requirement Senior sem

Mathematics and Physics

Adviser for the major: Vincent Moncrief, 64 SPL, 432-6930,
vincent.moncrief@yale.edu

The major in Mathematics and Physics allows students to explore the productive interaction between the two subjects more extensively than either individual major.

PREREQUISITES

Prerequisites to the major include MATH 120 or its equivalent, an introductory physics lecture sequence numbered PHYS 180, 181 or above, and the associated laboratory sequence PHYS 205L, 206L.

REQUIREMENTS OF THE MAJOR

Beyond the prerequisites, the major requires a minimum of fourteen term courses above the introductory level, including the senior project. At least six of these must be Mathematics courses numbered 222 or above, and at least six must be advanced Physics courses chosen in consultation with the adviser for the major.

SENIOR REQUIREMENT

A senior project in PHYS 471 or 472 on a topic appropriate for the combined major and acceptable to both the Physics and the Mathematics departments is also required. The student must present an oral report on this project to the Mathematics department.

REQUIREMENTS OF THE MAJOR

Prerequisites MATH 120 or equivalent; PHYS 180, 181, or 200, 201, or 260, 261;
PHYS 205L, 206L

Number of courses 14 term courses beyond prereqs, incl senior req

Distribution of courses 6 Math courses numbered 222 or above; 6 advanced Physics courses selected in consultation with major adviser

Senior requirement Senior project in PHYS 471 or 472 on topic acceptable to both depts; oral report on project to Math dept

Mechanical Engineering

Director of undergraduate studies: Corey O'Hern, M203 ML, 432-4258, corey.ohern@yale.edu; seas.yale.edu/departments/mechanical-engineering-and-materials-science

Mechanical engineering is among the most diversified of the traditional engineering disciplines. The mechanical engineer builds machines to extend our physical and mental capabilities and to convert traditional and novel energy sources into useful forms.

The role of the mechanical engineer has changed dramatically over the past few decades with the extensive use of high-performance computers (in such areas as computational fluid dynamics, materials design, control, and manufacturing), the interfacing of microelectromechanical systems and actuators via microprocessors to build high-precision sensors and devices, and the advent of advanced materials (e.g., composites, shape-memory alloys, ceramics, and superconductors) for new applications (e.g., coatings, biomaterials, and computer storage). These areas offer mechanical engineering students special opportunities for creativity, demanding that they learn not only in depth but also in breadth. Demands for increased energy efficiency and reduced environmental impact—as might be realized, for example, in novel gas turbine or electric hybrid vehicles—require that students understand the fundamentals of mechanics, thermodynamics, fluid mechanics, combustion, and materials science. In all these tasks, the utmost consideration of the modern mechanical engineer is improving the quality of human life. The engineer must also be constantly aware both of the finiteness of Earth's resources and its environment and of the burden that engineering places on them.

The educational mission of the Department of Mechanical Engineering and Materials Science is to provide an excellent education that will prepare students to become members of the next generation of mechanical engineers. To implement this mission, the department adheres to the following set of educational objectives: to provide a balanced technical and nontechnical education to enable graduates to enter highly selective graduate schools and/or to pursue technical careers in industry or government laboratories; to enable graduates to improve and adapt their skills to accommodate rapid technological changes; to prepare graduates to communicate effectively and to understand the ethical responsibilities and impact on society of their profession. To achieve these objectives, the following fundamental educational goals have been established for the Department of Mechanical Engineering and Materials Science: to provide a comprehensive introduction to basic science and mathematics, which form the foundation of mechanical engineering; to provide thorough training in analytical and experimental methods and in data analysis, including problem formulation; to provide instruction in the fundamentals of the design process, including project innovation, synthesis, and management, both individually and in a team setting; to provide both a technical and a nontechnical program of study in which oral and written communication skills are developed; and to instill in students an understanding of their professional and ethical responsibilities, which affect society and their profession.

COURSES FOR NONMAJORS

Mechanics and mechanical engineering content can be found in several courses intended for those not majoring in science. See under Engineering and Applied Science (p. 310).

THE MECHANICAL ENGINEERING PROGRAM

At Yale, three mechanical engineering programs are offered: a B.S. degree program with a major in Mechanical Engineering, a B.S. degree program with a major in Engineering Sciences (Mechanical), and a B.A. degree program with a major in Engineering Sciences (Mechanical). Prospective majors in both B.S. programs are advised to complete introductory physics and mathematics through calculus (MATH 115) by the end of their first year.

A student's undergraduate engineering program may include one or more special project courses (MENG 471, 472, 473, or 474), in which the student pursues a particular research interest through design-oriented projects and experimental investigations. Projects may be initiated by the student, may be performed in a team, or may be derived from the ideas of faculty members who place undergraduates in their ongoing research projects. All interested students should contact the director of undergraduate studies for more information on special project courses.

B.S. degree program in Mechanical Engineering This is the most technically intensive mechanical engineering degree program and is accredited by the Engineering Accreditation Commission of ABET, Inc. This program is appropriate for students who plan careers as practicing engineers in industry, consulting firms, or government as well as for students who are considering a career in research and plan to pursue an advanced degree in engineering.

B.S. degree program in Engineering Sciences (Mechanical) This non-ABET degree program is suitable for students who wish to gain significant expertise within mechanical engineering while combining their engineering studies with related disciplines. For example, a number of students have taken courses in architecture while pursuing a program in mechanical engineering that emphasizes structural mechanics; similarly, a student with an interest in computer graphics might combine engineering courses in computer-aided design with programming courses from the Department of Computer Science.

B.A. degree program in Engineering Sciences (Mechanical) In a society with increasing levels of technical sophistication, a well-rounded individual must have some background in science and technology. The non-ABET B.A. program is designed for students who may be planning careers in business, law, economics, medicine, journalism, or politics but need to understand the impact that science and technology can have on society at large. An understanding of engineering methods and practices, combined with a traditional liberal arts education, provides a strong background for a variety of careers. The program is well suited for students who wish to fulfill the requirements of two majors.

The major for all three degree programs requires a group of prerequisites or equivalents; several courses beyond the prerequisites; and a senior requirement, as indicated below.

PREREQUISITES

B.S. degree program in Mechanical Engineering The prerequisites in mathematics are MATH 112, 115, and ENAS 151, or the equivalent. The basic science prerequisites are PHYS 180, 181, or 200, 201; one laboratory from PHYS 165L or 205L, and one from PHYS 166L or 206L, or equivalents.

B.S. degree program in Engineering Sciences (Mechanical) The prerequisites in mathematics are MATH 112, 115, and ENAS 151, or the equivalent. The basic science prerequisites are PHYS 180, 181, or 200, 201; one laboratory from PHYS 165L or 205L, and one from PHYS 166L, 206L, or MENG 286L.

B.A. degree program in Engineering Sciences (Mechanical) The prerequisites in mathematics are MATH 112 and 115. The basic science prerequisite is physics at least to the level of PHYS 170, 171.

REQUIREMENTS OF THE MAJOR

B.S. degree program in Mechanical Engineering

The major for the Class of 2019 and the Class of 2020 With DUS approval, the following changes to the requirements of the major may be fulfilled by students who declared their major under previous requirements.

The major for the Class of 2021 and subsequent classes requires 21 courses and 19.5 credits beyond the prerequisites as follows:

1. Advanced mathematics: ENAS 194 and MATH 222 or 225
2. Mechanical engineering and related: MENG 185, 211, 280, 285, 286L, MENG 325, 361, 363L, 383, 389, 390, MENG 487L and MENG 488L (the senior requirement), ENAS 130, EENG 200, and at least one lecture course in chemistry numbered CHEM 161 or higher
3. Technical electives: three approved technical electives chosen in consultation with the director of undergraduate studies; only one course from MENG 471, 472, 473, and 474 may be counted as one of the three technical electives

The curriculum in this program is arranged in prescribed patterns, but some departures from it are possible with approval of the DUS.

B.S. degree program in Engineering Sciences (Mechanical) The major requires twelve approved term courses in engineering, beyond the prerequisites and including the senior project, which can cover a broad array of topics within the subject provided that they contribute to a coherent program. Students should consult with the DUS at the beginning of their sophomore year.

B.A. degree program in Engineering Sciences (Mechanical) The program requires eight approved term courses beyond the prerequisites, including the senior project. Students should consult with the DUS at the beginning of their sophomore year.

Credit/D/Fail No courses taken Credit/D/Fail may be counted toward the Mechanical Engineering major, including prerequisites.

SENIOR REQUIREMENT**B.S. degree program in Mechanical Engineering**

The major for the Class of 2019 and the Class of 2020 With DUS approval, the following change to the senior requirement may be fulfilled by students who declared their major under previous requirements.

The major for the Class of 2021 and subsequent classes MENG 487L (half-credit) and MENG 488L (half-credit) taken in the senior year fulfill the senior requirement.

B.S. degree program in Engineering Sciences (Mechanical) Students satisfy the senior project requirement by completing MENG 404; 471, 472, 473, or 474; 487L and 488L; 489; or another upper-level design course (taken during the senior year) chosen in consultation with the DUS.

B.A. degree program in Engineering Sciences (Mechanical) Students satisfy the senior project requirement by completing MENG 471, 472, 473, or 474; or another upper-level design course (taken during their senior year) chosen in consultation with the DUS.

REQUIREMENTS OF THE MAJOR**MECHANICAL ENGINEERING, B.S.**

Prerequisites MATH 112, 115, and ENAS 151, or equivalent; PHYS 180, 181, or 200, 201, and 2 labs (1 from PHYS 165L or 205L, and 1 from PHYS 166L or 206L, or equivalents)

Number of courses 21 term courses beyond prerequisites (including senior req)

Specific courses required ENAS 130 and 194; EENG 200; MATH 222 or 225; MENG 185, 211, 280, 285, 286L, MENG 325, 361, 363L, 383, 389, 390

Distribution of courses 3 technical electives chosen in consultation with DUS (only one of MENG 471, 472, 473, or 474); 1 term course in chemistry numbered CHEM 161 or higher

Substitution permitted With DUS approval

Senior requirement MENG 487L and MENG 488L taken in senior year

ENGINEERING SCIENCES (MECHANICAL), B.S.

Prerequisites MATH 112, 115, and ENAS 151, or equivalent; PHYS 180, 181, or 200, 201, and 2 labs (1 from PHYS 165L or 205L; 1 from PHYS 166L, 206L, or MENG 286L)

Number of courses 12 term courses beyond prerequisites (incl senior project)

Substitution permitted With DUS approval

Senior requirement MENG 404; 471, 472, 473, or 474; 487L and 488L; 489; or another upper-level design course chosen in consultation with the DUS

ENGINEERING SCIENCES (MECHANICAL), B.A.

Prerequisites MATH 112, 115; PHYS 170, 171

Number of courses 8 term courses beyond prerequisites (incl senior req)

Substitution permitted With DUS approval

Senior requirement MENG 471, 472, 473, or 474; or another upper-level design course chosen in consultation with the DUS

FACULTY OF THE DEPARTMENT OF MECHANICAL ENGINEERING AND MATERIALS SCIENCE

Professors Charles Ahn, Ira Bernstein (*Emeritus*), Juan Fernández de la Mora, Alessandro Gomez, †Sohrab Ismail-Beigi, †Shun-Ichiro Karato, Marshall Long, Corey O'Hern, Brian Scassellati, Jan Schroers, Udo Schwarz (*Chair*), Mitchell Smooke

Associate Professors Aaron Dollar

Assistant Professors Eric Brown, Judy Cha, Rebecca Kramer-Bottiglio, Madhusudhan Venkadesan

Lecturers Beth Anne Bennett, Joseph Zinter

†A joint appointment with primary affiliation in another department or school.

Courses

* **MENG 185a or b, Mechanical Design** Staff

A course designed for potential majors in mechanical engineering, with units on design, materials science, structural mechanics, utilization of a machine shop, mechanical dissection, and computers in mechanical engineering. Includes a design project competition. Prerequisite: physics at the level of PHYS 180, or permission of instructor
SC RP

MENG 211b, Thermodynamics for Mechanical Engineers Jeeyoung Cha

Study of energy and its transformation and utilization. First and Second Laws for closed and open systems, equations of state, multicomponent nonreacting systems, auxiliary functions (H, A, G), and the chemical potential and conditions of equilibrium. Engineering devices such as power and refrigeration systems and their efficiencies. Prerequisites: PHYS 180 or 200, and MATH 115. QR, SC RP

MENG 280a, Mechanical Engineering I: Strength and Deformation of Mechanical Elements Eric Brown

Elements of statics; mechanical behavior of materials; equilibrium equations, strains and displacements, and stress-strain relations. Elementary applications to trusses, bending of beams, pressure vessels, and torsion of bars. Prerequisites: PHYS 180 or 200, and MATH 115. QR, SC RP

MENG 285a, Introduction to Materials Science Jan Schroers

Study of the atomic and microscopic origin of the properties of engineering materials: metals, glasses, polymers, ceramics, and composites. Phase diagrams; diffusion; rates of reaction; mechanisms of deformation, fracture, and strengthening; thermal and electrical conduction. Prerequisites: elementary calculus and background in basic mechanics (deformation, Hooke's law) and structure of atoms (orbitals, periodic table).
QR, SC RP

MENG 286Lb, Solid Mechanics and Materials Science Laboratory Jan Schroers

Experiments that involve either structural mechanics or materials science. Comparisons between structural theories and experimental results. Relationships among processing, microstructure, and properties in materials science. Introduction to techniques for the examination of the structure of materials. SC RP ½ Course cr

*** MENG 325a, Machine Elements and Manufacturing Processes** Staff

This course provides students a working knowledge of two fundamental topics related to mechanical design: machine elements and manufacturing processes. *Machine elements* refer one or more of a range of common design elements that transmit power and enable smooth and efficient motion in mechanical systems with moving parts. This course introduces the most common of these elements and gives students the tools to systems design with them. Topics include common linkages, gearing, bearings, springs, clutches, brakes, and common actuators such as DC motors. *Manufacturing processes* are necessary for the mechanical design engineer to effectively perform her or his duties; they provide an understanding of how the parts and systems that they design are fabricated, allowing “Design for Manufacturing” principles to be taken into account in the product development process. Students learn the basics of common commercial manufacturing processes for mechanical systems, including low-volume processes such as machining to high-volume processes such as casting (metal parts), molding (plastic parts), and stamping (sheet metal parts). Prerequisites: Extensive CAD experience. MENG 185 and MENG 280 recommended.

MENG 361a, Mechanical Engineering II: Fluid Mechanics Alessandro Gomez
Mechanical properties of fluids, kinematics, Navier-Stokes equations, boundary conditions, hydrostatics, Euler's equations, Bernoulli's equation and applications, momentum theorems and control volume analysis, dimensional analysis and similitude, pipe flow, turbulence, concepts from boundary layer theory, elements of potential flow. Prerequisites: ENAS 194 or equivalent, and physics at least at the level of PHYS 180.
QR, SC RP

*** MENG 363Lb, Fluid Mechanics and Thermodynamics Laboratory** Eric Brown and Beth Anne Bennett
Hands-on experience in applying the principles of fluid mechanics and thermodynamics. Integration of experiment, theory, and simulation to reflect real-world phenomena. Students design and test prototype devices. Prerequisites: MENG 211 and 361. WR, SC RP

MENG 365b, Chemical Propulsion Systems Alessandro Gomez
Study of chemical propulsion systems. Topics include review of propulsion fundamentals; concepts of compressible fluid flow; development and application of relations for Fanno and Rayleigh flows; normal and oblique shock systems to various propulsion system components; engine performance characteristics; fundamentals of turbomachinery; liquid and solid rocket system components and performance. MENG 361 or permission of instructor. QR, SC RP

MENG 383b, Mechanical Engineering III: Dynamics Corey O'Hern
Kinematics and dynamics of particles and systems of particles. Relative motion; systems with constraints. Rigid body mechanics; gyroscopes. Prerequisites: PHYS 180 or 200, and MATH 120 or ENAS 151. QR, SC RP

MENG 389b, Mechanical Engineering IV: Fluid and Thermal Energy Science Juan Fernández de la Mora
Fundamentals of mechanical engineering applicable to the calculation of energy and power requirements, as well as transport of heat by conduction, convection, and radiation. Prerequisites: MENG 211, 361, and ENAS 194; or permission of instructor.
QR, SC RP

MENG 390b, 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. Prerequisites: ENAS 194 or equivalent, ENAS 130, and EENG 200; or permission of instructor. QR RP

MENG 400a, 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. Prerequisite: ENAS 130 or permission of instructor. QR

MENG 403a, Introduction to Nanomaterials and Nanotechnology Staff
Survey of nanomaterial synthesis methods and current nanotechnologies. Approaches to synthesizing nanomaterials; characterization techniques; device applications that involve nanoscale effects. Prerequisites: ENAS 194 and MENG 285, or permission of instructor. SC

MENG 404a / BENG 404a, Medical Device Design and Innovation Joseph Zinter
The engineering design, project planning, prototype creation, and fabrication processes for medical devices that improve patient conditions, experiences, and outcomes. Students develop viable solutions and professional-level working prototypes to address clinical needs identified by practicing physicians. Some attention to topics such as intellectual property, the history of medical devices, documentation and reporting, and regulatory affairs.

MENG 440a / ENAS 440a, Applied Numerical Methods for Algebraic Systems, Eigensystems, and Function Approximation Beth Anne Bennett
The derivation, analysis, and implementation of various numerical methods. Topics include root-finding methods, numerical solution of systems of linear and nonlinear equations, eigenvalue/eigenvector approximation, polynomial-based interpolation, and numerical integration. Additional topics such as computational cost, error analysis, and convergence are studied in several contexts throughout the course. Prerequisites: MATH 115, and 222 or 225, or equivalents; ENAS 130 or some experience with Matlab, C++, or Fortran programming. QR RP

MENG 441b / ENAS 441b, Applied Numerical Methods for Differential Equations
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. Prerequisites: MATH 115, and 222 or 225, or equivalents; ENAS 130 or some knowledge of Matlab, C++, or Fortran programming; ENAS 194 or equivalent. ENAS 440 is not a prerequisite. QR RP

* **MENG 450b / APHY 450b / ENAS 450b, Advanced Synchrotron Techniques and Electron Spectroscopy of Materials** Charles Ahn
Introduction to concepts of advanced x-ray and electron-based techniques used for understanding the electronic, structural, and chemical behavior of materials. Students

learn from world-leading experts on fundamentals and practical applications of various diffraction, spectroscopy, and microscopy methods. Course highlights the use of synchrotrons in practical experiments. Prerequisites: physics and quantum mechanics/physical chemistry courses for physical science and engineering majors, or by permission of instructor. QR, SC

MENG 459a / BENG 459a, Neuromuscular Biomechanics Madhusudhan Venkadesan
Mechanics and control of animal movement, including skeletal muscle mechanics, systems-level neural and sensory physiology, elements of feedback control, and optimal control. Deriving equations of motion for multibody mechanical systems that are actuated by muscles or muscle-like motors; incorporating sensory feedback; analyzing system properties such as stability and energetics. Prerequisites: MENG 383 and MATH 222 or equivalents, and familiarity with MATLAB or a similar scientific computing environment. QR RP

* **MENG 469a, Aerodynamics** Juan Fernández de la Mora
Review of fluid dynamics. Inviscid flows over airfoils; finite wing theory; viscous effects and boundary layer theory. Compressible aerodynamics: normal and oblique shock waves and expansion waves. Linearized compressible flows. Prerequisite: MENG 361 or permission of instructor. QR, SC

* **MENG 471a and MENG 472b, Special Projects I** Staff
Faculty-supervised one- or two-person projects with emphasis on research (experiment, simulation, or theory), engineering design, or tutorial study. Students are expected to consult the course instructor, director of undergraduate studies, and/or appropriate faculty members to discuss ideas and suggestions for topics. Focus on development of professional skills such as writing abstracts, prospectuses, and technical reports as well as good practices for preparing posters and delivering presentations. Permission of adviser and director of undergraduate studies is required.

* **MENG 473a and MENG 474b, Special Projects II** Staff
Faculty-supervised one- or two-person projects with emphasis on research (experiment, simulation, or theory), engineering design, or tutorial study. Students are expected to consult the course instructor, director of undergraduate studies, and/or appropriate faculty members to discuss ideas and suggestions for topics. These courses may be taken at any time during the student's career and may be taken more than once. Prerequisites: MENG 471 or 472; permission of adviser and director of undergraduate studies.

MENG 487La / MENG 488Lb, Mechanical Design: Process and Implementation I
Aaron Dollar

This course is the first half of the capstone design sequence (students take MENG 488 in the spring semester of the same academic year) and is a unique opportunity to apply and demonstrate broad and detailed knowledge of engineering in a team effort to design, construct, and test a functioning engineering system. The lecture portion of the class provides guidance in planning and managing your project, as well other topics associated with engineering design. This course sequence requires quality design; analyses and experiments to support the design effort; and the fabrication and testing of the engineered system; as well as proper documentation and presentation of results to a technical audience. Prerequisites: MENG 280 and MENG 361. MENG 185 and MENG 325 are strongly suggested. ½ Course cr

MENG 488Lb / MENG 487La, Mechanical Design: Process and Implementation II
Staff

This course is the second half of the capstone design sequence (students take MENG 487 in the fall semester of the same academic year) and is a unique opportunity to apply and demonstrate broad and detailed knowledge of engineering in a team effort to design, construct, and test a functioning engineering system. The lecture portion of the class provides guidance in planning and managing your project, as well other topics associated with engineering design. This course sequence requires quality design; analyses and experiments to support the design effort; and the fabrication and testing of the engineered system; as well as proper documentation and presentation of results to a technical audience. Prerequisites: MENG 487, MENG 280, and MENG 361. MENG 185 and MENG 325 are strongly suggested. ½ Course cr

Modern Middle East Studies

Director of undergraduate studies: Travis Zadeh, Rm. 308, 451 College St., 432-6532, travis.zadeh@yale.edu (travis.zadeh@yale.edu); www.yale.edu/macmillan/cmcs

The Modern Middle East Studies major focuses on the culture, history, religion, politics, and society of the modern Middle East in its full geographical breadth, while developing expertise in any of the major languages associated with the region, namely Arabic, Hebrew, Persian, and Turkish. Courses are drawn from departments in the humanities and social sciences, including Anthropology, History, History of Art, Judaic Studies, Political Science, Near Eastern Languages and Civilizations, Religious Studies, and Sociology. The Modern Middle East Studies major gives students the analytical and linguistic skills necessary to master the complex issues of the Middle East and serves as excellent preparation for graduate study or for professional careers in which an understanding of that region is essential.

REQUIREMENTS OF THE MAJOR

The major allows students to develop highly individualized courses of study, tailored to their own academic, intellectual, and linguistic interests. There are no prerequisites. Twelve term courses are required for the major, including one course at the L₅ level in a Middle Eastern language and two survey courses on the modern period, taken at the introductory level. Beyond those requirements, students take eight distribution courses focusing on any aspect of the culture, thought, history, religion, politics, and society of the region. These eight distribution courses must be spread geographically and temporally and include two courses from two different regions or countries within the Middle East, two courses from different departments or programs, and two that focus substantially on the period before 1750. These courses must draw from distinct methodological or disciplinary approaches, and they must include at least two advanced seminars. The proposed course of study requires the approval of the director of undergraduate studies.

SENIOR REQUIREMENT

Students in the major undertake a one- or two-term senior essay that involves use of materials in one or more modern Middle Eastern languages. Each student selects a faculty adviser with competence in the appropriate language. A prospectus and outline signed by the adviser must be submitted to the DUS by the end of the fourth week of classes in either term of the senior year. Senior essays are graded by the adviser and a second reader. See the course descriptions of the senior essay courses (MMES 491, 492, 493) for further information. Alternatively, under supervision of the instructor, majors may take an additional seminar and write an essay in that course to fulfill the senior requirement.

REQUIREMENTS OF THE MAJOR

Prerequisites None

Number of courses 12 term courses

Survey requirement 2 intro survey courses on the Middle East, focusing on the modern period

Distribution requirement 2 courses on Middle Eastern regions or countries; 2 courses from two different departments or programs; 2 courses with focus on pre-1750; and 2 adv seminars

Language requirement 1 course at L5 level or above in a Middle East language

Substitution permitted With DUS approval, up to 2 language courses below L5 in Modern Middle East language may count toward distrib requirement

Senior requirement One term senior essay (MMES 491), two term senior essay (MMES 492, 493), or essay written in additional seminar

FACULTY ASSOCIATED WITH THE PROGRAM OF MODERN MIDDLE EAST STUDIES

Professors Abbas Amanat (*History*), Gerhard Böwering (*Religious Studies*), John Darnell (*Near Eastern Languages & Civilizations*), Stephen Davis (*Religious Studies*), Steven Fraade (*Religious Studies*), Eckart Frahm (*Near Eastern Languages & Civilizations*), Frank Griffel (*Religious Studies*), Christine Hayes (*Religious Studies*), Hannan Hever (*Comparative Literature*), Marcia Inhorn (*Anthropology*), Anthony Kronman (*Law School*), Joseph Manning (*Classics, History*), Ivan Marcus (*History*), Alan Mikhail (*History*), A. Mushfiq Mobarak (*School of Management*), Robert Nelson (*History of Art*), Kishwar Rizvi (*History of Art*), Maurice Samuels (*French*), Lamin Sanneh (*Divinity School*), Shawkat Toorawa (*Near Eastern Languages & Civilizations*), Harvey Weiss (*Near Eastern Languages & Civilizations*)

Associate Professors Zareena Grewal (*American Studies*), Kaveh Khoshnood (*Public Health*), Mark Lazenby (*School of Nursing*), Eliyahu Stern (*Religious Studies*), Jonathan Wyrzten (*Sociology*), Travis Zadeh (*Religious Studies*)

Assistant Professors Rosie Bsheer (*History*), Thomas Connolly (*French*), Robyn Creswell (*Comparative Literature*), Narges Erami (*Anthropology*), Jill Jarvis (*French*)

Senior Lecturers Geetanjali Singh Chanda (*Women's, Gender, & Sexuality Studies*), Supriya Gandhi (*Religious Studies*), Tolga Köker (*Economics*), Kathryn Slanski (*Near Eastern Languages & Civilizations*)

Lecturers Karla Britton (*Architecture*), Karen Foster (*History of Art*), Emma Sky (*Global Affairs*)

Senior Lecturer II Shiri Goren

Senior Lectors Sarab Al Ani, Muhammad Aziz, Jonas Elbousty, Dina Roginsky, Farkhondeh Shayesteh

Lecturer Orit Yeret

Foundational Courses

MODERN THOUGHT

* **MMES 105a / AFST 372a / HIST 375J / SOCY 372a, Comparative Nationalism in North Africa and the Middle East** Jonathan Wyrzten

The rise of nationalism in the Maghreb (or Arab West) and Mashriq (or Arab East). Introduction to major debates about nationalism; the influence of transnational (pan-Islamic and pan-Arab) ideologies, ethnicity, gender, and religion. Case studies include

Egypt, Iraq, Israel, Palestine, Jordan, Saudi Arabia, the Gulf monarchies, Morocco, Western Sahara, Algeria, and Berber and Kurdish movements. SO

* **MMES 176b / PERS 161b, 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. L4 and instructor permission. L5

MMES 191b / RLST 100b, Intro to World Religions Gerhard Böwering

HU

CLASSICAL THOUGHT

* **MMES 139a / HIST 378Ja / HIST 378a / RLST 427a, 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 South East Asia, the Indian Ocean, Iberia, and West Africa. HU

MMES 192a / RLST 170a, The Religion of Islam Gerhard Böwering

The rise of Islam in Arabia; Muhammad and the Qur'an; Muslim tradition and religious law; crucial issues of Islamic philosophy and theology; basic beliefs and practices of the Muslim community; Sufism and Shi'ism; religious institutions and modern trends; fundamentalism and violence; freedom and democracy. HU

* **MMES 342a / HIST 232Ja / HUMS 443a / JDST 270a / RLST 201a, Medieval Jews, Christians, and Muslims In Conversation** Ivan Marcus

How members of Jewish, Christian, and Muslim communities thought of and interacted with members of the other two cultures during the Middle Ages. Cultural grids and expectations each imposed on the other; the rhetoric of otherness—humans or devils, purity or impurity, and animal imagery; and models of religious community and power in dealing with the other when confronted with cultural differences. Counts toward either European or Middle Eastern distributional credit within the History major, upon application to the director of undergraduate studies. WR, HU RP

MMES 391a / RLST 287a, Islamic Theology and Philosophy Frank Griffel

Historical survey of major themes in Muslim theology and philosophy, from teachings of the Qur'an to contemporary Muslim thought. The systematic character of Muslim thought and of the arguments given by thinkers; reason vs. revelation; the emergence of Sunnism and Shi'ism; the reaction of Muslim theology (from 1800) to the challenges of the West. HU

THE MODERN MIDDLE EAST

* **MMES 042a / HIST 042a, Oil and Empire** Rosie Bsheer

The political and social history of oil since the late nineteenth century, including global trends and processes. Oil's impact on the rise and fall of empires and the fates of nation-states; its role in war and its impact on social and cultural life. Focus on the Middle East, with some attention to Venezuela, Indonesia, and the Niger Delta. Enrollment limited to first-year students. Preregistration required; see under First-Year Seminar Program. WR, HU

* **MMES 256a / JDST 296a, State and Religion in Israel** Hannan Hever

An exploration of culture, politics, and society in modern Palestine and Israel through the study of Israel. Topics include the city in Zionist ideology, immigration and cosmopolitanism, Hebrew culture and language, architecture and city planning, centers and peripheries, and the city as a site of political activism. HU

MMES 346a / HIST 344a, Making of the Modern Middle East Rosie Bsheer

Introduction to narratives and debates in the history of the Middle East from the mid-eighteenth century to the present. Local, regional, and global events and processes; political, social, cultural, and intellectual realities. Readings from the fields of history, anthropology, politics, and literature. HU

* **MMES 347b / HIST 385Jb, Reformers and Revolutionaries in the Arab World**

Rosie Bsheer

Major social and intellectual trends of the Arab world and their relation to major events and movements of the twentieth century. The influence of colonial, postcolonial, and neocolonial thought; issues faced by activists, lawyers, feminists, leftists, nationalists, Islamists, secularists, liberals, and unionists; ways in which such struggles shaped people's social lives and futures; the causes and implications of current uprisings. WR, HU

Elective Courses

* **MMES 126a / ARCH 271a / HSAR 266a / SAST 266a, Introduction to Islamic Architecture** Kishwar Rizvi

Introduction to the architecture of the Islamic world from the seventh century to the present, encompassing regions of Asia, North Africa, and Europe. A variety of sources and media, from architecture to urbanism and from travelogues to paintings, are used in an attempt to understand the diversity and richness of Islamic architecture. Field trip to the Metropolitan Museum of Art in New York. HU

MMES 144a / HIST 346a, The Making of Modern Iran Abbas Amanat

The political, socioreligious, and cultural history of modern Iran from the Shi'ite revolution and the rise of the Safavid Empire to the present. Discussion of Shi'ism and the state, relations with neighboring countries (the Ottoman Empire and India), Russia and Britain in Qajar Iran, the Babi-Baha'i religion, the constitutional revolution, the Pahlavi dynasty, oil, nationalism and relations with the United States, the causes and the consequences of the Islamic revolution, and Iran in the contemporary Middle East. HU

* **MMES 150a / HEBR 150a / JDST 213a, Advanced Modern Hebrew: Daily Life in Israel** Orit Yeret

An examination of major controversies in Israeli society. Readings include newspaper editorials and academic articles as well as documentary and historical material. Advanced grammatical structures are introduced and practiced. Conducted in Hebrew. Prerequisite: HEBR 140 or equivalent. L5 RP

MMES 156b / HEBR 161b / JDST 407b, 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; modern popular music and 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. Conducted in Hebrew. Prerequisite: HEBR 140 or equivalent. L5

* **MMES 157b / JDST 306b / NELC 157b, Israeli Narratives** Shiri Goren

Close reading of major Israeli novels in translation with attention to how their themes and forms relate to the Israeli condition. Theories of war and peace, migration, nationalism, and gender. Authors include Yehoshua, Grossman, Matalon, Castel-Bloom, and Kashua. No knowledge of Hebrew required. HU TR

* **MMES 161a / HEBR 162a / JDST 319a, Israel in Ideology and Practice** Dina Roginsky

An advanced Hebrew class focusing on changing ideology and politics in Israel. Topics include right and left wing political discourse, elections, State-Religion dynamics, the Jewish-Arab divide, and demographic changes. Materials include newspapers, publications, on-line resources, speeches of different political and religious groups, and contemporary and archival footage. Comparisons to American political and ideological discourse. Prerequisite: HEBR 140 or permission of instructor. L5 RP

* **MMES 235b / JDST 235b / NELC 231b / RLST 147b, Introduction to Judaism in the Ancient World** 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. No prior background in Jewish history assumed.

HU

* **MMES 261a / AFST 414a / FREN 414a / LITR 269, Afterlives of Algeria's Revolution** Jill Jarvis

The Algerian War for Independence from France was the longest and most violent decolonizing war of the 20th century. This war and its aftermath transformed political, social, intellectual, and artistic life on both sides of the Mediterranean—and it became a model for other decolonizing and civil rights movements across the world. Memory of this war continues to shape current debates in Europe and North Africa about state violence, terrorism, racism, censorship, immigration, feminism, human rights, and justice. Through study of fiction, film, testimonies, graphic novels, and theater, this seminar charts the war's surprising and enduring legacies. Films may include Pontecorvo's *The Battle of Algiers*, Haneke's *Caché*, and Panijel's *Octobre à Paris*. Literary works by Djébar, Camus, Sebbar, Etcherelli, Dib, Cixous, Kateb, Fanon, De Beauvoir, Mechakra. The course is conducted in French. If you have any questions about your French ability, contact the instructor. L5, HU

* **MMES 345b / HIST 342Jb, The Middle East and the West: A Cultural Encounter** Abbas Amanat

Cultural dialogues and confrontation between the modern Middle East and the West (Europe and North America) and their significance for our time. Western images of the Orient and discourse of Orientalism, Middle East as a modern construct, Muslim knowledge of Western modernity, impact of colonialism and territorial conflicts, and cultural roots of Islamic Jihadism and nonstate terrorist entities. WR, HU

MMES 360b / FREN 425b, North African French Poetry Thomas Connolly
Introduction to North African poetry composed in French during the twentieth and twenty-first centuries. Works explored within the broader context of metropolitan French, Arabic, and Berber cultures; juxtaposition with other modes of expression including oral poetry, painting, dance, music, the Internet, and film. The literary, aesthetic, political, religious, and philosophical significance of poetic discourse. LS, HU

* **MMES 430b / MMES 399 / WGSS 399 / WGSS 430b, Gender and Citizenship in the Middle East** Eda Pepi

Examination of the gendered and sexual dimensions of war, conflict, and partition, and the codification of modern citizenship in the Middle East—from Syria, to the Middle East conflict, to Western Sahara, among others—this course presents ethnographic, historical, and literary scholarship that theorizes the role of kinship and citizenship in narratives of the nation and sovereignty. SO

* **MMES 465a / ARBC 165a, Arabic Seminar: Early Adab** Kevin Van Bladel

Study and interpretation of classical Arabic texts for advanced students. Prerequisite: ARBC 146, 151, or permission of instructor. May be repeated for credit.

Directed Study and Senior Essay Courses

* **MMES 471a and MMES 472b, Independent Directed Study** Travis Zadeh

Independent research or directed reading under the direction of a faculty member in the program on a special topic in Modern Middle East Studies not substantially covered by an existing undergraduate or graduate course. A proposal describing the nature of the program and the readings to be covered must be signed by the adviser and submitted to the director of undergraduate studies by the end of the second week of classes. The student should meet with the adviser regularly, typically for an hour a week, and write one term essay or several short essays.

* **MMES 491a or b, Senior Essay** Travis Zadeh

The one-term senior essay is a research paper of at least thirty pages prepared under the supervision of a faculty member in accordance with the following schedule: (1) by the end of the second week of classes of the term, students meet with advisers to discuss the essay's topic, approach, sources, and bibliography; (2) by the end of the fourth week of classes a prospectus with outline, including an annotated bibliography of materials in one or more modern Middle Eastern languages and of secondary sources, is signed by the adviser and submitted to the director of undergraduate studies. The prospectus should indicate the formal title, scope, and focus of the essay, as well as the proposed research method, including detailed indications of the nature and extent of materials in a modern Middle Eastern language that will be used; (3) at the end of the tenth week of classes, a rough draft of the complete essay is submitted to the adviser; (4) by 4 p.m. on the last day of reading period, two copies of the finished paper must be submitted to the MMES registrar, 115 Prospect St., room 344. A late essay will receive a lower grade. Senior essays are graded by faculty associated with the Modern Middle East Studies program unless, for exceptional reasons, different arrangements for another reader have been made in advance with the director of undergraduate studies and the faculty adviser.

MMES 492a and MMES 493b, The Yearlong Senior Essay Travis Zadeh

The yearlong senior essay is a research paper of at least sixty pages prepared under the supervision of a faculty member in accordance with the following schedule: (1) by the end of the second week of classes of the first term, students meet with advisers to discuss the essay's topic, approach, sources, and bibliography; (2) by the end of the fourth week of classes a prospectus with outline, including an annotated bibliography of materials in one or more modern Middle Eastern languages and of secondary sources, is signed by the adviser and submitted to the director of undergraduate studies. The prospectus should indicate the formal title, scope, and focus of the essay, as well as the proposed research method, including detailed indications of the nature and extent of materials in a modern Middle Eastern language that will be used; (3) at the end of February, a rough draft of the complete essay is submitted to the adviser; (4) by 4 p.m. on the last day of reading period in the spring term, two copies of the finished paper must be submitted to the MMES registrar, 115 Prospect St., room 344. A late essay will receive a lower grade. Senior essays are graded by faculty associated with the Modern Middle East Studies program unless, for exceptional reasons, different arrangements for another reader have been made in advance with the director of undergraduate studies and the faculty adviser. Credit for MMES 492 only on completion of MMES 493.

Molecular Biophysics and Biochemistry

Director of undergraduate studies: Michael Koelle, CE28A SHM, 737-5808, [F]; Karla Neugebauer, C123 SHM, 785-3322 [Sp]; MBBUndergrad@yale.edu; mb&b.yale.edu

The programs offered by the Department of Molecular Biophysics and Biochemistry are planned for students interested in the molecular and chemical basis of biological processes and are well suited to students hoping to attend medical school or pursue graduate studies in biochemistry, molecular biology, genetics, or biophysics. The B.S. major, designed for those with a strong commitment to research, provides an intensive introduction to laboratory techniques in biochemistry and biophysics. Students in this program usually carry out research projects in faculty laboratories during their junior and senior years. The B.A. major provides the intellectual discipline of biochemistry and biophysics for students who also wish to have sufficient time to pursue in-depth studies outside the major or who are interested in molecular biology as a liberal education; they too may engage in research during their junior and senior years.

PREREQUISITES

The basic science courses required of all majors include four half-term units of foundational biology (BIOL 101, 102, 103, 104); a two term lecture sequence in general chemistry with its associated laboratories; a first term course in organic chemistry with its associated laboratory; and two terms of calculus (MATH 112 and 116). The prerequisites in biology, chemistry, and mathematics may be satisfied by scores on Advanced Placement tests or placement examinations sufficient to earn acceleration credits in the particular subjects, even if the student does not choose to accelerate.

REQUIREMENTS OF THE MAJOR

The major for the Class of 2020 and previous classes With DUS approval, the following changes to the requirements of the major may be fulfilled by students who declared their major under previous requirements.

The major for the Class of 2021 and subsequent classes Changes to the requirements of the major for both the B.S. degree program and B.A. degree program are described below.

B.S. degree program Thirteen courses are required beyond the prerequisites: a second term of organic chemistry with its associated laboratory; two term courses in physics numbered PHYS 170 or higher; one term of physical chemistry; MB&B 251L, 300, 301, 302, and 490; two additional upper-level MB&B electives, one of which must not be a laboratory or independent research course; one quantitative reasoning elective (e.g., MATH 120 or above, S&DS 105 or 230 or above, CPSC 201 or above, or ENAS 130 or above); and one elective in the natural sciences at a level higher than required in the prerequisites. Students choose the elective courses in consultation with a faculty adviser (see below). Only two course credits of MB&B 470, 471, and 478, 479 may count toward these electives. Students may substitute CHEM 333 for MB&B 302. The physics requirement may be satisfied by an Advanced Placement test score sufficient to earn acceleration credit in that subject. The quantitative reasoning requirement may not be fulfilled by Advanced Placement test scores.

B.A. degree program Eleven courses are required beyond the prerequisites: a second term of organic chemistry with its associated laboratory; two term courses in physics numbered PHYS 170 or higher; one term of physical chemistry; MB&B 251L, 300, 301, 302, and 490; one additional upper-level MB&B elective; and one quantitative reasoning elective (e.g., MATH 120 or above, S&DS 105 or 230 or above, CPSC 201 or above, or ENAS 130 or above). Students choose the elective courses in consultation with a faculty adviser (see below). Students may substitute CHEM 333 for MB&B 302. The physics requirement may be satisfied by an Advanced Placement test score sufficient to earn acceleration credit in that subject. The quantitative reasoning requirement may not be fulfilled by Advanced Placement test scores.

Credit/D/Fail Courses taken Credit/D/Fail may not be counted toward the requirements of the major.

Roadmap See visual roadmap of the requirements.

SENIOR REQUIREMENT

The senior requirement for both the B.S. and the B.A. is fulfilled by successful completion of MB&B 490, The Senior Project. Students enrolled in this course prepare a written report and make an oral presentation of a literature project. Students meet with faculty members in charge of the colloquium during the first two weeks of the spring term to agree on a topic and an approach. It is appropriate for students who took research for credit earlier in their training to write on their research topic. It is inappropriate for students to submit a revised version of a past research report or to resubmit a literature paper prepared for another course. The literature project for the senior requirement should be original work approved by the faculty member overseeing the senior colloquium.

The written report is expected to be 15–25 pages in length (double-spaced, twelve-point font, exclusive of figures). A first draft of the paper is due two weeks prior to the date of the oral presentation. Faculty in charge of the program will review the draft and return it to the student with suggestions. A final draft of the paper is due the first day of the reading period in the student's final term.

Students make a fifteen-minute oral presentation during the last three weeks of their final term in a general scientific forum open to the public. Other students in the series are expected to attend all presentations.

ADVISING

Recommended courses All B.S. majors are encouraged to include MB&B 470 or 471 among their MB&B electives. Declared MB&B majors may take up to two credits of these independent research courses for a letter grade. The prerequisites in either general or organic chemistry should be taken in the first year.

Students with a strong interest in biophysics, including those planning to attend graduate school, are strongly encouraged to take courses beyond the basic requirements of the major. Such students are advised to take mathematics through differential equations (ENAS 194, MATH 246, or PHYS 301) and a full year of physical chemistry (CHEM 328 or 332, and 333). In place of one term of biophysics (MB&B 302) they may elect a full year of upper-level biophysics (MB&B 420 and graduate courses in optical

spectroscopy and macromolecular interactions). Such revisions to the basic curriculum must be made in consultation with the faculty adviser.

Graduate work Graduate courses in molecular biophysics and biochemistry, biology, and the biomedical sciences that may be of interest to undergraduates are listed in the bulletin of the Graduate School, and many are posted on the Biological and Biomedical Sciences Website. Additional information is available from the directors of undergraduate and graduate studies. Undergraduates with an appropriate background may enroll with the permission of the director of graduate studies and the instructor.

Typical programs Programs with the minimal number of science courses required of B.A. and B.S. majors are shown below. Students whose scores on the Advanced Placement tests make them eligible for advanced courses are urged to replace the elementary science courses with more advanced ones in their first year, and to complete the required biochemistry and physics courses by the end of their sophomore and junior years, respectively. Students are permitted to take the biochemistry sequence (MB&B 300, 301) after one term of organic chemistry (CHEM 220).

First-Year	Sophomore	Junior	Senior
BIOL 101, 102, 103, 104	CHEM 220, 221, 222L, 223L	MB&B 300, 301, 251L	CHEM 328
CHEM 161, 165, 134L, 136L	MATH 112, 115	One quantitative reasoning elective PHYS 180, 181	MB&B 302 One MB&B elective And, for B.S. major: One science elective and a second MB&B elective MB&B 490

Combined B.S./M.S. degree program Exceptionally able and well-prepared students may complete a course of study leading to the simultaneous award of the B.S. and M.S. degrees after eight terms of enrollment. See "Simultaneous Award of the Bachelor's and Master's Degrees" under Special Arrangements (p. 64) in the Academic Regulations. Interested students should consult the director of undergraduate studies prior to the sixth term of enrollment for specific requirements in Molecular Biophysics and Biochemistry.

MB&B faculty advisory system Two MB&B faculty serve as academic advisers for each class year. Students may choose either of the advisers as listed for their class year and maintain an advising relationship throughout their studies. The advisers are apprised of curriculum-related details for each year and are authorized to sign schedules. Members acting as faculty advisers are:

Class of 2019:

J. Howard, 334A BASS (432-7245)

C. Schlieker, 236A BASS (432-5035)

Class of 2020:

E. De La Cruz, 336A BASS (432-5424)

P. Sung, C-130A SHM (785-4553)

Class of 2021:

W. Gilbert, C-127 SHM (785-4857)

M. Solomon, 218 BASS (436-9053)

Class of 2022:

J. Berro, 230 BASS (432-5437)

M. Koelle, CE28A SHM (737-5808)

REQUIREMENTS OF THE MAJOR

Prerequisites *B.S.* and *B.A.* – BIOL 101, 102, 103, and 104; a two-term lecture sequence in general chem, with labs, and 1 term of organic chem with lab; MATH 112, 116

Number of courses *B.S.* – 13 term courses beyond prereqs, incl senior req; *B.A.* – 11 term courses beyond prereqs, incl senior req

Specific courses required *B.S.* and *B.A.* – MB&B 251L, 300, 301, 302

Distribution of courses *B.S.* – a second term of organic chem with lab; 1 term of physical chem; two terms of PHYS 170 or above; 2 addtl upper-level MB&B electives, 1 quantitative reasoning elective, and 1 natural science elective, all as specified; *B.A.* – a second term of organic chem with lab; 1 term of physical chem; two terms of PHYS 170 or above; 1 addtl upper-level MB&B elective and 1 quantitative reasoning elective, as specified

Substitution permitted CHEM 333 for MB&B 302

Senior requirement Senior project (MB&B 490)

FACULTY OF THE DEPARTMENT OF MOLECULAR BIOPHYSICS AND BIOCHEMISTRY

Professors †Karen Anderson, Susan Baserga, †Ronald Breaker, †Gary Brudvig, †Sandy Chang, Enrique De La Cruz, †Daniel DiMaio, Donald Engelman, Alan Garen, Mark Gerstein, Nigel Grindley (*Emeritus*), Mark Hochstrasser, Jonathon Howard, Michael Koelle, Anthony Koleske, William Konigsberg, †Mark Lemmon, Peter Lengyel (*Emeritus*), †Patrick Loria, †I. George Miller, Andrew Miranker, †Peter Moore (*Emeritus*), Karla Neugebauer, †Thomas Pollard, †Karen Reinisch, †David Schatz, Robert Schulman (*Emeritus*), †Frederick Sigworth, Dieter Söll, Mark Solomon, Joan Steitz, Thomas Steitz, Scott Strobel, †William Summers (*Emeritus*), Patrick Sung

Associate Professors †Titus Boggon, Wendy Gilbert, Christian Schlieker, Matthew Simon, Chuck Sindelar, Yong Xiong

Assistant Professors Julien Berro, †Erdem Karatekin, Nikhil Malvankar, Candice Paulsen, †Sarah Slavoff, †Shervin Takyar

Adjunct Professors Kenneth Williams, Carl Zimmer

Lecturer Aruna Pawashe

†A joint appointment with primary affiliation in another department.

Courses

* **MB&B 050b, Topics in Cancer Biology** Sandy Chang

Introduction to cancer as a genetic disease, with a focus on major discoveries in cancer biology that offer mechanistic insights into the disease process. A brief history of cancer; influence of the genomic revolution on cancer diagnostics; molecular defects underlying specific cancers; current and future cancer therapeutics. Patient case studies

highlight specific molecular pathways and treatment strategies. Enrollment limited to first-year students with a strong background in biology and/or chemistry, typically demonstrated by a score of 5 on Advanced Placement examinations. Preregistration required; see under First-Year Seminar Program. SC

* **MB&B 060a, Molecular Medicine** Sandy Chang

The main purpose of this course is to use benign and malignant hematological disorders to introduce fundamental concepts in molecular and cellular biology. Students emerge from this course with a firm understanding of the molecular pathways perturbed in various hematological disorders and the therapeutics currently used to exploit these pathways for disease treatment. Through lectures and reading of primary scientific literature, students learn about landmark discoveries in hematology and how these discoveries contribute to understanding of the normal hematopoietic system, and when perturbed, how diseases arise. Students also learn to (1) read primary scientific literature, (2) synthesize this material to present to the class and (3) learn how to write a short grant proposal. These skills are essential for any successful scientist or physician, and it's important to master them early. Enrollment limited to first-year students. Preregistration required; see under First-Year Seminar Program. Prerequisite: score of 5 on the AP Biology exam or AP Chemistry exam. SC

MB&B 105a or b / MCDB 105a or b, Biology, the World, and Us Staff

Biological concepts taught in context of current societal issues, such as emerging diseases, genetically modified organisms, green energy, and the human brain and its disorders. Emphasis on biological literacy to enable students to evaluate scientific arguments. SC

* **MB&B 107b / EDST 107b / PHYS 107b, Being Human in STEM** Helen Caines and Andrew Miranker

A collaboratively-designed, project-oriented course that seeks to examine, understand, and disseminate how diversity of gender, race, religion, sexuality, economic circumstances, etc. shape the STEM experience at Yale and nationally, and that seeks to formulate and implement solutions to issues that are identified. Study of relevant peer-reviewed literature and popular-press articles. Implementation of a questionnaire and interviews of STEM participants at Yale. Creation of role-play scenarios for provoking discussions and raising awareness. Design and implementation of group interventions. SO

[**MB&B 110, Current Issues in Biological Science**]

* **MB&B 200a / MCDB 300a, Biochemistry** Ronald Breaker 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. Prerequisites: BIOL 101 or equivalent performance on the corresponding biological sciences placement examination; one term of organic chemistry; or with permission of instructor. SC

[**MB&B 230, Rain Forest Expedition and Laboratory**]

* **MB&B 251La or b / MCDB 301La or b, Laboratory for Biochemistry** Aruna Pawashe and William Konigsberg

An introduction to current experimental methods in molecular biology, biophysics, and biochemistry. Limited enrollment. Requires preregistration by e-mail to

aruna.pawashe@yale.edu and william.konigsberg@yale.edu prior to the first week of classes. Meets for first half of the term. After BIOL 101. SC ½ Course cr

MB&B 300a, Principles of Biochemistry I Michael Koelle, Matthew Simon, Enrique De La Cruz, and Candice Paulsen

Discussion of the physical, structural, and functional properties of proteins, lipids, and carbohydrates, three major classes of molecules in living organisms. Energy metabolism and hormone signaling as examples of complex biological processes whose underlying mechanisms can be understood by identifying and analyzing the molecules responsible for these phenomena. After BIOL 101; after or concurrently with CHEM 175 (or CHEM 125) or 220 SC

MB&B 301b, Principles of Biochemistry II Christian Schlieker and Karla Neugebauer

Building on the principles of MB&B 300 through study of the chemistry and metabolism of DNA, RNA, and proteins. Critical thinking emphasized by exploration of experimental methods and data interpretation, from classic experiments in biochemistry and molecular biology through current approaches. Prerequisite: MB&B 300 or permission of instructor. SC

MB&B 302b, Principles of Biophysics Enrique De La Cruz and Charles Sindelar

An introduction to the theoretical basis of biophysical concepts and approaches with selected examples and applications. Prerequisites: MB&B 300 and CHEM 328. SC

MB&B 330a / MCDB 330a / NSCI 324a, Introduction to Dynamical Systems in

Biology Damon Clark, Kathryn Miller-Jensen, 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. Prerequisites: BIOL 101 and 102, and PHYS 170 and 171 or equivalents, or with permission of instructors. QR, SC

MB&B 361b / BENG 465b / MCDB 361b / NSCI 325b, Dynamical Systems in Biology

Thierry Emonet and Jonathon Howard

Advanced topics related to dynamical processes in biological systems. Processes by which cells compute, count, tell time, oscillate, and generate spatial patterns. Time-dependent dynamics in regulatory, signal-transduction, and neuronal networks; fluctuations, growth, and form. Comparisons between models and experimental data. Dynamical models applied to neurons, neural systems, and cellular biophysical processes. Use of MATLAB to create models. Prerequisite: MCDB 330 or equivalent, or a 200-level biology course, or with permission of instructor. QR

MB&B 420a, Macromolecular Structure and Biophysical Analysis Andrew Miranker and Yong Xiong

Analysis of macromolecular architecture 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: MBB 301 and 302. SC

*** MB&B 425a / MCDB 425a, Basic Concepts of Genetic Analysis** Jun Lu

The universal principles of genetic analysis in eukaryotes. Reading and analysis of primary papers that illustrate the best of genetic analysis in the study of various biological issues. Focus on the concepts and logic underlying modern genetic analysis. Prerequisite: MCDB 202 or pre-approval of instructor. SC

MB&B 435a, Quantitative Approaches in Biophysics and Biochemistry Julien Berro, Yong Xiong, and Jonathon Howard

An introduction to quantitative methods relevant to analysis and interpretation of biophysical and biochemical data. Topics include statistical testing, data presentation, and error analysis; introduction to mathematical modeling of biological dynamics; analysis of large datasets; and Fourier analysis in signal/image processing and macromolecular structural studies. Instruction in basic programming skills and data analysis using MATLAB; study of real data from MB&B research groups. Prerequisites: MATH 120 and MB&B 300 or equivalents, or with permission of instructors. QR, SC

MB&B 443b, Advanced Eukaryotic Molecular Biology Mark Hochstrasser and Wendy Gilbert

Selected topics in regulation of chromatin structure and remodeling, mRNA processing, mRNA stability, translation, protein degradation, DNA replication, DNA repair, site-specific DNA recombination, and somatic hypermutation. Prerequisites: MB&B 300 and 301, or permission of instructor. SC RP

*** MB&B 445b, Methods and Logic in Molecular Biology** Wendy Gilbert, Mark Hochstrasser, and Christian Schlieker

An examination of fundamental concepts in molecular biology through analysis of landmark papers. Development of skills in reading the primary scientific literature and in critical thinking. Prerequisites: MB&B 300 and 301. SC RP

MB&B 449a, Medical Impact of Basic Science Joan Steitz, Thomas Steitz, I. George Miller, David Schatz, Daniel DiMaio, Karla Neugebauer, and Wendy Gilbert

Examples of recent discoveries in basic science that have elucidated the molecular origins of disease or that have suggested new therapies for disease. Readings from the primary scientific and medical literature, with emphasis on developing the ability to read this literature critically. Prerequisites: MB&B 300 and 301 or equivalents, or permission of instructor. SC

MB&B 452b / MCDB 452b / S&DS 352, Biomedical Data Science, Mining and Modeling Mark Gerstein

Techniques in data mining and simulation applied to bioinformatics, the computational analysis of gene sequences, macromolecular structures, and functional genomics data on a large scale. Sequence alignment, comparative genomics and phylogenetics, biological databases, geometric analysis of protein structure, molecular-dynamics simulation, biological networks, microarray normalization, and machine-learning approaches to data integration. Prerequisites: MB&B 301 and MATH 115, or permission of instructor. SC

* **MB&B 459a / ENGL 459a / EVST 215a, Writing about Science, Medicine, and the Environment** Carl Zimmer

Advanced non-fiction workshop in which students write about science, medicine, and the environment for a broad public audience. Students read exemplary work, ranging from newspaper articles to book excerpts, to learn how to translate complex subjects into compelling prose. Admission by permission of the instructor only. Applicants should email the instructor at carl@carlzimmer.com with the following information:

1. One or two samples of nonacademic, nonfiction writing. (No fiction or scientific papers, please.) Indicate the course or publication, if any, for which you wrote each sample.
2. A note in which you briefly describe your background (including writing experience and courses) and explain why you'd like to take the course.

WR RP

* **MB&B 460Lb, Advanced Laboratory for Biochemistry** Aruna Pawashe and William Konigsberg

An advanced laboratory in biochemistry, molecular biology, and biophysics. Students perform experiments on an individual basis that have unknown outcomes using techniques currently used in research labs. MB&B 251L or permission of the instructor.

SC ½ Course cr

* **MB&B 470a and MB&B 471b, Research in Biochemistry and Biophysics for the Major** Alan Garen

Individual laboratory projects under the supervision of a faculty member. Students must submit an enrollment form that specifies the research supervisor by the date that course schedules are due. Students are expected to commit at least ten hours per week to working in a laboratory. Written assignments include a research proposal, due near the beginning of the term, and a research report that summarizes experimental results, due before the beginning of the final examination period. Students receive a letter grade. No more than two credits of MB&B 470/471 may be taken. These courses do count toward the degree requirements. Enrollment limited to MB&B majors.

Prerequisite: MB&B 251L or permission of the instructor. SC

* **MB&B 472a and MB&B 473b, Research in Biochemistry and Biophysics** Alan Garen

Individual laboratory projects under the supervision of a faculty member. Students must submit an enrollment form that specifies the research supervisor by the date that course schedules are due. Students are expected to commit at least ten hours per week to working in a laboratory. Written assignments include a research proposal, due near the beginning of the term, and a research report that summarizes experimental results, due before the beginning of the final examination period. Students are graded pass/fail. Taken after students have completed two credits of MB&B 470 and 471. These courses do not count toward the degree requirements. Prerequisites: MB&B 470, 471 and 251L or permission of the instructor. SC

* **MB&B 478a and MB&B 479b, Intensive Research in Biochemistry and Biophysics** Alan Garen

Individual laboratory projects under the supervision of a faculty member. Students must submit an enrollment form that specifies the research supervisor by the day that course schedules are due. Students are expected to commit at least twenty hours per week to working in a laboratory. Written assignments include a research proposal, due near the beginning of the term, and a research report that summarizes experimental results, due before the beginning of the final examination period. No more than two

course credits count as electives toward the B.S. degree. Enrollment limited to senior MB&B majors. Prerequisite: MB&B 251L or 360L. 2 Course cr per term

* **MB&B 490b, The Senior Project** Dieter Söll and Julien Berro

Colloquium for fulfillment of the senior requirement. The course involves a written and an oral presentation of a senior paper in an area of biochemistry or biophysics. The topic is selected in consultation with the faculty members in charge of the course.

Molecular, Cellular, and Developmental Biology

Director of undergraduate studies: Douglas Kankel, 1220B KBT, 432-3839, douglas.kankel@yale.edu; (douglas.kankel@yale.edu) registrar, Crystal Adamchek, 219 Prospect St., 432-3839, crystal.adamchek@yale.edu; mcdb.yale.edu/

The science of biology is extremely broad, ranging across the domains of molecules, cells, tissues and organs, organisms, and ecosystems. Moreover, biology explores questions of evolutionary history and the processes of evolutionary change, as well as the mechanisms by which cells, organisms, and ecosystems function. Students majoring in Molecular, Cellular, and Developmental Biology receive a thorough yet varied liberal education and preparation for professional careers in a diverse array of fields. Practical applications of biology include the development of biologicals and pharmaceuticals, the practice of medicine, and the pursuit of the scientific bases for understanding the development and function of biological systems.

Molecular, Cellular, and Developmental Biology (MCDB) offers programs for students wishing to concentrate on molecular and cellular biology and genetics, with applications to problems in cell and developmental biology, neurobiology, and various aspects of quantitative biology. Interdisciplinary opportunities are available within the major in the Biotechnology, Neurobiology, and Quantitative Biology tracks.

The MCDB major offers many opportunities for independent laboratory research. With approval, research can be conducted under the supervision of faculty members in any Yale department.

PREREQUISITES

The foundational biology courses required of all MCDB majors are BIOL 101, 102, 103, and 104. All majors must also complete a course in mathematics numbered MATH 115 or higher or a statistics course taken at Yale.

For the B.A. degree, additional prerequisites are a two term lecture sequence in chemistry, and a term course in physics numbered PHYS 170 or higher.

For the B.S. degree, additional prerequisites are a two term lecture sequence in chemistry, with associated laboratories; a term course in organic chemistry with its associated laboratory; and two term courses in physics numbered PHYS 170 or higher.

PLACEMENT PROCEDURES

Placement in MCDB courses is determined by examinations administered at Yale. A student may place out of one or more courses in the BIOL 101–104 sequence. One or more of these foundational biology courses (or equivalent performance on the corresponding biological sciences placement examination) may be explicitly required as prerequisites for upper-level MCDB courses.

Placement in chemistry courses is arranged by the Department of Chemistry. Because required chemistry courses are prerequisite to several MCDB courses, students are strongly encouraged to take general and organic chemistry in the first and/or sophomore years. Students who place out of general chemistry may want to consider taking organic chemistry during the first year. Finishing the prerequisites early allows for a more flexible program in later years.

Acceleration credit awarded in chemistry, mathematics, or physics, or completion of advanced courses in those subjects, is accepted in place of the corresponding prerequisites for the MCDB major. Students who have mathematics preparation equivalent to MATH 115 or higher are encouraged to take additional mathematics courses, such as MATH 120, 222, or 225, or ENAS 151 or 194. Students in the B.A. degree program who have satisfied one or more prerequisites with advanced placement must still complete three term courses in chemistry and physics at Yale, including at least one from each department.

REQUIREMENTS OF THE MAJOR

B.A. degree program The B.A. degree requires a minimum of five and one-half course credits beyond the prerequisites, including five lecture or seminar courses and one laboratory, as follows:

1. Two core courses selected from MCDB 200, 202, 205, 210, 290, 300 (or MB&B 300)
2. Two general electives selected from MCDB courses numbered 250 or above, or two additional core courses from the list above. Two laboratory courses, either MCDB 342L and 343L or MCDB 344L and 345L, can be paired for a single elective credit. If used as an elective, these laboratories cannot also fulfill the laboratory requirement
3. One special elective selected from MCDB courses numbered 350 or higher
4. One laboratory from the biological sciences. Laboratories may be selected from MCDB, or Ecology and Evolutionary Biology, or Molecular Biology and Biophysics, or, with permission of the DUS, from Anthropology or Biomedical Engineering
5. The senior requirement, described below

B.S. degree program The B.S. degree requires a minimum of nine course credits beyond the prerequisites, including eight lecture or seminar courses and two laboratories, as follows:

1. Three core courses selected from MCDB 200, 202, 205, 210, 290, 300 (or MB&B 300)
2. Two general electives selected from MCDB courses numbered 250 or above. Additional core courses from the list above, a second term of organic chemistry, and courses in statistics may be used as general electives. Two laboratory courses, either MCDB 342L and 343L or MCDB 344L and 345L, can be paired for a single elective credit. If used as an elective, these laboratories cannot also fulfill the laboratory requirement
3. One special elective from MCDB courses numbered 350 or higher
4. Two laboratories from MCDB
5. The senior requirement, described below

The B.S. degree program, intensive major Requirements for the B.S. degree program, intensive major are the same as those for the B.S. degree except for the senior requirement (see below).

Independent research courses before senior year The only independent research course available to students prior to the senior year is MCDB 474. This course is graded

pass/fail and contributes to the thirty-six course credits required for the bachelor's degree, but it does not substitute for any MCDB major requirement, including the senior requirement. No independent research course satisfies a laboratory requirement for the MCDB major.

Independent research courses during senior year The research courses MCDB 475, 485, 486, and 495, 496 exist primarily to fulfill the senior requirement, and do not satisfy any other requirement for the major. Note that Yale College limits the number of independent study or independent research courses that students may take; see (p. 44) Course Credits and Course Loads (p. 44) in the Academic Regulations. (p. 33) Any independent study course, regardless of its number, is included in the total. No independent research course satisfies a laboratory requirement for the MCDB major.

Credit/D/Fail No course taken Credit/D/Fail may be counted toward the MCDB major, including prerequisites.

Roadmap See visual roadmap of the requirements.

SENIOR REQUIREMENT

In addition to the course requirements described above, all students must satisfy a senior requirement undertaken during the senior year. A booklet listing the senior requirements of each track and degree is available in the office of the DUS (1220B KBT). All students must fill out a checklist of requirements and go over it with the undergraduate registrar, Crystal Adamchek (crystal.adamchek@yale.edu), by the spring term of the junior year.

B.A. degree program For the B.A. degree, the senior requirement can be met either by submitting a senior essay of fifteen to twenty pages evaluating current research in a field of biology, or by successful completion of one term of individual research (MCDB 475). A senior choosing to fulfill the requirement with a senior essay must consult with a faculty adviser on the scope and literature of the topic and submit the adviser's written approval to the DUS no later than the course selection period of the term in which the paper is due. The senior essay may be related to the subject matter of a course, but the essay is a separate departmental requirement in addition to any work done in a course and does not count toward the grade in any course. The senior essay must be completed and submitted to the office of the DUS by the last day of classes. Students electing this option should obtain an approval form from the office of the DUS.

B.S. degree program For the B.S. degree, the senior requirement is usually fulfilled by completing a yearlong research course, MCDB 485, 486. Alternatively, a student can take two consecutive terms of MCDB 475. With permission of the DUS, students taking two terms of MCDB 475 can begin the project during the spring term of the junior year, continue it over the summer, and complete it during the fall term of the senior year. In all other cases, the senior requirement must be completed during the senior year. Yale College does not grant academic credit for summer research unless the student is enrolled in an independent research course in Yale Summer Session. Seniors working toward the B.S. degree are expected to spend at least ten hours per week in the lab conducting individual research.

B.S. degree program, intensive major Requirements for the B.S. degree with an intensive major are the same as those for the B.S. degree except that students fulfill the senior requirement by taking MCDB 495, 496 for four course credits. Seniors in the intensive major are expected to spend at least twenty hours per week in the lab conducting individual research.

REQUIREMENTS OF THE NEUROBIOLOGY, BIOTECHNOLOGY, AND QUANTITATIVE BIOLOGY TRACKS

Neurobiology track In addition to the core courses for the standard major, the Neurobiology track requires the additional course MCDB 320. One elective is selected from MCDB courses numbered 350 or above and one is selected from BENG 410, CPSC 475, 310, 315, 415, 430, MCDB 361, PSYC 270, or S&DS 101. Other courses may be substituted with the approval of the student's track adviser. (Students should note that PSYC 110 is a prerequisite for many psychology courses but does not substitute as an elective in the Neurobiology track.) The laboratory requirement and the senior requirement are the same as those for the standard major. Students interested in the Neurobiology track should consult an adviser for the track.

Neurobiology track advisers

P. Forscher, 222 KBT (432-6344)
 H. Keshishian, 640A KBT (432-3478)
 R. Wyman, 610A KBT (432-3475)
 W. Zhong, 616 KBT (432-9233)

Biotechnology track In addition to the core courses for the standard major, the Biotechnology track requires the additional course MCDB 370. One elective is selected from MCDB courses numbered 350 or above and one is selected from MB&B 420, 443, BENG 351, 352, 410, 435, CENG 210, 411, CPSC 437, 445, 470, or 475. The laboratory requirement and the senior requirement are the same as those for the standard major. Students interested in the Biotechnology track should consult an adviser for the track.

Biotechnology track advisers

R. Breaker, 506 KBT (432-9389)
 C. Crews, 452 KBT (432-9364)
 F. Isaacs, 802 KBT (432-3783)
 K. Nelson, 710A KBT (432-5013)
 J. Wolenski, 330 KBT (432-6912)

Quantitative Biology track In addition to the core courses for the standard major, the Quantitative Biology track requires the additional course MCDB 330. One elective is selected from MCDB courses numbered 350 or above and one is selected from MCDB 320, 361, 461, MB&B 302, 435, 452, 523, PHYS 402, MATH 246, or CPSC 475. Two laboratories numbered MCDB 201L or above are also required. Students interested in the Quantitative Biology track should consult an adviser for the track.

Quantitative Biology track advisers

M. Acar, West Campus B-31 (737-3255)
 D. Clark, 224 KBT (432-0750)
 T. Emonet, 1048 KBT (432-3516)
 D. Kankel, 1118 KBT (432-3532)

ADDITIONAL INFORMATION AND ADVISING

The prerequisites for the B.S. degree fulfill most of the usual premedical science requirements. Students who choose the B.A. degree can also prepare for medical school by taking additional premedical courses.

Selection of courses A relevant intermediate or advanced course from another department in science, engineering, mathematics, or statistics may be accepted as an elective with permission of the DUS. Many courses in other departments have prerequisites; such prerequisites can be substituted for an upper-level elective with permission of the DUS.

Residential college seminars cannot be substituted for electives and do not count toward the requirements of the major. The MCDB major should not be taken as one of two majors with Molecular Biophysics and Biochemistry, Ecology and Evolutionary Biology, or with Neuroscience.

Advising First-year students considering a major in Molecular, Cellular, and Developmental Biology are invited to consult with the DUS and/or a faculty member in MCDB who is a fellow of their residential college. For assistance in identifying a suitable adviser, students should contact the departmental undergraduate registrar, Crystal Adamchek (crystal.adamchek@yale.edu). Students in the Biotechnology, Neurobiology, or Quantitative Biology tracks should consult an adviser for their track (listed above). The course schedules of all MCDB majors (including sophomores intending to major in MCDB) must be signed by a faculty member in the department. The signature of the DUS is required **only** for students who are fulfilling the requirements of two majors or who have been admitted to the simultaneous B.S./M.S. degree program. Students whose regular adviser is on leave can consult the office of the DUS to arrange for an alternate.

Any faculty member with a primary appointment in the MCDB department can serve as a faculty adviser to majors. College faculty advisers available to first-year students are listed below.

BF	D. Kankel	MC	H. Keshishian, T. Pollard
BK	V. Irish, J. Wolenski	MY	S. Bahmanyar, D. Clark, C. Crews, J. Gendron
BR	I. Dawson, T. Emonet, S. Hatzios, J. van Wolfswinkel	PC	J. Carlson, C. Crews
DC	S. Dellaporta, P. Forscher, W. Zhong	SM	J. Rosenbaum
ES	M. Acar	SY	C. Jacobs-Wagner
GH	M. Mooseker, R. Wyman	TC	Y. Jacob, M. Moreno
JE	R. Breaker, T. Emonet, F. Isaacs	TD	S. Holley

Simultaneous B.S./M.S. degree program Exceptionally able and well-prepared students may accelerate their professional education by completing a course of study leading to the simultaneous award of the B.S. and M.S. degrees after eight terms of enrollment. Students may not enroll in Yale College for more than eight terms in order to qualify for the simultaneous award of both degrees. It is possible to earn both degrees in fewer than eight terms, but not by the use of acceleration credits. The requirements are as follows:

1. Candidates must satisfy the Yale College requirements for the B.S. degree. Students in the program must complete the core courses for the major and choose their 4 electives from graduate-level courses. One of the electives must be a graduate seminar selected with the approval of the DUS. Grades below B- in graduate courses are not accepted.
2. In addition to the courses specified above, students must complete two graduate research courses for six course credits: (a) MCDB 585, a two-credit course taken in the second term of the junior year. At the start of the course, each student forms a committee comprised of the faculty adviser and two faculty members that meets to discuss the research project. Two of the members of this committee must be members of the MCDB faculty. At the end of the course, the student completes a detailed prospectus describing the thesis project and the work completed to date. The committee evaluates an oral and written presentation of the prospectus and determines whether the student may continue in the combined program; (b) MCDB 595, 596, a four-credit, yearlong course that is similar to MCDB 495, 496 and is taken during the senior year. During the course, the student gives an oral presentation describing the work. At the end of the course, the student is expected to present his or her work to the department in the form of a poster presentation. In addition, the student is expected to give an oral thesis defense, followed by a comprehensive examination of the thesis conducted by the thesis committee. Upon successful completion of this examination, as well as all other requirements, the student is awarded the combined B.S./M.S. degree.

Students must also satisfy the requirements of Yale College for the simultaneous award of the bachelor's and master's degrees, including the following:

1. To be considered for admission to the program, by the end of their fifth term of enrollment students must have achieved at least two-thirds A or A- grades in all of their courses as well as in all of the courses directly relating to the major, including prerequisites.
2. Students must apply in writing to the DUS and obtain departmental approval no later than the last day of classes in their fifth term of enrollment in Yale College.
3. Students must have the approval of both the DUS and the DGS to receive graduate credit for the graduate courses they select.
4. Graduate work must not be entirely concentrated in the final two terms, and students in the program must take at least six term courses outside the department during their last four terms at Yale and at least two undergraduate courses during their last two terms.
5. Students must earn grades of A in at least two of their graduate-level term courses (or in one yearlong course) and have at least a B average in the remaining ones.

For more information, see "Simultaneous Award of the Bachelor's and Master's Degrees" under (p. 64) section K, Special Arrangements (p. 64), in the Academic Regulations.

STUDY ABROAD

Some programs for study abroad are available to MCDB majors; approved programs can fulfill some of the requirements for the major. Interested students should consult the DUS and the Center for International and Professional Experience.

REQUIREMENTS OF THE MAJOR

Prerequisites *B.A.* – BIOL 101, 102, 103, 104; a two-term lecture sequence in chem; one term of PHYS 170 or above; MATH 115 or above or STAT course at Yale; *B.S.* – BIOL 101, 102, 103, 104; a two-term lecture sequence in chem, with labs, and 1 term of organic chem with lab; two terms of PHYS 170 or above; MATH 115 or above or STAT course at Yale; all courses taken for letter grades

Number of courses *B.A.* – 5 courses and 1 lab, totaling at least 5½ course credits; *B.S.* – 8 courses and 2 labs, totaling at least 9 course credits; *B.S., intensive major* – 8 courses and 2 labs, totaling at least 11 course credits; all courses taken for letter grades

Specific courses required *Biotechnology track* – MCDB 370; *Neurobiology track* – MCDB 320; *Quantitative Biology track* – MCDB 330

Distribution of courses *Standard track* – *B.A.* – 2 core courses from MCDB 200, 202, 205, 210, 290, 300 (or MB&B 300); 2 electives numbered MCDB 250 or above (or 2 addtl core courses); 1 elective numbered MCDB 350 or above; 1 biology lab; *B.S.* – 3 core courses from MCDB 200, 202, 205, 210, 290, 300 (or MB&B 300); 2 electives numbered MCDB 250 or above (or 2 addtl core courses); 1 elective numbered MCDB 350 or above; 2 MCDB labs; *Biotechnology, Neurobiology, and Quantitative Biology tracks* – same as standard track, with 1 addtl elective

Senior requirement *B.A.* – MCDB 475 taken in senior year, or senior essay; *B.S.* – 2 consecutive terms of independent research, MCDB 485, 486 (preferred) or 2 consecutive terms of MCDB 475; *B.S., intensive major* – MCDB 495, 496 in senior year

FACULTY OF THE DEPARTMENT OF MOLECULAR, CELLULAR, AND DEVELOPMENTAL BIOLOGY

Professors Ronald Breaker, John Carlson, †Lynn Cooley, Craig Crews, Stephen Dellaporta, Paul Forscher, †Mark Hochstrasser, Scott Holley, Vivian Irish, †Akiko Iwasaki, Christine Jacobs-Wagner, Douglas Kankel, †Paula Kavathas, Haig Keshishian, Mark Mooseker, Thomas Pollard, Anna Pyle, Joel Rosenbaum, †Alanna Schepartz, †Hugh Taylor, Robert Wyman

Associate Professors Murat Acar, †Sreeganga Chandra, Damon Clark, Thierry Emonet, Valerie Horsley, Farren Isaacs, †Kathryn Miller-Jensen, †Matthew Rodeheffer, Weimin Zhong

Assistant Professors Shirin Bahmanyar, David Breslow, Nadya Dimitrova, Joshua Gendron, Stavroula Hatzios, Yannick Jacob, Josien van Wolfswinkel

Professor Adjunct Robert Bazell

Lecturers †Alexia Belperron, †Surjit Chandhoke, Iain Dawson, Samantha Lin, Maria Moreno, Kenneth Nelson, Julie Park, †Aruna Pawashe, Joseph Wolenski

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

Introductory Courses

*** MCDB 040b, The Science and Politics of Cancer** Robert Bazell

Fundamentals of cell biology, Darwinian evolution, immunology, and genetics that underlie cancer; the history of cancer science and treatment; historical and current policy issues. Enrollment limited to first-year students. Preregistration required; see under First-Year Seminar Program. SC

*** MCDB 050a or b, Immunology and Microbes** Paula Kavathas

Introduction to the immune system and its interaction with specific microbes. Attention both to microbes that cause illness, such as influenza, HIV, and HPV, and to microbes that live in harmony with humans, collectively called the microbiome. Readings include novels and historical works on diseases such as polio and AIDS. Enrollment limited to first-year students. Preregistration required; see under First-Year Seminar Program.

SC RP

*** MCDB 065a, The Science and Politics of HIV/AIDS** Robert Bazell

Study of the basic virology and immunology of HIV/AIDS, along with its extraordinary historical and social effects. Issues include the threat of new epidemics emerging from a changing global environment; the potential harm of conspiracy theories based on false science; and how stigmas associated with poverty, gender inequality, sexual preference, and race facilitate an ongoing epidemic. For all first-year students regardless of whether they are considering a science major. Prerequisite: AP Biology or equivalent. Enrollment limited to first-year students. Preregistration required; see under First-Year Seminar Program. SC

MCDB 105a or b / MB&B 105a or b, Biology, the World, and Us Staff

Biological concepts taught in context of current societal issues, such as emerging diseases, genetically modified organisms, green energy, and the human brain and its disorders. Emphasis on biological literacy to enable students to evaluate scientific arguments. SC

*** MCDB 106a / E&EB 106a / HLTH 155a, Biology of Malaria, Lyme, and Other Vector-Borne Diseases** Alexia Belperron

Introduction to the biology of pathogen transmission from one organism to another by insects; special focus on malaria, dengue, and Lyme disease. Biology of the pathogens including modes of transmission, establishment of infection, and immune responses; the challenges associated with vector control, prevention, development of vaccines, and treatments. Intended for non-science majors; preference to freshmen and sophomores. Prerequisite: high school biology. SC

*** MCDB 109b, Immunity and Contagion** Paula Kavathas

Introduction to the basics of the immune system; strategies to fight pathogens while maintaining harmony with our microbiome. Discussion of specific microbes such as influenza, HIV, and HPV; historical analysis of the polio vaccine and the AIDS epidemic. Enrollment limited to freshmen and sophomores. SC

Intermediate and Advanced Courses

MCDB 200b, Molecular Biology Anna Pyle and Farren Isaacs

A study of the fundamental principles of molecular biology, including the experimental methodologies used in biological research. Topics include the structure, function,

and chemical behavior of biological macromolecules (DNA, RNA, and protein), chromosome and genome organization, replication and maintenance of the genome, transcriptional and translational regulation, microRNAs and other noncoding RNAs, RNA processing, systems biology, and synthetic biology. Designed to provide an accelerated venue for MCDB majors and other students seeking to understand the molecular basis for gene expression and the resultant implications for medicine and biological engineering. Prerequisites: CHEM 161, 165, or 167 (or CHEM 112, 114, or 118), and BIOL 101 or permission of instructor. SC

MCDB 201Lb, Molecular Biology Laboratory Maria Moreno

Basic molecular biology training in a project-based laboratory setting. Experiments analyze gene function through techniques of PCR, plasmid and cDNA cloning, DNA sequence analysis, and protein expression and purification. Instruction in experimental design, data analysis, and interpretation. Concurrently with or after MCDB 200, or with permission from instructor. For freshmen and sophomores interested in research integrated laboratory experience. Special registration procedures apply. Interested students must contact the instructor and attend an organizational meeting during the first week of classes. WR, SC ½ Course cr

* **MCDB 202a, Genetics** Stephen Dellaporta, Murat Acar, and Joshua Gendron
An introduction to classical, molecular, and population genetics of both prokaryotes and eukaryotes and their central importance in biological sciences. Emphasis on analytical approaches and techniques of genetics used to investigate mechanisms of heredity and variation. Topics include transmission genetics, cytogenetics, DNA structure and function, recombination, gene mutation, selection, and recombinant DNA technology. Prerequisite: BIOL 103 or equivalent performance on the corresponding biological sciences placement examination. SC RP

* **MCDB 203La, Laboratory for Genetics** Iain Dawson

Introduction to laboratory techniques used in genetic analysis. Genetic model organisms – bacteria, yeast, *Drosophila*, and *Arabidopsis* – are used to provide practical experience with various classical and molecular genetic techniques including cytogenetics; complementation, epistasis, and genetic suppressors; mutagenesis and mutant analysis, recombination and gene mapping, isolation and manipulation of DNA, and transformation of model organisms. Concurrently with or after MCDB 202. SC ½ Course cr

MCDB 205b, Cell Biology Thomas Pollard, Shirin Bahmanyar, and David Breslow
A comprehensive introductory course in cell biology. Emphasis on the general principles that explain the molecular mechanisms of cellular function. Prerequisites: BIOL 101 and 102, or equivalent performance on the corresponding biological sciences placement examinations, or a score of 5 on the Advanced Placement test in Biology, or a score of 710 or above on the SAT Biology M test, or MCDB 200. SC

MCDB 210a, Developmental Biology Scott Holley, Douglas Kankel, and Josephina van Wolfswinkel

A survey of the molecular and genetic control of embryonic development, cell-cell communication, and cell differentiation. Emphasis on mechanistic investigation in model organisms that reveal fundamental concepts explaining human birth defects and disease. Topics include gastrulation; neural and mesoderm induction; limb development; heart and vascular development; craniofacial development; adult and

embryonic stem cells; regeneration; evolution and development. Prerequisites: BIOL 101, 102, and 103, or equivalent performance on the corresponding biological sciences placement examinations. SC

MCDB 221La, Model Organisms in Biological Research Maria Moreno

An introduction to research and common methodologies in the biological sciences, with emphasis on the utility of model organisms. Techniques and methods commonly used in biochemistry, cell biology, genetics, and molecular and developmental biology; experimental design; data analysis and display; scientific writing. With permission of instructor or concurrently with or after BIOL 101, 102 or 103. WR, SC ½ Course cr

MCDB 250b, Biology of Reproduction Hugh Taylor and Seth Guller

Introduction to reproductive biology, with emphasis on human reproduction. Development and hormonal regulation of reproductive systems; sexuality, fertilization, and pregnancy; modern diagnosis and treatment of reproductive and developmental disorders; social and ethical issues. BIOL 101, 102, and 103, or equivalent performance on the corresponding biological sciences placement examinations, or a score of 5 on the Advanced Placement test in Biology, or a score of 710 or above on the SAT Biology M test SC

MCDB 251Lb, Laboratory for Biology of Reproduction and Development Hugh Taylor and Staff

Laboratory focus on aspects of human reproductive biology and connections with normal reproductive outcomes. Clinically relevant consideration of human tissue and cell models to study ovarian, uterine, and placental structure and function. Testing of the role of tissue specific cellular differentiation; human trophoblast function; and the roles of steroid hormones in the regulation of uterine, placental, and ovarian function. Mouse tissue models will be employed. Enrollment limited. Concurrently with or after MCDB 210 or 250. Not open to first-year students. Special registration procedures apply; students must consult the instructor prior to the first week of classes. SC ½ Course cr

MCDB 290b, Microbiology Christine Jacobs-Wagner and Stavroula Hatzios

Cell structure of bacteria, bacterial genetics, microbial evolution and diversity, bacterial development, microbial interaction, chemotaxis and motility, gene regulation, microbial genomics and proteomics, CRISPR, metabolism, infectious diseases, mechanisms of pathogenesis, host defense systems, viruses, gut microbiota in health and disease. Prerequisites: BIOL 101, 102, and 103, or equivalent performance on the corresponding biological sciences placement examinations; or one term of biochemistry, or cell biology, or genetics; or with permission of instructor. SC

* **MCDB 291Lb, Laboratory for Microbiology** Iain Dawson

Practical approaches used when working with microbes, primarily bacteria. Topics include microscopy, culture techniques, biochemical/metabolic assays, and basic environmental and medical microbiology. Concurrently with or after MCDB 290. Electronic permission key required; students should contact the instructor prior to the first class meeting. SC ½ Course cr

* **MCDB 300a / MB&B 200a, Biochemistry** Ronald Breaker 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. Prerequisites: BIOL 101 or equivalent performance on

the corresponding biological sciences placement examination; one term of organic chemistry; or with permission of instructor. SC

* **MCDB 301La or b / MB&B 251La or b, Laboratory for Biochemistry** Aruna Pawashe and William Konigsberg

An introduction to current experimental methods in molecular biology, biophysics, and biochemistry. Limited enrollment. Requires preregistration by e-mail to aruna.pawashe@yale.edu and william.konigsberg@yale.edu prior to the first week of classes. Meets for the first half of the term. After BIOL 101. SC ½ Course cr

* **MCDB 303Lb, Advanced Molecular Biology Laboratory** Maria Moreno and Timothy Nelson

A laboratory course that provides advanced biology research skills. Weekly workshops focus on laboratory practice, experimental design, data analysis, reading of primary literature, scientific presentations, and scientific writing skills. Application of these skills in project-based laboratory training sponsored by a faculty member. Enrollment limited. Special registration procedures apply; interested students must contact the instructor and attend an organizational meeting. This class is recommended to students in the sciences who are in their junior year and will be completing a senior research project requirement for graduation. SC RP

* **MCDB 310a / BENG 350a, Physiological Systems** Mark Saltzman and Stuart Campbell

Regulation and control in biological systems, emphasizing human physiology and principles of feedback. Biomechanical properties of tissues emphasizing the structural basis of physiological control. Conversion of chemical energy into work in light of metabolic control and temperature regulation. Prerequisites: CHEM 165 or 167 (or CHEM 113 or 115), or PHYS 180 and 181; MCDB 120, or BIOL 101 and 102. SC

MCDB 315b, Pathobiology S. David Hudnall, Jon Morrow, Jeffrey Sklar, Gilbert Moeckel, and Joanna Gibson

Mechanisms of human disease from a pathologic perspective. Includes sections devoted to systemic pathobiology, hematologic disease, gastrointestinal disease, renal disease, and cancer genetics. Subjects covered include cell and tissue injury, disordered physiology, inflammatory disease, and neoplastic disease. Enrollment limited; preference to junior and senior majors in MCDB or MB&B. Prerequisites: MCDB 205, 300, or 310 SC RP

MCDB 320a / NSCI 320a, Neurobiology Haig Keshishian and Paul Forscher

The excitability of the nerve cell membrane as a starting point for the study of molecular, cellular, and systems-level mechanisms underlying the generation and control of behavior. Prerequisites: year of college-level chemistry; a course in physics is strongly recommended. SC

MCDB 321La / NSCI 321La, Laboratory for Neurobiology Haig Keshishian and Paul Forscher

Introduction to the neurosciences. Projects include the study of neuronal excitability, sensory transduction, CNS function, synaptic physiology, and neuroanatomy. Concurrently with or after MCDB 320. SC ½ Course cr

MCDB 330a / MB&B 330a / NSCI 324a, Introduction to Dynamical Systems in**Biology** Damon Clark, Kathryn Miller-Jensen, 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. Prerequisites: BIOL 101 and 102, and PHYS 170 and 171 or equivalents, or with permission of instructors. QR, SC

*** MCDB 342La, Laboratory in Nucleic Acids I** Timothy Nelson

A project from a research laboratory within the MCDB department, using technologies from molecular and cell biology. Laboratories meet twice a week for the first half of the term. Concurrently with or after MCDB 202, 205, or 300. Enrollment limited. Special registration procedures apply; students should contact the instructor during January of the year you intend to take the course. SC ½ Course cr

*** MCDB 343La, Laboratory in Nucleic Acids II** Timothy Nelson

Continuation of MCDB 342L to more advanced projects in molecular and cell biology, such as making and screening cDNA libraries, microarray screening and analysis, or next-generation DNA sequencing. Laboratories meet twice a week for the second half of the term. Enrollment limited. Special registration procedures apply; students should contact the instructor during January of the year you intend to take the course. MCDB 342L or permission of instructor. SC ½ Course cr

*** MCDB 344Lb, Experimental Techniques in Cellular Biology** Joseph Wolenski

An inquiry-based approach to research in cell and molecular biology, with emphasis on experimental techniques commonly used in modern biomedical laboratories. Research is module-based and covers pertinent and timely topics. Methods include SDS-PAGE, immunoblotting, immunoprecipitation of proteins, column chromatography, mammalian cell culture, cell fractionation, cell transfection, plasmid design, DNA purification, PCR, and phase contrast and confocal microscopy. Meets during January and February. Prerequisite: MCDB 205. Special registration procedures apply; interested students must contact the instructor at least eighteen months in advance. SC ½ Course cr

*** MCDB 345Lb, Experimental Strategies in Cellular Biology** Joseph Wolenski

Continuation of MCDB 344L, with increased emphasis on experimental design, independent research, and presentation of data. Students develop semi-independent research projects in modern biomedical research. Emphasis on key components of being a successful principal investigator, including benchwork, seminar presentations, lab meetings, and critical analysis of data. Prepares for MCDB 475, 485, or 495. Meets during March and April. Prerequisite: MCDB 344L. Special registration procedures apply; interested students should contact the instructor. SC ½ Course cr

* **MCDB 350a, Epigenetics** Josephina van Wolfswinkel and Nadya Dimitrova
Study of epigenetic states and the various mechanisms of epigenetic regulation, including histone modification, DNA methylation, nuclear organization, and regulation by non-coding RNAs. Detailed critique of papers from primary literature and discussion of novel technologies, with specific attention to the impact of epigenetics on human health. Introductory courses (BIOL 101-104) and two MCDB 200-level courses (strongly recommended: MCDB 202 and MCDB 200 or MCDB 210) or instructor permission. SC

* **MCDB 355a, The Cytoskeleton, Associated Proteins, and Disease** Surjit Chandhoke
In-depth discussion of the cytoskeleton, proteins associated with the cytoskeleton, and diseases that implicate members of these protein families. Preference given to seniors in the MCDB major. Prerequisites: BIOL 101-104 *and* at least one MCDB 200-level course. SC

MCDB 361b / BENG 465b / MB&B 361b / NSCI 325b, Dynamical Systems in Biology

Thierry Emonet and Jonathon Howard

Advanced topics related to dynamical processes in biological systems. Processes by which cells compute, count, tell time, oscillate, and generate spatial patterns. Time-dependent dynamics in regulatory, signal-transduction, and neuronal networks; fluctuations, growth, and form. Comparisons between models and experimental data. Dynamical models applied to neurons, neural systems, and cellular biophysical processes. Use of MATLAB to create models. Prerequisite: MCDB 330 or equivalent, or a 200-level biology course, or with permission of instructor. QR

* **MCDB 370b, Biotechnology** Craig Crews, Ronald Breaker, Timothy Nelson, and Joseph Wolenski

The principles and applications of cellular, molecular, and chemical techniques that advance biotechnology. The most recent tools and strategies used by industrial labs, academic research, and government agencies to adapt biological and chemical compounds as medical treatments, as industrial agents, or for the further study of biological systems. Prerequisite: MCDB 200, 202, or 300. SC

* **MCDB 387b, The Eukaryotic Cell Cycle** Iain Dawson

The regulation and coordination of the eukaryotic cell cycle examined by means of a detailed critique of primary literature. Particular attention to the role of the cell cycle in the processes of development and differentiation and in cancer and other diseases. Students develop an understanding of experimental approaches to problem solving. Enrollment limited, with preference to juniors and seniors. Prerequisites: BIOL 101, 102, and 103, or equivalent performance on the corresponding biological sciences placement examinations; MCDB 202, 205, or 210. Electronic permission key required. Students must contact the instructor prior to the first class meeting. SC

* **MCDB 415b, Cellular and Molecular Physiology** Emile Boulpaep

Study of the processes that transfer molecules across membranes. Classes of molecular machines that mediate membrane transport. Emphasis on interactions among transport proteins in determining the physiologic behaviors of cells and tissues. Intended for seniors majoring in the biological sciences. Recommended preparation: MCDB 205, 310, 320, or permission of instructor. SC

* **MCDB 425a / MB&B 425a, Basic Concepts of Genetic Analysis** Jun Lu

The universal principles of genetic analysis in eukaryotes. Reading and analysis of primary papers that illustrate the best of genetic analysis in the study of various biological issues. Focus on the concepts and logic underlying modern genetic analysis. Prerequisite: MCDB 202 or pre-approval of instructor. SC

* **MCDB 430a, Biology of the Immune System** Eric Meffre, David Schatz, Peter Cresswell, Joao Pedro Pereira, Ruslan Medzhitov, Akiko Iwasaki, Craig Roy, Noah Palm, Susan Kaech, Kevan Herold, Carla Rothlin, and Carrie Lucas

The development of the immune system. Cellular and molecular mechanisms of immune recognition. Effector responses against pathogens. Immunologic memory and vaccines. Human diseases including allergy, autoimmunity, immunodeficiency, and HIV/AIDS. After MCDB 300. SC

* **MCDB 435a, Landmark Papers in Cell Biology** Joel Rosenbaum

Discussion and critical evaluation of selected research papers that were important in determining the directions of modern cell biological research. Emphasis on the nature of the problem, evaluation of the experimental approaches and results, and the authors' interpretation of the results. Grade dependent on weekly discussion by all participants. Seniors only. Students should contact the instructor prior to the first week of classes. Prerequisites: courses in cell biology, biochemistry, and genetics, or permission of instructor. SC

* **MCDB 450b, The Human Genome** Stephen Dellaporta

A focus on the primary scientific literature covering the principles of genomics and its application to the investigation of complex human traits and diseases. Topics include the technology of genome sequencing and resequencing, the characterization of sequence and structural variation in human populations, haplotype and linkage disequilibrium analysis, genome-wide association studies, the comparative genomics of humans and our closest relatives, and personalized genomics and medicine. Enrollment limited to 15. Students should contact the instructor prior to the first week of classes. Prerequisite: MCDB 202; a course in statistics is strongly recommended. SC

MCDB 452b / MB&B 452b / S&DS 352, Biomedical Data Science, Mining and Modeling Mark Gerstein

Techniques in data mining and simulation applied to bioinformatics, the computational analysis of gene sequences, macromolecular structures, and functional genomics data on a large scale. Sequence alignment, comparative genomics and phylogenetics, biological databases, geometric analysis of protein structure, molecular-dynamics simulation, biological networks, microarray normalization, and machine-learning approaches to data integration. Prerequisites: MB&B 301 and MATH 115, or permission of instructor. SC

* **MCDB 461b, Concepts and Applications in Systems Biology** Murat Acar

Analysis of the primary scientific literature on the topics of gene network design, stochasticity in gene expression, and evolution of genes and networks, in the context of both prokaryotic and eukaryotic systems. Critique of the approaches, data analysis, controls, results, and conclusions of selected current and classic papers in systems biology. Prerequisite: MCDB 261 or 361, or another MCDB course with permission of instructor. SC

* **MCDB 474a or b, Independent Research** Joseph Wolenski and Staff
 Research project under faculty supervision taken Pass/Fail. This is the only independent research course available to underclassmen. Students are expected to spend approximately ten hours per week in the laboratory. To register, the student must submit a form, which is available at <http://mcd.b.yale.edu/forms> as well as on the course site on Canvas@Yale, and a written plan of study with bibliography, approved by the faculty research adviser. The form and proposal must be uploaded to Canvas@Yale by the end of the second week of classes. A final research report is required at the end of the term. Students who take this course more than once must reapply each term. Guidelines for the course should be obtained from the office of the director of undergraduate studies or downloaded from the Canvas@Yale server.

* **MCDB 475a or b, Senior Independent Research** Joseph Wolenski and Staff
 Research project under faculty supervision, ordinarily taken to fulfill the senior requirement. This course is only available to MCDB seniors and they are awarded a letter grade. Students are expected to spend approximately ten hours per week in the laboratory. To register, the student must prepare a form, which is available at <http://mcd.b.yale.edu/forms> as well as on the course site on Canvas@Yale, and a written plan of study with bibliography, approved by the faculty research adviser. The form and proposal must be uploaded to Canvas@Yale by the end of the second week of classes. The final research paper is due in the hands of the sponsoring faculty member, with a copy uploaded to Canvas@Yale, by the last day of classes. Students who take this course more than once must reapply each term; students planning to conduct two terms of research should consider enrolling in MCDB 485, 486. Students should line up a research laboratory during the term preceding the research. Fulfills the senior requirement for the B.A. degree if taken in the senior year. Two consecutive terms of this course fulfill the senior requirement for the B.S. degree if at least one term is taken in the senior year.

* **MCDB 482a, Advanced Seminar in Cell Biology: Intracellular Signal Transduction**
 Craig Crews
 Discussion of intracellular signal transduction pathways. Detailed critique of experimental approaches, controls, results, and conclusions of selected current and classic papers in this field. SC

* **MCDB 485a and MCDB 486b, Senior Research** Joseph Wolenski, Yannick Jacob, and David Breslow
 Individual two-term laboratory research projects under the supervision of a faculty member. For MCDB seniors only. Students are expected to spend ten to twelve hours per week in the laboratory, and to make presentations to students and advisers. Written assignments include a short research proposal summary due at the beginning of the first term, a grant proposal due at the end of the first term, and a research report summarizing experimental results due at the end of the second term. Students are also required to present their research in either the fall or the spring term. A poster session is held at the end of the spring term. Students should line up a research laboratory during the term preceding the research. Guidelines for the course may be obtained at <http://mcd.b.yale.edu/forms> and on the course site on Canvas@Yale. Written proposals are due by the end of the second week of classes. Fulfills the senior requirement for the B.S. degree if taken in the senior year.

* **MCDB 486b, Senior Research** Joseph Wolenski, Stavroula Hatzios, and David Breslow

Individual two-term laboratory research projects under the supervision of a faculty member. For MCDB seniors only. Students are expected to spend ten to twelve hours per week in the laboratory, and to make presentations to students and advisers. Written assignments include a short research proposal summary due at the beginning of the first term, a grant proposal due at the end of the first term, and a research report summarizing experimental results due at the end of the second term. Students are also required to present their research in either the fall or the spring term. A poster session is held at the end of the spring term. Students should line up a research laboratory during the term preceding the research. Guidelines for the course may be obtained at <http://mcdb.yale.edu/forms> and on the course site on Classes*v2. Written proposals are due by the end of the second week of classes. Fulfills the senior requirement for the B.S. degree if taken in the senior year.

* **MCDB 495a and MCDB 496b, Senior Research Intensive** Joseph Wolenski, Yannick Jacob, and David Breslow

Individual two-term directed research projects in the field of biology under the supervision of a faculty member. For MCDB seniors only. Before registering, the student must be accepted by a Yale faculty member with a research program in experimental biology and obtain the approval of the instructor in charge of the course. Students spend approximately twenty hours per week in the laboratory, and make written and oral presentations of their research to students and advisers. Written assignments include a short research proposal summary due at the beginning of the first term, a grant proposal due at the end of the first term, and a research report summarizing experimental results due at the end of the second term. Students must attend a minimum of three research seminar sessions (including their own) per term. Students are also required to present their research during both the fall and spring terms. A poster session is held at the end of the spring term. Guidelines for the course may be obtained at <http://mcdb.yale.edu/forms> and on the course site on Canvas@Yale. Written proposals are due by the end of the second week of classes. Fulfills the senior requirement for the B.S. degree with an intensive major. 2 Course cr per term

* **MCDB 496b, Senior Research Intensive** Joseph Wolenski, Stavroula Hatzios, and David Breslow

Individual two-term directed research projects in the field of biology under the supervision of a faculty member. For MCDB seniors only. Before registering, the student must be accepted by a Yale faculty member with a research program in experimental biology and obtain the approval of the instructor in charge of the course. Students spend approximately twenty hours per week in the laboratory, and make written and oral presentations of their research to students and advisers. Written assignments include a short research proposal summary due at the beginning of the first term, a grant proposal due at the end of the first term, and a research report summarizing experimental results due at the end of the second term. Students must attend a minimum of three research seminar sessions (including their own) per term. Students are also required to present their research during both the fall and spring terms. A poster session is held at the end of the spring term. Guidelines for the course may be obtained at <http://mcdb.yale.edu/forms> and on the course site on Classes*v2.

Written proposals are due by the end of the second week of classes. Fulfills the senior requirement for the B.S. degree with an intensive major. 2 Course cr

Music

Director of undergraduate studies: Ian Quinn, 205 STOECK, 432-2986, dus.music@yale.edu; yalemusic.yale.edu

The Department of Music offers introductory and advanced instruction in the history of music, the theory of music, composition, music technology, and performance. The Music major provides a general music program in the humanities, as well as preparation for graduate studies or for careers in music.

COURSES FOR NONMAJORS AND MAJORS

Introductory courses, numbered from 100 to 199, are open to all undergraduates and require no previous experience in music.

Qualified students, whether majoring in music or not, may offer up to four terms of instruction in performance for academic credit toward the 36-course-credit requirement for the bachelor's degree. Of these four course credits, only two may be applied to the major in Music. Auditions for lessons are held at the beginning of the fall term; students sign up at the School of Music auditions site. Students who audition for lessons are placed into one of three groups: 1) noncredit instruction for a fee; 2) lessons for academic credit at the 300 level, graded Pass/Fail; or 3) lessons for academic credit at the 400 level, graded A–F. Only students with exceptional proficiency are placed into 400-level lessons.

Students accepted for noncredit instruction are charged \$550 for ten hours of lessons per term or \$350 for six hours of lessons per term. The fees are added to the Student Financial Services bill and are not refundable after the first two weeks of lessons each term. Declared music majors in their junior or senior year may receive noncredit lessons at a discounted rate: six hours of lessons per term at no charge or ten hours of lessons per term for \$275.

COURSE NUMBERING

Introductory courses are numbered from 100 to 199. Intermediate courses, numbered between 200 and 399, may require prerequisites or a familiarity with music notation. Advanced courses, numbered between 400 and 494, are intended for students who have completed intermediate courses in the relevant field. They are intended primarily for students majoring in music, but they may be elected by others who meet the stated prerequisites.

COREQUISITES AND LESSONS

Students taking MUSI 345 or 445 are required to be concurrently enrolled in an introductory or intermediate music theory or musicianship course (MUSI 100, 110, 200, 210, 211, 218, or 219) for two terms, or they must complete one term of the theory/musicianship requirement before enrolling in MUSI 345 or 445 for the first time, and another before enrolling in MUSI 345 or 445 again. MUSI 345 is taken Pass/Fail; MUSI 445 and the corequisites are taken for a letter grade.

PLACEMENT PROCEDURES

Students must take the Music Department's music theory placement test to determine their placement in the theory/musicianship sequences. Advanced Placement test scores

do not satisfy the music theory prerequisites for performance instruction. Although the faculty of the School of Music attempts to accommodate those who qualify for credit instruction, it cannot guarantee that they will be enrolled with the teacher of their choice.

REQUIREMENTS OF THE MAJOR

The major for the Class of 2020 and previous classes With DUS approval, the following changes to the requirements of the major may be fulfilled by students who declared their major under previous requirements.

The major for the Class of 2021 and subsequent classes Thirteen courses are required, two intermediate courses and one advanced course in each of four groups, plus the senior requirement. Group I (MUSI 220–249; 320–349; 420–449) includes composition, technology, and performance courses with a practical focus on techniques of artistic production. Group II (MUSI 200–219; 300–319; 400–419) includes music-theory and technology courses focused on the materials and structures of musical works and repertoires. Group III (MUSI 250–274; 350–374; 450–474) includes lectures and seminars taking a research- and writing-based approach to the Western art-music tradition. Group IV (MUSI 275–299; 375–399; 475–494) includes lectures and seminars taking a research- and writing-based approach to popular or vernacular music or to music of non-Western traditions.

Credit/D/Fail Courses taken Credit/D/Fail may not be counted toward the requirements of the major.

SENIOR REQUIREMENT

Each student majoring in Music must satisfy the senior requirement by completing a senior essay, composition, or recital in a course from the range MUSI 496–499.

The standard major Students must submit a completed Senior Project Form to the director of undergraduate studies by the end of the course selection period in the term during which the project will be completed. The Senior Project Form, available in the departmental office, includes a brief description of the project and a timeline for completion. The form must be signed by the project's primary and secondary advisers, at least one of whom is a member of the faculty of the Department of Music.

The intensive major The intensive major is for students of high standing who are qualified to do sustained independent and original work in music research or in composition. Students wishing to elect the intensive major must register for the senior project in the fall term of their senior year (MUSI 497–499). A plan for progress must be included in the project proposal at the beginning of the fall term, specifying a deliverable end-of-term product with approximately the same scope as a one-term senior project. Upon satisfactory completion of this work, a student may be admitted to the intensive major, which consists of a second term of registration for the senior project (MUSI 497–499). The additional course for the intensive major is supplementary to the thirteen term courses that constitute the standard major.

ADVISING

Simultaneous B.A./M.A. program Undergraduates with exceptionally strong preparation in music history or music theory may complete a course of study leading to the simultaneous award of the B.A. and M.A. degrees after eight terms of enrollment.

Students may not enroll in Yale College for more than eight terms to qualify for the simultaneous award of both degrees. Declared majors in Music may apply for the program until the last day of classes in their fifth term of enrollment, if they have completed at least two graduate courses in the Department of Music, at least one numbered 700 or higher, with grades of B+ or above, and if their overall grade average is A- or above. Applicants must demonstrate progress toward proficiency in a foreign language examined by the Department of Music.

Students in the simultaneous program fulfill the requirements for the intensive major in Music. They also take eight graduate courses in the Department of Music, with average grades of B+ or higher and grades of A or A- in at least two of the courses. They satisfy the Yale College requirements for the program (see "Simultaneous Award of the Bachelor's and Master's Degrees" in (p. 64)section K, Special Programs (p. 64), in the Academic Regulations), and they pass a departmental examination in a modern foreign language.

B.A./M.M. program The Bachelor of Arts/Master of Music program is designed for students with outstanding abilities in performance who are also interested in a liberal arts education. Admission to the B.A./M.M. program is through acceptance into Yale College as well as a separate, successful audition through the School of Music, either before matriculation into Yale College, or after the third year of the B.A. program.

B.A./M.M. students usually complete requirements for the Bachelor of Arts in their first four years and for the Master of Music after one year of the Master of Music program in the School of Music (fifth year). Before their fourth year students should have completed, at a minimum, four terms of performance (MUSI 345 or MUSI 445) and four courses at the intermediate or advanced level in Groups II, III, or IV.

Students cannot accelerate the undergraduate program in the B.A./M.M. program.

In their fourth year, students must take MUS 540 and MUS 544 each term, and they are advised to take two terms of a performance ensemble if schedules permit. B.A./M.M. students who major in an orchestral instrument are required to participate in the Yale Symphony or the School of Music Philharmonia. Guitarists and keyboard players should consult with their major teacher about prerequisites beyond the lessons and seminar.

By the end of the fifth year all students participating in the B.A./M.M. program must have met the School of Music's standard in musicianship and music history either through testing or course work. They must also have completed language and keyboard proficiency requirements.

REQUIREMENTS OF THE MAJOR

Prerequisites None

Number of courses 13 term courses numbered 200 or above (inc senior req)

Specific courses required None

Distribution of courses 2 courses from each intermediate group I-IV; 1 course from each advanced group I-IV

Senior requirement One-term senior essay or project in MUSI 496-499

Intensive major Two-term senior essay or project in MUSI 497-499; additional course is supplementary to the thirteen term course req

FACULTY OF THE DEPARTMENT OF MUSIC

Professors Kathryn Alexander (*Adjunct*), Richard Cohn, Michael Friedmann (*Adjunct*), Daniel Harrison, Paul Hawshaw (*Adjunct*), James Hepokoski (*Chair*), Richard Lalli (*Adjunct*), Patrick McCreless, Leon Plantinga (*Emeritus*), Ian Quinn, Ellen Rosand (*Emeritus*), Gary Tomlinson, Michael Veal (*on leave [Sp]*)

Associate Professors Robert Holzer (*Adjunct*), Brian Kane, Gundula Kreuzer (*on leave [Sp]*), Markus Rathey (*Adjunct*), Anna Zayaruznaya (*on leave*)

Assistant Professors Konrad Kaczmarek, Henry Parkes

Lecturers Daniel Egan, Andrew Gerle, Grant Herreid, Annette Jolles, Sara Kohane, Joshua Rosenblum, Wendy Sharp, Maho Ishiguro, Marissa Moore, Scott Frankel, Nathaniel Adam

First-Year Seminar

* **MUSI 007a, Noise** Brian Kane

The topic of noise as an introduction to the problems of sound and signification. The surplus of information in white noise, and the meaning perceived when noise is filtered. Contexts in which noise has become filtered for political and aesthetic ends. Topics include sound poetry, literature, electronic music, noise pollution, and consumption. *Enrollment limited to freshmen. Preregistration required. Please go to the following website to enter preferences for seminars: <https://students.yale.edu/ocs-preference/select/select?id=2041> WR, HU*

Introductory Courses

MUSI 110a or b, Introduction to the Elements of Music Staff

The fundamentals of musical language (notation, rhythm, scales, keys, melodies, and chords), including writing, analysis, singing, and dictation. Intended for students who have no music reading ability.

MUSI 175b, Listening to Music Marissa Moore

Development of aural skills that lead to an understanding of Western music. The musical novice is introduced to the ways in which music is put together and is taught how to listen to a wide variety of musical styles, from Bach and Mozart, to Gregorian chant, to the blues. HU

Intermediate Courses: Group I

* **MUSI 220a and MUSI 221b, The Performance of Chamber Music** Wendy Sharp

Coached chamber music emphasizing the development of ensemble skills, familiarization with the repertory, and musical analysis through performance. Admission by audition only. May be repeated for credit. For audition information e-mail wendy.sharp@yale.edu. Credit for MUSI 220 only on completion of MUSI 221. RP ½ Course cr per term

* **MUSI 221b, The Performance of Chamber Music** Wendy Sharp

Preparing and performing chamber music works, including rehearsal techniques, leading, developing musical concepts, learning to work effectively in a small group, and performing. Weekly coaching and rehearsals, bimonthly studio classes, and end-of-term recitals. Open to qualified Yale College instrumentalists and pianists by audition

only. Prerequisite: MUSI 220. May be repeated for credit. For audition information e-mail wendy.sharp@yale.edu. RP ½ Course cr

* **MUSI 222a or b, The Performance of Vocal Music** Richard Lalli

A course for singers and pianists that emphasizes the analysis and musical preparation of classical solo song and operatic repertoire. Examination of structure (poetic, harmonic, motivic), discussion of style, exploration of vocal techniques, and introduction to the International Phonetic Alphabet. Students are strongly encouraged to supplement the course with individual voice instruction. Admission by audition only. May be repeated for credit. For audition information e-mail richard.lalli@yale.edu. HU RP

* **MUSI 228a / THST 224a, Musical Theater Performance I** Andrew Gerle

The structure and meaning of traditional and contemporary musical theater repertoire. Focus on ways to "read" a work, decipher compositional cues for character and action, facilitate internalization of material, and elicit lucid interpretations. For singers, pianists, and directors. Prerequisites: MUSI 211 and 219, or with permission of instructor. Admission by audition only. May be repeated for credit. For audition information e-mail dan.egan@yale.edu. HU RP

* **MUSI 232a or b, Central Javanese Gamelan Ensemble** Maho Ishiguro

An introduction to performing the orchestral music of central Java and to the theoretical and aesthetic discourses of the gamelan tradition. Students form the nucleus of a gamelan ensemble that consists primarily of tuned gongs and metallophones; interested students may arrange for additional private instruction on more challenging instruments. The course culminates in a public performance by the ensemble. No previous musical experience required. RP

* **MUSI 330b, Musical Theater Composition II** Scott Frankel

Intermediate and advanced project-oriented studies in composition of musical theater. Prerequisite: MUSI 210. May be repeated for credit. Enrollment limited to 12. HU RP

Intermediate Courses: Group II

* **MUSI 210a or b, Elementary Studies in Analysis and Model Composition I** Staff

Practical investigation of the basic principles of tonal harmony, counterpoint, and composition through exercises in analysis, motivic development, phrase rhythm, texture, form, performance, and model composition. Recommended to be taken concurrently with MUSI 218 or 219. Admission after MUSI 110 or by the music theory placement test. See the *Calendar for the Opening Days* or the Music department Web site for information about the placement test. To be followed by MUSI 211. HU

* **MUSI 211a or b, Elementary Studies in Analysis and Model Composition II** Staff

Continuation of MUSI 210. Recommended to be taken concurrently with MUSI 218 or 219. Admission after MUSI 210 or by the music theory placement test. See the *Calendar for the Opening Days* or the Music department Web site for information about the placement test. HU RP

* **MUSI 218a or b, Elementary Musicianship I** Staff

Exercises in melodic and harmonic dictation, sight-singing, keyboard harmony, and aural analysis Admission after MUSI 110 or by the music theory placement test. See

the *Calendar for the Opening Days* or the Music department Web site for information about the placement test RP ½ Course cr

* **MUSI 219a or b, Elementary Musicianship II** Staff

Continuation of MUSI 218. Prerequisite: MUSI 218. Recommended to be taken concurrently with MUSI 210 or 211. RP ½ Course cr

* **MUSI 229b / THST 226b, Musical Theater Performance II** Annette Jolles

The collaborative process and its effect on musical theater performance. Choreography, music direction, and origination of new works. Analysis of texts, scripts, and taped or filmed performances; applications in students' own performance. May be repeated for credit. For audition information e-mail dan.egan@yale.edu. RP

* **MUSI 318b, Intermediate Musicianship** Richard Lalli

Training in advanced aural perception, sight-singing, and keyboard skills. Prerequisite: MUSI 219.

Intermediate Courses: Group III

* **MUSI 351a, Music in European Court, Church, and Theater, 1600-1800** James Hepokoski

A detailed investigation of the history of musical style from 1600 to 1800. Preference to Music majors according to class. HU

* **MUSI 352b, The European Art-Music Tradition, 1800-1950** James Hepokoski

A detailed investigation of the history of musical style from 1800 to the present. Preference to Music majors according to class. HU

Intermediate Courses: Group IV

* **MUSI 314b, Instrumentation and Orchestration** Kathryn Alexander

A study of instrumentation and orchestration in a variety of musical periods, genres and styles. Related creative project work and weekly labs. MUSI 210 or equivalent.

* **MUSI 320a, Composition Seminar I** Kathryn Alexander

Intermediate analytic and creative projects in music composition, instrumentation, and scoring for visual media. Study of compositional procedures and techniques in different genres and styles. Group and individual lessons to supplement in-class activities.

Enrollment limited to 20. Students with questions should contact the instructor at kathryn.alexander@yale.edu. Prerequisite: MUSI 210 or 211 or equivalent. WR, HU
RP

* **MUSI 345a or b, Introduction to Sound Studies** Richard Gard

Individual instruction in the study and interpretation of musical literature. Auditions for assignment to instructors (for both credit and noncredit lessons) are required for freshmen and some returning students, and are held only at the beginning of the fall term. For details, see the Music department's program description in the YCPS. sound studies intersects with more traditional methods of music studies.

Advanced Courses: Group I

* **MUSI 421b, Composition Seminar IV** Kathryn Alexander

Advanced analytic and creative projects in music composition and scoring for visual media. Ongoing study of evolving contemporary procedures and compositional

techniques. Group and individual lessons to supplement in-class lectures. Admission by audition only. May be repeated for credit. Enrollment limited to 10. To audition, students should upload two PDF scores and MP3 recordings in a single zip file by 4 p.m. on Wednesday, January 17, to the designated Music 413 Audition assignment page at the Canvas site. Students with questions should contact the instructor at kathryn.alexander@yale.edu. Prerequisites: both MUSI 312 and 313. RP

Advanced Courses: Group II

* **MUSI 404a, Nineteenth-Century Music: Analysis and Model Composition** Richard Cohn

Studies in the theory, analysis, and composition of music of the nineteenth century. Prerequisite: MUSI 211. Enrollment limited to 18. Preference to Music majors according to class. HU

* **MUSI 418a, Advanced Musicianship** Michael Friedmann

Development of students' ability to recognize and generate structures and processes particular to music of the twentieth century. Student composers and advanced performers of post-tonal music expand their perceptive skills. Course activities include singing (and playing), dictation, identification, improvisation, and recognition. Musical examples from the works of Schoenberg, Bartók, Debussy, and Stravinsky. Enrollment limited to 14.

Advanced Courses: Group III

Advanced Courses: Group IV

Individual Study and Senior Projects

* **MUSI 495a or b, Individual Study** Ian Quinn

Original essay in ethnomusicology, music history, music theory, or music technology and/or multimedia art under the direction of a faculty adviser. Admission to the course upon submission to the department of the essay proposal by the registration deadline, and approval of the director of undergraduate studies.

* **MUSI 496a or b, The Senior Recital** Ian Quinn

Preparation and performance of a senior recital and accompanying essay under faculty supervision. Admission by permission of the director of undergraduate studies. Prerequisite: MUSI 461.

* **MUSI 497a or b, The Senior Project in Composition** Ian Quinn

Preparation of a senior composition project under faculty supervision. Admission by permission of the composition faculty of the Department of Music. Prerequisites: MUSI 312, 313, 412, and 413.

Naval Science

Program adviser: Commander Adam Schlismann, USN; rm. 430, 55 Whitney Ave., 432-8223, adam.schlismann@yale.edu; nrotc.yalecollege.yale.edu

The Naval Reserve Officers Training Corps (NROTC) program educates young men and women for service as commissioned officers in the United States Navy (USN) or Marine Corps (USMC). NROTC develops future officers mentally, morally, and physically, and instills in them the highest ideals of duty and loyalty and the core values of honor, courage, and commitment. The Naval Science program prepares students to assume the highest responsibilities of command, citizenship, and government.

ACADEMIC REQUIREMENTS

The Naval Science curriculum includes courses on topics such as Navy and Marine Corps organization, at-sea navigation, leadership, naval history, amphibious warfare, engineering, and weapons systems. Courses emphasize development of professional knowledge and leadership skills, which are placed in the context of military service immediately following graduation from Yale College.

Students in the NROTC program enroll in one Naval Science course per term. Some courses are required for both Navy and Marine option students, while others are specific to the branch of service. All NROTC students must also enroll in the Naval Science Laboratory each term.

Navy students must complete eight core curriculum courses offered by Yale College: two term courses in calculus to be completed by the sophomore year, two term courses in calculus-based physics (with laboratory) to be completed by the junior year, two term courses in English or equivalent writing courses, one term course in history or national security policy, and one term course in world culture or regional studies.

For Navy students, the usual sequence of Naval Science courses is:

First-Year	Sophomore	Junior	Senior
Introduction to Naval Science	Leadership & Management	Naval Engineering	Naval Operations
Military History of the West since 1500	Navigation	Naval Systems	Leadership & Ethics

Marine students must complete three core curriculum courses offered by Yale College, including two term courses in English or equivalent writing courses, and one term course in history or national security policy.

For Marine Corps students, the usual sequence of Naval Science courses is:

First-Year	Sophomore	Junior	Senior
Introduction to Naval Science	Leadership & Management	Elective	Evolution of Warfare
Military History of the West since 1500	Elective	Fundamentals of Maneuver Warfare	Leadership & Ethics

ADVISING AND APPLICATION TO THE PROGRAM

Application to the National Scholarship Program Eligible applicants must use the online application to complete and submit all the required information to apply for the NROTC scholarship. Applicants select either the Navy or Marine Corps option and scholarship recipients are appointed midshipmen in either the United States Naval Reserve (USNR) or United States Marine Corps Reserve (USMCR), as appropriate. Scholarship recipients are granted the compensation and benefits authorized by law and current policy for a total period not to exceed four years (forty months or fifty months with approved fifth year benefits). During this period, the United States government pays for college tuition, authorized academic fees, a textbook stipend, and a subsistence allowance, and provides uniforms or compensation in lieu. Upon conferral of a degree, graduates are commissioned into the Navy or Marine Corps for a minimum of five years of active duty service. Yale students who matriculate without a scholarship may apply for the National Scholarship program during the fall term of their first year.

Application to the College Program Students without a scholarship, who are in their first or second year, may apply for enrollment in the College Program and compete for two- or three-year scholarships. If selected for the two- or three-year Scholarship Program, students receive the same benefits as students in the National Scholarship Program for their remaining undergraduate studies. Upon conferral of a degree, graduates of the College Program are commissioned into the Navy or Marine Corps for a minimum of three years of active duty service. Yale students interested in the College Program may apply directly to the Yale University NROTC Unit.

FACULTY OF THE DEPARTMENT OF NAVAL SCIENCE

Professor Captain Wayne Graddock, USN (*Adjunct*)

Lecturers Lieutenant Garrett Alfstad, USN, Captain Timothy Brunstetter, USMC, Lieutenant Brandon Ordway, USN, Commander Adam Schlismann, USN, Lieutenant Brian Schoendorfer, USN,

Courses

NAVY 100a or b, Naval Science Laboratory Staff

Leadership and practical application skills from the Professional Core Competency objectives that are not covered in other Naval Science courses. Emphasis on professional training that is not of an academic nature. Includes both classroom instruction and physical training. Topics and special briefings as determined by Naval Science faculty and the Naval Service Training Command. Required for NROTC students each term. Receives no credit; cannot be applied toward the 36-course-credit requirement for the Yale bachelor's degree. Grades earned in this course do not count toward GPA or eligibility for General Honors. o Course cr

* **NAVY 111a, Introduction to Naval Science** Staff

An overview of the naval service for first-year Naval ROTC students and others interested in pursuing the NROTC program. Organization, missions, customs and traditions, leadership principles, ethics, duties of a junior officer, and career options in the U.S. Navy and Marine Corps. Discussion of shipboard organization and procedures, safety, and damage control prepares students for summer training aboard naval vessels. For enrollment credit only; cannot be applied toward the 36-course-credit requirement

for the Yale bachelor's degree. Grades earned in this course do not count toward GPA or eligibility for General Honors.

NAVY 211a, Leadership and Management Staff

A study of leadership, ethics, resource management, and organizational behavior, with emphasis on situations commonly encountered by junior officers in the naval service. Classical theories of management, motivation, and communication; development of skills in organizational thinking and problem solving. Required for second-year NROTC students. For enrollment credit only; cannot be applied toward the 36-course-credit requirement for the Yale bachelor's degree. Grades earned in this course do not count toward GPA or eligibility for General Honors.

*** NAVY 212b, Navigation** Staff

Introduction to surface-ship navigation and practical piloting in both restricted and open water. Celestial navigation theory, navigational charts and instruments, and electronic navigation. Weather and other environmental factors that affect naval operations. Navigation rules and regulations, maneuvering board concepts, and practical exercises. For enrollment credit only; cannot be applied toward the 36-course-credit requirement for the Yale bachelor's degree. Grades earned in this course do not count toward GPA or eligibility for General Honors.

NAVY 311a, Naval Engineering Staff

An overview of Naval engineering systems and a detailed study of the principles behind ship construction. Topics include ship design, hydrodynamic forces, stability, conventional and nuclear propulsion, electrical theory and systems, interior communications, damage control, hydraulics, and ship control. Basic concepts in the theory and design of steam, gas turbine, and diesel propulsion. For enrollment credit only; cannot be applied toward the 36-course-credit requirement for the Yale bachelor's degree. Grades earned in this course do not count toward GPA or eligibility for General Honors.

NAVY 312b, Naval Systems Staff

The characteristics and capabilities of the major systems and platforms used in the U.S. Navy. Technical concepts and scientific theory addressed through study of designations, characteristics, capabilities, and missions of ships and aircraft. How computers and electronic and space-based communications influence operational employment of various naval platforms. Classic theory of radar, sonar, and fire-control systems. For enrollment credit only; cannot be applied toward the 36-course-credit requirement for the Yale bachelor's degree. Grades earned in this course do not count toward GPA or eligibility for General Honors.

NAVY 411a, Naval Operations and Seamanship Staff

Study of relative motion, formation tactics, and ship employment. Introductions to Naval operations and operations analysis, ship behavior and characteristics in maneuvering, applied aspects of ship handling, afloat communications, Naval command and control, Naval warfare areas, and joint warfare. Analysis of case studies involving related moral, ethical, and leadership issues. Prerequisites: NAVY 111 and 112. For enrollment credit only; cannot be applied toward the 36-course-credit requirement for the Yale bachelor's degree. Grades earned in this course do not count toward GPA or eligibility for General Honors.

*** NAVY 412b, Leadership and Ethics** Staff

Exploration of Western moral traditions and ethical philosophy and of their applications to naval leadership in the twenty-first century. Topics include military leadership, core values, and professional ethics; the Uniform Code of Military Justice and Navy regulations; the roles of enlisted members, junior and senior officers, command relationships, and the conduct of warfare. Discussion of current and historical events in the United States Navy and Marine Corps. Prerequisite: NAVY 212. For enrollment credit only; cannot be applied toward the 36-course-credit requirement for the Yale bachelor's degree. Grades earned in this course do not count toward GPA or eligibility for General Honors.

*** NAVY 413a, Evolution of Warfare** Staff

The development of warfare to the present day, with attention to the causes of continuity and change in the means and methods of warfare. The influence of political, economic, and societal factors on the conduct of war, with a focus on the role of technological innovation in changing the battlefield. The contributions of preeminent military theorists and battlefield commanders to the modern understanding of the art and science of war. Prerequisites: NAVY 111 and 212. Required for Marine-option NROTC students. For enrollment credit only; cannot be applied toward the 36-course-credit requirement for the Yale bachelor's degree. Grades earned in this course do not count toward GPA or eligibility for General Honors.

HIST 221b / GLBL 281b, Military History of the West since 1500 Paul Kennedy

A study of the military history of the West since 1500, with emphasis on the relationship between armies and navies on the one hand, and technology, economics, geography, and the rise of the modern nation-state on the other. The coming of airpower in its varied manifestations. Also meets requirements for the Air Force and Naval ROTC programs. HU

Near Eastern Languages and Civilizations

Director of undergraduate studies: Jonas Elbousty, Arnold Hall, 304 Elm Street, Room B41A, 432-2944, jonas.elbousty@yale.edu; nelc.yale.edu

The major in Near Eastern Languages & Civilizations is an interdisciplinary liberal arts major. Students acquire language proficiency and skills in critical analysis in order to study the long-lived and rich civilizations of the Near East, ranging from ancient Mesopotamia and Egypt, to the Medieval Near East and Classical Islam, to modern cultures represented by modern Arabic, Hebrew, Persian, and Turkish.

The Near East is studied for its own intrinsic literary, historic, and artistic interest, as well as its cultural and historical legacies, while also providing new ways of understanding developments and challenges in the modern world. Majors go on to careers in government, foreign service, law, medicine, education, and academic research. The major also provides an excellent basis for graduate study.

REQUIREMENTS OF THE MAJOR

The major for the Class of 2020 and previous classes With DUS approval, the following changes to the requirements of the major may be fulfilled by students who declared their major under previous requirements.

The major for the Class of 2021 and subsequent classes The Near Eastern Languages and Civilizations major has two tracks from which students may choose. In track A, students focus, in depth, on a particular language, civilization, period, or region. In track B, students focus on Near Eastern languages and civilizations more broadly and comparatively.

Twelve term courses in the department, or their equivalent, are required for the major, including the senior essay course. There are no prerequisites. Students develop coherent programs of study in one of two tracks:

Track A, Language and Civilization (depth), offers students a rigorous and intellectually coherent foundation in line with their own specific interests. Through in-depth study of Near Eastern languages and texts in their original languages, richly contextualized through study of literature, religion, visual arts, archaeology, political and social history, students focus on the Ancient Near East, the Classical Near East, Medieval Islam, or Modern Hebrew language and culture. Requirements include: six term courses of one or two Near Eastern languages; one NELC Foundations course; five electives, chosen in consultation with the DUS and assigned faculty adviser; and the senior essay.

Track B, Languages, Civilization, and Culture (breadth), provides students the opportunity to study the Near East in its historical and cultural breadth, and to explore its rich and long-lived civilizations and cultures. This flexible program allows students to take a range of classes and to design their course of study in line with their interests. Areas of interest include languages, literature, history, religion, art and archaeology, and philosophy. Requirements include four term courses of one or more languages; two NELC Foundations courses; and five electives, including one on the ancient Near East, one on the medieval Near East, and one on the modern Middle East, chosen in consultation with the DUS and assigned faculty adviser; and the senior essay.

All students are also encouraged to take related courses in other departments and programs, such as Anthropology, Archaeology, Classics, History, History of Art, History of Science, Medicine & Public Health, Judaic Studies, Literature, Philosophy, and Religious Studies. Such courses, including college seminars, will routinely be accepted for credit toward the major if they deal with Near Eastern topics, at the discretion of the assigned faculty adviser and DUS.

SENIOR REQUIREMENT

The senior essay is a research paper of at least thirty pages prepared under the supervision of a departmental faculty member. It may be written under the rubric of NELC 492 and/or 493, or as an extended seminar paper in a departmental seminar course, in which case the instructor serves as the essay adviser. The topic and a prospectus signed by an adviser are to be submitted to the DUS by the end of the fourth week of classes in either term of the senior year. The particular subject matter and theoretical approach of the essay are decided by the student after consultation with the faculty adviser.

In cases in which students demonstrably need more time for an extended research paper, the senior essay may be approved as a yearlong course after consultation with the adviser and the DUS. Only those students who have advanced language skills and whose project is considered to be of exceptional promise are eligible. The requirements for the two-term essay are the same as for the one-term essay, except that the essay should be at least sixty pages.

ADVISING

All course schedules must be discussed with the assigned faculty adviser and approved by the DUS.

Languages currently offered by the Department of Near Eastern Languages & Civilizations include Akkadian, Arabic, Egyptian, Hebrew, Ottoman Turkish, Persian, Syriac, and Turkish. Students who take a foreign language during a term, year, or summer abroad must complete a departmental placement examination after they return to Yale; there are no exceptions to this requirement.

Well-qualified students who have acquired the requisite background in undergraduate courses may, with the permission of the instructor, the DUS, and the director of graduate studies, be admitted to graduate courses where no suitable undergraduate courses exist.

REQUIREMENTS OF THE MAJOR

Prerequisites None

Number of courses 12 term courses (incl senior essay)

Distribution of courses *Language and Civilization track A (depth)*—6 term courses of up to 2 Near Eastern language courses; 1 foundations course; and 5 electives, with DUS consultation; *Languages, Civilization, and Culture track B (breadth)*—4 term courses of 1 or more Near Eastern language courses; 2 foundations courses; 5 electives to include 1 ancient, 1 medieval, and 1 modern course, with DUS consultation

Senior requirement Senior essay in NELC 492 and/or 493 or in dept seminar

FACULTY OF THE DEPARTMENT OF NEAR EASTERN LANGUAGES AND CIVILIZATIONS

Professors John Darnell, Benjamin Foster, Eckart Frahm, Shawkat Toorawa, Kevin Van Bladel, Harvey Weiss

Senior Lectors and Senior Lecturers Sarab Al Ani, Muhammad Aziz, Jonas Elbousty, Shiri Goren, Dina Roginsky, Farkhondeh Shayesteh, Kathryn Slanski

Lectors and Lecturers Julien Cooper, Ozgen Felek, Karen Foster, Christina Geisen, Agnete Lassen, Selim Tiryakiol, Klaus Wagenonner, Orit Yeret

Professors Emeritus Dimitri Gutas, Bentley Layton

First-Year Seminars

* **NELC 001b / AFST 001b / ARCG 001b, Egypt and Northeast Africa: A Multidisciplinary Approach** John Darnell

Examination of approximately 10,000 years of Nile Valley cultural history, with an introduction to the historical and archaeological study of Egypt and Nubia. Consideration of the Nile Valley as the meeting place of the cultures and societies of northeast Africa. Various written and visual sources are used, including the collections of the Peabody Museum and the Yale Art Gallery. Enrollment limited to first-year students. Preregistration required; see under First-Year Seminar Program. WR, HU

* **NELC 003a / HUMS 077a, Medieval Travel and Exploration** Shawkat Toorawa
Introduction to the motivations for travel and exploration in the Middle Ages. For adventure, for commerce, on pilgrimage, and for conquest, travelers include Christian, Jewish, and Muslim merchants, ambassadors, scholars, geographers, explorers, sailors, and soldiers. All material in English translation. Enrollment limited to freshmen. Preregistration required; see under Freshman Seminar Program. HU

Foundations Courses

NELC 101b / HUMS 438b, Origins of Western Civilization: The Near East from Alexander to Muhammad Benjamin Foster

Cultural and historical survey of Hellenistic, eastern Roman, Parthian, Byzantine, and Sassanian empires in the Near East. Emphasis on mutual influences of Near Eastern and classical worlds, the rise of Christianity and Islam in Near Eastern contexts, and the division of East and West between conflicting ideas of unity. HU

NELC 119b / CLCV 419a / NELC 419a, Ancient Empires Kevin Van Bladel

This is an introduction to the history and cultures of the ancient empires of southwestern Asia, focusing on the period from the Assyrian and Persian Empires to the establishment of Islam (ca 900 BCE–ca 750 CE). Students learn how to use ancient primary sources critically to create a historical narrative and to understand the modern appropriation of ancient history for political and other purposes. Primary sources include classical Greek and Latin authors, as well as works composed in Iran, from royal inscriptions to neighboring Armenian and Aramaic sources chronicling war and strife. Major topics include the formation of early states, the kingdoms of Mesopotamia, Anshan and the Elamites, the Achaemenid dynasty, Alexander and his successors, the Parthian and Sasanian Persian empires and their rivalries with Rome, as well as the empires of Afghanistan and the kingdom of Armenia. Additionally, the

course includes an introduction to the geography of southwestern Asia and a survey of languages, Iranian and other religions, and some ancient literature from a variety of cultures. Events covered in this course contributed decisively to the demography of the present-day Near East and the social characteristics of its people, from the distribution of language communities to the variety of Near Eastern religions. Students gain some understanding of the makeup of the modern Near East, including how the population of the region became predominantly Muslim. HU

History and Civilization Courses

NELC 108a / ARCG 237a / HSAR 237a, Ancient Painting and Mosaics Karen Foster
Developments in wall painting, vase painting, and mosaics as seen in ancient Egypt, the Aegean Bronze Age, and the Greek, Etruscan, and Roman world. HU

NELC 109a / ARCG 244a / RLST 245a, The Age of Akhenaton John Darnell
Study of the period of the Egyptian pharaoh Akhenaton (reigned 1353–1336 B.C.E.), often termed the Amarna Revolution, from historical, literary, religious, artistic, and archaeological perspectives. Consideration of the wider Egyptian, ancient Near Eastern, African, and Mediterranean contexts. Examination of the international diplomacy, solar theology, and artistic developments of the period. Reading of primary source material in translation. HU

* **NELC 157b / JDST 306b / MMES 157b, Israeli Narratives** Shiri Goren
Close reading of major Israeli novels in translation with attention to how their themes and forms relate to the Israeli condition. Theories of war and peace, migration, nationalism, and gender. Authors include Yehoshua, Grossman, Matalon, Castel-Bloom, and Kashua. No knowledge of Hebrew required. HU TR

NELC 191b / ARCG 218b, Ancient Ships and Maritime Archaeology Karen Foster
Introduction to the world of the ancient mariners, with special attention to new discoveries and interpretations. HU, SO

* **NELC 231b / JDST 235b / MMES 235b / RLST 147b, Introduction to Judaism in the Ancient World** 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. No prior background in Jewish history assumed. HU

NELC 268a / ARCG 226a / EVST 226a, Global Environmental History Harvey Weiss
The dynamic relationship between environmental and social forces from the Pleistocene glaciations to the Anthropocene present. Pleistocene extinctions; transition from hunting and gathering to agriculture; origins of cities, states, and civilization; adaptations and collapses of Old and New World civilizations in the face of climate disasters; the destruction and reconstruction of the New World by the Old. Focus on issues of adaptation, resilience, and sustainability, including forces that caused long-term societal change. SO

- * **NELC 321b / ANTH 492b / ARCG 492b, Imaging Ancient Worlds** John Darnell, Roderick McIntosh, and Agnete Lassen

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 those sites. Use of new technologies in computer graphics, including 3D imaging, to support current research in archaeology and anthropology.

- NELC 326a / HIST 159 / HUMS 129 / RLST 158a, From Jesus to Muhammad**

Stephen Davis

The history of Christianity and the development of Western culture from Jesus to the early Middle Ages. The creation of orthodoxy and heresy; Christian religious practice; philosophy and theology; politics and society; gender; Christian literature in its various forms, up to and including the early Islamic period. HU

- * **NELC 381a / JDST 391a / RLST 407a, Midrash Seminar: The Exodus from Egypt**

Steven Fraade

The Exodus from Egypt as seen through rabbinic eyes. Close readings of the early rabbinic commentary (midrash), Mekhilta, to the narrative of Exodus 13:17ff (the lection Beshallah). Particular attention to the methods and language of rabbinic exegesis and to the rhetorical interplay of tradition and scriptural commentary. Interpretations and interpretive strategies compared and contrasted with those of other ancient biblical exegetes (Jewish and non-Jewish), where available. Prerequisite: reading fluency in ancient Hebrew. L5, HU

- * **NELC 382a / JDST 392a / RLST 405a, Mishnah Seminar: Tractate Sanhedrin**

Steven Fraade

Close study of a section of the Mishnah, the earliest digest of Jewish law, treating religious courts and their jurisprudential practice. Dual attention to the historical significance of the institutions of law represented and to the cultural significance of the rhetoric of that representation. Consideration of the textual practices of rabbinic legal discourse in relation to its social function, as well as to the interplay of law and narrative. Prerequisite: reading fluency in ancient Hebrew. L5, HU

- * **NELC 385b / ANTH 389b / MMES 376b / PLSC 469b / SOCY 359b, Politics of Culture in Iran** Nahid Siamdoust

Examination of cultural production in post-revolutionary Iran (1979 to the present) through works of noteworthy cultural and sociopolitical content in cinema, music, and newspaper journalism. Consideration of the policies the new Islamic Republic has put in place in order to regulate the field of cultural production, and the strategies that cultural producers have devised to navigate the given constraints.

HU

- * **NELC 389a / ARCG 611a / CLCV 389 / CLSS 811a / NELC 611a / RLST 355a / RLST 833a, The Ancient Egyptian Temple as Cosmos: Correlation of Architecture and Decoration Program** Christina Geisen

The course focuses on the correlation of archaeology, iconography, and philology by analyzing ancient Egyptian temples under the specific consideration of the interplay of architecture and decoration program. The different types of temples and their developments over time are discussed. The main focus is the function of each temple type, which can only be understood by analyzing the architecture of the monument,

its decoration program, related texts (such as rituals, myths, and festival description, but also historical texts), and its place in the cultic landscape of the specific location. The class also provides an overview of rituals performed and festivals celebrated in the temples, as well as of the administrative sphere of the temple. Optional field trip to the Metropolitan Museum of Art in New York to see the Temple of Dendur. No previous knowledge of ancient Egyptian culture or languages is necessary; all texts are read in translation. HU

* **NELC 399a / ANTH 478a / ARCG 399a / EVST 399a, 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. SO

* **NELC 453b / ARBC 450b, History of the Arabic Language** Kevin Van Bladel

This course covers the development of the Arabic language from the earliest epigraphic evidence through the formation of the Classical 'Arabiyya and further, to Middle Arabic and Neo-Arabic. Readings of textual specimens and survey of secondary literature. Prerequisite: ARBC 140 and permission of instructor.

* **NELC 473b / ANTH 473b / ARCG 473b / EVST 473b, Abrupt Climate Change and Societal Collapse** Harvey Weiss

The coincidence of societal collapses throughout history with decadal and century-scale drought events. Challenges to anthropological and historical paradigms of cultural adaptation and resilience. Examination of archaeological and historical records and high-resolution sets of paleoclimate proxies. HU, SO

Languages and Literatures

AKKADIAN

Students wishing to study Akkadian should consult the director of undergraduate studies.

ARABIC

ARBC 110a, Elementary Modern Standard Arabic I Elham Alkasimi

Development of a basic knowledge of Modern Standard Arabic. Emphasis on grammatical analysis, vocabulary acquisition, and the growth of skills in speaking, listening, reading, and writing. Credit only on completion of ARBC 120. L1 RP
1½ Course cr

ARBC 120b, Elementary Modern Standard Arabic II Staff

Continuation of ARBC 110. Prerequisite: ARBC 110 or requisite score on a placement test. L2 RP 1½ Course cr

* **ARBC 130a, Intermediate Modern Standard Arabic I** Sarab Al Ani

Intensive review of grammar; readings from contemporary and classical Arab authors with emphasis on serial reading of unvoweled Arabic texts, prose composition, and formal conversation. Prerequisite: ARBC 120 or requisite score on a placement test. L3
RP 1½ Course cr

ARBC 136a, Intermediate Classical Arabic I Staff

Introduction to classical Arabic, with emphasis on grammar to improve analytical reading skills. Readings include Qur'anic passages, literary material in both poetry and prose, biographical entries, and religious texts. Prerequisite: ARBC 120 or permission of instructor. May be taken concurrently with ARBC 130 or 150. L3 RP

ARBC 140b, Intermediate Modern Standard Arabic II Muhammad Aziz

Continuation of ARBC 130. Prerequisite: ARBC 130 or requisite score on a placement test. L4 RP ½ Course cr

ARBC 146b, Intermediate Classical Arabic II Staff

Continuation of ARBC 136. Prerequisite: ARBC 136 or permission of instructor. May be taken concurrently with ARBC 140 or 151. L4 RP

*** ARBC 150a, Advanced Modern Standard Arabic I** Muhammad Aziz

Further development of listening, writing, and speaking skills. For students who already have a substantial background in Modern Standard Arabic. Prerequisite: ARBC 140 or requisite score on a placement test. L5 RP

*** ARBC 151b, Advanced Modern Standard Arabic II** Muhammad Aziz

Continuation of ARBC 150. Prerequisite: ARBC 150 or requisite score on a placement test. L5 RP

*** ARBC 161a, Arabic Narrative Prose** Muhammad Aziz

Close reading of selected novels by Naguib Mahfouz. Attention to idiomatic expressions, structural patterns, and literary analysis. Prerequisite: ARBC 151 or requisite score on a placement test. May be repeated for credit. L5

*** ARBC 165a / MMES 465a, Arabic Seminar: Early Adab** Kevin Van Bladel

Study and interpretation of classical Arabic texts for advanced students. Prerequisite: ARBC 146, 151, or permission of instructor. May be repeated for credit.

ARBC 170a / NELC 236a, Creative Writing in Arabic Jonas Elbousty

This course combines both analysis and production of literary texts. Students study modern Arabic literary texts as a vehicle for generating their own creative prose and to engage with prose, personal essay, and other literary genres attending particularly to how authors evoke experience through character, setting, dialog, etc. The class looks to popular fiction in Arabic and focuses upon the writer's craft to create vivid and engaging narratives. This analysis provides inspiration for students writing their own unique creative pieces and encourages them to polish their ability to express themselves in Arabic. Prerequisite: ARBC 140. L5 RP

*** ARBC 171b / NELC 237b, Hunger in Eden: Mohamed Choukri's Narratives** Jonas Elbousty

A survey of the work of Mohamed Choukri, one of the most prominent Moroccan, if not Arab, writers to have shaped the modern Arabic literary canon. His influence has been instrumental in forming a generation of writers and enthusiastic readers, who fervently cherish his narratives. Students dive deeply into Choukri's narratives, analyzing them with an eye toward their cultural and political importance. The class looks to Choukri's amazing life story to reveal the roots of his passion for writing and explores the culture of the time and places about which he writes. Through his narratives, students better understand the political environment within which they were composed and the importance of Choukri's work to today's reader regarding

current debates over Arab identity. This class surveys the entirety of his work, contextualizing within the sphere of Arabic novelistic tradition. Prerequisite: ARBC 151, L4 or equivalent, or permission from the of instructor.

* **ARBC 173a / NELC 338a, Tracing the Image of the Arab "Other"** Jonas Elbousty
This course places the modern Arabic novel in conversation with the west in an effort to uncover both dominant narratives regarding Arab identity, as well as counter narratives that present a challenge to these dominant narratives. We study the tradition of modern Arabic literature, looking specifically to the ways in which the image of the "other" is presented in Arabic narratives as well as the ways in which the image of the Arab is constructed through the others' literature. Prerequisite: ARBC 140. WR, HU

ARBC 190a, Levantine Arabic Sarab Al Ani

Basic course in the Arabic dialect of the Levant (Lebanon, Syria, Jordan, Palestine). Principles of grammar and syntax; foundations for conversation and reading. Focus on the development of speaking and listening skills using media materials (television, Internet) and social networking sites (Facebook, Twitter). The essentials of conversing, using expressions, popular idioms, and everyday phrases. Topics include cultural components. Prerequisite: ARBC 130. RP

* **ARBC 450b / NELC 453b, History of the Arabic Language** Kevin Van Bladel
This course covers the development of the Arabic language from the earliest epigraphic evidence through the formation of the Classical 'Arabiyya and further, to Middle Arabic and Neo-Arabic. Readings of textual specimens and survey of secondary literature. Prerequisite: ARBC 140 and permission of instructor.

EGYPTIAN

EGYP 110a, Introduction to Classical Hieroglyphic Egyptian I Staff

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. Credit only on completion of EGYP 120. L1 RP

EGYP 120b, Introduction to Classical Hieroglyphic Egyptian II Staff

Continuation of EGYP 110. Prerequisite: EGYP 110. L2 RP

* **EGYP 131a, Intermediate Egyptian: Literary Texts** John Darnell

Close reading of Middle Egyptian literary texts; introduction to the hieratic (cursive) Egyptian script. Readings include the Middle Kingdom stories of Sinuhe and the Eloquent Peasant and excerpts from Wisdom Literature. Prerequisite: EGYP 120. L3 RP

* **EGYP 137a / RLST 423a, Gnostic Texts in Coptic** Harold Attridge

Reading, translation, and analysis of Gnostic and Valentinian literature from Nag Hammadi, in several dialects of Coptic. Prerequisite: EGYP 127 or equivalent. Counts as L4 if taken after EGYP 147 or equivalent. L3

* **EGYP 147b / RLST 422b, Egyptian Monastic Literature in Coptic** Stephen Davis

Readings in the early Egyptian classics of Christian asceticism in Sahidic Coptic, including the desert Fathers and Shenute. Prerequisite: EGYP 127 or equivalent. Counts as L4 if taken after EGYP 137 or equivalent. L3

* **EGYP 161b, Intermediate Egyptian: Late Egyptian Texts** Christina Geisen
Focus on Late Egyptian. After discussion of grammar, highlighting the differences between Middle and Late Egyptian, students read documents from different text genres (historical, literary, love poems, letters) to gain background information in this area. This course is valuable for any student planning to pursue studies within the field of Egyptology, and/or focus on the Coptic language. Prerequisites: EGYP 110 and 120.
HU

* **EGYP 221b, The Wisdom of Ancient Egypt** Christina Geisen
Overview of the different text genres attested 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. Prerequisite: general introductory class on the Egyptian history and culture, or permission of the instructor. HU

* **EGYP 227a, Ancient Egyptian Hieratic Texts** Christina Geisen
Introduction to the Hieratic script, used primarily for everyday documents. Study of Old and Late Egyptian, the other major language phases beside the classic Middle Egyptian. Prerequisite: EGYP 120.

HEBREW

HEBR 110a, Elementary Modern Hebrew I Dina Roginsky
Introduction to the language of contemporary Israel, both spoken and written. Fundamentals of grammar; extensive practice in speaking, reading, and writing under the guidance of a native speaker. Credit only on completion of HEBR 120. L1 RP
1½ Course cr

HEBR 117a, Elementary Biblical Hebrew I Staff
An introduction to biblical Hebrew. Intensive instruction in grammar and vocabulary, supplemented by readings from the Bible. Credit only on completion of HEBR 127b. No prior knowledge of Hebrew required. L1 RP

HEBR 120b, Elementary Modern Hebrew II Orit Yeret
Continuation of HEBR 110. Introduction to the language of contemporary Israel, both spoken and written. Fundamentals of grammar; extensive practice in speaking, reading, and writing under the guidance of a native speaker. Prerequisite: HEBR 110 or equivalent. L2 RP 1½ Course cr

HEBR 127b, Elementary Biblical Hebrew II Staff
Continuation of HEBR 117a. Prerequisite: HEBR 117a. L2 RP

* **HEBR 130a, Intermediate Modern Hebrew I** Orit Yeret
Review and continuation of grammatical study, leading to a deeper understanding of style and usage. Focus on selected readings and on writing, comprehension, and speaking skills. Prerequisite: HEBR 120 or equivalent. L3 RP

HEBR 140b, Intermediate Modern Hebrew II Shiri Goren
Continuation of HEBR 130. Review and continuation of grammatical study leading to a deeper comprehension of style and usage. Focus on selected readings and on writing, comprehension, and speaking skills. Prerequisite: HEBR 130 or equivalent. L4 RP

* **HEBR 150a / JDST 213a / MMES 150a, Advanced Modern Hebrew: Daily Life in Israel** Orit Yeret
An examination of major controversies in Israeli society. Readings include newspaper editorials and academic articles as well as documentary and historical material.

Advanced grammatical structures are introduced and practiced. Conducted in Hebrew.
Prerequisite: HEBR 140 or equivalent. L5 RP

* **HEBR 152b / JDST 401b, Reading Academic Texts in Modern Hebrew** Dina Roginsky

Reading of academic texts in modern Hebrew, for students with a strong background in Hebrew. Discussion of grammar and stylistics; special concentration on the development of accuracy and fluency. Prerequisite: HEBR 150 or permission of instructor. Conducted in Hebrew. L5 RP

HEBR 161b / JDST 407b / MMES 156b, 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; modern popular music and 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. Conducted in Hebrew. Prerequisite: HEBR 140 or equivalent. L5

* **HEBR 162a / JDST 319a / MMES 161a, Israel in Ideology and Practice** Dina Roginsky

An advanced Hebrew class focusing on changing ideology and politics in Israel. Topics include right and left wing political discourse, elections, State-Religion dynamics, the Jewish-Arab divide, and demographic changes. Materials include newspapers, publications, on-line resources, speeches of different political and religious groups, and contemporary and archival footage. Comparisons to American political and ideological discourse. Prerequisite: HEBR 140 or permission of instructor. L5 RP

OTTOMAN TURKISH

Students wishing to study Ottoman Turkish should consult the director of undergraduate studies.

PERSIAN

PERS 110a, Elementary Persian I Farkhondeh Shayesteh

Introduction to modern Persian, with emphasis on all four language skills: reading, writing, listening, and speaking. Credit only on completion of PERS 120. L1 RP
1½ Course cr

PERS 120b, Elementary Persian II Farkhondeh Shayesteh

Continuation of PERS 110, with emphasis on all four language skills: reading, writing, listening, and speaking. Prerequisite: PERS 110 or permission of instructor. L2 RP
1½ Course cr

PERS 130a, Intermediate Persian I Farkhondeh Shayesteh

Continuation of PERS 120, with emphasis on expanding vocabulary and understanding more complex grammatical forms and syntax. Prerequisite: PERS 120 or permission of instructor. L3 RP 1½ Course cr

PERS 140b, Intermediate Persian II Farkhondeh Shayesteh

Continuation of PERS 130, with emphasis on expanding vocabulary and understanding more complex grammatical forms and syntax. Prerequisite: PERS 130 or permission of instructor. L4 RP 1½ Course cr

* **PERS 161b / MMES 176b, 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. L4 and instructor permission. L5

SYRIAC

Students wishing to study Syriac should consult the director of undergraduate studies.

TURKISH

TKSH 110a, Elementary Modern Turkish I Staff

Integration of basic listening, reading, speaking, and writing skills through a variety of functional, meaningful, and contextual activities. Students become active users of modern Turkish and gain a deeper understanding of Anatolian culture through lessons based on real-life situations and authentic materials. Credit only on completion of TKSH 120. L1 RP 1½ Course cr

TKSH 120b, Elementary Modern Turkish II Staff

Continuation of TKSH 110. Prerequisite: TKSH 110 or permission of instructor. L2 RP 1½ Course cr

TKSH 130a, Intermediate Turkish I Staff

Continued study of modern Turkish, with emphasis on advanced syntax, vocabulary acquisition, and the beginnings of free oral and written expression. Prerequisite: TKSH 120 or permission of instructor. L3 RP

TKSH 140b, Intermediate Turkish II Staff

Continuation of TKSH 130. Prerequisite: TKSH 130. L4 RP

TKSH 150a, Advanced Turkish I Staff

An advanced language course focused on improving students' reading, writing, listening, and speaking skills in modern Turkish. Extensive study of vocabulary and idiomatic expressions. Readings from genres including academic articles, critical essays, literature, newspaper articles, and formal business writing. Screening of films, documentaries, and news broadcasts. Prerequisite: TKSH 140. L5 RP

TKSH 151b, Advanced Turkish II Staff

Continuation of TKSH 150. An advanced language course focused on improving students' reading, writing, listening, and speaking skills in modern Turkish. Extensive study of vocabulary and idiomatic expressions. Readings from genres including academic articles, critical essays, literature, newspaper articles, and formal business writing. Screening of films, documentaries, and news broadcasts. Prerequisite: TKSH 150. L5 RP

Senior Essay

* **NELC 492a and NELC 493b, The Senior Essay** Jonas Elbousty

Preparation of a research paper of at least thirty pages (sixty pages for a two-term essay) under the supervision of a departmental faculty member, in accordance with the following schedule: (1) by the end of the second week of classes of the fall term, students meet with advisers to discuss the topic, approach, sources, and bibliography of the essay. Note: students planning to write the essay in the second term (NELC 493)

should also meet with their prospective advisers by this deadline; (2) by the end of the fourth week of classes a prospectus with outline, including an annotated bibliography of materials in one or more Near Eastern languages and of secondary sources, is signed by the adviser and submitted to the director of undergraduate studies. The prospectus should indicate the formal title, scope, and focus of the essay, as well as the proposed research method, including detailed indications of the nature and extent of materials in a Near Eastern language that will be used; (3) at the end of the tenth week of classes (end of February for yearlong essays), a rough draft of the complete essay is submitted to the adviser; (4) two copies of the finished paper must be submitted to the director of undergraduate studies, Rm 314 HGS, by 4 p.m. on the last day of reading period. Failure to comply with the deadline will be penalized by a lower grade. Senior essays will be graded by departmental faculty unless, for exceptional reasons, different arrangements for an outside reader are made in advance with the director of undergraduate studies and the departmental adviser.

GRADUATE AND PROFESSIONAL SCHOOL COURSES OF INTEREST TO UNDERGRADUATES

Some Graduate School courses are open to qualified undergraduates with permission of the instructor and of the director of graduate studies. For course descriptions see the Online Course Information Website. (Also see “Courses in the Yale Graduate and Professional Schools” under “Special Arrangements” in the Academic Regulations.)

Neuroscience

Directors of undergraduate studies: Damon Clark (MCDB), KBT 224 and Nicholas Turk-Browne (Psychology), SSS 305; neuroscience.dus@yale.edu; neuroscience.yale.edu

Neuroscience aims to understand how the brain produces the mind and behavior, with the goal of advancing human understanding, improving physical and mental health, and optimizing performance. This entails a broad, interdisciplinary effort that spans from molecules to minds. At one end, biology, chemistry, and physics are improving our understanding of the molecular and cellular mechanisms of neuronal signaling and development. At the other end, psychology, psychiatry, and computer science link neural processes and systems to the mind and behavior. At all levels, the rich array of methods and data analysis depends on a strong foundation in the basic sciences, mathematics, statistics, and computer science.

PREREQUISITES

The foundational biology courses required of all Neuroscience majors are BIOL 101, 102, 103, and 104. All majors must also complete one of the following: PSYC 200, S&DS 103, 105, 238.

PLACEMENT PROCEDURES

Students must apply to enter the major. Applications are reviewed at the end of each term; decisions are based on a cover letter, transcript, and completed Neuroscience major worksheet. More information regarding the application process is available on the program's website.

REQUIREMENTS OF THE MAJOR

Both the B.S. and B.A. Neuroscience degrees require a minimum of 18.5 credits, including the three prerequisites, 15 lecture or seminar courses (which include the senior requirement), and one laboratory, as follows:

1. Two neuroscience foundation courses, NSCI 160 and NSCI 320.
2. One neuroscience lab chosen from NSCI 321L, 235, 240, 260, 258.
3. Eleven electives from the following core groupings, with a minimum of: two from the Systems/Circuits/Behavior core, two from the Molecular/Cellular/Biological core, one from the Quantitative core, one from the Basic Allied core, and one from the Advanced Allied core. No more than two credits may be taken from the Other Allied core.

Systems/Circuits/Behavior Core: NSCI 340, 341, 346, 352, 355, 360, 442, 445

Molecular/Cellular/Biological Core: NSCI 324, 325, 420; MCDB 200, 202, 205, 210, 310, 370, 450, 452; MB&B 300 or MCDB 300

Quantitative Core: MATH 112, 115, 116, 120, 222, 225, 230, 231, 244, 246, 247; NSCI 324, 325; CPSC 202

Basic Allied Core: PHYS 170, 171, 180, 181, 200, 201, 260, 261; CHEM 161, 165, 163, 167, 174, 175, 220, 221

Advanced Allied Core: CPSC 100, 112, 201, 202, 223, 323, 365, 475, 476; S&DS 262, 361; BENG 444, 445, 485

Other Allied Core: NSCI 141, 147, 161; MCDB 250; CGSC 110

Credit/D/Fail No course taken Credit/D/Fail may be counted toward the major, including prerequisites.

Roadmap See visual roadmap of the requirements.

SENIOR REQUIREMENT

In addition to the course requirements described above, all students must satisfy a senior requirement undertaken during the senior year. All students must fill out a checklist of requirements and go over it with the undergraduate registrar by the spring term of the junior year.

B.S. degree program The B.S. degree requires two course credits of empirical research, NSCI 490 and 491. These courses are only available to Neuroscience seniors (and second term juniors with DUS permission), and receive a letter grade. Students are expected to spend at least ten hours per week in the laboratory, to complete written assignments, and to make a presentation. Research can be conducted over original, archival, or consortium data sets. Written assignments include a short research proposal summary due at the beginning of the term, and a full research report due at the end of the term. Students are encouraged to pursue the same research project for two terms, in which case, the first term full research report and the second term proposal summary may be combined into a full research proposal due at the end of the first term. Final papers are due by the stated deadline near the end of the term. Seniors are also required to present their research once in either the fall or the spring term. Students should find a research laboratory during the term preceding the research. Yale College does not grant academic credit for summer research unless the student is enrolled in an independent research course in Yale Summer Session. To register for NSCI 490 and 491, students must submit a form and a written plan of study with bibliography, approved by the faculty research adviser and DUS, by the end of the first week of classes.

B.A. degree program The B.A. degree requires two course credits in non-empirical research, NSCI 480 and 481; or one credit in non-empirical research, NSCI 480 or NSCI 481, and one credit in empirical research, NSCI 490 or 491. These courses are only open to Neuroscience seniors and receive a letter grade. Under faculty supervision, students are required to conduct a literature review, complete written assignments, and make a presentation. The final research paper is due to the sponsoring faculty member, with a copy submitted to the department, by the stated deadline near the end of the term. Seniors are also required to present their research once in either the fall or the spring term. To register, students must submit a form and a written plan of study with bibliography, approved by the faculty research adviser and DUS, by the end of the first week of classes.

More detailed guidelines, forms, and deadline information is available on the department website.

ADVISING

Departmental advisers Schedules for all majors must be discussed with, and approved by, one of the directors of undergraduate studies. Only then may a schedule be submitted to the residential college dean's office. For questions concerning credits for courses taken at other institutions, or courses not listed in this bulletin, students should consult with one of the directors of undergraduate studies.

REQUIREMENTS OF THE MAJOR

Prerequisites BIOL 101, 102, 103, and 104; and one of PSYC 200, S&DS 103, 105, 238

Number of courses 18.5 courses (incl prereqs and senior req)

Specific courses required 2 neuroscience foundation courses, NSCI 160 and NSCI 320

Distribution of courses *B.S. or B.A.* – 1 lab course; 11 electives incl at least: 2 systems/circuits/behavior core courses, 2 molecular/cellular/biological core courses, 1 quantitative core course, 1 basic allied core course, 1 advanced allied core course, and no more than 2 other allied core courses

Senior requirement *B.S.* – 2 courses in empirical research; *B.A.* – 2 courses in non-empirical research, or 1 course in empirical research and 1 course in non-empirical research

FACULTY OF THE NEUROSCIENCE MAJOR

Professors †Amy Arnsten (*School of Medicine, Psychology*), Tom Brown (*Psychology*), Ty Cannon (*Psychology*), John Carlson (*Molecular, Cellular, and Developmental Biology*), BJ Casey (*Psychology*), Marvin Chun (*Psychology*), Paul Forscher (*Molecular, Cellular, and Developmental Biology*), Jutta Joorman (*Psychology*), Douglas Kankel (*Molecular, Cellular, and Developmental Biology*), Haig Keshishian (*Molecular, Cellular, and Developmental Biology*), †John Krystal (*School of Medicine, Psychology*), †Daeyeol Lee (*School of Medicine, Psychology*), †Linda Mayes (*School of Medicine, Psychology*), Greg McCarthy (*Psychology*), Laurie Santos (*Psychology*), †Dana Small (*School of Medicine, Psychology*), †Jane Taylor (*School of Medicine, Psychology*), Nick Turk-Browne (*Psychology*), Robert Wyman (*Molecular, Cellular, and Developmental Biology*)

Associate Professors †Sreeganga Chandra (*School of Medicine, Molecular, Cellular, and Developmental Biology*), Damon Clark (*Molecular, Cellular, and Developmental Biology*), Thierry Emonet (*Molecular, Cellular, and Developmental Biology*), Weimin Zhong (*Molecular, Cellular, and Developmental Biology*)

Assistant Professors †Alan Anticevic (*School of Medicine, Psychology*), Arielle Baskin-Sommers (*Psychology*), Steve Chang (*Psychology*), †Philip Corlett (*School of Medicine, Psychology*), Molly Crockett (*Psychology*), Dylan Gee (*Psychology*), Avram Holmes (*Psychology*), †Hedy Kober (*School of Medicine, Psychology*), †Ifat Levy (*School of Medicine, Psychology*), †James McPartland (*School of Medicine, Psychology*)

Lecturer Nelson Donegan (*Psychology*)

†A joint appointment with primary affiliation in another department or school.

Courses

NSCI 141a / PSYC 141a, The Criminal Mind Arielle Baskin-Sommers

Theoretical and empirical study of the development of criminal behavior, including constitutional, social, and neurobiological elements. Personality and psychopathological

factors associated with criminal behavior; theoretical and psychobiological explanations of crime; the biological/environment interaction; the impact of psychobiological models for policy and intervention. SC

NSCI 147a / PSYC 147a, Animal Models of Clinical Disorders Nelson Donegan

An interdisciplinary approach to understanding and treating psychiatric disorders, integrating clinical psychology, psychiatry, and advances in basic neuroscience. Focus on how research with animal models can advance our understanding of psychiatric disorders and generate more effective treatments for patients. Topics include drug addiction, depression, Parkinson's disease, and schizophrenia.

SC, SO

NSCI 160a / PSYC 160a, The Human Brain Gregory McCarthy

Introduction to the neural bases of human psychological function, including social, cognitive, and affective processing. Preparation for more advanced courses in cognitive and social neuroscience. Topics include memory, reward processing, neuroeconomics, individual differences, emotion, social inferences, and clinical disorders. Neuroanatomy, neurophysiology, and neuropharmacology are also introduced. SC

*** NSCI 229Lb / PSYC 229Lb, Laboratory in Human Neuroscience** Gregory McCarthy

Instruction in the acquisition and analysis of human neuroscience data. This laboratory complements the lecture course "Methods in Human Neuroscience" (PSYC 230/NSCI 240). The main topics include structural, diffusion, and functional magnetic resonance imaging (MRI), electroencephalography (EEG), and event-related potentials. Students engage in laboratory exercise that illustrate the design and analysis of experiments using each technique. These laboratory exercises involve acquiring, visualizing, and analyzing MRI and EEG data. Prerequisites: PSYC 160/NSCI 160, PSYC 200, PSYC 230/NSCI 240, or permission of the instructor. SC RP ½ Course cr

NSCI 235a or b / PSYC 270a or b, Research Methods in Behavioral Neuroscience

Nelson Donegan

Students design and conduct research to study brain function and behavior. Emphasis on hands-on participation in behavioral and neuroscience techniques. Prerequisites: PSYC 160 or 170, and a course in statistics, or with permission of instructor. SC

NSCI 240b / PSYC 230b, Research Methods in Human Neuroscience Gregory

McCarthy

Experience in methods of human neuroscience research. Focus on functional magnetic resonance imaging, electroencephalography, and evoked potentials. Some attention to psychophysiological techniques such as the measurement of skin conductance. Prerequisites: PSYC 110, 170, and a course in statistics, or permission of instructor. SC

*** NSCI 258b / PSYC 258b, 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. Prerequisites: CPSC 100 or upper level course involving programming (CPSC 201, CPSC 202, and knowledge of Python preferred); PSYC 160; PSYC 230 preferred. QR, SC

NSCI 265b / ANTH 148Lb / PSYC 248b, Hormones and Behavior Claudia Valeggia and Eduardo Fernandez-Duque

Introductory laboratory focusing on the interaction between hormones and behavior from an evolutionary and developmental perspective. Students gain competency in basic laboratory techniques (pipetting, diluting, aliquoting, etc.) and develop a small, group research project. Additional study of the theoretical background on which any laboratory work is developed through reading and discussing primary scientific literature on both human and non-human primates. SC ½ Course cr

NSCI 320a / MCDB 320a, Neurobiology Haig Keshishian and Paul Forscher

The excitability of the nerve cell membrane as a starting point for the study of molecular, cellular, and systems-level mechanisms underlying the generation and control of behavior. Prerequisites: year of college-level chemistry; a course in physics is strongly recommended. SC

NSCI 321La / MCDB 321La, Laboratory for Neurobiology Haig Keshishian and Paul Forscher

Introduction to the neurosciences. Projects include the study of neuronal excitability, sensory transduction, CNS function, synaptic physiology, and neuroanatomy. Concurrently with or after MCDB 320. SC ½ Course cr

NSCI 324a / MB&B 330a / MCDB 330a, Introduction to Dynamical Systems in Biology Damon Clark, Kathryn Miller-Jensen, 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. Prerequisites: BIOL 101 and 102, and PHYS 170 and 171 or equivalents, or with permission of instructors. QR, SC

NSCI 325b / BENG 465b / MB&B 361b / MCDB 361b, Dynamical Systems in Biology Thierry Emonet and Jonathon Howard

Advanced topics related to dynamical processes in biological systems. Processes by which cells compute, count, tell time, oscillate, and generate spatial patterns. Time-dependent dynamics in regulatory, signal-transduction, and neuronal networks; fluctuations, growth, and form. Comparisons between models and experimental data. Dynamical models applied to neurons, neural systems, and cellular biophysical processes. Use of MATLAB to create models. Prerequisite: MCDB 330 or equivalent, or a 200-level biology course, or with permission of instructor. QR

NSCI 340b / PSYC 335b, Cognitive Neuroscience Steve Wohn Chang

Examination of the fundamental and advanced principles underlying several cognitive functions from the perspectives of modern cognitive, systems, and computational neuroscience. Discussion of cognition in both humans and animal models through research of general neurobiological principles followed by several key examples from

research studies that have influentially shaped the field. Prerequisite: PSYC 160 or specific chapter readings from the instructor. SC

NSCI 341a / PSYC 376a, Learning and Memory Thomas Brown

The basic facts, general principles, and theories that describe how higher animals, from mice to humans, are changed by their experiences. The historically separate fields of learning and memory research desegregated under a neuroscientific perspective that recognizes the evolutionary continuity among higher animals. Prerequisite: Introductory courses in biology and psychology, or permission of instructor. SC, SO

NSCI 352a / CGSC 352a / PSYC 352a, Arrested or Adaptive Development in the Adolescent Brain BJ Casey

Study of empirical and theoretical accounts of adolescent-specific changes in the brain and in behavior that relate to the development of self control. Discussions will focus on adaptive and arrested adolescent brain development in the context of relevant legal, social, and health policy issues. SC

NSCI 355b / PSYC 303b, Social Neuroscience Molly Crockett

Exploration of the psychological and neural mechanisms that enable the formation, maintenance, and dissolution of social relationships. Topics include the neuroscience of how we form impressions and decide whether to instigate relationships with others; how we build relationships through trust, cooperation, attachment, conflict, and reconciliation; and group-level processes including intergroup bias, moral judgment, and decision making. Prerequisite: PSYC 110 or permission of instructor. SC

NSCI 360a / PSYC 316a, Clinical Neuroscience Tyrone Cannon

The biological bases of psychopathology, with attention to the interplay of biological and psychological factors. Research and theory regarding the role of biological influences such as genetics, neuronal physiology and signaling, and psychopharmacology in the major classes of mental disorders. Discussion of mood and anxiety disorders, schizophrenia, addictions, personality disorders, eating disorders, and autism. SC

*** NSCI 442a / PSYC 428a, 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). Permission of the instructor. SC

*** NSCI 470a and NSCI 471b, Independent Research** Damon Clark and Nicholas Turk-Browne

Research project under faculty supervision taken Pass/Fail; does not count toward the major, but does count toward graduation requirements. Students are expected to spend approximately ten hours per week in the laboratory. A final research report and/or presentation is required by end of term. Students who take this course more than once must reapply each term. To register, students must submit a form and written plan of study with bibliography, approved by the faculty research adviser and DUS, by the end of the first week of class. More detailed guidelines and forms can be obtained from <http://neuroscience.yale.edu>.

* **NSCI 480a and NSCI 481b, Senior Non-empirical Research** Damon Clark and Nicholas Turk-Browne

Research survey under faculty supervision fulfills the senior requirement for the B.A. degree and awards a letter grade. For NSCI seniors only (and second term juniors with DUS permission). Students are expected to conduct a literature review, to complete written assignments, and to present their research once in either the fall or spring term. Students are encouraged to pursue the same research project for two terms. The final research paper is due in the hands of the sponsoring faculty member, with a copy submitted to the department, by the stated deadline near the end of the term. To register, students submit a form and written plan of study with bibliography, approved by the faculty research adviser and DUS, by the end of the first week of classes. More detailed guidelines and forms can be obtained from <http://neuroscience.yale.edu>.

* **NSCI 490a and NSCI 491b, Senior Empirical Research** Damon Clark and Nicholas Turk-Browne

Laboratory or independent empirical research project under faculty supervision to fulfill the senior requirement for the B.S. degree. For NSCI seniors only (and second term juniors with DUS permission); this course awards a letter grade. Students are expected to spend at least ten hours per week in the laboratory, to complete written assignments, and to present their research once in either the fall or the spring term. Written assignments include a short research proposal summary due at the beginning of the term and a full research report due at the end of the term. Students are encouraged to pursue the same research project for two terms, in which case, the first term research report and the second term proposal summary may be combined into a full research proposal due at the end of the first term. Final papers are due by the stated deadline. Students should reserve a research laboratory during the term preceding the research. To register, students must submit a form and written plan of study with bibliography, approved by the faculty research adviser and DUS, by the end of the first week of classes. More detailed guidelines and forms can be obtained from <http://neuroscience.yale.edu>.

Philosophy

Director of undergraduate studies: Daniel Greco, 106A C, 432-1687, daniel.greco@yale.edu; (daniel.greco@yale.edu)philosophy.yale.edu

The Philosophy major prepares students to reflect critically and creatively on questions concerning the nature of things, the scope and limits of human understanding, and the principles of value and right action. The aim of the major is to address these questions wherever they arise, whether in the philosophical tradition, in other disciplines and practices, or in everyday life. Our courses are designed to encourage depth in thinking, rigor in argument, clarity in writing and speaking, and the widest possible view of whatever subject matter we take up.

COURSES FOR NONMAJORS AND MAJORS

Introductory philosophy courses, numbered 100 through 199, are open to all students and have no prerequisites.

COURSE NUMBERING

Courses numbered 100 through 199 are introductory and have no prerequisites. Courses numbered 200 through 399 are intermediate. Some have prerequisites; others do not, and may be taken as a student's first course in philosophy, though such a student should consult the instructor first. In general, it is a good idea to take a broadly based course in any area of philosophy before taking a specialized course. Courses numbered 400 through 499 are seminars. These advanced courses are intended primarily for juniors and seniors, though other students may be admitted with the instructor's permission. Undergraduates should be sure they have enough background to take such a course, including previous work in the same area of philosophy. Students with questions should consult the instructor.

PREREQUISITES

Standard major Prerequisite to the standard major are two introductory or intermediate philosophy courses.

Psychology track Prerequisite to the major in the psychology track are two courses in philosophy or psychology.

REQUIREMENTS OF THE MAJOR

The standard major The major requires twelve courses (including the prerequisites and the senior requirement) that collectively expose students to a wide range of philosophy and philosophers. The Philosophy curriculum is divided into three broad groups: history of philosophy; metaphysics and epistemology; and ethics and value theory. In history of philosophy, majors are required to take (a) either PHIL 125 and 126 or both terms of Directed Studies (DRST 003, 004), and (b) an additional, third course in history of philosophy. Majors are encouraged to take PHIL 125 and 126 as early as possible; these courses may be taken in either order. Majors must complete two courses in metaphysics and epistemology, two courses in ethics and value theory, and a course in logic (such as PHIL 115), the last preferably by the fall of their junior year. Majors must also take two seminars (either or both of which can be counted toward one of the group requirements) and satisfy the senior requirement as described below.

All courses in Philosophy count toward the twelve-course requirement. With approval from the director of undergraduate studies, courses offered by other departments may be counted toward the major requirements, though no more than two such courses will normally be allowed.

Specific regulations for the group requirements are as follows:

1. Some introductory courses do not count toward any group requirement. Other courses count toward a group requirement unless they are otherwise designated.
2. Courses automatically count toward the group under which they are listed in this bulletin. In rare cases, a course will be designated as counting toward a second group, although no single course can be counted by the same student toward two group requirements. In addition, students may petition to have a course count toward a group other than the one under which it is listed in this bulletin, though the presumption will be against such petitions.
3. Courses taken in other departments and applied to the major will not normally count toward a group requirement. Students may petition for credit toward a group requirement, though the presumption will be against such petitions.

The Psychology track The psychology track is designed for students interested in both philosophy and psychology. Majors in the track must take seven courses in philosophy and five in psychology, for a total of twelve, including the prerequisites and senior requirement. The seven philosophy courses must include (a) two courses in the history of philosophy, usually PHIL 125 and 126 or DRST 003 and 004, (b) a course in logic, such as PHIL 115, preferably by the fall of the junior year, (c) two seminars, one of which may be in the Psychology department, with the approval of the DUS, and (d) at least two courses at the intermediate or advanced level that bear on the intersection of philosophy and psychology, at least one of which must be a philosophy seminar. Courses satisfying (d) must be approved by the DUS. The five psychology courses must include PSYC 110 or its equivalent. Each major must also satisfy the senior requirement as described below.

Credit/D/Fail No more than one course taken Credit/D/Fail may be counted toward the major, with the permission of the DUS. This applies to both the standard and the psychology tracks.

SENIOR REQUIREMENT

The senior requirement is normally satisfied by completing a third philosophy seminar. Students taking a seminar to satisfy the senior requirement are expected to produce work superior in argument and articulation to that of a standard seminar paper. To this end, students taking a seminar for the senior requirement must satisfy additional requirements, which may include (a) additional readings, (b) submission of a complete draft of the final paper by the eighth week of the term that will then be significantly revised, and (c) one-on-one or small-group meetings with the instructor to discuss class material, the additional readings, and drafts in preparation. The specific nature of these additional requirements will vary from seminar to seminar, so students planning to satisfy the requirement with a third seminar should express that intention to the instructor at the beginning of the term, so the instructor can explain the work that will be required.

In special cases, students may meet the senior requirement through either a one-term or a two-term independent project supervised by an instructor (PHIL 490, 491). Students must petition to fulfill the senior requirement through an independent project, and approval is not guaranteed. Applicants must submit a proposal to the DUS, in consultation with an appropriate supervisor, by the end of the term prior to beginning the independent study.

ADVISING

Each major should, by October 1 of the junior year, secure the agreement of a member of the Philosophy department to serve as adviser for the year. The adviser aids the student in choosing courses and in planning for the senior year. All senior majors must have their schedules signed by the DUS.

Other majors involving philosophy Majors in Mathematics and Philosophy (p. 531) and in Physics and Philosophy (p. 625) are also available. Students interested in philosophy and psychology should also consider the major in Cognitive Science (p. 213).

REQUIREMENTS OF THE MAJOR

Prerequisites *Standard track*—any 2 intro or intermediate phil courses; *Psychology track*—any 2 courses in phil or psych

Number of courses *Both tracks*—12 term courses, incl prereqs and senior req

Specific courses required *Standard track*—PHIL 125 and 126, or DRST 003 and 004; *Psychology track*—PSYC 110 or equivalent

Distribution of courses *Standard track*—3 courses in hist of phil (incl PHIL 125 and 126, or DRST 003 and 004), 2 in metaphysics and epistemology, 2 in ethics and value theory, and 1 in logic; 2 phil sems; *Psychology track*—7 courses in phil, as specified; 5 courses in psych

Senior requirement *Both tracks*—a third sem in phil, or a one- or two-term independent project (PHIL 490, 491)

FACULTY OF THE DEPARTMENT OF PHILOSOPHY

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

Introductory Courses

PHIL 112a, Problems of Philosophy Daniel Greco

Exploration of perennial philosophical problems, including differences between knowledge and opinion, the objectivity or nonobjectivity of moral judgment, the nature of consciousness, the existence of God, the nature and possibility of free will, and how people remain the same over time as their bodily and psychological traits change. Readings from both classical and influential contemporary works. HU

PHIL 115a, First-Order Logic Elizabeth Miller

An introduction to formal logic. Study of the formal deductive systems and semantics for both propositional and predicate logic. Some discussion of metatheory. QR

*** PHIL 192a / RLST 107a, Metaphysics and Modernity** Nancy Levene

This course surveys concepts and controversies in and among select works of philosophy, theology, and literature. The focus is twofold: on reading works in view of their own principles, thus on questions of truth and interpretation, and on histories of the ideas, thus on questions of origin, change, and story. What and when is metaphysics? What and when is modernity? HU

HISTORY OF PHILOSOPHY

PHIL 125a / CLCV 125a, Introduction to Ancient Philosophy Verity Harte

An introduction to ancient philosophy, beginning with the earliest pre-Socratics, concentrating on Plato and Aristotle, and including a brief foray into Hellenistic philosophy. Intended to be taken in conjunction with PHIL 126. WR, HU

PHIL 126b, Introduction to Modern Philosophy from Descartes to Kant Michael Della Rocca

An introduction to major figures in the history of modern philosophy, with critical reading of works by Descartes, Malabranche, Spinoza, Leibniz, Locke, Berkeley, Hume, and Kant. Intended to be taken in conjunction with PHIL 125, although PHIL 125 is not a prerequisite. HU

ETHICS AND VALUE THEORY

PHIL 174a, Moral Skepticism Shelly Kagan

The legitimacy of doubts about morality. Can there really be any objective moral facts? Isn't morality all a matter of personal opinion or subjective preference, or, alternatively, all socially or culturally relative? If there were moral facts, how could one possibly know anything about them? Can one's moral views be justified at all? What place can morality possibly have in a scientific world view? HU

PHIL 175b, Introduction to Ethics Shelly Kagan

What makes one act right and another wrong? What am I morally required to do for others? What is the basis of morality? These are some of the questions raised in moral philosophy. Examination of two of the most important answers, the theories of Mill and Kant, with brief consideration of the views of Hume and Hobbes. Discussion of the question: Why be moral? HU

PHIL 177b / AFAM 198b / CGSC 277b / EDST 177b / EP&E 494b, Propaganda, Ideology, and Democracy Jason Stanley

Historical, philosophical, psychological, and linguistic introduction to the issues and challenges that propaganda raises for liberal democracy. How propaganda can work to undermine democracy; ways in which schools and the press are implicated; the use of propaganda by social movements to address democracy's deficiencies; the legitimacy of propaganda in cases of political crisis. HU

PHIL 178b, Introduction to Political Philosophy Thomas Pogge

A survey of social and political theory, beginning with Plato and continuing through modern philosophers such as Rawls, Nozick, and Cohen. Emphasis on tracing the development of political ideas; challenges to political theories. HU

PHIL 182a / CGSC 282a / PSYC 182a, Perspectives on Human Nature Joshua Knobe

Comparison of philosophical and psychological perspectives on human nature. Nietzsche on morality, paired with contemporary work on the psychology of moral

judgment; Marx on religion, paired with systematic research on the science of religious belief; Schopenhauer paired with social psychology on happiness. HU

Intermediate Courses

HISTORY OF PHILOSOPHY

PHIL 204a / GMAN 381a, Kant's *Critique of Pure Reason* Paul Franks

An examination of the metaphysical and epistemological doctrines of Kant's *Critique of Pure Reason*. Prerequisite: PHIL 126 or DRST 004. HU

METAPHYSICS AND EPISTEMOLOGY

PHIL 267a, Mathematical Logic Sun-Joo Shin

An introduction to the metatheory of first-order logic, up to and including the completeness theorem for the first-order calculus. Introduction to the basic concepts of set theory. Prerequisite: PHIL 115 or permission of instructor. QR

PHIL 270b, Epistemology Keith DeRose

Introduction to current topics in the theory of knowledge. The analysis of knowledge, justified belief, rationality, certainty, and evidence. HU

PHIL 271a / LING 271a, Philosophy of Language Jason Stanley

An introduction to contemporary philosophy of language, organized around four broad topics: meaning, reference, context, and communication. Introduction to the use of logical notation. HU

* **PHIL 274a / GMAN 254a / JDST 335a / RLST 249a, Jewish Philosophy** Paul Franks

Introduction to Jewish philosophy, including classical rationalism of Maimonides, classical kabbalah, and Franz Rosenzweig's inheritance of both traditions. Critical examination of concepts arising in and from Jewish life and experience, in a way that illuminates universal problems of leading a meaningful human life in a multicultural and increasingly globalized world. No previous knowledge of Judaism is required. WR, HU

PHIL 281b, Infinity Zoltán Szabó

The idea of infinity. Traditional and contemporary versions of the paradoxes of space, time, and motion, as well as the paradoxes of classes, chances, and truth. Some elementary arithmetic, geometry, probability theory, and set theory. QR, HU

* **PHIL 311b / RLST 303b, The End of Metaphysics** Nancy Levene

Exploration of metaphysics in light of the supposition that it is at an end. Readings from classics and critics in the history of philosophy and religion. None. WR, HU

ETHICS AND VALUE THEORY

PHIL 326a / RLST 402a, The Philosophy of Religion John Hare

The relation between religion and ethics, traditional arguments for the existence of God, religious experience, the problem of evil, miracles, immortality, science and religion, and faith and reason. HU

Seminars

HISTORY OF PHILOSOPHY

* **PHIL 404b, The Philosophy of Leibniz** Michael Della Rocca

A close examination of Leibniz's vast, intricate, and still poorly understood philosophical system. Topics include substance, necessity, freedom, psychology, teleology, and the problem of evil. Attention to philosophical and theological antecedents (Spinoza, Descartes, Suarez, Aquinas, Aristotle) and to Leibniz's relevance to contemporary philosophy. HU

METAPHYSICS AND EPISTEMOLOGY

* **PHIL 426b / CGSC 426b / EP&E 490b / PSYC 422b, The Cognitive Science of Morality** Joshua Knobe

Introduction to the emerging field of moral cognition. Focus on questions about the philosophical significance of psychological findings. Topics include the role of emotion in moral judgment; the significance of character traits in virtue ethics and personality psychology; the reliability of intuitions and the psychological processes that underlie them. HU

* **PHIL 427b, Computability and Logic** Sun-Joo Shin

A technical exposition of Gödel's first and second incompleteness theorems and of some of their consequences in proof theory and model theory, such as Löb's theorem, Tarski's undefinability of truth, provability logic, and nonstandard models of arithmetic. Prerequisite: PHIL 267 or permission of instructor. QR, HU

* **PHIL 437b, Philosophy of Mathematics** Sun-Joo Shin

Metaphysical and epistemological issues raised by mathematics. Questions concerning the notion of a set, whether one can quantify absolutely everything, and whether there are really infinite sets of different sizes; the significance of Gödel's incompleteness theorems; arguments designed to show that certain mathematical terms are referentially indeterminate. HU

* **PHIL 441b, Reductionism** Elizabeth Miller

Exploration of reductive approaches in contemporary metaphysics and philosophy of science. The question of whether there is a deep sense in which all the complexity of reality reduces to some more limited class of fundamental features. Prerequisite: a course in philosophy, or with permission of instructor. HU

* **PHIL 443a, Philosophy of Quantum Mechanics** Elizabeth Miller

Examination of philosophical issues as informed by quantum mechanics and evaluation of why that which quantum mechanical formalism tells us about the world remains controversial. Topics include the measurement problem, superposition, non-locality, the wave function, configuration space, probability, and compatibility with relativity.

ETHICS AND VALUE THEORY

* **PHIL 450a / EP&E 478a, The Problem of Evil** Keith DeRose

The challenge that evil's existence in the world poses for belief in a perfectly good and omnipotent God. The main formulations of the problem of evil; proposed ways of solving or mitigating the problem and criticism of those solutions. Skeptical theism, the free-will defense, soul-making theodicies, and doctrines of hell. HU

* **PHIL 455a / EP&E 334a, 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 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). Prerequisite: a course in moral philosophy. HU

* **PHIL 464b / PLSC 291b, Justice, Taxes, and Global Financial Integrity** Thomas Pogge

Study of the formulation, interpretation, and enforcement of national and international tax rules from the perspective of national and global economic justice. Previous courses in one or two of the following: law, economics, political science, or political philosophy. HU

* **PHIL 465a / EP&E 480a, Recent Work in Ethical Theory** Stephen Darwall

A study of recently published works on ethics and its foundations. Issues include the grounds of normativity and rightness and the role of the virtues. HU

* **PHIL 472a / GMAN 314a / PLSC 309a, Contemporary Critical Theory** Seyla Benhabib

Frankfurt School and Critical Theory focuses on a number of unresolved questions such as pragmatic Kantianism; modernity and post-colonial theory; the idea of progress in critical theory; and judgment as amoral, political, aesthetic. Readings from: Habermas, McCarthy, Baynes, Honneth, A. Allen, Ferrara, and Zerilli. Prerequisite: Directed Studies or two or more advanced courses in modern political philosophy. SO

PHIL 474a / PLSC 326a, Borders, Culture, and Citizenship Seyla Benhabib

The contemporary refugee crisis in Europe and elsewhere; new patterns of migration; increasing demands for multicultural rights of Muslim minorities in the West; and transnational effects of globalization faced by modern societies. Examination of these issues in a multidisciplinary perspective in light of political theories of citizenship and migration, as well as laws concerning refugees and migrants in Europe and the United States. SO

* **PHIL 479b, Contemporary Deontology** Shelly Kagan

Most people are intuitively drawn to *deontological* moral theories rather than consequentialist ones (roughly, to theories that give priority to moral factors other than simply the potential goodness of results). In this course we read and evaluate three major contemporary works exploring this deontological perspective in a systematic way: Judy Thomson's *The Realm of Rights*, Tim Scanlon's *What We Owe to Each Other*, and (parts of) Frances Kamm's *Intricate Ethics*. Our goal throughout is to investigate the complications involved in moving beyond the initial pull toward deontology to spelling out such a deontological theory in fuller detail (whether at the normative or at the foundational level). Prerequisite: A previous class in philosophy is required. A previous class in moral philosophy is highly recommended. HU

* **PHIL 485b, Wittgenstein** Kenneth Winkler

Study and discussion of Wittgenstein's *Tractatus Logico-Philosophicus*, *Philosophical Investigations*, and *On Certainty*, with some attention to their background in writings by Frege, Russell, and Moore. Consideration of Wittgenstein's influence on more

recent philosophers, among them Iris Murdoch, Elizabeth Anscombe, Saul Kripke, and Cora Diamond. Prerequisite: one prior course in philosophy and permission of the instructor. HU RP

Tutorial and Senior Essay Courses

* **PHIL 480a or b, Tutorial** Daniel Greco

A reading course supervised by a member of the department and satisfying the following conditions: (1) the work of the course must not be possible in an already existing course; (2) the course must involve a substantial amount of writing, i.e., a term essay or a series of short essays; (3) the student must meet with the instructor regularly, normally for at least an hour a week; (4) the proposed course of study must be approved by both the director of undergraduate studies and the instructor.

* **PHIL 490a and PHIL 491b, The Senior Essay** Daniel Greco

The essay, written under the supervision of a member of the department, should be a substantial paper; a suggested length is between 8,000 and 12,000 words for one-term projects, and between 12,500 and 15,000 words for two-term projects. Students completing a one-term project should enroll in either 490 in the fall or 491 in the spring. Students completing a two-term project should enroll in both 490 and 491. The deadline for senior essays completed in the fall is December 5; the deadline for both one- and two-term senior essays completed in the spring is April 21.

GRADUATE, DIVINITY, AND LAW SCHOOL COURSES THAT COUNT TOWARD THE MAJOR

Some Graduate, Divinity, and Law School courses are open to qualified undergraduates with permission of the instructor and the director of graduate studies or the dean or registrar of the Divinity or the Law School. (See "Courses in the Yale Graduate and Professional Schools" in section K of the Academic Regulations.) With permission of the director of undergraduate studies, relevant Graduate, Divinity, and Law School courses may count toward the major. Course descriptions appear in the Graduate, Divinity, and Law School bulletins.

Physics

Director of undergraduate studies: Simon Mochrie, 68C SPL, 436-4809, dus.physics@yale.edu; physics.yale.edu/academics/undergraduate-studies

The overarching goal of the physics program is to train students – majors and non-majors alike – to think like a physicist, the hallmarks of which include: striving for fundamental explanations that have broad predictive power; appreciating that quantitative analysis is necessary for proper understanding; simplifying physical situations to their essentials to enable the development of mathematical models to explain and predict experimental data; and comparing experimental data from the natural world to theory.

To achieve this goal, we offer courses for physics majors who intend to further their study of physics or any STEM field in graduate school, as well as those physics majors who intend to go into law, consulting, financial services, technology industries, teaching, or any number of fields. Many students enroll in our introductory courses as a compulsory requirement of their STEM major; to satisfy a requirement for admission into medical school; or because they appreciate the quantitative training and intrinsic value offered by a basic understanding of modern physics. The director of undergraduate studies can help students prepare for graduate school in physics by recommending appropriate electives to supplement the core courses. Research experience (PHYS 469, 470, 471, and 472) is an important aspect of preparing for graduate school.

The department offers two majors in Physics: the B.S. and the B.S. intensive major. Students in either program acquire advanced training in physics, mathematics, and related topics through the core courses. They use electives to design individualized programs with more depth or breadth, depending on their interests. Both degree programs require some research experience. PHYS 469 and PHYS 470, introductory research courses, are open to all students. Juniors and seniors, as part of the senior requirement, are required to enroll in PHYS 471 and 472 – one term for the B.S. degree and two terms for the B.S. degree, intensive major. Combined majors are available in Mathematics and Physics; Astrophysics; Physics and Philosophy; and Physics and Geosciences.

COURSES NONMAJORS AND MAJORS

A guide to selecting physics courses is available to aid in course selection. Questions about placement should be addressed to the DUS.

Introductory courses with no calculus requirement Physics courses numbered 120 or below and are for students with little or no previous experience in physics who do not plan to major in the natural sciences. Many of these courses fulfill the science and/or quantitative reasoning distributional requirements. These courses have no college-level mathematics requirement and do not satisfy the medical school requirement.

Introductory calculus-based lecture sequences

1. PHYS 170, 171 is aimed at students who are interested in the biological sciences or medicine. Knowledge of differential and integral calculus at the level of MATH 112

- or equivalent is a prerequisite. MATH 115 should be taken concurrently with PHYS 171. PHYS 170 is a prerequisite for PHYS 171.
- PHYS 180, 181 is aimed at students who plan to major in the physical sciences or engineering. Calculus at the level of MATH 112 is a prerequisite; MATH 115 and 120 should be taken concurrently. PHYS 180 or PHYS 200 is a prerequisite for PHYS 181.
 - PHYS 260, 261 is intended for students who have had excellent prior training in mathematics and a solid foundation in physics. One of MATH 120, ENAS 151, PHYS 301, or MATH 230, 231 or equivalent should be taken concurrently with PHYS 260, 261.

Introductory laboratories Two different introductory laboratory sequences are offered: PHYS 165L, 166L, and PHYS 205L, 206L. Each of these laboratory courses earns one-half course credit. Students normally take the laboratory courses associated with the introductory physics sequence in which they are enrolled.

- PHYS 165L, 166L is an introductory laboratory sequence aimed at students interested in engineering, the life sciences, and medicine. Related lecture courses are PHYS 170, 171, and PHYS 180, 181.
- PHYS 205L, 206L is for students who plan to major in the physical sciences or engineering. Related lecture courses are PHYS 180, 181; PHYS 200, 201; and PHYS 260, 261. Students who take the lecture courses in their first year are advised to start this laboratory sequence with PHYS 205L in the spring of their first year or in the fall of sophomore year.

Advanced electives A series of 340-level electives explores special topics of interest to both majors and nonmajors. The electives are open to any student in Yale College who has completed a year of introductory calculus-based physics (PHYS 170, 171; or 180, 181; or 200, 201; or 260, 261). The offerings for 2018–2019 include PHYS 341, PHYS 343, and PHYS 344.

PREREQUISITES

B.S. degree program The prerequisites are an introductory lecture course sequence with a mathematics sequence equivalent to, or more advanced than, the corequisite of the physics sequence. The following options are appropriate: PHYS 170, 171 with MATH 112, 115; or PHYS 180, 181 with MATH 115, 120; or PHYS 200, 201 with MATH 120 and either 222 or 225; or PHYS 260, 261 with MATH 120, ENAS 151, PHYS 301, or MATH 230, 231 or equivalent. In addition, the laboratory sequence PHYS 205L, 206L or PHYS 165L, 166L is required. Students who take these physics and mathematics courses starting in their first year may satisfy the prerequisites by the middle of their sophomore year. Students who begin taking physics courses in their sophomore year may also complete either the standard or the intensive major. Students are advised to take mathematics courses throughout their first year at the appropriate level.

B.S. degree program, intensive major The prerequisites for the B.S. degree with an intensive major are the same as for the standard program.

REQUIREMENTS OF THE MAJOR

B.S. degree program Eight courses are required beyond the prerequisites, including the senior project. Students must take a mathematics course at the level of, or more advanced than, PHYS 301. Three courses at the core of the major, PHYS 401, 402, and PHYS 440 or 439, involve advanced study of fundamental topics common to all branches of physics. PHYS 401 and 402 pertain to advanced classical physics (mechanics, statistical physics and thermodynamics, and electromagnetism), while the third, PHYS 439 or 440 covers quantum mechanics. PHYS 401 must be taken before PHYS 402, 440, or 439.

Three advanced elective courses are also required. Suitable advanced courses include the PHYS 340-level electives, an advanced laboratory such as PHYS 382L, and 400-level courses in Physics. Students may also find suitable advanced courses in other departments in the sciences, engineering, and mathematics. Courses taken to satisfy these requirements must be approved by the DUS. In order to pursue their individual interests in sufficient depth, many students choose to take more than the required number of advanced courses.

B.S. degree program, intensive major Ten courses are required beyond the prerequisites, including the senior project. Students must take a mathematics course at the level of, or more advanced than, PHYS 301. Five courses at the core of the major involve advanced study of fundamental topics common to all branches of physics. Three of the courses pertain to advanced classical physics: mechanics (PHYS 410), statistical physics and thermodynamics (PHYS 420), and electromagnetism (PHYS 430). Two other courses incorporate quantum mechanics (PHYS 440 and 441). Because the ideas build progressively: PHYS 410 must precede PHYS 440, and PHYS 440 must precede 441, 420, and 430.

Because experiment is at the heart of the discipline, the intensive major requires one term of advanced laboratory (PHYS 382L or equivalent) and at least two terms of independent research (PHYS 471, 472 or equivalent). One advanced elective course is required to complete the program. Suitable advanced courses include the PHYS 340-level electives and 400-level courses in Physics. Students may also find suitable advanced courses in other departments in the sciences, engineering, and mathematics. Courses taken to satisfy these requirements must be approved by the DUS. In order to pursue their individual interests in sufficient depth, many students choose to take more than ten advanced courses.

Credit/D/Fail courses Courses taken Credit/D/Fail may not be counted toward the requirements of either major.

Roadmap See visual roadmap of the requirements.

SENIOR REQUIREMENT

B.S. degree program The senior requirement for the standard B.S. degree is fulfilled by receiving a passing grade on a one-term research project in PHYS 471 or 472 or equivalent. Students should consult the DUS for further information.

B.S. degree program, intensive major The senior requirement for the intensive major is fulfilled by receiving a passing grade on a two-term research project in PHYS 471, 472 or equivalent. Students should consult the DUS for further information.

ADVISING

All Physics majors in the sophomore, junior, and senior classes must have their programs approved by the DUS. First-year students and undeclared sophomores who are interested in Physics or related majors are encouraged to meet with the DUS to discuss their questions and proposed programs.

For both the standard B.S. degree and the B.S. degree with an intensive major, students are advised to begin the program in their first year to allow the greatest amount of flexibility in course selection. It is possible, however, to complete either program in a total of six terms, as illustrated below.

A program for a student completing the Physics B.S. in three years might be:

First-Year or Sophomore	Sophomore or Junior	Senior
PHYS 170, 171, or 180, 181, or 200, 201, or 260, 261	PHYS 206L	PHYS 439 or PHYS 440
PHYS 205L	PHYS 301	PHYS 471 or 472
Mathematics corequisites	PHYS 401 PHYS 402 One advanced elective	Two advanced electives

A program for a student completing the intensive major in three years might be:

First-Year or Sophomore	Sophomore or Junior	Senior
PHYS 170, 171, or 180, 181, or 200, 201, or 260, 261	PHYS 206L	PHYS 441
PHYS 205L	PHYS 301	PHYS 420
Mathematics corequisites	PHYS 410 PHYS 440 PHYS 382L	PHYS 430 PHYS 471 PHYS 472 One advanced elective

REQUIREMENTS OF THE MAJOR**B.S. DEGREE**

Prerequisites PHYS 170, 171 or 180, 181 or 200, 201 or 260, 261, with appropriate math coreqs; PHYS 205L, 206L or PHYS 165L, 166L

Number of courses 8 term courses beyond prereqs (incl senior req)

Specific courses required PHYS 301 or other advanced math course; PHYS 401, 402, and either PHYS 439 or 440, in sequence

Distribution of courses 3 advanced electives approved by DUS

Senior requirement PHYS 471 or 472 or equivalent

B.S. DEGREE, INTENSIVE MAJOR

Prerequisites PHYS 170, 171 or 180, 181 or 200, 201 or 260, 261, with appropriate math coreqs; PHYS 205L, 206L or PHYS 165L, 166L

Number of courses 10 term courses beyond prereqs (incl senior req)

Specific courses required PHYS 301 or other advanced math course; PHYS 410, 440, 441, 420, 430, in sequence; PHYS 382L

Distribution of courses 1 advanced elective approved by DUS

Senior requirement PHYS 471 and 472 or equivalent

FACULTY OF THE DEPARTMENT OF PHYSICS

Professors †Charles Ahn, Yoram Alhassid, Thomas Appelquist, †Charles Bailyn, O. Keith Baker, Charles Baltay, Sean Barrett, †Hui Cao, Richard Casten (*Emeritus*), †Paolo Coppi, David DeMille, †Michel Devoret, †Debra Fischer, Bonnie Fleming, †Marla Geha, Steven Girvin, Leonid Glazman, John Harris, Karsten Heeger, †Victor Henrich, †Jonathon Howard, Francesco Iachello, †Sohrab Ismail-Beigi, Steven Lamoreaux, Simon Mochrie, Vincent Moncrief, †Priyamvada Natarajan, Peter Parker (*Emeritus*), †Daniel Prober, Nicholas Read, Jack Sandweiss (*Emeritus*), †Peter Schiffer, †Robert Schoelkopf, Ramamurti Shankar, Witold Skiba, †A. Douglas Stone, †Hong Tang, Paul Tipton (*Chair*), C. Megan Urry, †Pieter van Dokkum, †John Wettlaufer, Michael Zeller (*Emeritus*)

Associate Professors †Murat Acar, Helen Caines, Sarah Demers, †Thierry Emonet, Walter Goldberger, Jack Harris, Reina Maruyama, Daisuke Nagai, †Corey O'Hern, Nikhil Padmanabhan, David Poland

Assistant Professors †Eric Michael Brown, Meng Cheng, †Damon Clark, †Liang Jiang, Benjamin Machta, David Moore, †John Murray, †Michael Murrell, Nir Navon, Laura Newburgh, †Peter Rakich

Senior Lecturer Sidney Cahn

Lecturers Stephen Irons, Rona Ramos, Adriane Steinacker

†A joint appointment with primary affiliation in another department.

Courses

* **PHYS 040a / ASTR 040, Expanding Ideas of Time and Space** C. Megan Urry
Discussions on the nature of time and space. Topics include the shape and contents of the universe, special and general relativity, dark and light matter, and dark energy. Observations and ideas fundamental to astronomers' current model of an expanding and accelerating four-dimensional universe. Enrollment limited to first-year students. Preregistration required; see under First-Year Seminar Program. SC

* **PHYS 050a / APHY 050a, Science of Modern Technology and Public Policy** Daniel Prober
Examination of the science behind selected advances in modern technology and implications for public policy, with focus on the scientific and contextual basis of each advance. Topics are developed by the participants with the instructor and with guest lecturers, and may include nanotechnology, quantum computation and cryptography, renewable energy technologies, optical systems for communication and medical diagnostics, transistors, satellite imaging and global positioning systems, large-scale immunization, and DNA made to order. Enrollment limited to first-year students. Preregistration required; see under First-Year Seminar Program. SC RP

*** PHYS 100b / APHY 100b / ENAS 100b / EVST 100b / G&G 105b, Energy**

Technology and Society Daniel Prober, Michael Oristaglio, and Julie Paquette
The technology and use of energy. Impacts on the environment, climate, security, and economy. Application of scientific reasoning and quantitative analysis. Intended for non-science majors with strong backgrounds in math and science. QR, SC

*** PHYS 107b / EDST 107b / MB&B 107b, Being Human in STEM** Helen Caines and Andrew Miranker

A collaboratively-designed, project-oriented course that seeks to examine, understand, and disseminate how diversity of gender, race, religion, sexuality, economic circumstances, etc. shape the STEM experience at Yale and nationally, and that seeks to formulate and implement solutions to issues that are identified. Study of relevant peer-reviewed literature and popular-press articles. Implementation of a questionnaire and interviews of STEM participants at Yale. Creation of role-play scenarios for provoking discussions and raising awareness. Design and implementation of group interventions.
SO

*** PHYS 120b, Quantum Physics and Beyond** John Harris

Current topics in modern physics, beginning with quantum physics and continuing through subatomic physics, special and general relativity, cosmology, astrophysics, and string theory. SC

PHYS 151a or b / APHY 151a or b / ENAS 151a or b, Multivariable Calculus for Engineers Staff

An introduction to multivariable calculus focusing on applications to engineering problems. Topics include vector-valued functions, vector analysis, partial differentiation, multiple integrals, vector calculus, and the theorems of Green, Stokes, and Gauss. Prerequisite: MATH 115 or equivalent. QR RP

PHYS 165La, General Physics Laboratory David DeMille, Rona Ramos, Oliver Baker, and Laura Newburgh

A variety of individually self-contained experiments are roughly coordinated with the lectures in PHYS 170, 171, and 180, 181 and illustrate and develop physical principles covered in those lectures. SC ½ Course cr per term

PHYS 166Lb, General Physics Laboratory David DeMille, Rona Ramos, C. Megan Urry, and Jack Harris

A variety of individually self-contained experiments are roughly coordinated with the lectures in PHYS 170, 171, and 180, 181 and illustrate and develop physical principles covered in those lectures. SC ½ Course cr

*** PHYS 170a and PHYS 171b, University Physics for the Life Sciences** Simon Mochrie

An introduction to classical physics with special emphasis on applications drawn from the life sciences and medicine. Fall-term topics include vectors and kinematics, Newton's laws, momentum, energy, random walks, diffusion, fluid mechanics, mathematical modeling, and statistical mechanics. Spring-term topics include oscillations, waves, sound, electrostatics, circuits, Maxwell's equations, electromagnetic waves, gene circuits, and quantum mechanics. Essential mathematics are introduced and explained as needed. Completion of MATH 112 or equivalent is prerequisite for PHYS 170. Completion of PHYS 170 is a prerequisite for PHYS 171. MATH 116 (or MATH 115) is recommended prior to or concurrently with PHYS 171. QR, SC

PHYS 180a and PHYS 181b, University Physics Adriane Steinacker

A broad introduction to classical and modern physics for students who have some previous preparation in physics and mathematics. Fall-term topics include Newtonian mechanics, gravitation, waves, and thermodynamics. Spring-term topics include electromagnetism, special relativity, and quantum physics. Concurrently with MATH 115 and 120 or equivalents. See comparison of introductory sequences and laboratories in the YCPS. May not be taken for credit after PHYS 170, 171. QR, SC

PHYS 200a and PHYS 201b, Fundamentals of Physics Sarah Demers Konezny

A thorough introduction to the principles and methods of physics for students who have good preparation in physics and mathematics. Emphasis on problem solving and quantitative reasoning. Fall-term topics include Newtonian mechanics, special relativity, gravitation, thermodynamics, and waves. Spring-term topics include electromagnetism, geometrical and physical optics, and elements of quantum mechanics. Prerequisite: MATH 115 or equivalent. MATH 210 and either MATH 225 or MATH 222, are generally taken concurrently. See comparison of introductory sequences and laboratories in the YCPS. QR, SC

PHYS 205La or b, Modern Physical Measurement Staff

A two-term sequence of experiments in classical and modern physics for students who plan to major in Physics. In the first term, the basic principles of mechanics, electricity, and magnetism are illustrated in experiments designed to make use of computer data handling and teach error analysis. In the second term, students plan and carry out experiments illustrating aspects of wave and quantum phenomena and of atomic, solid state, and nuclear physics using modern instrumentation. May be begun in either term. SC ½ Course cr per term

PHYS 206La or b, Modern Physical Measurement Staff

A two-term sequence of experiments in classical and modern physics for students who plan to major in Physics. In the first term, the basic principles of mechanics, electricity, and magnetism are illustrated in experiments designed to make use of computer data handling and teach error analysis. In the second term, students plan and carry out experiments illustrating aspects of wave and quantum phenomena and of atomic, solid state, and nuclear physics using modern instrumentation. SC ½ Course cr

* **PHYS 210a, Electronics for the Physicist** Stephen Irons and Steve Lamoreaux
Hands-on investigation of electronics topics of particular interest to the experimental physicist. Students learn the about electronic circuits, equipment and devices that are commonly used in modern experimental laboratories. Topics covered include, but are limited to: basic theory of circuits, test equipment, passive and active components, amplifiers, filters and noise, sensors and feedback, prototyping and circuit construction, and programmable microprocessors. There will be weekly hands-on activities and a final project. Prerequisites: PHYS 170 and 171, or PHYS 180 and 181, or PHYS 200 and 201, or PHYS 260 and 261; and MATH 115 or equivalent. SC

*** PHYS 260a and PHYS 261b, Intensive Introductory Physics** Steven Girvin

The major branches of physics—classical and relativistic dynamics, gravitation, electromagnetism, heat and thermodynamics, statistical mechanics, quantum physics— at a sophisticated level. For students majoring in the physical sciences, Mathematics, and Philosophy who have excellent training in and a flair for mathematical methods

and quantitative analysis. Concurrently with MATH 230 and 231, or PHYS 301, or equivalent. QR, SC

PHYS 295b / ASTR 255b, Research Methods in Astrophysics Marla Geha

The acquisition and analysis of astrophysical data, including the design and use of ground- and space-based telescopes, computational manipulation of digitized images and spectra, and confrontation of data with theoretical models. Examples taken from current research at Yale and elsewhere. Use of the Python programming language. A background in high school calculus and physics. No previous programming experience required. QR, SC RP

PHYS 301a, Introduction to Mathematical Methods of Physics Vincent Moncrief

Topics include multivariable calculus, linear algebra, complex variables, vector calculus, and differential equations. Designed to give accelerated access to 400-level courses by providing, in one term, the essential background in mathematical methods. Recommended to be taken concurrently with PHYS 401 or 410. Prerequisite: PHYS 170, 171, or 180, 181, or 200, 201, or 260, 261, or permission of instructor. QR

PHYS 341b, Biological Physics Benjamin Machta

An introduction to the physics of biological structures and life processes, and to the burgeoning field of biological physics. Related concepts from probability theory and statistical physics are developed as needed. Prerequisite: PHYS 170, 171, or 180, 181, or 200, 201, or 260, 261, or permission of instructor. QR, SC

PHYS 344b, Quantum and Nanoscale Physics Sean Barrett

An introduction to cutting-edge developments in physics involving quantum information and/or nanotechnology. Background concepts in quantum mechanics, electromagnetism, and optics are introduced as necessary. Prerequisite: PHYS 170, 171, or 180, 181, or 200, 201, or 260, 261, or permission of instructor. PHYS 301 or other advanced mathematics course recommended. QR, SC

*** PHYS 356a / ASTR 356a, Astrostatistics and Data Mining** Hector Arce

Introduction to the statistical tools used to analyze and interpret astrophysical data, including common data mining techniques for finding patterns in large data sets and data-based prediction methods. Use of publicly available high-quality astronomical data from large surveys such as SDSS and 2MASS, and from space-based observatories such as Spitzer, Herschel, and WISE. Coding with the Python programming language. Prerequisite: ASTR 255 or equivalent. QR, SC

*** PHYS 382Lb, Advanced Physics Laboratory** Reina Maruyama, Sidney Cahn, Steve Lamoreaux, and Nir Navon

Laboratory experiments with some discussion of theory and techniques. An advanced course focusing on modern experimental methods and concepts in atomic, optical, nuclear, and condensed matter physics. Intended to prepare students for independent research. For majors in the physical sciences. After or concurrently with PHYS 439 or 440, or with permission of instructor. PHYS 206L WR, SC

PHYS 401a and PHYS 402b, Advanced Classical Physics from Newton to Einstein

Nikhil Padmanabhan

Advanced physics as the field developed from the time of Newton to the age of Einstein. Topics include mechanics, electricity and magnetism, statistical physics, and thermodynamics. The development of classical physics into a "mature" scientific discipline, an idea that was subsequently shaken to the core by the revolutionary

discoveries of quantum physics and relativity. Prerequisite: PHYS 170, 171, or 180, 181, or 200, 201, or 260, 261. Concurrently with PHYS 301 or other advanced mathematics course. QR, SC

PHYS 410a, Classical Mechanics Charles Baltay

An advanced treatment of mechanics, with a focus on the methods of Lagrange and Hamilton. Lectures and problems address the mechanics of particles, systems of particles, and rigid bodies, as well as free and forced oscillations. Introduction to chaos and special relativity. Prerequisite: PHYS 170, 171, or 180, 181, or 200, 201, or 260, 261. Concurrently with PHYS 301 or other advanced mathematics course. QR, SC

*** PHYS 420a / APHY 420a, Thermodynamics and Statistical Mechanics** Nir Navon

An introduction to the laws of thermodynamics and their theoretical explanation by statistical mechanics. Applications to gases, solids, phase equilibrium, chemical equilibrium, and boson and fermion systems. Prerequisites: PHYS 301, 410, and 440 or permission of instructor. QR, SC

PHYS 428a / AMTH 428a / E&EB 428a / G&G 428a, 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. Prerequisite: PHYS 301, MATH 247, or equivalent. QR, SC

PHYS 430b, Electromagnetic Fields and Optics David Moore

Electrostatics, magnetic fields of steady currents, electromagnetic waves, and relativistic dynamics. Provides a working knowledge of electrodynamics. Prerequisites: PHYS 301 and 410 or equivalents. QR, SC

PHYS 439a / APHY 439a, Basic Quantum Mechanics Liang Jiang

The 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. Prerequisites: PHYS 181 or 201, PHYS 301, or equivalents, or permission of instructor. QR, SC

PHYS 440b, Quantum Mechanics and Natural Phenomena I Ramamurti Shankar

The first term of a two-term sequence covering principles of quantum mechanics with examples of applications to atomic physics. The solution of bound-state eigenvalue problems, free scattering states, barrier penetration, the hydrogen-atom problem, perturbation theory, transition amplitudes, scattering, and approximation techniques. Prerequisite: PHYS 410 or 401. QR, SC

PHYS 441a, Quantum Mechanics and Natural Phenomena II Witold Skiba

Continuation of PHYS 440. Prerequisite: PHYS 440. QR, SC

PHYS 442b, Introduction to Nuclear and Elementary Particle Physics Charles Baltay

Fundamental concepts in nuclear and particle physics, including the discovery of radioactivity, the Dirac equation, antimatter, Feynman diagrams, hadron resonances, quarks and gluons, fundamental symmetries, the weak interaction, beta decay, quantum

chromodynamics, neutrino oscillation, unification, and particle theories for dark matter. Prerequisite: two term courses in quantum mechanics. QR, SC

PHYS 448a / APHY 448a, Solid State Physics I Sohrab Ismail-Beigi

The first term of a two-term sequence covering the principles underlying the electrical, thermal, magnetic, and optical properties of solids, including crystal structure, phonons, energy bands, semiconductors, Fermi surfaces, magnetic resonances, phase transitions, dielectrics, magnetic materials, and superconductors. Prerequisites: APHY 322, 439, PHYS 420. QR, SC

PHYS 449b / APHY 449b, Solid State Physics II Vidvuds Ozolins

The second term of the sequence described under APHY 448. QR, SC

PHYS 458a / APHY 458a, 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, and nanostructure physics. Topics include propagation of light, reflection and refraction, guiding light, polarization, interference, diffraction, scattering, Fourier optics, and optical coherence. Prerequisite: PHYS 430. QR, SC

PHYS 460a, Mathematical Methods of Physics Nicholas Read

Survey of mathematical techniques useful in physics. Physical examples illustrate vector and tensor analysis, group theory, complex analysis (residue calculus, method of steepest descent), differential equations and Green's functions, and selected advanced topics. Prerequisite: PHYS 301 or other advanced mathematics course. QR

* **PHYS 471a and PHYS 472b, Independent Projects in Physics** David Moore

Each student works on an independent project under the supervision of a member of the faculty or research staff. Students participate in a series of seminar meetings in which they present a talk on their project or research related to it. A written report is also required. Registration is limited to junior and senior physics majors. This course may be taken up to four times for a letter grade.

Physics and Geosciences

Directors of undergraduate studies: Simon Mochrie (Physics), 68C SPL, 436-4809, dus.physics@yale.edu; Mary-Louise Timmermans (Geology and Geophysics), 111 KGL, 432-3167, mary-louise.timmermans@yale.edu (mary-louise.timmermans@yale.edu)

The major in Physics and Geosciences applies fundamental physical principles to the study of Earth and other planetary bodies at a level that is more intensive than in the Physics or Geology and Geophysics majors individually. Topics of interest range from atmosphere, ocean, and climate dynamics to physics of the solid Earth or of other planetary bodies.

PREREQUISITES

The prerequisites for the major include MATH 120 or its equivalent, PHYS 170, 171 or another introductory physics sequence, the associated physics laboratory sequence PHYS 205L, 206L, and a course in ordinary differential equations chosen from ENAS 194, MATH 246, or PHYS 301.

REQUIREMENTS OF THE MAJOR

Beyond the prerequisites, the major requires a minimum of twelve term courses, including the senior project. At least four of these courses must be in Physics and at least six must be in Geology and Geophysics. Students complete a two- or three-term advanced physics sequence: either PHYS 401 and 402, or PHYS 410, 420, and 430. They must also take basic quantum mechanics (PHYS 439) and one elective numbered PHYS 320 or above. Required courses in Geology and Geophysics include one introductory course numbered G&G 100–150, with any accompanying laboratory; one elective numbered G&G 200 or above; and four advanced electives from one of two Geology and Geophysics tracks: the Atmosphere, Ocean, and Climate track or the Solid Earth Science track. A list of suggested electives is available from the office of the director of undergraduate studies in Geology and Geophysics or on the G&G departmental website. No elective course may count toward multiple requirements for the major.

Credit/D/Fail No course taken Credit/D/Fail may be counted toward the Physics and Geosciences major, including prerequisites.

SENIOR REQUIREMENT

Students complete a two-term senior project on a topic that is appropriate for the combined major and acceptable to both the Physics and Geology and Geophysics departments. The project is undertaken in either PHYS 471, 472 or G&G 490, 491. In addition, students must present an oral report on their project to each department.

ADVISING

Interested students should consult the directors of undergraduate studies in Physics and in Geology and Geophysics.

REQUIREMENTS OF THE MAJOR

Prerequisites MATH 120 or equivalent; PHYS 170, 171 or above; PHYS 205L, 206L; ENAS 194, MATH 246, or PHYS 301

Number of courses At least 12 courses beyond prereqs, incl senior req

Specific courses required PHYS 401 and 402, or PHYS 410, 420, and 430; PHYS 439

Distribution of courses 1 elective numbered PHYS 320 or above; 1 intro course in G&G, with lab, as specified; 1 elective course numbered G&G 200 or above; 4 advanced courses in a G&G track, as specified

Senior requirement Senior project in PHYS 471, 472 or G&G 490, 491, on topic acceptable to both depts; oral report on project to both depts or equivalent

Physics and Philosophy

Directors of undergraduate studies: Simon Mochrie (Physics), 68C SPL, 436-4809, dus.physics@yale.edu; Daniel Greco (Philosophy), 106A C, 432-1687, daniel.greco@yale.edu

PREREQUISITES

Prospective majors in Physics and Philosophy are advised to begin taking the prerequisites during their first year, and to take at least two of the required Philosophy courses by the end of their sophomore year. Prerequisites for this major are as follows: mathematics through calculus at the level of MATH 120; any introductory Physics lecture sequence numbered 170 or higher; PHYS 165L and 166L, or 205L and 206L; and one introductory Philosophy course.

REQUIREMENTS OF THE MAJOR

Beyond the prerequisites, students take fourteen term courses, including the senior requirement. Seven courses in Physics approved by the director of undergraduate studies and numbered 301 or higher are required, including PHYS 301 or equivalent and either PHYS 439 or 440. Six courses in Philosophy or in History of Science, Medicine, and Public Health are required, including PHIL 125 and 126, one course in logic above the introductory level, and a Philosophy seminar selected with the approval of the directors of undergraduate studies.

SENIOR REQUIREMENT

Seniors must complete one of the following: (1) PHYS 471 or 472 (independent project); (2) PHIL 490 or 491 (senior essay); (3) PHIL 480 (tutorial) on an appropriate subject; (4) an appropriate Philosophy seminar with the approval of the director of undergraduate studies in Philosophy.

REQUIREMENTS OF THE MAJOR

Prerequisites MATH 120; PHYS 170, 171, or 180, 181, or 200, 201, or 260, 261; PHYS 165L, 166L, or 205L, 206L; 1 intro Phil course

Number of courses 14 term courses beyond prereqs, incl senior req

Specific courses required PHYS 301 or equivalent; PHYS 439 or 440; PHIL 125, 126

Distribution of courses 7 Physics courses numbered 301 or higher approved by DUS; 6 courses in Phil or HSHM, incl 1 in logic above intro level and a Phil sem, as specified

Senior requirement 1 from PHYS 471 or 472, PHIL 490 or 491, PHIL 480 on appropriate topic, or approved Phil sem

Political Science

Director of undergraduate studies: David Simon, 115 Prospect St., 432-5236, david.simon@yale.edu; politicalscience.yale.edu/academics/about-undergraduate-program

Political science addresses how individuals and groups allocate, organize, and challenge the power to make collective decisions involving public issues. At Yale, the political science curriculum begins with the theoretical building blocks of the discipline, including political philosophy as well as both qualitative and quantitative methodology. With these tools in hand, faculty and students address a wide range of topics within political science, across five sub-fields: American politics, comparative politics, international relations, political philosophy, and analytical political theory. Students may also construct interdisciplinary curricula, which might be based, for example, on a specific policy realm or a regional focus.

REQUIREMENTS OF THE MAJOR

The standard B.A. degree program Twelve term courses in political science are required. Students must take at least two courses in each of any three of the department's five fields—international relations, American government, political philosophy, analytical political theory, and comparative government. Students expecting to major in Political Science should take one or more introductory-level courses in the department early in their college careers. Introductory courses count toward the overall course requirement and toward the departmental fields requirement.

Students are encouraged to take courses related to political science that are offered by other departments. Students who elect the standard program may petition to count up to two such courses toward the major. Students may routinely count college seminars taught by members of the Political Science faculty toward the major, and they may petition to count one college seminar taught by an instructor outside the department. Students who have completed Directed Studies may, with the approval of the director of undergraduate studies (DUS), count one term of DRST 005, 006 toward the major.

The standard B.A. degree program, interdisciplinary concentration Students majoring in Political Science may choose an interdisciplinary concentration, which allows them to identify and pursue an area of study that crosses conventional disciplinary and departmental boundaries. Examples of interdisciplinary concentrations are urban studies, health politics and policy, political economy, political psychology, and global affairs. Students choosing such a concentration are required to take twelve term courses toward the major. At least seven courses must be in the field of concentration. Of the courses counting toward the major outside of the field of concentration, at least two courses must be taken in each of any two of the department's five fields. As many as three courses taken in other departments may be counted toward the major, with the permission of the DUS.

Students wishing to pursue the Political Science major with an interdisciplinary concentration must submit an application and meet with the DUS to discuss their proposed program of study. The application is due prior to the beginning of the November recess in the student's final year of enrollment.

The intensive major The intensive major gives students an opportunity to undertake more extensive course work and research for the senior essay than is possible in the standard major. Requirements for the intensive major are identical to those for the nonintensive major (standard program or interdisciplinary concentration), with the following exceptions: (1) in the spring term of the junior year, intensive majors take PLSC 474 in preparation for writing a yearlong senior essay; (2) in the senior year, intensive majors fulfill the senior essay requirement by enrolling in the yearlong course sequence PLSC 490 and PLSC 493 (PLSC 490 also counts toward the senior seminar requirement); (3) a total of fifteen term courses is required.

Juniors wishing to pursue an intensive major must apply to the DUS by November 16, 2018. The application should contain: (1) the intensive major application form signed by a faculty adviser who has agreed to supervise the student for the final three terms of enrollment; (2) a plan of study that identifies the political science courses that will be taken in those three terms; and (3) a one-to-two-page description of the proposed senior essay.

Seminar preregistration Each term, the department provides all declared Political Science majors the opportunity to apply for preregistration to its seminars. Instructors of seminars may preregister up to twelve students per course, or up to eight students for multiple-titled courses. The maximum enrollment for each seminar is eighteen. Students may be preregistered in up to two seminars per term, although they may enroll in others if they obtain instructor permission during shopping week.

Seminar requirement Students majoring in Political Science are required to take at least two seminars taught by members of the Political Science department, including at least one during the senior year.

Credit/D/Fail Students may count up to two lecture courses taken Credit/D/Fail toward the major which will count as non-A grades for purposes of calculating distinction. Seminars taken Credit/D/F will not count toward the major requirements, but will count as non-A grades for purposes of calculating distinction.

Roadmap See visual roadmap of the requirements.

SENIOR REQUIREMENT

Seniors in the major must complete a senior essay, as described under "Senior essay" below. The essay can be written either in one term or over both terms of the senior year. In order to graduate from Yale College, a student majoring in Political Science must achieve a passing grade on the senior essay. The senior requirement for the standard B.A. degree program with an interdisciplinary concentration is the same as for the standard program, with the provision that the essay must be written on a subject that falls within the field of concentration.

Senior essay The senior essay provides an appropriate intellectual culmination to the student's work in the major and in Yale College. The essay should ordinarily be written on a topic in an area in which the student has previously done course work. It should rest on extensive research that is appropriate to the subject matter. Essays are expected to be in the range of twenty-five to thirty double-spaced pages. At the beginning of the term in which the essay is written, students must have their senior essay topic approved by a faculty member who has agreed to advise them. Each student is expected to consult

regularly with the seminar instructor or adviser and take the initiative in developing a plan of research, scheduling regular meetings, and submitting preliminary drafts for review.

One-term essays may be written either in a seminar or, with the approval of an adviser and the DUS, in PLSC 480. Senior essays written in the fall term are due on December 7, 2018. Spring-term and yearlong essays are due on April 23, 2019. More extensive information about the senior essay can be found on the department website.

Yearlong senior essay Students who wish to undertake a more extensive research project than is possible in a single term may fulfill the senior essay requirement by enrolling in the yearlong course sequence PLSC 490 and 491. PLSC 490 also counts toward the senior seminar requirement. In the fall term, students writing a yearlong senior essay develop a research prospectus for the essay and begin their research under the supervision of a member of the faculty who specializes in the area being investigated. In the spring term, students complete the essay. Yearlong senior essays are expected to be substantially longer than a regular term paper. While there is no fixed length, they are normally at least fifty pages long.

Majors who wish to enroll in the yearlong senior essay must apply for admission in the spring of their junior year. The deadline for the Class of 2020 is April 8, 2019. By that date, students should submit to the office of the director of undergraduate studies: (1) the yearlong senior essay prospectus form signed by a faculty adviser who has agreed to supervise the student during both terms of the senior year; and (2) a one-to-two-page statement describing the research project. It is expected that no more than fifteen students will be admitted each year.

ADVISING

The director of undergraduate studies and other members of the department can provide advice about departmental requirements, options within the major, requirements of two majors, study abroad, and other matters related to the major. Majors must secure written approval of their course selections each term from the DUS. All subsequent changes in a student's major program must also be approved. Students are also encouraged to seek advice from other departmental faculty members who are knowledgeable about their fields of interest. Information on faculty interests can be found on the departmental website.

Combined B.A./M.A. degree program Exceptionally able and well-prepared students may complete a course of study leading to the simultaneous award of the B.A. and M.A. degrees after eight terms of enrollment. See "Simultaneous Award of the Bachelor's and Master's Degrees" under (p. 64)Special Arrangements (p. 64) in the Academic Regulations. Interested students should consult the director of undergraduate studies prior to the sixth term of enrollment for specific requirements in Political Science.

STUDY ABROAD

Students who study in a Junior Term Abroad program or at another university during the summer may, with the approval of the DUS, count up to two courses toward the major. Students who study in a Junior Year Abroad program may, with the approval of the DUS, count up to four courses toward the major. Students may also petition to have non-Yale courses that were not taught in political science departments count toward

the major. Pending approval of the DUS, these courses will count toward the maximum number of substitutions.

REQUIREMENTS OF THE MAJOR

B.A. DEGREE, STANDARD PROGRAM

Prerequisites None

Number of courses *Standard major* – 12 term courses; *intensive major* – 15 term courses

Distribution of courses 2 courses in each of 3 of the 5 departmental fields; 2 PLSC sems, 1 in senior year

Substitution permitted 2 courses from other depts with DUS approval

Senior requirement 1-term senior essay in sem or in PLSC 480; or 2-term senior essay in PLSC 490, 491

Intensive major PLSC 474 in spring term of junior year; 2 courses in each of 3 of the 5 departmental fields; 2-term senior essay in PLSC 490, 493

B.A. DEGREE, INTERDISCIPLINARY CONCENTRATION

Prerequisites None

Number of courses *Standard major with interdisciplinary concentration* – 12 term courses; *intensive major with interdisciplinary concentration* – 15 term courses

Distribution of courses 7 courses in concentration; 2 courses in each of 2 of the 5 departmental fields; 2 PLSC sems, 1 in senior year

Substitution permitted 3 courses from other depts with DUS approval (2 courses from other depts with DUS approval for intensive major)

Senior requirement 1-term senior essay in sem or in PLSC 480; or 2-term senior essay in PLSC 490, 491; both options on subject within concentration

Intensive major PLSC 474 in spring term of junior year; 7 courses in concentration; 2 courses in each of 3 of the 5 departmental fields; 2-term senior essay in PLSC 490, 493 on subject within concentration

FACULTY OF THE DEPARTMENT OF POLITICAL SCIENCE

Professors Bruce Ackerman, Akhil Amar, Seyla Benhabib, Paul Bracken, David Cameron, Benjamin Cashore, Bryan Garsten, Alan Gerber, Jacob Hacker, Oona Hathaway, Gregory Huber, Joseph LaPalombara (*Emeritus*), David Mayhew (*Emeritus*), Gerard Pedro-i-Miquel, Thomas Pogge, Douglas Rae, John Roemer, Susan Rose-Ackerman, Frances Rosenbluth, Bruce Russett (*Emeritus*), James Scott, Ian Shapiro, Stephen Skowronek, Steven Smith, Milan Svolik, Peter Swenson, John Wargo, Ebonya Washington, Steven Wilkinson, Elisabeth Wood

Associate Professors Peter Aronow, Ana De La O, Alexandre Debs, H el ene Landemore, Jason Lyall, Karuna Mantena, Nuno Monteiro

Assistant Professors Katharine Baldwin, Deborah Beim, Daniela Cammack, Alexander Coppock, John Henderson, Joshua Kalla, Daniel Mattingly, Elizabeth Nugent, Giulia Oskian, Tyler Pratt, Didac Queralt, Kelly Rader, Thania Sanchez, Fredrik Savje, Ian Turner

Senior Lecturers Boris Kapustin, Steven Latham, David Simon

Lecturers Elizabeth Acord, Andrea Aldrich, Paris Aslanidis, Leanna Barlow, Steven Calabresi, John DeStefano, Albert Fang, Michael Fotos, Andrew Gooch, Thomas Graham, Allison Hartnett, Maria Jose Hierro, Jane Karr, Tally Kritzman-Amir, Brian

Libgober, Adam Liu, Nicholas Lotito, Matthew Mahler, Isabela Mares, Patrick O'Brien, Nilakshi Parndigamage, Joan Ricart-Huguet, Alexander Rosas, Walter Shapiro, Gordon Silverstein, Rebecca Sinderbrand, Derek Slap, James Sleeper, Jonny Steinberg, Bonnie Weir, Graeme Wood

Introductory Courses

*** PLSC 030a, Law and the Limits of Freedom** Alexander Rosas

This course evaluates the desired role of law in free and modern societies and dissects, more broadly, the relationship between law, the state, and the individual in such societies. Particularly, this course considers when, if ever, it is appropriate to use law to limit freedom in the name of equality, security, community, utility, and/or morality. Enrollment limited to freshmen. Preregistration required; see under Freshman Seminar Program. SO

PLSC 111b / GBLB 268b, Introduction to International Relations Jason Lyall

Survey of key debates and concepts in international relations. Exploration of historical and contemporary issues using Western and non-Western cases and evidence. Topics include the rise of states; causes, conduct, and outcomes of wars; the emergence of new actors and forms of conflict; and evolution of global economy. SO

PLSC 113a, Introduction to American Politics Greg Huber

Introduction to American national government. The Constitution, American political culture, civil rights, Congress, the executive, political parties, public opinion, interest groups, the media, social movements, and the policy-making process. SO

PLSC 114a, Introduction to Political Philosophy Hélène Landemore

Fundamental issues in contemporary politics investigated through reflection on classic texts in the history of political thought. Emphasis on topics linked to modern constitutional democracies, including executive power, representation, and political parties. Readings from Plato, Machiavelli, Hobbes, Locke, Rousseau, Madison and Hamilton, Lincoln, and Tocqueville, in addition to recent articles on contemporary issues. SO

PLSC 116a, Comparative Politics: States, Regimes, and Conflict David Simon

Introduction to the study of politics and political life in the world outside the United States. State formation and nationalism, the causes and consequences of democracy, the functioning of authoritarian regimes, social movements and collective action, and violence. SO

PLSC 118b, The Moral Foundations of Politics Ian Shapiro

An introduction to contemporary discussions about the foundations of political argument. Emphasis on the relations between political theory and policy debate (e.g., social welfare provision and affirmative action). Readings from Bentham, Mill, Marx, Burke, Rawls, Nozick, and others. SO

International Relations

PLSC 128a / GBLB 247a, Development Under Fire Jason Lyall

The recent emergence of foreign assistance as a tool of counterinsurgency and post-conflict reconciliation. Evaluation of the effects of aid in settings such as Afghanistan, Iraq, Colombia, and the Philippines. Examination of both theory and practice of conducting development work in the shadow of violence. Strengths and weaknesses of

different evaluation methods, including randomized control trials (RCTs) and survey experiments. SO

PLSC 130b / GBLB 260b, Nuclear Politics Alexandre Debs

The pursuit, use, and non-use of nuclear weapons from the Manhattan Project to the present. The effect of the international system, regional dynamics, alliance politics, and domestic politics in the decision to pursue or forgo nuclear weapons. The role of nuclear weapons in international relations, the history of the Cold War, and recent challenges in stemming nuclear proliferation. SO

* **PLSC 137a or b / GBLB 274a or b, Terrorism** Bonnie Weir

Theoretical and empirical literature used to examine a host of questions about terrorism. The definition(s) of terrorism, the application of the term to individuals and groups, the historical use and potential causes of terrorism, suicide and so-called religious terrorism, dynamics within groups that use terrorism, and counterterrorism strategies and tactics. Theoretical readings supplemented by case studies. SO

* **PLSC 138a / MGRK 236a / SOCY 221a, The Euro Crisis** Paris Aslanidis

Examination of how Europe continues to struggle with repercussions of the Great Recession and the impact of the Eurozone crisis in countries such as Portugal, Ireland, Spain, and, especially, Greece. Topics include the euro as a viable common currency; why and how the Eurozone crisis erupted and spread; and whether this catastrophe could have been averted. SO

PLSC 148b / HMRT 100b, Theories, Practices, and Politics of Human Rights Thania Sanchez

Introduction to core human-rights issues, ideas, practices, and controversies. The concept of human rights as a philosophical construct, a legal instrument, a political tool, an approach to economic and equity issues, a social agenda, and an international locus of contestation and legitimation. Required for students in the Multidisciplinary Academic Program in Human Rights. SO

PLSC 149a / EVST 292a / GBLB 217a, Sustainability in the Twenty-First Century
Daniel Esty

Sustainability as a guiding concept for addressing twenty-first century tensions between economic, environmental, and social progress. Using a cross-disciplinary set of materials from the “sustainability canon,” students explore the interlocking challenges of providing abundant energy, reducing pollution, addressing climate change, conserving natural resources, and mitigating the other impacts of economic development. SO

* **PLSC 152a / EP&E 245a, Global Firms and National Governments** Joseph LaPalombara

Interactions between large-scale firms that make international investments and policy makers and government officials in the “host” countries. National and subnational officials who work to attract investments (or not) and who set policies regulating global firms and their investments. Focus on less-developed countries. Theories as to why firms “globalize”; case studies of controversies created by overseas corporate investments; the changing economic landscape associated with investments by countries such as China, Brazil, and India. SO

* **PLSC 161a / HIST 483Ja, Studies in Grand Strategy II** Beverly Gage

The study of grand strategy, of how individuals and groups can accomplish large ends with limited means. During the fall term, students put into action the ideas studied in the spring term by applying concepts of grand strategy to present day issues. Admission is by application only; the cycle for the current year is closed. This course does not fulfill the history seminar requirement, but may count toward geographical distributional credit within the History major for any region studied, upon application to the director of undergraduate studies. Prerequisite: PLSC 321. Previous study courses in political science, history, global affairs, or subjects with broad interdisciplinary relevance encouraged. SO

PLSC 186a / GBL 203a, Introduction to International Political Economy Didac Queralt

Examination of the political and institutional conditions that explain why some politicians and interest groups (e.g. lobbies, unions, voters, NGOs) prevail over others in crafting foreign policy. Consideration of traditional global economic exchange (trade, monetary policy and finance) as well as new topics in the international political economy (IPE), such as migration and environmental policy.

PLSC 346a / EP&E 231a / GBL 180a, Game Theory and International Relations Alexandre Debs

Introduction to game theory and its applications in political science and economics, with a focus on international relations. Standard solution concepts in game theory; case studies from important episodes in the history of international relations, including World War II, the Cuban missile crisis, and the 2003 U.S.-led invasion of Iraq. Recommended preparation: introductory microeconomics. QR, SO

American Government

* **PLSC 212a / EP&E 390a / EVST 212a, Democracy and Sustainability** Michael Fotos
Democracy, liberty, and the sustainable use of natural resources. Concepts include institutional analysis, democratic consent, property rights, market failure, and common pool resources. Topics of policy substance are related to human use of the environment and to U.S. and global political institutions. WR, SO

PLSC 215b / EVST 255b / F&ES 255b, Environmental Politics and Law John Wargo
Exploration of the politics, policy, and law associated with attempts to manage environmental quality and natural resources. Themes of democracy, liberty, power, property, equality, causation, and risk. Case histories include air quality, water quality and quantity, pesticides and toxic substances, land use, agriculture and food, parks and protected areas, and energy. SO

* **PLSC 217a, U.S. National Elections** David Mayhew

An investigation of electoral realignments, voting for president and Congress, voter turnout, incumbency advantage, nominations, and campaign finance. SO

* **PLSC 219b / EP&E 497b / EVST 247b, Politics of the Environment** Peter Swenson

Historical and contemporary politics aimed at regulating human behavior to limit damage to the environment. Goals, strategies, successes, and failures of movements, organizations, corporations, scientists, and politicians in conflicts over environmental policy. Focus on politics in the U.S., including the role of public opinion; attention to international regulatory efforts, especially with regard to climate change. SO

* **PLSC 220a / WGSS 220a, Gender Politics** Andrea Aldrich

Exploration of theoretical and empirical work in political science to study the relationship between gender and politics in the United States and around the world. Topics include women's representative in legislative and executive branch politics in democratic regimes; the impact of gender stereotypes on elections and public opinion; conditions that impact the supply and demand of candidates across genders; and the underrepresentation of women in political institutions. SO

PLSC 233a, Constitutional Law Akhil Reed Amar

An introduction to the main themes of the American Constitution – popular sovereignty, separation of powers, federalism, and rights – and to basic techniques of constitutional interpretation. Special emphasis on the interplay of constitutional text, judicial doctrine, and constitutional decision making outside the judiciary. SO

* **PLSC 235a, Political Journalism and Public Policy** Derek Slap

The effects of political journalism on American public policy from 1960 to the present. Focus on changes in the media during the past few decades. The Dewey-Lippmann debate on the role journalism should play in politics, marketing in the 1968 presidential campaign, broadcast news and audience fragmentation in the 1970s, media dysfunction and the Clinton and Obama health care initiatives, the Internet, hyperpartisanship, media bias, and recent gun control initiatives. SO

* **PLSC 241a / SOCY 365a, The Making of Political News** Matthew Mahler

The processes through which political news gets made. How the form and content of political news are shaped in and through the ongoing relationships between political operatives and journalists; ways in which these actors attempt to structure and restructure such relationships to their benefit. SO

* **PLSC 244a / EP&E 324a, Journalism, Liberalism, Democracy** James Sleeper

The news media's role in configuring the democratic public sphere, from the early synergy of print capitalism and liberalism through the corporate consolidation of mass media and the recent fragmentation and fluidity of "news." Classical-humanist and civic-republican responses to these trends. SO

* **PLSC 251a / AMST 469a / EP&E 396a, Progressivism: Theory and Practice**

Stephen Skowronek

The progressive reform tradition in American politics. The tradition's conceptual underpinnings, social supports, practical manifestations in policy and in new governmental arrangements, and conservative critics. Emphasis on the origins of progressivism in the early decades of the twentieth century, with attention to latter-day manifestations and to changes in the progressive impulse over time. SO

* **PLSC 253a or b / ENGL 467a or b, Journalism** Staff

Examination of the practices, methods, and impact of journalism, with focus on reporting and writing; consideration of how others have done it, what works, and what doesn't. Students learn how to improve story drafts, follow best practices in journalism, improve methods for obtaining, skeptically evaluating, and assessing information, as well as writing a story for others to read. The core course for Yale Journalism Scholars. No prerequisites. WR

PLSC 254b, Political Parties in the American System John Henderson

The evolution of American political parties and the role of parties and partisanship in contemporary government and elections. Empirical and theoretical accounts of parties,

including divided government, parties in Congress, realignment, responsible party government, party identification, and ideology. Elite-led polarization, decline and resurgence of strong parties, and the antiparty constitutional tradition. SO

* **PLSC 256b / EP&E 248b, American Political Institutions** Michael Fotos

The origins and development of American political institutions, especially in relation to how institutions shape the policy process. Issues of temporality, policy feedback, and policy substance. WR, SO

* **PLSC 262b / AMST 324b, Race, Politics, and the Law** Daniel HoSang

Examination of how race—as a mode of domination and resistance—has developed and transformed in the United States since the early-twentieth-century. How political actors and social movements engage the law to shape visions of freedom, democracy, and political life. Consideration of critical race theory, political discourse analysis, intersectionality and women of color feminism, and American political development. SO

* **PLSC 266b, The Press and the Presidency** Rebecca Sinderbrand

Press coverage of the presidency in recent history and contemporary times. Focus on the choices facing journalists covering the presidency, and the impact of presidential press coverage on American and world politics. SO

* **PLSC 274a, Cities: Making Public Choices in New Haven** John DeStefano

Examination of cities, particularly the relationship of people to place and most importantly to one another, through the prism and experiences of the City of New Haven. Exploration of how concepts of social capital and legitimacy of institutions in policy design and execution, are key to the well being of community residents. How cities, in the context of retreating or antagonistic strategies by the state and federal governments, can be key platforms for future economic and social wealth creation. SO

* **PLSC 278b, Politics and the Supreme Court** Kelly Rader

The role of the U.S. Supreme Court in the American political system. Ways in which the political preferences of Congress, the President, and the American public shape, constrain, or compel the Court's decision making. Supreme Court justices as political actors who issue decisions that make policy. SO

Political Philosophy

* **PLSC 287a / EP&E 411a, Democracy and Distribution** Ian Shapiro

An examination of relations between democracy and the distribution of income and wealth. Focus on ways in which different classes and coalitions affect, and are affected by, democratic distributive politics. Open to juniors and seniors. SO

PLSC 290a / SOCY 151a, Foundations of Modern Social Theory Emily Erikson

Major works of social thought from the beginning of the modern era through the 1900s. Attention to social and intellectual concepts, conceptual frameworks and methods, and contributions to contemporary social analysis. Writers include W.E.B. Du Bois, Simone De Beauvoir, Adam Smith, Thomas Hobbes, Jean-Jacques Rousseau, Immanuel Kant, Emile Durkheim, Max Weber, and Karl Marx. SO

* **PLSC 291b / PHIL 464b, Justice, Taxes, and Global Financial Integrity** Thomas Pogge

Study of the formulation, interpretation, and enforcement of national and international tax rules from the perspective of national and global economic justice. Previous courses in one or two of the following: law, economics, political science, or political philosophy. HU

* **PLSC 297a / EP&E 312a, Moral Choices in Politics** Boris Kapustin

A study of how and why people make costly moral choices in politics. Figures studied include Thomas More, Abraham Lincoln, Nelson Mandela, Václav Havel, and Aung San Suu Kyi. SO

* **PLSC 301a / EP&E 280a, Ancient Greek Political Development** Daniela Cammack

Varieties of political experience in the ancient Greek world during the archaic, classical, and hellenistic periods. Attention to different regime types, places, political forms, institutions, and persons. SO

* **PLSC 305b / EP&E 353b, Critique of Political Violence** Boris Kapustin

Methods of conceptualizing political violence that are prevalent in contemporary political philosophical discourse. Use of theoretical-analytical tools to examine the modes violence assumes and the functions it performs in modern political life as well as the meanings and possibilities of nonviolence in politics. SO

* **PLSC 309a / GMAN 314a / PHIL 472a, Contemporary Critical Theory** Seyla Benhabib

Frankfurt School and Critical Theory focuses on a number of unresolved questions such as pragmatic Kantianism; modernity and post-colonial theory; the idea of progress in critical theory; and judgment as amoral, political, aesthetic. Readings from: Habermas, McCarthy, Baynes, Honneth, A. Allen, Ferrara, and Zerilli. Prerequisite: Directed Studies or two or more advanced courses in modern political philosophy. SO

* **PLSC 313a / EP&E 380a, Bioethics, Politics, and Economics** Stephen Latham

Ethical, political, and economic aspects of a number of contemporary issues in biomedical ethics. Topics include abortion, assisted reproduction, end-of-life care, research on human subjects, and stem cell research. SO

PLSC 318a, Lincoln's Statecraft and Rhetoric Steven Smith

Close reading of major speeches and letters by Abraham Lincoln, with a focus on his views concerning slavery, equality, and race in American society. The relation of words to deeds in Lincoln's practice of statecraft; his place in the history and theory of statesmanship. The emergence of Lincoln's thought from an engagement with views of the American founders; ways in which his vision of American democracy both drew upon and transformed the founders' vision. SO

* **PLSC 320a or b / EP&E 421a or b, Ethics, Law, and Current Issues** Karen Goodrow

Examination of how freedom of speech and bias influence the criminal justice system, focusing on wrongful convictions and administration of the death penalty. Understanding the role of potential bias at various levels and the competing interests of protecting speech, due process, and the innocent. Topics include limitations on speech, practical effects of speech, the efficacy of the death penalty, actual innocence, gender/race/economic bias and its effects on the justice system, as well as best practices for improving our sense of justice.

* **PLSC 321b / HIST 482Jb, Studies in Grand Strategy I** Beverly Gage

The study of grand strategy, of how individuals and groups can accomplish large ends with limited means. The spring term focuses on key moments in history that illustrate strategic thinking in action. During the summer, students undertake research projects or internships analyzing strategic problems or aspects of strategy. The following fall, students put their ideas into action by applying concepts of grand strategy to present day issues. Admission is by application only; the cycle for the current year is closed. This course does not fulfill the history seminar requirement, but may count toward geographical distributional credit within the History major for any region studied, upon application to the director of undergraduate studies. Previous study courses in political science, history, global affairs, or subjects with broad interdisciplinary relevance encouraged. HU, SO

* **PLSC 327b, Advanced Topics in Modern Political Philosophy** Steven Smith and Giulia Oskian

Advanced survey of modern political philosophy. Focus on democracy and inequality from Rousseau to Marx. The identity of the modern representative republic, the nature of capitalism or commercial society, and the relation between the two. Close analysis of the writings of Rousseau, Smith, and Marx. Prerequisite: substantial course work in intellectual history and/or political theory. HU, SO

* **PLSC 332b / EP&E 299b, Philosophy of Science for the Study of Politics** Hélène Landemore

An examination of the philosophy of science from the perspective of the study of politics. Particular attention to the ways in which assumptions about science influence models of political behavior, the methods adopted to study that behavior, and the relations between science and democracy. Readings include works by both classic and contemporary authors. SO

Analytical Political Theory

PLSC 326a / PHIL 474a, Borders, Culture, and Citizenship Seyla Benhabib

The contemporary refugee crisis in Europe and elsewhere; new patterns of migration; increasing demands for multicultural rights of Muslim minorities in the West; and transnational effects of globalization faced by modern societies. Examination of these issues in a multidisciplinary perspective in light of political theories of citizenship and migration, as well as laws concerning refugees and migrants in Europe and the United States. SO

PLSC 342a / EP&E 220a, Strategic Models of Politics Milan Svobik

Introduction to formal political theory including application of rational choice and game theoretic analysis. Key topics and findings include: why voters vote in elections; how candidates choose platforms; why common resources tend to be overexploited; whether the state is needed for public good provision; how electoral systems shape politicians' and voters' behavior; whether voters can hold politicians accountable for their performance in office; how constitutions affect politicians' incentives to compromise; and why countries fight wars. SO

* **PLSC 343b / ECON 473b / EP&E 227b, Equality** John Roemer

Egalitarian theories of justice and their critics. Readings in philosophy are paired with analytic methods from economics. Topics include Rawlsian justice, utilitarianism,

the veil of ignorance, Dworkin's resource egalitarianism, Roemer's equality of opportunity, Marxian exploitation, and Nozickian procedural justice. Some discussion of American economic inequality, Nordic social democracy, and the politics of inequality. Recommended preparation: intermediate microeconomics. SO

PLSC 344b / EP&E 295b, Game Theory and Political Science Deborah Beim
Introduction to game theory—a method by which strategic interactions among individuals and groups in society are mathematically modeled—and its applications to political science. Concepts employed by game theorists, such as Nash equilibrium, subgame perfect equilibrium, and perfect Bayesian equilibrium. Problems of cooperation, time-consistency, signaling, and reputation formation. Political applications include candidate competition, policy making, political bargaining, and international conflict. No prerequisites other than high school algebra. Political Science majors who take this course may not count ECON 159 toward the major. QR, SO

* **PLSC 345a, Introduction to Research Design** Maria Jose Hierro
Introduction to principles of research design in political science. The process of scientific research. Modes of hypothesis testing: Large-n statistical research designs, comparative research designs, case studies, formal models, experiments, and mixed methods. SO

Comparative Government

* **PLSC 354a / EP&E 250a, 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. SO

PLSC 357a / EAST 310a / GLBL 309a, The Rise of China Daniel Mattingly
Analysis of contemporary Chinese politics, with focus on how the country has become a major power and how the regime has endured. Topics include China's recent history, state, ruling party, economy, censorship, elite politics, and foreign policy. SO

* **PLSC 367a, Contemporary Spanish Politics** Maria Jose Hierro
Spanish politics in comparative perspective. Overview of Spain's recent history, introduction to the Spanish political system, and discussion of relevant issues in Spanish politics today. Topics include transitional justice, the economic and institutional crisis, corruption, nationalism, ETA terrorism, and Catalan secessionism.
SO

* **PLSC 375a / GLBL 215a / LAST 386a / MGRK 237a / SOCY 389a, Populism from Chavez to Trump** Paris Aslanidis
Investigation of the nature of the populist phenomenon and its impact on politics, society, and the economy in various regions of the world. Conceptual and methodological analyses are supported by comparative assessments of various empirical instances, from populist politicians such as Hugo Chavez and Donald Trump, to populist social movements such as the Tea Party and Occupy Wall Street. SO

PLSC 378b / AFAM 186b / LAST 214b / SOCY 170b, Contesting Injustice Elisabeth Wood

Exploration of why, when, and how people organize collectively to challenge political, social, and economic injustice. Cross-national comparison of the extent, causes, and

consequences of inequality. Analysis of mobilizations for social justice in both U.S. and international settings. Intended primarily for freshmen and sophomores. SO

PLSC 381b / AFST 381b, Government and Politics in Africa Katharine Baldwin

The establishment and use of political power in selected countries of tropical Africa. The political role of ethnic and class cleavages, military coups, and the relation between politics and economic development. SO

* **PLSC 391b / GLBL 259b / HIST 469Jb, State Formation** Didac Queralt

Study of the domestic and international determinants of functional states from antiquity to date. Analysis of state-formation in Europe in pre-modern and outside Europe from colonial times to date. Topics include centralization of power, capacity to tax, and contract enforcement. SO

* **PLSC 393a, Comparative Constitutionalism and Legal Institutions** Steven Calabresi

Introduction to the field of comparative constitutional law. Constitutional texts, materials, and cases drawn primarily from those constitutional democracies that are also members of the Group of Twenty Nations and that respect judicial independence. SO

* **PLSC 399b / EP&E 257b / LAST 251b, Politics in Latin America** Ana De La O

Overview and analysis of politics in Latin America. The emergence of democracy and the forces that led to the unprecedented increase in inequality in the twentieth century. Topics include institutional design, historical legacies, corruption, clientelism, and violence.

PLSC 400a / RSEE 400a, Legacies of Communism and Conflict in Europe Andrea Aldrich

The challenges of democratic transition and consolidation in Europe. Exploration of authoritarianism, state collapse, nationalism and ethnic conflict, transitional justice, and democratic development through the turbulent and violent political history of southeastern Europe. Study of communist legacies and democratic transitions of the Balkans (Albania, Bulgaria, Greece, Romania and the states of the former Yugoslavia) to understand the complex nature of regime change and political transition. SO

* **PLSC 409a or b / GLBL 261a or b, Civil Conflict** Bonnie Weir

Forms of civil conflict and political violence and theories about reasons for and implications of these types of violence. Natural and philosophical foundations of political violence; the potential roles of ethnicity, economic factors, territory, and political institutions and structures in the onset and dynamics of civil conflict; problems of conflict termination.

* **PLSC 410b, Political Protests** Maria Jose Hierro

The study of political protest, with discussion of theoretical approaches explaining the origin and decline of social movements and protest. Topics include the conditions under which individuals coordinate and start protest actions; what favors individual participation in protests; and when do protests succeed. SO

* **PLSC 415a / SOCY 172a, Religion and Politics in the World** Katharine Baldwin

A broad overview of the relationship between religion and politics around the world, especially Christianity and Islam. Religions are considered to constitute not just theologies but also sets of institutions, networks, interests, and sub-cultures. The course's principal aim is to understand how religion affects politics as an empirical matter, rather than to explore moral dimensions of this relationship. SO

* **PLSC 420a / ANTH 406a / EVST 424a, Rivers: Nature and Politics** James Scott
The natural history of rivers and river systems and the politics surrounding the efforts of states to manage and engineer them. SO

* **PLSC 423a / EP&E 243a / GLBL 336a / LAST 423a, Political Economy of Poverty Alleviation** Ana De La O

Overview of classic and contemporary approaches to the question of why some countries have done better than others at reducing poverty. Emphasis on the role of politics. SO

PLSC 424b / AFAM 195b / SAST 440b, Gandhi, King, and the Politics of Nonviolence
Karuna Mantena

A study of the theory and practice of nonviolent political action, as proposed and practiced by M. K. Gandhi and Martin Luther King, Jr. The origins of nonviolence in Gandhian politics and the Indian independence movement; Gandhian influences on the Civil Rights movement; King's development of nonviolent politics; the legacies and lessons for nonviolent politics today. SO

PLSC 437b / ER&M 206b / SOCY 223b, The Politics of Ethnic and National Identity
Maria Jose Hierro

Introduction to the study of ethnic and national identity, their determinants and consequences in comparative perspective. SO

PLSC 439b / GLBL 263b, Challenges of Young Democracies Ana De La O

Challenges faced by young democracies, such as organizing free and fair elections, controlling government corruption, building an accountable system of governance, sustaining development, and curtailing conflict and violence. Factors that lead to the consolidation of democratic politics or to stagnation and a return to nondemocratic political systems. SO

* **PLSC 444a / EAST 344a, Governing China** Daniel Mattingly

Advanced study of the domestic and international politics of China. Topics include China's recent history, elite politics, the rule of law, censorship, propaganda, nationalism, trade, territorial disputes, and international security. SO

* **PLSC 448a / EP&E 496a, 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. Prerequisites: three courses in political science. SO

* **PLSC 469b / ANTH 389b / MMES 376b / NELC 385b / SOCY 359b, Politics of Culture in Iran** Nahid Siamdoust

Examination of cultural production in post-revolutionary Iran (1979 to the present) through works of noteworthy cultural and sociopolitical content in cinema, music, and newspaper journalism. Consideration of the policies the new Islamic Republic has put in place in order to regulate the field of cultural production, and the strategies that cultural producers have devised to navigate the given constraints.

Statistical and Mathematical Methods

PLSC 452a / EP&E 203a / S&DS 102a, 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. QR

PLSC 453a / EP&E 209a / S&DS 103a, 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. QR

*** PLSC 454b / EVST 454b, Data Science for Politics and Policy** Fredrik Sävje

Data plays an increasingly important role in policy making and politics. The ability to draw valid conclusions from quantitative information can tilt elections or be the difference between a successful or failed policy. This course teaches how to use tools from statistics, data science, and machine learning to solve problems and challenges faced in policy making and politics. Students learn how data can help people make campaign decisions, detect election fraud, predict election outcomes, and investigate if a policy had the intended effect. Students receive an introduction to statistical programming in R, supervised and unsupervised machine learning, and causal inference. QR, SO

Advanced Courses

*** PLSC 471a and PLSC 472b, Individual Reading for Majors** David Simon

Special reading courses may be established with individual members of the department. They must satisfy the following conditions: (1) a prospectus describing the nature of the program and the readings to be covered must be approved by both the instructor and the director of undergraduate studies; (2) the student must meet regularly with the instructor for an average of at least two hours per week; (3) the course must include a term essay, several short essays, or a final examination; (4) the topic and/or content must not be substantially encompassed by an existing undergraduate or graduate course. All coursework must be submitted no later than the last day of reading period.

*** PLSC 474b, Directed Reading and Research for Junior Intensive Majors** David Simon

For juniors preparing to write yearlong senior essays as intensive majors. The student acquires the methodological skills necessary in research, identifies a basic reading list pertinent to the research, and prepares a research design for the project. All coursework must be submitted no later than the last day of reading period.

*** PLSC 480a or b, One-Term Senior Essay** David Simon

For seniors writing the senior essay who do not wish, or are unable, to write the essay in a department seminar. Students must receive the prior agreement of a member of the department who will serve as the senior essay adviser, and must arrange to meet with that adviser on a regular basis throughout the term.

* **PLSC 490a, The Senior Colloquium** David Simon

Presentation and discussion of students' research proposals, with particular attention to choice of topic and research design. Each student frames the structure of the essay, chooses research methods, begins the research, and presents and discusses a draft of the introductory section of the essay. Enrollment limited to Political Science majors writing a yearlong senior essay.

* **PLSC 491b, The Senior Essay** David Simon

Each student writing a yearlong senior essay establishes a regular consultation schedule with a department member who, working from the prospectus prepared for PLSC 490, advises the student about preparation of the essay and changes to successive drafts. Enrollment limited to Political Science majors writing a yearlong senior essay.

* **PLSC 493b, Senior Essay for Intensive Majors** David Simon

Each student in the intensive major establishes a regular consultation schedule with a department member who, working from the prospectus prepared for PLSC 490, advises the student about preparation of the essay and changes to successive drafts, as well as reporting the student's progress until submission of the final essay. Enrollment limited to Political Science intensive majors.

Portuguese

Director of undergraduate studies: K. David Jackson, 82–90 Wall St., 432-1158, k.jackson@yale.edu; span-port.yale.edu

Portuguese is taught at Yale as part of the Department of Spanish and Portuguese.

The major in Portuguese is a liberal arts major intended to develop competence in the Portuguese language and to provide students with a comprehensive knowledge of the literatures and cultures of Portugal, Brazil, and African and Asian lands of Portuguese language or influence.

PREREQUISITES

Students begin the study of Portuguese with PORT 110, 125, or S112. After two years of Portuguese language study, or equivalent, students have sufficient proficiency to take advanced courses in Luso-Brazilian literature and culture.

The prerequisite for the major is PORT 130 or the equivalent.

PLACEMENT PROCEDURES

All students who have not yet taken Portuguese at Yale are expected to take the departmental placement test, with the exception of students who have no previous knowledge of Portuguese whatsoever. The departmental placement test covers reading, writing, speaking, and listening skills. The placement test will be given at the beginning of the fall and spring terms; see the departmental website for details.

REQUIREMENTS OF THE MAJOR

The requirements of the Portuguese major consist of ten term courses. Students must take at least five term courses in the literatures or cultures of the Portuguese world. In completing their programs, students may elect up to four courses in other languages and literatures, anthropology, history, or history of art, or from study abroad, that are related to their field of study and approved by the DUS.

SENIOR REQUIREMENT

All majors must present a senior essay. The essay is written in PORT 491 and/or 492. A maximum of two credits counts toward the major.

ADVISING

Juniors and seniors majoring in Portuguese may, with the permission of the instructor and the director of graduate studies, enroll in graduate courses in Portuguese.

REQUIREMENTS OF THE MAJOR

Prerequisite PORT 130 or equivalent

Number of courses 10 term courses beyond prereq (incl senior essay course)

Distribution of courses At least five term course in literatures or cultures of the Portuguese world

Substitution permitted With DUS permission, up to 4 relevant courses from other depts or from study abroad

Senior requirement Senior essay (PORT 491 and/or 492)

FACULTY OF THE DEPARTMENT OF SPANISH AND PORTUGUESE

Professors Rolena Adorno, Howard Bloch (*Chair*), Roberto González Echevarría, Aníbal González, K. David Jackson, Noël Valis

Associate Professor Leslie Harkema

Senior Lectors II Sybil Alexandrov, Margherita Tortora, Sonia Valle

Senior Lectors I María Pilar Asensio-Manrique, Mercedes Carreras, Ame Cividanes, Sebastián Díaz, María de la Paz García, María Jordán, Rosamaría León, Juliana Ramos-Ruano, Lissette Reymundi, Lourdes Sabé-Colom, Virginia Santos, Terry Seymour

Lecturers Marina Henriques Gomes de Andrade, Carolina Baffi, Deborah K. Symons Roldán, Giseli Tordin, María M. Vázquez

Courses

PORT 110a, Elementary Portuguese I Staff

Basic vocabulary and fundamentals of grammar through practice in speaking, reading, and writing, with stress on audio-lingual proficiency. Introduces Brazilian and Portuguese culture and civilization. Credit only on completion of PORT 120. L1 RP 1½ Course cr

PORT 120b, Elementary Portuguese II Staff

Continuation of PORT 110. To be followed by PORT 130. Prerequisite: PORT 110. Qualifies students for summer study abroad. L2 RP 1½ Course cr

PORT 130a, Intermediate Portuguese I Marina Henriques Gomes De Andrade
Contemporary and colloquial usage of Portuguese in the spoken and written language of Brazil. Grammar review and writing practice. Readings on Brazilian society and history are used to build vocabulary. Exercises develop students' oral command of the language. L3 RP 1½ Course cr

PORT 140b, Intermediate Portuguese II Staff

Continuation of PORT 130. Grammar review, conversation, cultural topics, and readings from Brazilian literature. Prerequisite: PORT 130. L4 RP 1½ Course cr

* **PORT 150a or b, Advanced Practice in Portuguese** Staff

Advanced conversation and composition, with an introduction to Luso-Brazilian literature and culture. After PORT 140 or equivalent. May be repeated for credit. L5 RP

* **PORT 355a or b / LAST 254a or b, Brazilian Modernist Poetry** K. David Jackson
The generation of major poets who were part of Brazilian modernism, centered on the "Modern Art Week" of 1922. Poetry written to express the individuality and character of Brazil's language and culture at the onset of modernization, urbanization, and industrialization. Points of analysis include form, use of language, themes of memory and modernization, cultural characterization, humor, and ethical and existential concerns. Prerequisite: PORT 140 equivalent. L5, HU

* **PORT 356a / LAST 252a, Experimental, Visual, and Concrete Poetry in Perspective**

K. David Jackson

Brazilian concrete poetry in international perspective; production and theory of concrete poetry, translation, and criticism during the second half of the twentieth

century. Brazilian concrete poets in the context of visual and concrete poetics. Representative works include 'Pilot Plan' and *Theory of Concrete Poetry*, graphic and spatial poems, and public expositions of works. Brazilian concrete poets were among the leaders of an international neo-vanguard movement in mid-twentieth century related to geometrical abstraction in painting. In the journals *Noigandres* and *Invenção*, and the *Theory of Concrete Poetry* the Brazilians link their poetics to Pound, Mallarmé, Cummings and other inventive figures in world poetry, while relating poetry to graphic arts through reference to painting and to semiotics, including Fenollosa's essay on use of the Chinese character. The exhibit in S. Paulo's Museum of Modern Art in December 1956 was the beginning of the public exhibition of concrete poetry, now the topic of anthologies, websites, criticism, and museum retrospectives. Concrete poetics dominated the production of poetry in Brazil for half a century with a major effect on cultural and intellectual life. Prerequisite: PORT 140 or equivalent. HU TR

* **PORT 360a / EALL 286a / HUMS 290a / LITR 285a, The Modern Novel in Brazil and Japan** Seth Jacobowitz

Brazilian and Japanese novels from the late nineteenth century to the present. Representative texts from major authors are read in pairs to explore their commonalities and divergences. Topics include nineteenth-century realism and naturalism, the rise of mass culture and the avant-garde, and existentialism and postmodernism. No knowledge of Portuguese or Japanese required. HU TR

* **PORT 385b / LAST 385b / LITR 260b, Brazilian Novel of the 21st Century** K. David Jackson

Changing narratives, themes, styles, and aesthetic ideals in current Brazilian prose and poetry. The writers' attempts to express or define a personal, national, and global consciousness influenced by the return of political democracy to Brazil. Focus on readings published within the last five years. Readings and discussion in English; texts available in Portuguese. WR, HU TR

* **PORT 392a / LAST 392a / LITR 296a, Brazil's Modern Art Movement** K. David Jackson

A study of Brazilian modernism in literature and the arts, centered on São Paulo's "Modern Art Week" of 1922 from the perspective of the European avant-gardes (cubism, futurism, surrealism). The *Cannibal Manifesto* and cultural independence from Europe; avant-garde practices in literature and the arts from the 1920s to the construction of Brasília. Reading knowledge of French and Portuguese helpful but not required. WR, HU TR

* **PORT 471a or b, Directed Reading or Directed Research** K. David Jackson

Individual study for qualified students under the supervision of a faculty member selected by the student. Approval of the director of undergraduate studies is required.

* **PORT 491a or b, The Senior Essay** K. David Jackson

A research project designed under a faculty director, resulting in a substantial paper written in Portuguese, submitted to the DUS and a second designated reader.

Psychology

Director of undergraduate studies: Woo-Kyoung Ahn, 319 SSS, 432-9626, woo-kyoung.ahn@yale.edu; (woo-kyoung.ahn@yale.edu) psychology.yale.edu

Psychology is the scientific study of the mind, the brain, and human behavior. The Psychology department offers course work and research opportunities in the fields of clinical, cognitive, developmental, neuroscientific, and social psychology. By studying psychology, students better understand human behavior, including who we are, how we do the things we do, and how we enhance our lives and society. The Psychology major provides a foundation for careers in education and research; law; medicine and public health; politics and public policy; and in business fields such as marketing, finance, and management.

COURSE NUMBERING

Courses in the department are organized so that they are best taken in several parallel sequences. Courses numbered from 120 to 190 and ending in a zero are core survey courses that introduce students to major areas of psychology and provide additional background for more advanced courses. These courses represent major content areas of psychology; students should sample broadly from them before specializing. Courses numbered from 200 to 209 focus on statistics. Courses numbered from 210 to 299 teach general methodology or data collection in various areas of psychology. Courses numbered from 300 to 399 are more advanced courses in a particular specialization. Senior seminars, whose enrollment is limited to twenty students, are numbered from 400 to 489. These seminars are best taken once a student has appropriate background. Courses numbered from 490 to 499 are special tutorial courses that require permission of the adviser and the director of undergraduate studies.

PREREQUISITE

PSYC 110, a general survey course, is prerequisite to several 100-level and all 200-level and above courses. This prerequisite may alternatively be satisfied by a score of 5 on the Psychology Advanced Placement test or a score of 7 on the IB Psychology exam.

REQUIREMENTS OF THE MAJOR

The standard major in Psychology for both the B.A. degree program and the B.S. degree program requires twelve term courses beyond PSYC 110, including the senior requirement.

1. Because psychology is so diverse a subject, every student is required to take four courses from the list below. Two of these courses must be from the social science point of view in psychology and two must be from the natural science point of view. At least one from each group must be a course designated as "Core" in the course listings. Students are expected to take their two core courses as early as possible in the major, normally within two terms after declaring their major.

Social science: PSYC 125, 126, 127, 128, 131, 136, 139, 140, 141, 150, 151, 157, 165, 180, 181, 182, 232L, 250, 280L, 308, 313, 315, 330, 332, 334, 342, 355

Natural science: PSYC 120, 130, 135, 136, 147, 149, 160, 161, 162, 171, 179, 316, 230L, 233, 260, 270, 303, 307, 316, 317, 318, 320, 321, 322, 324, 327, 331, 335, 337, 350, 352, 371, 372, 376

2. Because statistical techniques and the mode of reasoning they employ are fundamental in psychology, a course in statistics (PSYC 200) is required, preferably prior to the senior year. A student may substitute S&DS 103 for PSYC 200 or may substitute an examination arranged with the instructor of PSYC 200 for the course requirement. Students may take the examination only one time, and an additional course in psychology should be taken if the examination substitutes for PSYC 200. A student who has taken S&DS 103 may not take PSYC 200 for credit.
3. To assure some direct experience in collecting and analyzing data, students must elect at least one course, preferably prior to the senior year, in which research is planned and carried out. Courses numbered between 210 and 299 fulfill this research methods requirement.
4. Students may, with permission of the DUS, count up to three term courses in other related departments toward the major. Appropriate courses are rare and students should consult with the DUS in Psychology about selecting outside courses.

Students interested in research are encouraged to take an independent study course (PSYC 493) as early as the sophomore year. Students may also take PSYC 495 for one-half course credit of independent research per term with prior permission of the faculty adviser and the DUS. To obtain permission, download the tutorial form from the department website, and submit it by the seventh calendar day after classes begin. These independent study courses are graded P/F. No more than a total of three credits from PSYC 490–499 combined may count toward the major.

Neuroscience track Students with a major interest in neuroscience may wish to elect the neuroscience track. Such students are considered Psychology majors for whom the requirements have been modified to accommodate their interests, and to reflect the multidisciplinary nature of modern neuroscience and psychology. Given the broad nature of the field of neuroscience, students may wish to concentrate their studies in one area of the field (e.g., behavioral, cellular and molecular, cognitive, affective, social, clinical, or developmental). Interested students are encouraged to meet with the track adviser, Avram Holmes, 402 SSS, 436-9240, avram.holmes@yale.edu. Majors in the neuroscience track meet with the track adviser at the beginning of each term in their junior and senior years.

Requirements for the neuroscience track are the same as for the standard major, with the following additional requirements:

1. Two terms of introductory biology are required for the major, either MCDB 120 or BIOL 101 and 102, and either E&EB 122 or BIOL 103 and 104. Students who have scored 5 on the Advanced Placement test in Biology or scored 7 on the IB Psychology exam may place out of these courses.
2. Students must take PSYC 160 or 170 and a data-collection course chosen from PSYC 230L, 260, or 270. MCDB 320 may substitute for the PSYC 160 or 170 requirement, or MCDB 320 and 321L may substitute for the PSYC 230L, 260, or 270 requirement, but not both. If MCDB 320 is substituted for a Psychology

course, it cannot be counted as one of the two advanced science courses outside the department (see item 4 below).

3. As required for the standard major, students in the neuroscience track must take two courses from the social science list above, at least one of which must be designated as "Core" in the course listings. Students in the neuroscience track must also take a course from the natural science list in addition to the courses specified in item 2 above.
4. At least two advanced science courses must be chosen from Molecular, Cellular, and Developmental Biology and Ecology and Evolutionary Biology courses numbered 200 and above that deal with human and/or animal biology; recommended courses include MCDB 200, 202, 205, 210, 250, 300, 315, 320, E&EB 220, 225, and 240. Certain courses outside of these departments may also meet the advanced science requirement, including BENG 350, 421, CPSC 475, MB&B 300, 301, 420, 435, 443, 452, MATH 222, 225, 230, 231, and 241. Other courses may qualify for this requirement with permission of the neuroscience track adviser. Laboratory courses do not count toward the advanced science requirement. Students should note that many advanced science courses have prerequisites that must be taken first.

Credit/D/Fail No more than two term courses taken Credit/D/Fail may be applied toward the major; no 200-level course taken Credit/D/Fail may be applied toward the major.

SENIOR REQUIREMENT

Standard major Majors are required to earn two course credits from courses numbered PSYC 400–499. At least one of these courses (excluding PSYC 490–495, which can only be taken P/F) must be taken during the senior year, for which a student must write a substantial final paper (a minimum of 5,000 words) and receive a letter grade. The B.A. degree is typically awarded to students who conduct a nonempirical literature review during senior year. There are no restrictions in the research format for the B.A. The B.S. degree is awarded to students who conduct empirical research through PSYC 499 during senior year. An empirical research project normally includes designing an experiment and collecting and analyzing the data.

Neuroscience track The senior requirement for the neuroscience track is the same as for the standard major, except that the two required course credits from PSYC 400–499 must have neuroscience content. Students pursuing the B.S. degree in the track must carry out a neuroscientific empirical project in PSYC 499 and must be supervised by a faculty member within the neuroscience area of the Psychology department. Students who wish to work with an affiliated faculty member studying neuroscience outside the department must obtain permission from the neuroscience track adviser.

Distinction in the Major To be considered for Distinction in the Major, students must submit a senior essay to the Psychology department at least one week before the last day of classes in the term when the course used for the senior essay is taken. Senior essays that are submitted after the deadline will be subject to grade penalties. Senior essays considered for Distinction in the Major are graded by a second reader and the essay adviser.

ADVISING

Schedules for all majors must be discussed with, and approved by, the DUS or the adviser for the neuroscience track in Psychology. Only then may a schedule be submitted to the residential college dean's office. For questions concerning credits for courses taken at other institutions or at Yale but outside the Department of Psychology, students should consult with the DUS. For questions concerning the neuroscience track, students should consult with the adviser for the neuroscience track in Psychology.

Computer Science and Psychology major The interdepartmental major in Computer Science and Psychology may be considered by students with interests lying squarely between the two disciplines. See under Computer Science and Psychology (p. 235) for more information.

REQUIREMENTS OF THE MAJOR**STANDARD MAJOR**

Prerequisite PSYC 110

Number of courses 12 courses beyond prereq (incl senior req)

Specific course required PSYC 200

Distribution of courses *B.A.* or *B.S.* – 2 social science courses and 2 natural science courses, as specified; 1 course numbered PSYC 210–299

Substitution permitted For PSYC 200, S&DS 103 or exam arranged with instructor; up to 3 relevant courses in other depts, with DUS permission

Senior requirement *B.A.* – 1 course credit from PSYC 400–489 or 499 taken during senior year; 1 additional course credit from PSYC 400–499; *B.S.* – PSYC 499 taken during senior year; 1 additional course credit from PSYC 400–499

NEUROSCIENCE TRACK

Prerequisite PSYC 110

Number of courses 12 courses beyond prereq (incl senior req); same as for the standard major with the additional requirements listed below

Specific courses required MCDB 120 or BIOL 101 and 102; E&EB 122 or BIOL 103 and 104; PSYC 160 or 170; PSYC 200; PSYC 230L, 260, or 270

Distribution of courses *B.A.* or *B.S.* – 2 social science courses and 1 natural science course, as specified; at least 2 advanced science courses, as specified

Substitution permitted MCDB 320 for PSYC 160 or 170; or MCDB 320 and 321L for PSYC 230L, 260, or 270; S&DS 103 or exam arranged with instructor for PSYC 200

Senior requirement *B.A.* – 1 course credit from PSYC 400–489 or 499 with neuroscience content taken during senior year; 1 additional course credit from PSYC 400–499 with neuroscience content; *B.S.* – PSYC 499 taken during senior year, with neuroscience content in a research project; 1 additional course credit from PSYC 400–499 with neuroscience content

FACULTY OF THE DEPARTMENT OF PSYCHOLOGY

Professors Woo-kyoung Ahn, John Bargh, Paul Bloom, Thomas Brown, Tyrone Cannon, BJ Casey, Marvin Chun, Margaret Clark, John Dovidio, Jutta Joormann, Frank Keil, Joshua Knobe, Marianne LaFrance, Gregory McCarthy, Jennifer Richeson, Peter Salovey, Laurie Santos, Brian Scholl, Nick Turk-Browne, Karen Wynn

Assistant Professors Arielle Baskin-Sommers, Steve Wohn Chang, Molly Crockett, Yarrow Dunham, Dylan Gee, Maria Gendron, Avram Holmes, Julian Jara-Ettinger

Lecturers Natalia Cordova, Nelson Donegan, Jennifer Hirsch, Angie Johnston, Kristi Lockhart, Mary O'Brien, Matthias Siemer

Courses

PSYC 110a or b, Introduction to Psychology Staff

A survey of major psychological approaches to the biological, cognitive, and social bases of behavior. SO

* **PSYC 125a / CHLD 125a / EDST 125a, Child Development** Nancy Close and Carla Horwitz

The reading of selected material with supervised participant-observer experience in infant programs, a day-care and kindergarten center, or a family day-care program. Regularly scheduled seminar discussions emphasize both theory and practice. An assumption of the course is that it is not possible to understand children – their behavior and development – without understanding their parents and the relationship between child and parents. The focus is on infancy as well as early childhood. Enrollment limited to juniors and seniors. WR, SO

PSYC 126a, Attraction and Relationships Jennifer Hirsch

Theory and empirical research on the antecedents and consequences of attraction, and on intra- and interpersonal processes that either facilitate or interfere with the formation and maintenance of close relationships. Methodological bases for rigorous study of these topics. SO

* **PSYC 127a or b / CHLD 127a or b / EDST 127a or b, Theory and Practice of Early Childhood Education** Carla Horwitz

Development of curricula for preschool children – infants through six-year-olds – in light of current research and child development theory. Regularly scheduled seminar sessions emphasize both theory and practice. Workshop exploration of early childhood curriculum materials. Weekly observation practicum in a preschool or kindergarten classroom. Priority for juniors, seniors, and Education Study students. WR, SO RP

* **PSYC 128b / CHLD 128b / EDST 128b, Language, Literacy, and Play** Nancy Close and Carla Horwitz

The complicated role of play in the development of language and literacy skills among preschool-aged children. Topics include social-emotional, cross-cultural, cognitive, and communicative aspects of play. WR, SO RP

PSYC 130a / CGSC 110a, Introduction to Cognitive Science Brian Scholl

An introduction to the interdisciplinary study of how the mind works. Discussion of tools, theories, and assumptions from psychology, computer science, neuroscience, linguistics, and philosophy. SO

PSYC 131a, Human Emotion Matthias Siemer

Introduction to major discoveries in human emotion. Evolutionary theories of anger, love, and disgust; emotion and morality; cultural and gender differences; emotion and the brain; relation between emotion and thinking; development of emotion; and abnormal emotions in mental illness. SO RP

*** PSYC 136a, Canine Cognition** Angela Johnston

This sophomore seminar provides an overview of recent research in canine cognition. The focus is primarily on what current research with dogs, dingoes, and wolves can tell us about human cognition. Considerable time is spent reading primary source material and discussing potential avenues for future research. SO

PSYC 139a / CGSC 139a / EDST 139a, The Mental Lives of Babies and Animals

Karen Wynn

Interdisciplinary exploration of the cognitive, social, and emotional capacities of creatures lacking language and culture. The extent to which our complex psychology is unique to mature humans; the relative richness of a mental life without language or culture. Some attention to particular human populations such as children with autism and adults with language disorders. SO

PSYC 140b / EDST 140b, Developmental Psychology Frank Keil

An introduction to research and theory on the development of perception, action, emotion, personality, language, and cognition from a cognitive science perspective. Focus on birth to adolescence in humans and other species. Prerequisite: PSYC 110. SO

PSYC 141a / NSCI 141a, The Criminal Mind Arielle Baskin-Sommers

Theoretical and empirical study of the development of criminal behavior, including constitutional, social, and neurobiological elements. Personality and psychopathological factors associated with criminal behavior; theoretical and psychobiological explanations of crime; the biological/environment interaction; the impact of psychobiological models for policy and intervention. SO

PSYC 147a / NSCI 147a, Animal Models of Clinical Disorders Nelson Donegan

An interdisciplinary approach to understanding and treating psychiatric disorders, integrating clinical psychology, psychiatry, and advances in basic neuroscience. Focus on how research with animal models can advance our understanding of psychiatric disorders and generate more effective treatments for patients. Topics include drug addiction, depression, Parkinson's disease, and schizophrenia.

SC, SO

PSYC 150b / EDST 160b, Social Psychology Staff

Theories, methodology, and applications of social psychology. Core topics include the self, social cognition/social perception, attitudes and persuasion, group processes, conformity, human conflict and aggression, prejudice, prosocial behavior, and emotion. Prerequisite: PSYC 110. SO

PSYC 160a / NSCI 160a, The Human Brain Gregory McCarthy

Introduction to the neural bases of human psychological function, including social, cognitive, and affective processing. Preparation for more advanced courses in cognitive and social neuroscience. Topics include memory, reward processing, neuroeconomics, individual differences, emotion, social inferences, and clinical disorders. Neuroanatomy, neurophysiology, and neuropharmacology are also introduced. SC

PSYC 165b, Personality Psychology Jennifer Hirsch

This course provides a broad overview of the research topics, methodology, and findings in the study of personality psychology. Content includes breadth (and focused depth) on personality development, the self, the influence of personality on behavior, and individual differences, like motivation and emotionality. Please note this is not an

abnormal psychology class and, as such, will largely *not* be focused on psychopathy or personality disorders. SO

[PSYC 179, Thinking]

PSYC 180b / EDST 180b, Abnormal Psychology Jutta Joormann

The major forms of psychopathology that appear in childhood and adult life. Topics include the symptomatology of mental disorders; their etiology from psychological, biological, and sociocultural perspectives; and issues pertaining to diagnosis and treatment. SO

PSYC 182a / CGSC 282a / PHIL 182a, Perspectives on Human Nature Joshua Knobe

Comparison of philosophical and psychological perspectives on human nature. Nietzsche on morality, paired with contemporary work on the psychology of moral judgment; Marx on religion, paired with systematic research on the science of religious belief; Schopenhauer paired with social psychology on happiness. HU

PSYC 200b, Statistics Angela Johnston

Measures of central tendency, variability, association, and the application of probability concepts in determining the significance of research findings. QR

*** PSYC 229Lb / NSCI 229Lb, Laboratory in Human Neuroscience** Gregory McCarthy

Instruction in the acquisition and analysis of human neuroscience data. This laboratory complements the lecture course "Methods in Human Neuroscience" (PSYC 230/NSCI 240). The main topics include structural, diffusion, and functional magnetic resonance imaging (MRI), electroencephalography (EEG), and event-related potentials. Students engage in laboratory exercise that illustrate the design and analysis of experiments using each technique. These laboratory exercises involve acquiring, visualizing, and analyzing MRI and EEG data. Prerequisites: PSYC 160/NSCI 160, PSYC 200, PSYC 230/NSCI 240, or permission of the instructor. SC RP ½ Course cr

PSYC 230b / NSCI 240b, Research Methods in Human Neuroscience Gregory McCarthy

Experience in methods of human neuroscience research. Focus on functional magnetic resonance imaging, electroencephalography, and evoked potentials. Some attention to psychophysiological techniques such as the measurement of skin conductance. Prerequisites: PSYC 110, 170, and a course in statistics, or permission of instructor. SC

PSYC 235a or b, Research Methods, Writing Intensive Staff

Introduction to general principles and strategies of psychological research. Topics include generating and testing hypotheses, laboratory and field experiments, scale construction, sampling, archival methods, case studies, ethics and politics of research, and Internet and cross-cultural methods. Hands-on research experience in laboratories. WR, SO

PSYC 248b / ANTH 148Lb / NSCI 265b, Hormones and Behavior Claudia Valeggia and Eduardo Fernandez-Duque

Introductory laboratory focusing on the interaction between hormones and behavior from an evolutionary and developmental perspective. Students gain competency in basic laboratory techniques (pipetting, diluting, aliquoting, etc.) and develop a small, group research project. Additional study of the theoretical background on which any laboratory work is developed through reading and discussing primary scientific literature on both human and non-human primates. SC ½ Course cr

*** PSYC 258b / NSCI 258b, 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. Prerequisites: CPSC 100 or upper level course involving programming (CPSC 201, CPSC 202, and knowledge of Python preferred); PSYC 160; PSYC 230 preferred. QR, SC

[PSYC 260, Research Methods in Behavioral Genetics]**PSYC 270a or b / NSCI 235a or b, Research Methods in Behavioral Neuroscience**

Nelson Donegan

Students design and conduct research to study brain function and behavior. Emphasis on hands-on participation in behavioral and neuroscience techniques. Prerequisites: PSYC 160 or 170, and a course in statistics, or with permission of instructor. SC

PSYC 303b / NSCI 355b, Social Neuroscience Molly Crockett

Exploration of the psychological and neural mechanisms that enable the formation, maintenance, and dissolution of social relationships. Topics include the neuroscience of how we form impressions and decide whether to instigate relationships with others; how we build relationships through trust, cooperation, attachment, conflict, and reconciliation; and group-level processes including intergroup bias, moral judgment, and decision making. Prerequisite: PSYC 110 or permission of instructor. SC

PSYC 307a, Human Memory Staff

This course surveys classic and current issues in the study of human memory. Topics include the ability to actively maintain thoughts in the face of distraction (working memory), the ability to remember previously experienced events (episodic memory), and the ability to learn and remember the meanings of items (semantic memory). In delving into how the human mind remembers (and forgets), evidence from behavioral experiments and neuroscientific studies are considered. Prerequisite: PSYC 110. SO

PSYC 315a / CGSC 315a, The Modern Unconscious John Bargh

The notion of the unconscious mind traced from the early 1800s through Freud to present-day cognitive science, with a focus on the past thirty years. The power and function of the unconscious as a pervasive part of normal everyday human functioning. Readings from philosophy of mind and evolutionary biology. SO

PSYC 316a / NSCI 360a, Clinical Neuroscience Tyrone Cannon

The biological bases of psychopathology, with attention to the interplay of biological and psychological factors. Research and theory regarding the role of biological influences such as genetics, neuronal physiology and signaling, and psychopharmacology in the major classes of mental disorders. Discussion of mood and anxiety disorders, schizophrenia, addictions, personality disorders, eating disorders, and autism. SC

PSYC 317a / EDST 237a / LING 217a, Language and Mind Maria Piñango

The structure of linguistic knowledge and how it is used during communication. The principles that guide the acquisition of this system by children learning their first

language and adults learning a second language. The processing of language in real-time. Language breakdown as a result of brain damage. SO

PSYC 318b / LING 220b, General Phonetics Jason Shaw

Investigation of possible ways to describe the speech sounds of human languages. Acoustics and physiology of speech; computer synthesis of speech; practical exercises in producing and transcribing sounds. SO

PSYC 327a / LING 227a, 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 instructor. QR, SO

PSYC 330b, Psychology and the Law Kristi Lockhart

Contributions of psychological theory and research to our understanding of the law and the criminal justice system. Topics include criminality, eyewitness testimony, lie detection, jury decision making, the death penalty, the insanity defense, civil commitment, prisons, repressed memories, children as witnesses and defendants, and the role of psychologists as expert witnesses and trial consultants. SO

PSYC 331b / LING 231b, Neurolinguistics Maria Piñango

The study of language as a cognitive neuroscience. The interaction between linguistic theory and neurological evidence from brain damage, degenerative diseases (e.g., Alzheimer's disease), mental illness (e.g., schizophrenia), neuroimaging, and neurophysiology. The connection of language as a neurocognitive system to other systems such as memory and music. SO

*** PSYC 334a / CHLD 334a, Developmental Psychopathology** Fred Volkmar, Eli Lebowitz, and Denis Sukhodolsky

Study of developmental psychopathology during childhood and adolescence, team taught by a child psychiatrist and three psychologists. Topics include: aspects of normal development, assessment methods, clinical disorders, treatment, and legal and social policy issues. Review of normative development, followed by discussion of theoretical approaches to understanding developmental aspects of common mental health conditions in childhood. Attention to treatment models as well as relevant issues of culture and ethnicity in the expression of psychopathology. PSYC 130, 140, 180, or equivalent, or with permission of instructor.

PSYC 335b / NSCI 340b, Cognitive Neuroscience Steve Wohn Chang

Examination of the fundamental and advanced principles underlying several cognitive functions from the perspectives of modern cognitive, systems, and computational neuroscience. Discussion of cognition in both humans and animal models through research of general neurobiological principles followed by several key examples from research studies that have influentially shaped the field. Prerequisite: PSYC 160 or specific chapter readings from the instructor. SC

PSYC 342a / WGSS 315a, Psychology of Gender Marianne LaFrance

Exploration of the relationship between gender and psychological processes at individual, interpersonal, institutional, and cross-cultural levels. SO

*** PSYC 350b / CHLD 350b / EDST 350b, Autism and Related Disorders** Fred Volkmar and James McPartland

Weekly seminar focusing on autism and related disorders of socialization. A series of lectures on topics in etiology, diagnosis and assessment, treatment and advocacy, and social neuroscience methods; topics cover infancy through adulthood. Supervised experience in the form of placement in a school, residence, or treatment setting for individuals with autism spectrum disorders. Details about admission to the course are explained at the first course meeting. Prerequisite: an introductory psychology course. SO

PSYC 352a / CGSC 352a / NSCI 352a, Arrested or Adaptive Development in the Adolescent Brain BJ Casey

Study of empirical and theoretical accounts of adolescent-specific changes in the brain and in behavior that relate to the development of self control. Discussions will focus on adaptive and arrested adolescent brain development in the context of relevant legal, social, and health policy issues. SC

*** PSYC 355a / EDST 355a, Clinical Psychology in the Community** Kristi Lockhart
Mental disorders as they are treated within a community setting. Students participate in a fieldwork placement, working either one-on-one or in groups with the psychiatrically disabled. Seminar meetings focus on such topics as the nature of severe mental disorders, the effects of deinstitutionalization, counseling skills, and social policy issues related to mental health. Prerequisite: PSYC 180 or permission of instructor.

*** PSYC 372a / LING 490a, Research Methods in Linguistics** Hadas Kotek
Development of skills in linguistics research, writing, and presentation. Choosing a research area, identifying good research questions, developing hypotheses, and presenting ideas clearly and effectively, both orally and in writing; methodological issues; the balance between building on existing literature and making a novel contribution. Prepares for the writing of the senior essay.

PSYC 376a / NSCI 341a, Learning and Memory Thomas Brown

The basic facts, general principles, and theories that describe how higher animals, from mice to humans, are changed by their experiences. The historically separate fields of learning and memory research desegregated under a neuroscientific perspective that recognizes the evolutionary continuity among higher animals. Prerequisite: Introductory courses in biology and psychology, or permission of instructor. SC, SO

[PSYC 402, Topics in Infant Studies]

*** PSYC 404b, Topics in Cognition and Emotion** Matthias Siemer

An overview of current research questions and results in the area of cognition and emotion. Exploration of both basic research questions as well as implications of cognitive approaches towards emotions for domains such as emotional disorders and psychological resilience and well-being. Prerequisite: PSYC 110. SO RP

*** PSYC 405a, Social Emotions** Margaret Clark

The nature and function of emotions in social context. How emotions such as happiness, sadness, fear, and anger shape how we relate to others; how the ways in which we relate to others shape our experience and expression of these emotions. The nature and functions of additional emotions that seem to arise only within the context

of social relationships: feelings of hurt, guilt, gratitude, empathic joy, and empathic sadness. SO

* **PSYC 409a, Science of Free Will** Thomas Brown

The scientific facts and arguments behind the theory that free will is an illusion or invalid construct. Implications of this theory for religion, law, and morality. Supporting evidence drawn from the fields of psychology, neuroscience, genetics, physics, and complex adaptive systems. SO

* **PSYC 416b, The Psychology of Group Life** Yarrow Dunham

Study of social categorization, the psychological tendency to partition individuals into groups, with attention to cognitive, developmental, social, and evolutionary approaches. The nature and development of social categorization, including its evolutionary advantages and its relation to the phenomenon of categorization more broadly. Ways in which social categorization influences prejudice and discriminatory behavior; methods for reducing such negative effects. Prerequisites: PSYC 110 and permission of the instructor. SO

* **PSYC 417b, Etiology and Treatment of Addictions** Arielle Baskin-Sommers

Research from the fields of cognitive neuroscience, psychology, sociology, and public health on the etiology and treatment of addictions. Social, neurobiological, and genetic explanations for addiction; evaluation of addiction treatments; the social construction of substance policies. SO

* **PSYC 421a / CGSC 421a, Cognitive Science of Pleasure** Paul Bloom

Exploration of the mysterious pleasures of the imagination, including daydreams, novels, movies, pretend play in children, and video games. Approach is eclectic, drawing on fields such as psychology, philosophy, neuroscience, evolutionary theory, and literary criticism. SO

* **PSYC 422b / CGSC 426b / EP&E 490b / PHIL 426b, The Cognitive Science of Morality** Joshua Knobe

Introduction to the emerging field of moral cognition. Focus on questions about the philosophical significance of psychological findings. Topics include the role of emotion in moral judgment; the significance of character traits in virtue ethics and personality psychology; the reliability of intuitions and the psychological processes that underlie them. HU

* **PSYC 425b / CGSC 425b, Social Perception** Brian Scholl

Connections between visual perception, among the earliest and most basic of human cognitive processes, and social cognition, among the most advanced forms of higher-level cognition. 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. SO

* **PSYC 428a / NSCI 442a, 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). Permission of the instructor. SC

* **PSYC 430a, Topics in Cultural Psychology** Staff

Overview of theory and research in cultural psychology, including the role of culture in social, cognitive, and health domains. Principles of the acquisition, transmission, and evolution of culture. Specialized topics include culture in non-human animals, and the intersection between culture and globalization and technology. Prerequisite: PSYC 110. SO

* **PSYC 437b / CGSC 437b, 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. SO RP

* **PSYC 477a / EDST 377a, Psychopathology and the Family** Kristi Lockhart

The influence of the family on development and maintenance of both normal and abnormal behavior. Special emphasis on the role of early childhood experiences. Psychological, biological, and sociocultural factors within the family that contribute to variations in behavior. Relations between family and disorders such as schizophrenia, depression, anorexia nervosa, and criminality. Family therapy approaches and techniques. SO

* **PSYC 493a, Directed Research** Woo-kyoung Ahn

Empirical research projects or literature review. A student must be sponsored by a faculty member, who sets the requirements and supervises the student's progress. To register, the student must download a tutorial form from <http://psychology.yale.edu/undergraduate/undergraduate-major-forms>, complete it with the adviser, and submit it to the director of undergraduate studies by the seventh calendar day from the beginning of the term. The normal minimum requirement is a written report of the completed research or literature review, but individual faculty members may set alternative equivalent requirements. May be elected for one or two terms. May not be used for the Psychology senior requirement.

* **PSYC 495a, Research Topics** Woo-kyoung Ahn

Empirical research project or literature review. A student must be sponsored by a faculty member, who sets the requirements and supervises the student's progress. To register, the student must download a tutorial form from <http://psychology.yale.edu/undergraduate/undergraduate-major-forms>, complete it with the adviser, and submit it to the director of undergraduate studies by the seventh calendar day from the beginning of the term. The normal minimum requirement is a written report of the completed research or literature review, but individual faculty members may set alternative equivalent requirements. May be elected for one or two terms. May be repeated for credit. May not be used for the Psychology senior requirement.

½ Course cr

* **PSYC 499a, Senior Essay** Woo-kyoung Ahn

Independent senior research project (either empirical research or literature review), conducted under the guidance of a faculty adviser who sets the requirements and supervises the research. To register, the student must download a tutorial form from <http://psychology.yale.edu/undergraduate/undergraduate-major-forms>, complete it with the adviser, and submit it to the director of undergraduate studies by the seventh

calendar day from the beginning of the term. The normal minimum requirement is a written report of the completed research or literature review, but individual faculty members may set alternative equivalent requirements. A paper of 5,000 words or more meets the writing needed for the senior requirement. To be considered for Distinction in the Major, the paper should be submitted at least one week before the last day of classes and will be graded by the adviser and a second reader assigned by the DUS.

Public Health

For information about Yale College course offerings related to health, see under Global Health Studies (p. 427).

The five-year B.A.–B.S./M.P.H. degree program The B.A.–B.S./M.P.H. degree program in Public Health offers Yale College students interested in the field of public health the opportunity to earn a bachelor's degree from Yale College and an M.P.H. degree from the Yale School of Public Health (YSPH) in a five-year joint program.

Undergraduate requirements During four years of Yale College enrollment, students complete any standard major. Four of the thirty-six course credits required for the bachelor's degree are typically taken at YSPH in partial fulfillment of the M.P.H. degree requirements. Students may take additional YSPH courses while enrolled in Yale College, but no more than four course credits earned in the professional schools may be applied toward the bachelor's degree. Two Yale College courses selected from an approved list may be counted as electives toward the M.P.H. degree requirements.

Students accepted into the B.A.–B.S./M.P.H. program typically take the following courses at the School of Public Health while enrolled in Yale College: BIS 505, Introduction to Statistical Thinking I and II; CDE 505, Social and Behavioral Foundations of Health; CDE 508, Principles of Epidemiology I; EPH 515, Introduction to Research and Professional Ethics Seminar; either HPM 510, Introduction to Health Policy and Health Systems, or HPM 560, Health Economics and U.S. Health Policy; and either EHS 510, Introduction to Environmental Health, or EHS 503, Introduction to Toxicology.

During the summer between the fourth and fifth years, students complete a public health internship.

Master's program requirements Students accepted into the program affiliate with one of seven departments or programs at the School of Public Health; this affiliation determines the primary adviser and the specific requirements for the five-year program. During the fifth year, students are in full-time residence at the School of Public Health to complete their remaining course work and master's thesis.

Admission requirements Students apply to the B.A.–B.S./M.P.H. program in the fall term of the junior year. Successful candidates present a verified commitment to improving the health of the public and evidence of quantitative skills. Two terms each of college-level mathematics, science, and social science courses are recommended, although some of these courses can be completed after applying to the program. Additional qualifications may be required by particular departments or programs. A complete application includes the application form, transcripts, SAT scores, two letters of recommendation (at least one from an instructor of a Yale course), a personal statement, and approval from the student's residential college dean. Questions about admissions should be directed to Mary Keefe (mary.keefe@yale.edu).

Further information about the program may be viewed on the YSPH Website.

Religious Studies

Director of undergraduate studies: Phyllis Granoff, 451 College St., 432-0830, phyllis.granoff@yale.edu, religiousstudies.yale.edu

The Religious Studies curriculum approaches the history of human thought and practice while focusing on specific geographical, cultural, and philosophical areas of scholarly interest. Courses explore when, how, and why communities forge systems of value. Faculty guide students to examine institutions, practices, texts, and ideas simultaneously: to see how texts influence institutions, how institutions prescribe habits, and how human beings resist and reiterate the given institutions and practices of their specific geographic and historical contexts. The Religious Studies department is particularly known for its promotion of scholarly research by undergraduates. Undergraduate majors acquire the linguistic, philosophical, and historical acumen necessary for an in-depth research project during their senior year.

COURSE NUMBERING

Religious Studies course offerings, other than first-year seminars, are arranged in four categories. Group A features general and comparative courses that engage more than one tradition, concept, or text. Group B includes survey courses that provide a broad introduction to a particular religious tradition or scripture in historical context. Group C includes courses on specialized topics in religious studies, both introductory and intermediate. Group D offers advanced courses on specialized topics which typically have specific prerequisites or require the permission of the instructor. Students who want a broad introduction to the study of religions can choose courses listed under Groups A or B, though courses listed under Group C are also open without prerequisite. Religious Studies majors develop specialized concentrations as they plan a major program in consultation with the DUS and other members of the faculty.

REQUIREMENTS OF THE MAJOR

The department offers two programs for students majoring in Religious Studies: the standard major and a major in which religious studies is combined with another subject closely related to the senior essay. Both programs require a core of six courses, a seminar, and a two-term senior essay.

Core requirement A core of six courses in Religious Studies is required of all majors and should be selected in consultation with the DUS. Students select one core course from Group A that involves the comparative study of religions and three core courses from Groups B and C that concentrate on the historical or textual study of three different religious traditions or regions. Students are encouraged to select religions and regions as widely divergent as possible in order to balance in-depth study with global diversity and connection. One core course must focus on systematic thought (ethics, philosophy, or theology). The final core course is RLST 490, Religion and Society, the junior seminar on the academic study of religion; this course is required for all majors.

Seminar requirement Before the end of the junior year, students must complete a seminar (in addition to the junior seminar) that requires a major research paper. In Program I, this seminar must be an elective in Religious Studies. In Program II, it

may be a course in Religious Studies, or it may constitute one of the four term courses outside the department.

Program I. The standard major Program I consists of twelve term courses in Religious Studies, including the core of six required courses, the two-term senior essay, and four electives. The electives are usually selected from Groups C and D and form a coherent unit to help the student prepare for the senior essay. Certain cognate courses in other departments that are integral to the student's area of concentration may count toward the major with permission of the DUS. Normally the maximum number of cognate courses that may be applied is two. Two terms of an ancient language related to the study of religion may, with permission of the DUS, be counted.

Program II. Religious studies with another subject Program II consists of eight term courses in Religious Studies (the core of six required courses and the two-term senior essay) and four term courses outside the department, one of which may fulfill the seminar requirement outlined above. The four courses outside the department need not directly concern religion, but they must form a coherent, focused unit of concentration. Through them students can develop expertise in a methodological approach, cultural area, historical period, or body of literature contributing to the senior essay. Examples of successful combinations might be: four courses in Chinese history, language, and literature with a senior essay topic on Chinese Buddhism; four courses in early American history and literature with a topic on colonial American religion; four courses in a specific area of biology and medical science with a topic on biomedical ethics; or four courses in globalization and international relations with a topic on religion and globalization. Each student's petition to take this program will be judged on its contribution to the student's senior essay. Normally, introductory courses in other departments may not count among the outside courses; appropriate language courses at a higher level may. Students electing Program II must, at the end of the junior year and in no case later than the beginning of the senior year, obtain approval for their proposed program from the DUS. Students who think they may elect this program should consult the DUS as early as possible in their studies to begin suitable selection of courses.

SENIOR REQUIREMENT

Students in both programs must write a senior essay under the supervision of a faculty adviser in the student's area of concentration. In selecting a senior essay topic, students normally choose a subject on which they have completed course work before commencing the senior year. The essay counts as two term courses toward the major and is taken in both terms of the senior year. The student should begin choosing a senior essay topic during the second term of the junior year, and early in the first term of the senior year must submit a Statement of Intention approved by a faculty adviser and the DUS. The senior essay course, RLST 491 and 492, includes research and writing assignments as well as colloquia in which seniors present and discuss their research. The student must submit at least ten pages of the essay to the DUS by the last day of classes in the first term in order to receive a grade of "satisfactory" for that term.

ADVISING

Students majoring in Religious Studies who plan to do graduate work in the subject are strongly encouraged to study the languages that they will need for their graduate programs.

Courses in the Divinity School Some Divinity School courses may count toward the major, with permission of the DUS. Divinity School faculty are eligible to advise senior essays. Information about courses and faculty may be found in the Divinity School bulletin.

REQUIREMENTS OF THE MAJOR

Prerequisites None

Number of courses 12 term courses (incl senior req)

Specific course required RLST 490

Distribution of courses *Both programs* – 1 course in comparative religions; 3 courses in historical or textual study of religious traditions, as specified; 1 course in systematic thought, as specified; *Program I* – 4 electives, one of which is seminar as specified; *Program II* – 4 nonintro courses in another subject linked with senior essay, one of which may be seminar, approved by DUS

Substitution permitted *Both programs* – Divinity School courses, with DUS permission; *Program I* – 2 related courses in other depts, with DUS permission

Senior requirement Senior essay (RLST 491, 492)

FACULTY OF THE DEPARTMENT OF RELIGIOUS STUDIES

Professors Gerhard Böwering, Stephen Davis, Carlos Eire, Steven Fraade, Paul Franks, Bruce Gordon, Philip Gorski, Phyllis Granoff, Frank Griffel, John Hare, Christine Hayes, Noel Lenski, Kathryn Lofton, Ivan Marcus, Sally Promey, Harry Stout (*Chair*), Shawkat Toorawa, Robert Wilson

Associate Professors Zareena Grewal, Noreen Khawaja, Hwansoo Kim, Nancy Levene, Elijah Stern, Travis Zadeh

Assistant Professors Maria Doerfler, Eric Greene

Senior Lecturers John Grim, Margaret Olin, Mary Evelyn Tucker

Lecturers Jimmy Daccache, Supriya Gandhi, Stephen Latham

First-Year Seminars

* **RLST 012b / HUMS 092b, Divine Law in Historical Perspective** Christine Hayes
Exploration of the divergent notions of divine law in Greco-Roman antiquity and biblical Israel; the cognitive dissonance their historical encounter engendered and attempts by Jewish, Christian, and contemporary secular thinkers to negotiate competing claims. Topics include: debates over the attributes and nature of divine law versus human law; the grounds of divine law's authority; law as a religious expression versus law as debasement of the divine-human relationship; the impact of divine law debates on secular legal theory. Enrollment limited to first-year students. Preregistration required; see under First-Year Seminar Program. HU

* **RLST 017a, Authenticity** Noreen Khawaja

The origins of personal authenticity in Western thought and the impact of this idea on modern notions of truth, sincerity, and identity. The "true" self as a historical idea and as a social performance. Readings in philosophy, literature, and religious thought from antiquity to the present. Enrollment limited to first-year students. Preregistration required; see under First-Year Seminar Program. HU

General, Comparative, and Thematic Courses (Group A)

RLST 100b / MMES 191b, Introduction to World Religions Gerhard Bowering
Introduction to the literature, ideals, concepts, practices, rituals, and institutions of four major world religions as they have appeared in history: Hinduism, Buddhism, Christianity, and Islam. A historical survey combined with a phenomenological treatment of principal topics. HU

* **RLST 107a / PHIL 192a, Metaphysics and Modernity** Nancy Levene
This course surveys concepts and controversies in and among select works of philosophy, theology, and literature. The focus is twofold: on reading works in view of their own principles, thus on questions of truth and interpretation, and on histories of the ideas, thus on questions of origin, change, and story. What and when is metaphysics? What and when is modernity? HU

RLST 158a / HIST 159 / HUMS 129 / NELC 326a, From Jesus to Muhammad
Stephen Davis

The history of Christianity and the development of Western culture from Jesus to the early Middle Ages. The creation of orthodoxy and heresy; Christian religious practice; philosophy and theology; politics and society; gender; Christian literature in its various forms, up to and including the early Islamic period. HU

RLST 180a / HIST 342a / SAST 280a, Mughal India, 1500–1800 Supriya Gandhi
Exploration of religion and the state in Mughal India, focusing on the period between 1500–1800. Topics include sacred sovereignty, orthodoxy, Sufism, vernacular literary and religious cultures, and the early colonial encounter. HU

Surveys of Religious Traditions (Group B)

RLST 145a / HUMS 133 / JDST 110a, The Bible Staff
The writings common to both Jewish and Christian scripture examined as diverse and often conflicting expressions of the religious life and thought of ancient Israel. The works' cultural and historical setting in the ancient Near East; the interpretive history of selected passages influential in Western culture. Introduction to a wide range of critical and literary approaches to biblical studies. Students view course lectures, which survey the entire Bible, on line; class time focuses on specific biblical passages and their subsequent interpretation in Jewish and Christian culture. HU

* **RLST 147b / JDST 235b / MMES 235b / NELC 231b, Introduction to Judaism in the Ancient World** 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. No prior background in Jewish history assumed.

HU

RLST 149b / HIST 220b / JDST 201b, Introduction to Modern Jewish History Staff

A broad introduction to the history of Jewish culture from the late Middle Ages until the present. Emphasis on the changing interaction of Jews with the larger society as well as the transformation of Judaism in its encounter with modernity. HU

RLST 150b, The New Testament in History and Culture Staff

Introduction to historical development and cultural significance of the New Testament with special attention to material contexts ancient and modern. Focus on authorship and function of early Christian texts; interpretation and biblical criticism; and the use of New Testament in art, politics, theological debates, contemporary bible publishing, and museums. Includes trips to the Yale University Art Gallery and Beinecke Library. No prior study of New Testament required. HU

RLST 160a / HIST 280a / ITAL 315a, The Catholic Intellectual Tradition Carlos Eire

Introductory survey of the interaction between Catholicism and Western culture from the first century to the present, with a focus on pivotal moments and crucial developments that defined both traditions. Key beliefs, rites, and customs of the Roman Catholic Church, and the ways in which they have found expression; interaction between Catholics and the institution of the Church; Catholicism in its cultural and sociopolitical matrices. Close reading of primary sources. HU

RLST 170a / MMES 192a, The Religion of Islam Gerhard Böwering

The rise of Islam in Arabia; Muhammad and the Qur'an; Muslim tradition and religious law; crucial issues of Islamic philosophy and theology; basic beliefs and practices of the Muslim community; Sufism and Shi'ism; religious institutions and modern trends; fundamentalism and violence; freedom and democracy. HU

Topics in Religious Studies (Group C)

* **RLST 121a, Religion and Culture in Korea** Staff

Introduction to Shamanism, Buddhism, Confucianism, Daoism, Christianity, and new religions in Korea from ancient times to the present. Examination of religious traditions in close relationships with social, economic, political, and cultural environments in Korean society. Examination of religious tensions, philosophical arguments, and ethical issues that indigenous and foreign religions in Korea have engaged throughout history to maximize their influence in Korean society. HU

* **RLST 201a / HIST 232Ja / HUMS 443a / JDST 270a / MMES 342a, Medieval Jews, Christians, and Muslims In Conversation** Ivan Marcus

How members of Jewish, Christian, and Muslim communities thought of and interacted with members of the other two cultures during the Middle Ages. Cultural grids and expectations each imposed on the other; the rhetoric of otherness – humans or devils, purity or impurity, and animal imagery; and models of religious community and power in dealing with the other when confronted with cultural differences. Counts toward either European or Middle Eastern distributional credit within the History major, upon application to the director of undergraduate studies. WR, HU RP

* **RLST 233a / ENGL 346a / HUMS 253a, Poetry and Faith** Christian Wiman
Issues of faith examined through poetry, with a focus on modern Christian poems from 1850 to the present. Some attention to poems from other faith traditions, as well as to secular and antireligious poetry. HU

* **RLST 238b / JDST 282b / LITR 437b / SPAN 282b, Judeo-Spanish Culture, Language, and Literature** Allyson Gonzalez
This course explores the rich body of culture, language, and literature that emerged in the Sephardi (Judeo-Spanish) diaspora following the expulsion of Jews from Iberia in 1492, and continuing to the present. This course is taught in English. TR HU

RLST 245a / ARCG 244a / NELC 109a, The Age of Akhenaton John Darnell
Study of the period of the Egyptian pharaoh Akhenaton (reigned 1353–1336 B.C.E.), often termed the Amarna Revolution, from historical, literary, religious, artistic, and archaeological perspectives. Consideration of the wider Egyptian, ancient Near Eastern, African, and Mediterranean contexts. Examination of the international diplomacy, solar theology, and artistic developments of the period. Reading of primary source material in translation. HU

* **RLST 249a / GMAN 254a / JDST 335a / PHIL 274a, Jewish Philosophy** Paul Franks
Introduction to Jewish philosophy, including classical rationalism of Maimonides, classical kabbalah, and Franz Rosenzweig's inheritance of both traditions. Critical examination of concepts arising in and from Jewish life and experience, in a way that illuminates universal problems of leading a meaningful human life in a multicultural and increasingly globalized world. No previous knowledge of Judaism is required. WR, HU

* **RLST 260a / AMST 451a / HIST 174Ja, Religion, War, and the Meaning of America** Harry Stout
The relationship between religion and war in American history from colonial beginnings through Vietnam. The religious meanings of Americans at war; the mutually reinforcing influences of nationalism and religion; war as the norm of American national life; the concept of civil religion; biblical and messianic contexts of key U.S. conflicts. HU

* **RLST 274a / HUMS 268a, Analyzing Antisemitism** Adam Stern
Analysis of the "longest hatred" from a historical as well as theoretical point of view; and the development of antisemitism and key manifestations from the ancient world to the present moment. Topics include how hatred of Jews relates to other forms of bigotry and prejudice; how antisemitism mutates in different times and places; antisemitism before the modern period; why antisemitism exists in countries that have no Jews; why antisemitism is once again on the rise around the world and how it can be combated.

RLST 283b / HIST 215b, Reformation Europe, 1450–1650 Carlos Eire
Examination of a series of religious revolutions in Europe between 1450 and 1650. The causes and nature of the reformations that changed the religious, political, social, and economic landscapes of early modern Europe and shaped the course of Western civilization as a whole. HU

RLST 287a / MMES 391a, Islamic Theology and Philosophy Frank Griffel
Historical survey of major themes in Muslim theology and philosophy, from teachings of the Qur'an to contemporary Muslim thought. The systematic character of Muslim

thought and of the arguments given by thinkers; reason vs. revelation; the emergence of Sunnism and Shi'ism; the reaction of Muslim theology (from 1800) to the challenges of the West. HU

* **RLST 303b / PHIL 311b, The End of Metaphysics** Nancy Levene

Exploration of metaphysics in light of the supposition that it is at an end. Readings from classics and critics in the history of philosophy and religion. None. WR, HU

* **RLST 309a, Religion and Capitalism** Staff

A comparative and interdisciplinary seminar exploring the religious qualities of capitalism and the economic qualities of religion. Topics include: consumer culture as religious practice; raced and gendered ethics of work; the legacy of Christianity for secular markets; missionary humanitarianism and corporate social responsibility; images of diversity in global markets; technology, science, and the post-human; critiques of capitalism and alternative visions of freedom. Emphasis on critical race, feminist, and queer analysis. WR, HU

RLST 342b / AMST 234b / ER&M 243b / HIST 188b, Spiritual But Not Religious

Zareena Grewal

Study of the historical and contemporary “unchurching” trends in American religious life in a comparative perspective and across different scales of analysis in order to think about the relationship between spirituality, formal religion, secular psychology and the self-help industry. HU, SO

* **RLST 347a / HIST 287Ja / SOCY 331a / WGSS 291a, Sexual Minorities from Plato to the Enlightenment** Igor De Souza

This interdisciplinary course surveys the history of homosexuality from a cross-cultural, comparative perspective. Students study contexts where homosexuality and sodomy were categorized, regulated, and persecuted and examine ancient and medieval constructions of same-sex desire in light of post-modern developments, challenging ideas around what is considered normal and/or natural. Ultimately, we ask: what has changed, and what has remained the same, in the history of homosexuality? What do gays and lesbians today have in common with pre-modern sodomites? Can this history help us ground or rethink our sexual selves and identities? Primary and secondary historical sources, some legal and religious sources, and texts in intellectual history are studied. Among the case studies for the course are ancient attitudes among Jews, early Christians, and Greeks; Christian theologians of the Middle Ages; Renaissance Florence; the Inquisition in Iberia; colonial Latin America; and the Enlightenment's condemnation of sodomy by Montesquieu and Voltaire, and its defense by Bentham.

HU

* **RLST 355a / ARCG 611a / CLCV 389 / CLSS 811a / NELC 389a / NELC 611a / RLST 833a, The Ancient Egyptian Temple as Cosmos: Correlation of Architecture and Decoration Program** Christina Geisen

The course focuses on the correlation of archaeology, iconography, and philology by analyzing ancient Egyptian temples under the specific consideration of the interplay of architecture and decoration program. The different types of temples and their developments over time are discussed. The main focus is the function of each temple type, which can only be understood by analyzing the architecture of the monument, its decoration program, related texts (such as rituals, myths, and festival description, but also historical texts), and its place in the cultic landscape of the specific location.

The class also provides an overview of rituals performed and festivals celebrated in the temples, as well as of the administrative sphere of the temple. Optional field trip to the Metropolitan Museum of Art in New York to see the Temple of Dendur. No previous knowledge of ancient Egyptian culture or languages is necessary; all texts are read in translation. HU

*** RLST 357b / WGSS 359b, Buddhism and Sexuality** Staff

Critical examination of the relation of religion and sexuality with special attention to Buddhism. Discussion of religious interpretations of sex, sexuality, and gender; the codification and normalization of these rules through texts, symbols, and practices; and recent challenges to these interpretations. Topics include homosexuality, same-sex marriage, abortion, contraception, gender equality, clerical marriage, married clerics' wives, and clerical sexual abuse. Draws on religious theory, gender theory, and critical theory. Places Buddhism in conversation with Jewish, Christian, and Islamic traditions.

HU

*** RLST 368b / EVST 368b / HIST 491Jb / HSHM 479b, The History of the Earth from Noah to Darwin** Ivano Dal Prete

Young earth creationism and flood geology have long been among the most divisive features of American culture and politics. Yet a basic postulate is shared across the spectrum: for better or worse, the old age of the Earth is regarded as the recent product of a secular science, consistently rejected by traditional Christianity. This seminar challenges this long-established narrative, by uncovering the surprising boldness, complexity, and societal diffusion of pre-modern debates on the history of the Earth, and of humankind itself. Students have opportunity to explore the nature, assumptions, and methods of Earth sciences before the advent of modern geology, to question ingrained assumptions about their relation to religion and society, and to place outstanding issues into historical perspective. How have the great monotheistic religions dealt with the possibility of an ancient Earth? Was a young creation always important in traditional Christianity? If not, what led to the emergence of young Earth creationism as a force to be reckoned with? What are the intellectual roots of American preadamism, which claims that the black and white races were created at different times and do not descend from the same ancestor? These and other questions are addressed not only through scholarly literature in the field, but also with the analysis of literary, visual, and material sources available on campus. WR, HU

*** RLST 370a / EP&E 401a / HUMS 325a, Law, Morality, and Religion** Andrew Forsyth

The relationship— if any— between law, morality, and religion. Topics include the twentieth-century jurisprudential debate on law and morality; debates on law's relationship to reason and will, flourishing and restraint, in the "Western" tradition from antiquity to early modernity; and the U.S. Constitution and debates over free exercise and establishment of religion. HU

RLST 375b, Hindu Nationalism Supriya Gandhi

This course analyzes the development of Hindu nationalism from the nineteenth to the twenty-first centuries. Students interrogate the emergence of Hinduism as a religion, before exploring the reform and revivalist movements in the nineteenth century that paved the way for the articulation of Hindu nationalism. Students also read from key writings of several Hindu nationalist thinkers of the twentieth century and investigate the historical and social contexts leading to the emergence of Hindu nationalism as a

major political force. Topics include: colonialism, modernity, the idea of Hinduism, nationalist ideologies, gender, and religious violence. HU, SO

Advanced Topics in Religious Studies (Group D)

RLST 402a / PHIL 326a, The Philosophy of Religion John Hare

The relation between religion and ethics, traditional arguments for the existence of God, religious experience, the problem of evil, miracles, immortality, science and religion, and faith and reason. HU

* **RLST 405a / JDST 392a / NELC 382a, Mishnah Seminar: Tractate Sanhedrin** Steven Fraade

Close study of a section of the Mishnah, the earliest digest of Jewish law, treating religious courts and their jurisprudential practice. Dual attention to the historical significance of the institutions of law represented and to the cultural significance of the rhetoric of that representation. Consideration of the textual practices of rabbinic legal discourse in relation to its social function, as well as to the interplay of law and narrative. Prerequisite: reading fluency in ancient Hebrew. L5, HU

* **RLST 407a / JDST 391a / NELC 381a, Midrash Seminar: The Exodus from Egypt** Steven Fraade

The Exodus from Egypt as seen through rabbinic eyes. Close readings of the early rabbinic commentary (midrash), Mekhilta, to the narrative of Exodus 13:17ff (the lection Beshallah). Particular attention to the methods and language of rabbinic exegesis and to the rhetorical interplay of tradition and scriptural commentary. Interpretations and interpretive strategies compared and contrasted with those of other ancient biblical exegetes (Jewish and non-Jewish), where available. Prerequisite: reading fluency in ancient Hebrew. L5, HU

* **RLST 422b / EGYPT 147b, Egyptian Monastic Literature in Coptic** Stephen Davis

Readings in the early Egyptian classics of Christian asceticism in Sahidic Coptic, including the desert Fathers and Shenute. Prerequisite: EGYPT 127 or equivalent. Counts as L4 if taken after EGYPT 137 or equivalent. L3

* **RLST 423a / EGYPT 137a, Gnostic Texts in Coptic** Harold Attridge

Reading, translation, and analysis of Gnostic and Valentinian literature from Nag Hammadi, in several dialects of Coptic. Prerequisite: EGYPT 127 or equivalent. Counts as L4 if taken after EGYPT 147 or equivalent. L3

* **RLST 427a / HIST 378Ja / HIST 378a / MMES 139a, 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 South East Asia, the Indian Ocean, Iberia, and West Africa. HU

* **RLST 450a / JDST 219a / PHIL 403, Spinoza and the God of the Bible** Nancy Levene

This course considers Spinoza's metaphysics and social and political thought in light of a family of problems named religion: the concept of God, the relations among politics, divine law, and their institutions, the value of Judaism and Christianity, and the interpretation of the Bible. We read from Spinoza's principal works as well as from

the Bible and a few other thinkers, medieval and modern, in conceptual proximity to Spinoza. HU

Other Courses

* **RLST 490b, Religion and Society** Noreen Khawaja

Seminar on religion in its social formations. Issues include different concepts of social life, the operation of violence in social relationships, and religion as both champion and critic of society.

Russian and East European Studies

Directors of undergraduate studies: John Mackay, 2702 HGS, 432-7202, john.mackay@yale.edu [F]; Edyta Bojanowska, 2705 HGS, 432-1301, edyta.bojanowska@yale.edu [Sp]; language coordinator: Irina Dolgova, 2704A HGS, 432-1307, irina.dolgova@yale.edu; slavicedpartment/rsee

The major in Russian and East European Studies, administered by the Department of Slavic Languages and Literatures, offers an interdisciplinary approach to the study of a broad region: Russia, Ukraine, Belarus, the Caucasus, and Central Asia; Poland, Hungary, the Czech and Slovak Republics, and other areas in east central Europe; and the Balkans. The program is appropriate for students considering careers in international public policy, diplomacy, or business, and is also suited to students wishing to continue academic work.

REQUIREMENTS OF THE MAJOR

Thirteen term courses taken for a letter grade are required for the major. Students must take one course in Russian or East European history selected in consultation with the director of undergraduate studies. If Russian is presented as the primary language to satisfy the requirements of the major, then all East European language courses and third- and fourth-year Russian courses count toward the major. If an East European language other than Russian is presented as the primary language, then all courses in that language designated L3 or higher count toward the major. Electives are chosen in consultation with the DUS from an annual list of offerings. Electives must include at least one course in a social science. Other undergraduate courses relevant to Russian and East European Studies, including residential college seminars, may also count toward the major if approved by the DUS.

Languages A full understanding of the area demands knowledge of its languages. Students must demonstrate either proficiency in Russian or intermediate-level ability in an East European language. Students may demonstrate proficiency in Russian by (1) completing fourth-year Russian (RUSS 160, 161); (2) passing a written examination to demonstrate equivalent ability; or (3) completing a literature course taught in Russian and approved by the DUS. Students may demonstrate intermediate-level ability in an East European language by (1) completing a two-year sequence in an East European language (currently Czech, Polish, Romanian, or Ukrainian; students interested in studying other East European languages should contact the DUS); or (2) by passing a language examination demonstrating equivalent ability. Students are encouraged to learn more than one language.

SENIOR REQUIREMENT

Every major must write a senior essay in RSEE 490, 491. At the beginning of the senior year, students enroll in RSEE 490 and arrange for a faculty member to serve as senior adviser. By the third Friday of October, majors submit a detailed prospectus of the essay, with bibliography, to the adviser. A draft of at least ten pages of the text of the essay, or a detailed outline of the entire essay, is due to the adviser by the last day of reading period of the fall semester. The student provides the adviser with a form that the adviser signs to notify the DUS that the first-term requirements for the senior essay have been met. Failure to meet these requirements results in loss of credit for

RSEE 490. The senior essay takes the form of a substantial article, no longer than 13,000 words, excluding footnotes and bibliography. Three copies of the essay are due in the Slavic departmental office by April 12, 2019. A member of the faculty other than the adviser grades the essay.

ADVISING

Qualified students may elect pertinent courses in the Graduate School with the permission of the instructor, the director of graduate studies, and the director of undergraduate studies.

Graduate work The European and Russian Studies program does not offer the simultaneous award of the B.A. and M.A. degrees. However, students in Yale College are eligible to complete the M.A. in European and Russian Studies (with concentration in Russia and eastern Europe) in one year of graduate work. Students interested in this option must complete eight graduate courses in the area by the time they complete the bachelor's degree. Only two courses may be counted toward both the graduate degree and the undergraduate major. Successful completion of graduate courses while still an undergraduate does not guarantee admission into the M.A. program. Students must submit the standard application for admission to the M.A. program.

STUDY ABROAD

Students should be aware of opportunities for study and travel in Russia and eastern Europe. The DUS can provide information on these programs and facilitate enrollment. Students who spend all or part of the academic year in the region participating in established academic programs usually receive Yale College credit, and are strongly encouraged to take advantage of study abroad opportunities during summers or through the Year or Term Abroad program. Students wishing to travel abroad as part of the major should consult the DUS.

REQUIREMENTS OF THE MAJOR

Prerequisite or corequisite Demonstrated proficiency in Russian or intermediate-level ability in an East European lang

Number of courses 13 term courses (incl senior essay and specified lang courses)

Distribution of courses 1 course in Russian or East European hist approved by DUS; at least 1 course in social science

Senior requirement Senior essay (RSEE 490, 491)

FACULTY ASSOCIATED WITH THE MAJOR

Professors Sergei Antonov (*History*), Edyta Bojanowska (*Slavic Languages & Literatures*), Paul Bushkovitch (*History*), Katerina Clark (*Comparative Literature, Slavic Languages & Literatures*), John Gaddis (*History*), Harvey Goldblatt (*Slavic Languages & Literatures*), John MacKay (*Slavic Languages & Literatures, Film & Media Studies*), Timothy Snyder (*History*)

Associate Professors Molly Brunson (*Slavic Languages & Literatures*), Jason Lyall (*Political Science*), Douglas Rogers (*Anthropology*), Marci Shore (*History*)

Assistant Professors Marijeta Bozovic (*Slavic Languages & Literatures, Film and Media Studies, Women's, Gender, & Sexuality Studies*), Marta Figlerowicz (*Comparative Literature and English*)

Senior Lectors II Irina Dolgova, Constantine Muravnik

Senior Lectors Krystyna Illakowicz, Julia Titus, Karen von Kunes

Courses

* **RSEE 246b / RUSS 246b, Love and Death in the Russian Short Story** Edyta Bojanowska

A brilliant counterpart to the expansive Russian novel, the Russian short story is held in high esteem by the genre's connoisseurs and practitioners. This course explores both the classics and the hidden gems of the Russian short-story tradition from the 19th century to today, focusing on the most universal themes of story-writing: love and death. The course poses the following questions: What is distinctive about the short story form? How do stories "talk to" other stories in a tradition? What narrative twists and complications do authors use to keep readers hooked and spellbound? The readings cover most major Russian writers and movements, so the course provides a good overview of modern Russian literature. All readings and discussion in English.

WR, HU

* **RSEE 300b / CZEC 301b / LITR 220b, Milan Kundera: The Czech Novelist and French Thinker** Karen von Kunes

Close reading of Kundera's novels, with analysis of his aesthetics and artistic development. Relationships to French, German, and Spanish literatures and to history, philosophy, music, and art. Topics include paradoxes of public and private life, the irrational in erotic behavior, the duality of body and soul, the interplay of imagination and reality, the function of literary metaphor, and the art of composition. Readings and discussion in English. HU TR

RSEE 400a / PLSC 400a, Legacies of Communism and Conflict in Europe Andrea Aldrich

The challenges of democratic transition and consolidation in Europe. Exploration of authoritarianism, state collapse, nationalism and ethnic conflict, transitional justice, and democratic development through the turbulent and violent political history of southeastern Europe. Study of communist legacies and democratic transitions of the Balkans (Albania, Bulgaria, Greece, Romania and the states of the former Yugoslavia) to understand the complex nature of regime change and political transition. so

RELATED COURSES THAT COUNT TOWARD THE MAJOR

Students are encouraged to examine the offerings in Slavic Languages and Literatures and other departments, as well as residential college seminars, for additional related courses that may count toward the major.

Science

Yale College offers a yearlong interdepartmental course sequence for first-year students with strong preparation in the sciences who do not intend to major in science. SCIE 030 and 031, Current Topics in Science, presents a broader range of topics than standard courses and highlights the interdependence of the scientific disciplines. Application information is available on the First-Year Seminar Website.

Courses

*** SCIE 030a and SCIE 031b, Current Topics in Science** Douglas Kankel

A series of modules in lecture and discussion format addressing scientific issues arising in current affairs. Topics are selected for their scientific interest and contemporary relevance, and may include global warming, human cloning, and the existence of extrasolar planets. Credit for SCIE 030 upon completion of SCIE 031; one course credit is awarded for successful completion of the year's work. Enrollment limited to freshmen. Preregistration required; see under Freshman Seminar Program. SC ½ Course cr per term

Slavic Languages and Literatures

Directors of undergraduate studies: John MacKay, 2702 HGS, 432-7202, john.mackay@yale.edu [F]; Edyta Bojanowska, 2705 HGS, 432-1301, edyta.bojanowska@yale.edu [Sp]; language coordinator: Irina Dolgova, 2704A HGS, 432-1307, irina.dolgova@yale.edu; slavic.yale.edu

The major in Russian offered by the Department of Slavic Languages and Literatures acquaints students with Russian literature and culture, develops students' appreciation of literary values and skill in literary analysis, and gives them a basic competence in Russian. For an area major in Russian studies, see Russian and East European Studies, an interdisciplinary program administered by the Department of Slavic Languages and Literatures.

Students majoring in Russian may concentrate exclusively on Russian language and literature (Program I), or they may elect to study Russian literature in the context of comparative studies of literature (Program II). For Program II, credit is given for work done in other departments. Specific courses in each program must be arranged with the director of undergraduate studies. Students interested in specializing in Russian or Slavic linguistics may arrange a special concentration in linguistics with the DUS.

PREREQUISITES

Prerequisite to the major in both programs is RUSS 151. The department offers two sequences of language courses to fulfill the prerequisite: either (1) RUSS 110, 120, 130, 140, 150, and 151 or (2) RUSS 125, 145, 150, and 151. Prospective majors should complete RUSS 140 or 145 by the end of their sophomore year or accelerate their course of study by taking summer courses or studying abroad. While completing the prerequisite, students are encouraged to begin fulfilling requirements of the major that do not presuppose advanced knowledge of Russian by taking courses in Russian history and Russian literature in translation.

PLACEMENT PROCEDURES

Students who have previously studied Russian formally or informally are required to take the Russian placement exam. This brief oral exam will help determine which Russian course best fits each student's background. Contact the Russian language coordinator, Irina Dolgova (irina.dolgova@yale.edu), to schedule the oral placement exam or for information about preregistration. She may be reached via email or at 203-432-1307. Entering first-year students who have some knowledge of Czech or Polish should contact Krystyna Illakowicz (krystyna.illakowicz@yale.edu) (Polish) or Karen von Kunes (karen.vonkunes@yale.edu) (Czech) to arrange to take a brief placement examination.

REQUIREMENTS OF THE MAJOR

In addition to the prerequisite, the major in Russian requires at least eleven term courses, which must include the following (some courses may fulfill more than one requirement):

1. Two terms of Russian literature in translation: RUSS 250 and 253.
2. Fourth-year Russian: RUSS 160 and 161.

3. Two terms of Russian literature read and discussed in the original language, typically selected from Group A courses numbered 170 or above.
4. At least two term courses in Russian literature of the nineteenth century and two in Russian literature of the twentieth century. Students should select courses from Group A and from the 250 series with this requirement in mind.
5. RUSS 490. The senior essay is the intellectual culmination of the student's work in the major. All primary sources used in the essay must be read in Russian.

In addition to the requirements above, each program requires the following:

Program I One term course in the history or culture of Russia, selected in consultation with the DUS; three additional term courses in the Department of Slavic Languages and Literatures above RUSS 151. These may include literature courses taught either in translation or in the original, advanced language training courses, or graduate courses.

Program II Four term courses outside the Department of Slavic Languages and Literatures that are relevant to the major in the context of comparative studies of literature, selected in consultation with the DUS.

SENIOR REQUIREMENT

All majors write a senior essay (RUSS 490), an independent project carried out under the guidance of a faculty member. Three copies of the essay are due in the Slavic departmental office on April 12, 2019.

ADVISING

Courses in the Graduate School are open to qualified undergraduates with permission of the instructor and of the director of graduate studies. Course descriptions are available at the office of the DUS.

STUDY ABROAD

Students majoring in Russian are strongly encouraged to spend a summer or a term studying in the Russian Federation under the auspices of programs approved by the DUS. Language courses taken during the summer or during a term in Russia in approved programs may substitute for certain advanced Russian courses at Yale. Students interested in study abroad should consult the DUS well before their junior year.

REQUIREMENTS OF THE MAJOR

Prerequisite RUSS 151

Number of courses 11 term courses beyond prereq (incl senior essay)

Specific courses required *Both programs*—RUSS 160, 161, 250, 253

Distribution of courses *Both programs*—2 terms of 19th-century Russian lit; 2 terms of 20th-century Russian lit; 2 courses from Group A numbered 170 or above; *Program I*—1 course in hist or culture of Russia; 3 addtl courses in dept of Slavic Langs and Lits above level of RUSS 151; *Program II*—4 courses relevant to major in other depts, with DUS approval

Senior requirement Senior essay (RUSS 490)

FACULTY OF THE DEPARTMENT OF SLAVIC LANGUAGES AND LITERATURES

Professors Edyta Bojanowska (*Slavic Languages and Literatures*), Katerina Clark (*Comparative Literature, Slavic Languages and Literatures*), Harvey Goldblatt (*Slavic Languages and Literatures*), John MacKay (*Film & Media Studies, Slavic Languages and Literatures*)

Associate Professor Molly Brunson (*Slavic Languages and Literatures*)

Assistant Professor Marijeta Bozovic (*Slavic Languages and Literatures*)

Senior Lectors II Irina Dolgova (*Slavic Languages and Literatures*), Constantine Muravnik (*Slavic Languages and Literatures*)

Senior Lectors I Krystyna Illakowicz (*Slavic Languages and Literatures*), Julia Titus (*Slavic Languages and Literatures*), Karen von Kunes (*Slavic Languages and Literatures*)

Czech, Polish, Romanian, and Ukrainian Courses

CZEC 110a, Elementary Czech I Karen von Kunes

A comprehensive introduction to Czech for students with no previous knowledge of the language. Essentials of grammar, with emphasis on oral proficiency, reading, writing, and listening comprehension. Newspaper articles, annotated excerpts from Capek's *R.U.R.*, Hasek's *Svejk*, Kundera's *Joke* and *Unbearable Lightness of Being*, and Havel's *Private View*. Audio- and videotapes. Credit only on completion of CZEC 120. L1 RP 1½ Course cr

CZEC 120b, Elementary Czech II Karen von Kunes

Continuation of CZEC 110. After CZEC 110 or equivalent. L2 RP 1½ Course cr

CZEC 130a, Intermediate Czech Staff

Continuation of CZEC 120. Grammar and usage, with emphasis on idiomatic expressions, syntax, and stylistics. Readings in modern Czech history, prose, and poetry; discussion of economic, political, and social issues. After CZEC 120 or equivalent. L3 RP 1½ Course cr

CZEC 140b, Advanced Czech Karen von Kunes

Continuation of CZEC 130. Emphasis on writing skills and spoken literary Czech. After CZEC 130 or equivalent. L4 RP 1½ Course cr

PLSH 110a, Elementary Polish I Krystyna Illakowicz

A comprehensive introduction to elementary Polish grammar and conversation, with emphasis on spontaneous oral expression. Reading of original texts, including poetry. Use of video materials. Credit only on completion of PLSH 120. L1 RP 1½ Course cr

PLSH 120b, Elementary Polish II Krystyna Illakowicz

Continuation of PLSH 110. After PLSH 110 or equivalent. L2 RP 1½ Course cr

* **PLSH 150a, Advanced Polish** Krystyna Illakowicz

Improvement of high-level language skills through reading, comprehension, discussion, and writing. Focus on the study of language through major literary and cultural texts, as well as through film and other media. Exploration of major historical and cultural themes. Prerequisite: PLSH 140 or equivalent. L5

* **PLSH 160b, Advanced Polish II** Krystyna Illakowicz

Improvement of high-level language skills through reading, comprehension, discussion, and writing. Focus on the study of language through major literary and cultural texts, as well as through film and other media. Exploration of major historical and cultural themes. Prerequisite: PLSH 150 or equivalent. L5, HU

* **ROMN 110a, Elementary Romanian I** Staff

The first half of a two-term introduction to Romanian language, grammar, and cultural literacy centered around the theme of life in Bucharest. Topics, vocabulary, and grammar lessons based on everyday linguistic interactions in the city. Course taught through distance learning using videoconferencing technology from Columbia University. Enrollment limited; interested students should e-mail minjin.hashbat@yale.edu for more information. Credit only on completion of ROMN 120. L1 RP 1½ Course cr

* **ROMN 120b, Elementary Romanian II** Staff

The second half of a two-term introduction to Romanian language, grammar, and cultural literacy centered around the theme of life in Bucharest. Topics, vocabulary, and grammar lessons based on everyday linguistic interactions in the city. Prerequisite: ROMN 110. Course taught through distance learning using videoconferencing technology from Columbia University. Enrollment limited; interested students should e-mail minjin.hashbat@yale.edu for more information. L2 RP 1½ Course cr

* **ROMN 130a, Intermediate Romanian I** Staff

Continuation of ROMN 120, with attention to all four language skills and to cultural literacy. Students reach B2 level in compliance with the Common European Framework of Reference for Languages (CEFRL). Prerequisite: ROMN 120 or equivalent. Course taught through distance learning using videoconferencing technology from Columbia University. Enrollment limited; interested students should e-mail minjin.hashbat@yale.edu for more information. L3 RP 1½ Course cr

* **ROMN 140b, Intermediate Romanian II** Staff

Continuation of ROMN 130, with attention to all four language skills and to cultural literacy. Students reach C1 level in compliance with the Common European Framework of Reference for Languages (CEFRL). Course taught through distance learning using videoconferencing technology from Columbia University. Enrollment limited; interested students should e-mail minjin.hashbat@yale.edu for more information. L4 RP 1½ Course cr

* **UKRN 110a, Elementary Ukrainian I** Staff

The first half of a two-term introduction to Ukrainian for students with no previous knowledge of the language. Emphasis on speaking, reading, listening, and writing skills. Topics, vocabulary, and grammar lessons based on everyday linguistic interactions. Course taught through distance learning using videoconferencing technology from Columbia University. Enrollment limited; interested students should e-mail minjin.hashbat@yale.edu for more information. Credit only on completion of UKRN 120. L1 RP 1½ Course cr

* **UKRN 120b, Elementary Ukrainian II** Staff

The second half of a two-term introduction to Ukrainian for students with no previous knowledge of the language. Emphasis on speaking, reading, listening, and writing skills. Topics, vocabulary, and grammar lessons based on everyday linguistic

interactions. Prerequisite: UKRN 110. Course taught through distance learning using videoconferencing technology from Columbia University. Enrollment limited; interested students should e-mail minjin.hashbat@yale.edu for more information. L2
1½ Course cr

*** UKRN 140b, Intermediate Ukrainian II** Staff

Continued review and reinforcement of grammar fundamentals and of core vocabulary pertaining to common aspects of daily life. Special attention to verbal aspect and verbs of motion. Emphasis on further development of oral and written communication skills on topics such as the self, family, studies and leisure, travel, and meals. UKRN 130 or equivalent. Course taught through distance learning using videoconferencing technology from Columbia University. Enrollment limited; interested students should e-mail minjin.hashbat@yale.edu for more information. L4 RP 1½ Course cr

Group A Courses

Unless otherwise noted, all Group A courses are conducted in Russian.

RUSS 110a, First-Year Russian I Staff

A video-based course designed to develop all four language skills: reading, writing, speaking, and listening comprehension. Use of dialogues, games, and role playing. In addition to readings in the textbook, students read original short stories and learn Russian songs and poems. Oral and written examinations. Credit only on completion of RUSS 120. L1 RP 1½ Course cr

RUSS 120b, First-Year Russian II Staff

Continuation of RUSS 110. After RUSS 110 or equivalent. L2 RP 1½ Course cr

RUSS 122a, Russian for Bilingual Students I Julia Titus

A comprehensive Russian course for native speakers of Russian or other Slavic languages whose formal education has been in English. Overview of Russian grammar, focusing on the writing system, cases, conjunction, and syntax. Readings from Russian prose, film screenings, discussion, and regular practice in translation and composition.

L1, L2

RUSS 125a, Intensive Elementary Russian Constantine Muravnik

An intensive course that covers in one term the material taught in RUSS 110 and 120. For students of superior linguistic ability. Study of Russian grammar; practice in conversation, reading, and composition. Recommended for prospective majors in Russian and in Russian and East European Studies. L1, L2 RP 2 Course cr

RUSS 130a, Second-Year Russian I Irina Dolgova

A course to improve functional competence in all four language skills (speaking, writing, reading, and listening comprehension). Audio activities, for use both in the classroom and independently, are designed to help students improve their listening comprehension skills and pronunciation. Lexical and grammatical materials are thematically based. After RUSS 120 or equivalent. L3 RP 1½ Course cr

*** RUSS 142b, Russian for Bilingual Students II** Julia Titus

Continuation of RUSS 122. Further development of reading and writing skills. Expansion of vocabulary. After RUSS 122 or equivalent. L3, L4

RUSS 145b, Intensive Intermediate Russian Constantine Muravnik

A continuation of RUSS 125 that covers in one term the material taught in RUSS 130 and 140. For students of superior linguistic ability. Prerequisite: RUSS 125. L3, L4 RP
2 Course cr

RUSS 150a, Third-Year Russian I Constantine Muravnik

Intensive practice in conversation and composition accompanied by review and refinement of grammar. Readings from nineteenth- and twentieth-century literature, selected readings in Russian history and current events, and videotapes and films are used as the basis of structured conversation, composition, and grammatical exercises. Oral and written examinations. Audiovisual work in the Center for Language Study required. After RUSS 140 or 145 or equivalent. L5 RP 1½ Course cr

RUSS 151b, Third-Year Russian II Constantine Muravnik

Continuation of RUSS 150. After RUSS 150 or equivalent. L5 RP 1½ Course cr

RUSS 160a, Fourth-Year Russian I Irina Dolgova

Discussion topics include Russian culture, literature, and self-identity; the old and new capitals of Russia, the cultural impact of the Russian Orthodox Church, and Russia at war. Readings from mass media, textbooks, and classic and modern literature. Use of video materials. After RUSS 151 or equivalent. L5

RUSS 161b, Fourth-Year Russian II Irina Dolgova

Continuation of RUSS 160. After RUSS 160 or equivalent. L5

*** RUSS 174a, The Russian Works of Vladimir Nabokov** Constantine Muravnik

An aesthetic reading of Vladimir Nabokov's Russian works. Nabokov as a writer who first and foremost was interested in the question of the ontological significance of art and, consequently, in various modes of the artist's relationship to the world. Prerequisite: RUSS 150 or equivalent, or with permission of instructor. L5, HU RP

*** RUSS 184b, Advanced Russian Conversation through Contemporary Media** Irina Dolgova

Development of oral and written skills necessary for engaging in sophisticated discourse on current events. Attention to sociopolitical, economic, and cultural realities of modern Russia and the Russian-speaking world. Topics include the law, religion, healthcare, military and educational systems and policies, and cultural and social events. Materials drawn from contemporary newspapers, radio, television, and blogs. Prerequisite: RUSS 142 or 151. L5

Group B Courses

The courses in this group, conducted in English, are open to all Yale College students.

*** CZEC 301b / LITR 220b / RSEE 300b, Milan Kundera: The Czech Novelist and French Thinker** Karen von Kunes

Close reading of Kundera's novels, with analysis of his aesthetics and artistic development. Relationships to French, German, and Spanish literatures and to history, philosophy, music, and art. Topics include paradoxes of public and private life, the irrational in erotic behavior, the duality of body and soul, the interplay of imagination and reality, the function of literary metaphor, and the art of composition. Readings and discussion in English. HU TR

* **PLSH 248b / THST 370b, Polish Theater and Its Traditions** Krystyna Illakowicz
Exploration of the rebellious, defiant, and explosive nature of Polish theater, including ways in which theater has challenged, ridiculed, dissected, and disabled oppressive political power. Polish experimental and absurdist traditions that resulted from a merger of the artistic and the political; environmental and community traditions of the Reduta Theatre; Polish-American theater connections. Includes attendance at live theater events as well as meetings with Polish theater groups and actors. HU TR

RUSS 220a / HSAR 221a, Russian and Soviet Art, 1757 to the Present Molly Brunson
The history of Russian and Soviet art from the foundation of the Academy of the Arts in 1757 to the present. Nineteenth-century academicism, romanticism, and realism; the Russian avant-garde and early Soviet experimentation; socialist realism and late- and post-Soviet culture. Readings and discussion in English. HU TR

* **RUSS 380b / FILM 360b / LITR 301b, Putin's Russia and Protest Culture** Marijeta Bozovic

Survey of Russian literature and culture since the fall of communism. The chaos of the 1990s; the solidification of power in Putin's Russia; the recent rise of protest culture. Sources include literature, film, and performances by art collectives. Readings and discussion in English; texts available in Russian. WR, HU

* **SLAV 202a, Church Slavonic** Harvey Goldblatt

A study of the long history of Church Slavonic, with special attention given to “New” or “Synodal” Church Slavonic, the language used in the “Elizabeth” or “Synodal” Bible (first published in 1751), which remains even today the authorized version of the Russian Orthodox Church. Special emphasis on the reading of representative New Testament excerpts from this “Synodal Bible,” comparing them to equivalent textual portions written in both earlier forms of Russian Church Slavonic and Modern Russian. Conducted in English. Prerequisite: Knowledge of Modern Russian.

* **SLAV 206a, 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. Readings and discussion in English. HU

Group C Courses

* **RUSS 481b, Directed Reading in Russian Literature** Staff

Individual study under the supervision of a faculty member selected by the student. Applicants must submit a prospectus approved by the adviser to the director of undergraduate studies by the end of the first week of classes in the term in which the course is taken. The student meets with the adviser at least one hour each week, and takes a final examination or writes a term paper. No credit granted without prior approval of the director of undergraduate studies.

* **RUSS 490a or b, The Senior Essay** Staff

Research and writing on a topic of the student's own devising. Regular meetings with an adviser as the work progresses from prospectus to final form.

*** SLAV 485b, Directed Reading or Individual Research in Slavic Languages and Literatures** Staff

Individual study under the supervision of a faculty member selected by the student. Applicants must submit a prospectus approved by the adviser to the director of undergraduate studies by the end of the first week of classes in the term in which the course is taken. The student meets with the adviser at least one hour each week, and takes a final examination or writes a term paper. No credit granted without prior approval of the director of undergraduate studies.

Sociology

Director of undergraduate studies: Rene Almeling, 493 College St., Room 309, 432-3340, rene.aming@yale.edu (rene.almeling@yale.edu); sociology.yale.edu

Sociology provides the theoretical and empirical foundation for understanding how societies function and how they change over time. Sociologists are interested in the causes and consequences of processes such as the social construction of groups and identity, the evolution of culture, intersubjective meanings, intergroup relations, and hierarchies and social norms. They conduct research on individual behavior and outcomes such as educational attainment, jobs and careers, religious commitment, and political involvement; interpersonal processes such as intimate relationships, sexuality, social interaction in groups, and social networks; the behaviors of organizations and institutions; the causes and consequences of group differences and social inequality; and social change at the societal and global level.

The Sociology major provides both a solid foundation for students interested in careers in the social sciences and a strong background for a variety of professions in which knowledge about social processes and how societies work is relevant. Many recent graduates have gone on to law school, medical school, or graduate programs in public health, business, education, urban planning, criminology, or sociology. Others work in finance, consulting, publishing, marketing, city planning, teaching, research, and advocacy.

The Sociology department offers four undergraduate programs leading to the B.A. degree: (1) the standard program focuses on sociological concepts, theories, and methods; (2) a combined program allows students to combine sociology with a concentration in another field; (3) a concentration in markets and society focuses on the cultural frameworks, social ties, and social institutions that give rise to markets and that shape economic behavior; (4) a concentration in health and society emphasizes social processes as they affect health and medicine. Students interested in the major are encouraged to contact the director of undergraduate studies early in their academic careers to discuss potential options.

COURSE NUMBERING

Courses in Sociology are divided by level, with introductory courses numbered from 110 to 149, courses in sociological theory from 150 to 159, courses in sociological methods from 160 to 169, intermediate courses from 150 to 299, advanced courses in the 300s, and individual study and research courses in the 400s. Freshman seminars are numbered below 100 and count as introductory or intermediate courses.

PREREQUISITE

Students interested in the Sociology major should complete either a freshman seminar or at least one introductory course (numbered SOCY 110–149), ideally, by the end of the sophomore year. This course may be applied toward the requirements of the major. The DUS can waive the introductory course requirement for students who demonstrate adequate preparation for advanced course work in sociology.

REQUIREMENTS OF THE MAJOR

Program I. The standard major The requirements for the standard major are:

1. Thirteen term courses in sociology (including the prerequisite and senior colloquium), of which normally no more than two may be drawn from outside the Sociology department. At least one must be an introductory Sociology course or a substitute approved by the DUS, but no more than two introductory courses may count toward the total.
2. Two courses in sociological theory and two in sociological methods, normally completed by the end of the junior year. SOCY 151 and 152 are the required courses for theory. SOCY 160 and one additional Sociology course numbered SOCY 161–169 are required for methods. Other methods courses from outside the department can be approved at the discretion of the DUS. Students planning to study abroad in their junior year are strongly encouraged to begin meeting the theory and methods requirements in their sophomore year. They should also discuss the options for their course of study with the DUS before finalizing their plans.
3. One advanced seminar in Sociology (SOCY 300–399).
4. The senior requirement.

Program II. Sociology with another subject The combined program allows students to unite the study of sociology with the study of another discipline or substantive area, and to design a program that satisfies their own interests and career plans. By the beginning of the junior year, participants in the combined program are expected to consult with the DUS in order to obtain approval for their course of study. The requirements for Program II are:

1. Thirteen term courses (including the prerequisite and senior colloquium), of which at least nine and no more than ten are selected from Sociology, the remainder being chosen from another department or program. At least one must be an introductory Sociology course or a substitute approved by the DUS, but no more than two introductory courses in any department or program may count toward the total. The courses outside Sociology must constitute a coherent unit alone and form a logical whole when combined with the Sociology courses.
2. Two courses in sociological theory and two in sociological methods, normally completed by the end of the junior year. SOCY 151 and 152 are the required courses for theory. SOCY 160 and one additional Sociology course numbered SOCY 161–169 are required for methods. Other methods courses from outside the department can be approved at the discretion of the DUS. Students planning to study abroad in their junior year are strongly encouraged to begin meeting the theory and methods requirements in their sophomore year. They should also discuss the options for their course of study with the DUS before finalizing their plans.
3. One advanced seminar in Sociology (SOCY 300–399).
4. The senior requirement, integrating sociology and the other subject chosen.

Program III. Concentration in markets and society Students in the markets and society concentration gain a broad understanding of markets and their relationship to social networks, religion, the state, and culture. Students explore the field of economic sociology, develop insights into market logics and economic outcomes, and develop skills in network analysis. Application is required to the markets and society concentration, using a form downloaded from the Sociology department website. Requirements for the concentration are:

1. Thirteen term courses in sociology (including the prerequisite and senior colloquium). At least one must be an introductory Sociology course or a substitute approved by the DUS, but no more than two introductory courses in any department or program may count toward the total. Up to four courses may be drawn from outside the Sociology department, with approval from the DUS.
2. Two courses in sociological methods, one in network analysis (e.g., SOCY 167) and another in statistics (e.g., SOCY 162).
3. Two additional intermediate or advanced courses in economic sociology. Suitable courses include SOCY 219 and SOCY 395; other courses may fulfill this requirement with approval from the DUS.
4. At least one intermediate or advanced course in microeconomics (e.g., ECON 121 or 125).
5. The senior requirement, integrating sociology with business, markets, or economic behavior.

Program IV. Concentration in health and society Students in the health and society concentration gain a broad understanding of how supraindividual factors such as socioeconomic inequality, demographic processes, neighborhood environments, cultural norms, and social networks affect health and medical care. Students explore the fields of medical sociology, stratification, demography, and network science. The core courses in the concentration satisfy the social science requirements of premedical programs while also providing a solid foundation for students interested in public health, health policy, and global health. Application is required to the health and society concentration, using a form downloaded from the Sociology department website. Requirements for the concentration are:

1. Thirteen term courses in Sociology (including the prerequisite and senior colloquium). Up to five course credits may be drawn from outside the Sociology department, with approval from the DUS.
2. SOCY 127, the gateway course for the concentration (or other similar course, with approval of DUS).
3. SOCY 151, is highly recommended.
4. A course in statistics: SOCY 162, S&DS 103, GLBL 121, or a higher-level statistics course approved by the DUS.
5. SOCY 160 or a comparable course approved by the DUS.
6. In order to build a broad base of interdisciplinary knowledge on health, students may take up to five course credits from outside the Sociology department. It is recommended that students select at least one course credit from the following: BIOL 101, BIOL 102, BIOL 103, BIOL 104; MATH 112 or higher-level MATH course; ECON 170.
7. Two upper-level Sociology seminars (200 or 300 level), or other courses approved by the DUS.
8. The senior requirement, integrating sociology with health and medicine.

Credit/D/Fail courses A maximum of two courses taken Credit/D/Fail may be counted toward the requirements of the major.

SENIOR REQUIREMENTS

For the nonintensive major Students electing the nonintensive major take one additional seminar in Sociology (SOCY 300–399) and write a one-credit senior essay during the senior year (SOCY 491). The senior essay for nonintensive majors is intended to be an in-depth scholarly review and critical analysis based on secondary sources. Students select an important topic in any sociological field and write a literature review that evaluates what is known about the topic. All nonintensive majors are required to enroll in SOCY 491 to receive credit for the senior essay. To register for this course, students must submit a written plan of study approved by a faculty adviser to the DUS no later than the end of registration period in the term in which the senior essay is to be written. Nonintensive majors are not eligible to graduate with Distinction in the Major.

For the intensive major The intensive major gives students an opportunity to undertake a yearlong program of original research resulting in a contribution to sociological knowledge. The yearlong project requires substantial independent research and knowledge of a sociological subfield. Students use research methods such as data gathering through participant observation, in-depth interviewing, administration of small-scale surveys, or secondary analysis of existing data. They may present findings in a variety of forms, from ethnographic narratives to analytical statistics. Students select primary and secondary advisers from the faculty. Students in the intensive major enroll in SOCY 493, 494 during their senior year. The colloquium provides a forum for discussing the research process and for presenting students' research at various stages. Intensive majors are eligible to graduate with Distinction in the Major if they meet the grade standards for Distinction—see under Honors (p. 31) in the Undergraduate Curriculum (p. 19) section—and submit a senior essay written in SOCY 493, 494.

ADVISING

All students interested in the Sociology major should meet with the DUS no later than the beginning of the junior year to elect a program of study. Qualified students may petition to enroll in graduate courses, with permission of the instructor and the director of graduate studies. A list of graduate courses and descriptions is available from the DUS.

Admission to the intensive major Candidates for the intensive major should apply to the DUS by the last day of classes in the spring term of their junior year. The intensive major is especially recommended for students considering graduate school or social research. In special circumstances, applications may be accepted through the end of registration period in the first term of the senior year. Applications should include a one-page statement of interest that includes a list of relevant courses taken and identifies a prospective senior essay adviser. Admission is based on performance and promise. The DUS and the senior essay adviser serve as advisers to seniors in the intensive major.

STUDY ABROAD

Students planning to study abroad in their junior year are strongly encouraged to begin meeting specific requirements in their sophomore year. They should also discuss the options for their course of study with the DUS before finalizing their plans.

REQUIREMENTS OF THE MAJOR

Prerequisite 1 freshman sem or intro course (SOCY 110–149) or equivalent

Number of courses 13 term courses (incl prereq and senior essay)

Specific courses required *Programs I and II*—SOCY 151, 152, 160, 1 addtl course from SOCY 161–169; *Program IV*—SOCY 127, SOCY 160, or a comparable course approved by the DUS

Distribution of courses *All programs*—no more than 2 intro courses; *Program I*—1 sem from SOCY 300–399; *Program II*—9 or 10 courses in Sociology; 3 or 4 courses from another dept; 1 sem from SOCY 300–399; *Program III*—2 courses in sociological methods; 1 course in network analysis; 1 course in statistics, as specified; 2 intermed or adv course in economic sociology; 1 intermed or adv course in microecon; *Program IV*—1 course in stat, as specified; 2 upper-level sems, as specified

Substitution permitted *Program I*—up to 2 courses from other depts; *Program III*—up to 4 courses from other depts, with DUS approval; *Program IV*—up to 5 courses from other depts, with DUS approval

Senior requirement *Nonintensive major*—1 addtl 300-level Sociology sem and senior essay (SOCY 491); *Intensive major*—two-term senior essay (SOCY 493, 494)

FACULTY OF THE DEPARTMENT OF SOCIOLOGY

Professors Julia Adams, Jeffrey Alexander, Elijah Anderson, †James Baron, Scott Boorman, Nicholas Christakis, †Paul Cleary, Ron Eyerman, Philip Gorski, Grace Kao, †Peter Salovey, †Vicki Schultz, Philip Smith, †Olav Sorensen

Associate Professors Rene Almeling, Emily Erikson, †Marissa King, †Issa Kohler-Hausmann, Jonathan Wrytzen

Assistant Professors †Justin Farrell, Lloyd Grieger, Alka Menon

†A joint appointment with primary affiliation in another department or school.

Introductory Courses

SOCY 112a / EDST 110a, Foundations in Education Studies Staff

Introduction to key issues and debates in the U.S. public education system. Focus on the nexus of education practice, policy, and research. Social, scientific, economic, and political forces that shape approaches to schooling and education reform. Theoretical and practical perspectives from practitioners, policymakers, and scholars. SO

SOCY 133a, Computers, Networks, and Society Scott Boorman

Comparison of major algorithm-centered approaches to the analysis of complex social network and organizational data. Fundamental principles for developing a disciplined and coherent perspective on the effects of modern information technology on societies worldwide. Software warfare and algorithm sabotage; blockmodeling and privacy; legal, ethical, and policy issues. No prior experience with computers required. SO RP

SOCY 138a / ANTH 140a, The Corporation Douglas Rogers

Survey of the rise, diversity, and power of the capitalist corporation in global contexts, with a focus on the 20th and 21st centuries. Topics include: the corporation as legal entity and the social and cultural consequences of this status; corporations in the colonial era; relationships among corporations, states, and non-governmental

organizations in Western and non-Western contexts; anti-corporate critique and response; corporate social responsibility; and race, gender, and indigeneity. HU, SO

SOCY 144a / EDST 144a / ER&M 211a, Race, Ethnicity, and Immigration Grace Kao

Exploration of sociological studies and theoretical and empirical analyses of race, ethnicity, and immigration, with focus on race relations and racial and ethnic differences in outcomes in contemporary U.S. society (post-1960s). Study of the patterns of educational and labor market outcomes, incarceration, and family formation of whites, blacks (African Americans), Hispanics, and Asian Americans in the United States, as well as immigration patterns and how they affect race and ethnic relations.

SO

SOCY 147b, Introduction to Social Policy Analysis Scott Boorman

The capabilities and limitations of four fundamental tools of policy: markets, networks, bureaucracy, and legislation. Examples from the policy history of the United States since the 1930s and from formal models of social structure and process. SO

SOCY 167b, Social Networks and Society Emily Erikson

Introduction to the theory and practice of social network analysis. The role of social networks in contemporary society; basic properties of network measures, matrices, and statistics. Theoretical concepts such as centrality and power, cohesion and community, structural holes, duality of persons and groups, small worlds, and diffusion and contagion. Use of social structural, dynamic, and statistical approaches, as well as network analysis software. No background in statistics required. SO

Courses in Sociological Theory

Open to all students without prerequisite.

SOCY 151a / PLSC 290a, Foundations of Modern Social Theory Emily Erikson

Major works of social thought from the beginning of the modern era through the 1900s. Attention to social and intellectual concepts, conceptual frameworks and methods, and contributions to contemporary social analysis. Writers include W.E.B. Du Bois, Simone De Beauvoir, Adam Smith, Thomas Hobbes, Jean-Jacques Rousseau, Immanuel Kant, Emile Durkheim, Max Weber, and Karl Marx. SO

* **SOCY 152b, Topics in Contemporary Social Theory** Philip Gorski

In-depth introduction to recent developments in social theory, with particular emphasis on the last twenty years. Focus on three distinct areas of study: the building blocks and contrasting understandings of human persons and social action; the competing theories of the social structure of markets, institutions, cultures, social fields, and actor-networks; and the theoretical controversies concerning nations, states and empires, ethnic and racial identity, and the relation between facts and values in social research. Authors include Judith Butler, Michel Foucault, Jurgen Habermas, Pierre Bourdieu and Bruno Latour. None. Though "Foundations of Modern Social Theory" or equivalent is strongly recommended. WR, SO

Courses in Sociological Methods

* **SOCY 162a / EDST 162a, Methods in Quantitative Sociology** Lloyd Grieger

Introduction to methods in quantitative sociological research. Topics include: data description; graphical approaches; elementary probability theory; bivariate and

multivariate linear regression; regression diagnostics. Students use Stata for hands-on data analysis. QR, SO

SOCY 167b, Social Networks and Society Emily Erikson

Introduction to the theory and practice of social network analysis. The role of social networks in contemporary society; basic properties of network measures, matrices, and statistics. Theoretical concepts such as centrality and power, cohesion and community, structural holes, duality of persons and groups, small worlds, and diffusion and contagion. Use of social structural, dynamic, and statistical approaches, as well as network analysis software. No background in statistics required. SO

Intermediate Courses

The prerequisite for intermediate courses is one introductory Sociology course or permission of the instructor.

SOCY 170b / AFAM 186b / LAST 214b / PLSC 378b, Contesting Injustice Elisabeth Wood

Exploration of why, when, and how people organize collectively to challenge political, social, and economic injustice. Cross-national comparison of the extent, causes, and consequences of inequality. Analysis of mobilizations for social justice in both U.S. and international settings. Intended primarily for freshmen and sophomores. SO

* **SOCY 172a / PLSC 415a, Religion and Politics in the World** Katharine Baldwin

A broad overview of the relationship between religion and politics around the world, especially Christianity and Islam. Religions are considered to constitute not just theologies but also sets of institutions, networks, interests, and sub-cultures. The course's principal aim is to understand how religion affects politics as an empirical matter, rather than to explore moral dimensions of this relationship. SO

* **SOCY 221a / MGRK 236a / PLSC 138a, The Euro Crisis** Paris Aslanidis

Examination of how Europe continues to struggle with repercussions of the Great Recession and the impact of the Eurozone crisis in countries such as Portugal, Ireland, Spain, and, especially, Greece. Topics include the euro as a viable common currency; why and how the Eurozone crisis erupted and spread; and whether this catastrophe could have been averted. SO

SOCY 223b / ER&M 206b / PLSC 437b, The Politics of Ethnic and National Identity

Maria Jose Hierro

Introduction to the study of ethnic and national identity, their determinants and consequences in comparative perspective. SO

* **SOCY 228b, Norms and Deviance** Elijah Anderson

A sociological analysis of the origins, development, and reactions surrounding deviance in contemporary society. Group labeling, stigma, power, and competing notions of propriety. SO

SOCY 249a, Sociology of Islam Jonathan Wyrzten

Social scientific studies of Islam; introduction to sociology of religion and its application to Islam; the utility of "Islam" and "Muslim" as analytical categories; debates about definitions of Islam and religion in anthropology and religious studies; comparative sociological studies both within Islam and contrasting Islam with other religions.

Advanced Courses

Courses in this category are open to students who have completed one intermediate course and any other specified requirement, or by permission of the instructor. Preference is given to Sociology majors in their junior and senior years.

*** SOCY 319a / AFAM 390a / ER&M 419a, Ethnography of the African American Community** Elijah Anderson

An ethnographic study of the African American community. Analysis of ethnographic and historical literature, with attention to substantive, conceptual, and methodological issues. Topics include the significance of slavery, the racial ghetto, structural poverty, the middle class, the color line, racial etiquette, and social identity. SO

*** SOCY 330b / AFST 303b / EP&E 303b, Civil Sphere and Democracy** Jeffrey Alexander

Examination of civil sphere theory in dialogue with normative and empirical approaches to civil society. The sacred and profane binaries that animate the civil sphere are studied, as are such civil sphere organizations as polls, mass media, electoral system, law, and office. Topics include: United States presidential elections, immigration and its controversies, the civil rights movement, the crisis of contemporary journalism, recent controversies over church pedophilia, the financial system, telephone hacking, and the challenge of de-provincializing civil sphere theory. HU, SO

*** SOCY 331a / HIST 287Ja / RLST 347a / WGSS 291a, Sexual Minorities from Plato to the Enlightenment** Igor De Souza

This interdisciplinary course surveys the history of homosexuality from a cross-cultural, comparative perspective. Students study contexts where homosexuality and sodomy were categorized, regulated, and persecuted and examine ancient and medieval constructions of same-sex desire in light of post-modern developments, challenging ideas around what is considered normal and/or natural. Ultimately, we ask: what has changed, and what has remained the same, in the history of homosexuality? What do gays and lesbians today have in common with pre-modern sodomites? Can this history help us ground or rethink our sexual selves and identities? Primary and secondary historical sources, some legal and religious sources, and texts in intellectual history are studied. Among the case studies for the course are ancient attitudes among Jews, early Christians, and Greeks; Christian theologians of the Middle Ages; Renaissance Florence; the Inquisition in Iberia; colonial Latin America; and the Enlightenment's condemnation of sodomy by Montesquieu and Voltaire, and its defense by Bentham.

HU

*** SOCY 341b, Poverty and Social Welfare Policy in the United States** Lloyd Grieger

Formation and effectiveness of anti-poverty policies from a sociological and public policy perspective. Consideration of who is poor and who deserves federal assistance. Topics include: origins of the modern social safety net; the federal government's role in constructing and implementing anti-poverty policy; realities of low-wage work; the "culture of poverty;" and employment- and family-based policy strategies for alleviating poverty. Applied understanding of quantitative social science research methods is helpful, but not required.

* **SOCY 352b / HUMS 247b, Material Culture and Iconic Consciousness** Jeffrey Alexander

How and why contemporary societies continue to symbolize sacred and profane meanings, investing these meanings with materiality and shaping them aesthetically. Exploration of "iconic consciousness" in theoretical terms (philosophy, sociology, semiotics) and further exploration of compelling empirical studies about food and bodies, nature, fashion, celebrities, popular culture, art, architecture, branding, and politics. HU, SO

* **SOCY 360a / AFAM 278a, Black Urban America As Sociological Memoir** Staff

This interdisciplinary course traces formation of contemporary African American class and family structures through investigation of how evolving racialized class-gender relations shaped twenty-first-century populations of poor and affluent blacks. Sources drawn from social sciences, history, literature to explore relationships between social behavior (agency) and blocked opportunity (structure). SO

* **SOCY 365a / PLSC 241a, The Making of Political News** Matthew Mahler

The processes through which political news gets made. How the form and content of political news are shaped in and through the ongoing relationships between political operatives and journalists; ways in which these actors attempt to structure and restructure such relationships to their benefit. SO

* **SOCY 372a / AFST 372a / HIST 375J / MMES 105a, Comparative Nationalism in North Africa and the Middle East** Jonathan Wyrzten

The rise of nationalism in the Maghreb (or Arab West) and Mashriq (or Arab East). Introduction to major debates about nationalism; the influence of transnational (pan-Islamic and pan-Arab) ideologies, ethnicity, gender, and religion. Case studies include Egypt, Iraq, Israel, Palestine, Jordan, Saudi Arabia, the Gulf monarchies, Morocco, Western Sahara, Algeria, and Berber and Kurdish movements. SO

* **SOCY 373b / AFAM 358b / ER&M 463b, Ethnography of Policing and Race** Staff

Ethnography is the systematic study of culture and a method of knowledge production utilized by social scientists to apprehend, comprehend, and represent cultural groups and other social phenomena. This course explores the ethnographic representations of policing historically alongside the American construction of race. It explores the complex nature of policing in racially concentrated contexts. Additionally, it explores the warrants of ethnography as it relates to the study of policing and race. Students examine the tension between typical racial minorities and policing and the experiences of various other racialize groups that have appeared in and fallen out of focus as targets for racialize police contact. SO

* **SOCY 389a / GLBL 215a / LAST 386a / MGRK 237a / PLSC 375a, Populism from Chavez to Trump** Paris Aslanidis

Investigation of the nature of the populist phenomenon and its impact on politics, society, and the economy in various regions of the world. Conceptual and methodological analyses are supported by comparative assessments of various empirical instances, from populist politicians such as Hugo Chavez and Donald Trump, to populist social movements such as the Tea Party and Occupy Wall Street. SO

* **SOCY 390b / ER&M 360b / HLTH 370b / HSHM 432b / WGSS 390b, Politics of Reproduction** Rene Almeling

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

* **SOCY 396b / EDST 240b, Cities, Suburbs, and School Choice** Staff

The changing dynamic between cities and suburbs and the role of individuals and institutions in promoting desegregation or perpetuating segregation since the mid-twentieth century. The government's role in the expansion of suburbs; desegregating schools; the rise of school choice through magnets and charters; the effects of inner-ring suburban desegregation and of urban gentrification on the landscape of education reform. Recommended preparation: EDST 110. Preference to Education Studies Scholars. SO RP

Individual Study and Research Courses

* **SOCY 471a and SOCY 472b, Individual Study** Rene Almeling

Individual study for qualified juniors and seniors under faculty supervision. To register for this course, each student must submit to the director of undergraduate studies a written plan of study that has been approved by a faculty adviser.

* **SOCY 491a and SOCY 492b, Senior Essay and Colloquium for Nonintensive Majors**
Staff

Independent library-based research under faculty supervision. To register for this course, students must submit a written plan of study approved by a faculty adviser to the director of undergraduate studies no later than the end of registration period in the term in which the senior essay is to be written. The course meets biweekly, beginning in the first week of the term.

* **SOCY 493a and SOCY 494b, Senior Essay and Colloquium for Intensive Majors**
Rene Almeling

Independent research under faculty direction, involving empirical research and resulting in a substantial paper. Workshop meets biweekly to discuss various stages of the research process and to share experiences in gathering and analyzing data. The first meeting is in the second week of the term.

South Asian Studies

Director of undergraduate studies: Harry Blair, Rm. 210, 34 Hillhouse Ave., 432-5687; harry.blair@yale.edu; southasia.macmillan.yale.edu/

The program in South Asian Studies combines the requirements of a discipline-based first major with significant course work in South Asian Studies. South Asian Studies can be taken only as a second major. The major is intended to provide students with a broad understanding of the history, culture, and languages of South Asia, as well as the region's current social, political, and economic conditions. Work in a discipline-based major coupled with a focus on South Asia prepares students for graduate study, employment in nongovernmental organizations, or business and professional careers in which an understanding of the region is essential.

REQUIREMENTS OF THE MAJOR

In addition to fulfilling the requirements of the primary major, a student choosing South Asian Studies as a second major must complete seven term courses in South Asian Studies numbered 200 or above. At least two of the seven courses must address premodern South Asia, and at least two should be seminars. Students may petition the director of undergraduate studies to include one relevant course from another department or program; approval may require additional course work on South Asian topics. Students must also complete the senior requirement and meet the major's language requirement.

Language requirement One South Asian language must be studied at the advanced level (L5). Students who matriculate with advanced proficiency in a South Asian language (excluding English), as demonstrated through testing, are encouraged to study Sanskrit, or to study a second modern language through Yale courses or the Directed Independent Language Study program. Students may request substitution of another appropriate language (e.g., Persian or Arabic) for the core language requirement, and they are encouraged to pursue intensive language study through courses or work abroad.

Credit/D/Fail A maximum of one course taken Credit/D/Fail may count toward the major.

SENIOR REQUIREMENT

The senior requirement may be fulfilled by completion of a seminar that culminates in a senior essay. Alternatively, the requirement may be fulfilled by completion of a one-credit, two-term senior research project in SAST 491, 492, or by completion of a one-credit, one-term directed study in SAST 486 that culminates in a senior essay. The senior essay should be a substantial paper with a maximum length of 8,000 words for one term, and 10,500 words for two terms. The use of primary materials in the languages of the region is encouraged in senior essay projects. The DUS must approve senior essay plans early in the student's senior year.

ADVISING

The South Asian Studies major permits students to choose courses from a wide range of disciplines. Individual programs should have a balance between courses in the humanities and those in the social sciences. The proposed course of study must be

approved each term by the DUS. Students should also identify an adviser from the South Asian Studies faculty in their area of specialization as early as possible.

Two majors Permission to complete two majors must be secured from the Committee on Honors and Academic Standing. Application forms are available from the residential college deans and must be submitted prior to the student's final term.

Courses in the Graduate School Graduate courses in South Asian Studies are open to qualified undergraduates. Course descriptions appear in the online Graduate School bulletin and are also available in the South Asian Studies program office. Permission of the instructor and of the director of graduate studies is required.

STUDY ABROAD

Up to three course credits from approved study abroad programs may be applied toward the requirements of the major, with permission of the DUS.

REQUIREMENTS OF THE MAJOR

Prerequisites None

Number of courses 7 term courses (not incl senior req or lang req)

Distribution of courses 7 courses in South Asian Studies numbered 200 or above, 2 in premodern, 2 sems

Substitution permitted One relevant course in another dept, and/or up to 3 study abroad credits with DUS permission

Language requirement Study in a South Asian lang through L5 level

Senior requirement Senior essay in sem, or research project in SAST 491, 492, or senior essay in SAST 486

FACULTY ASSOCIATED WITH THE PROGRAM OF SOUTH ASIAN STUDIES

Professors Akhil Amar (*Law School*), Tim Barringer (*History of Art*), Nihal de Lanerolle (*School of Medicine*), Michael Dove (*Anthropology, Forestry & Environmental Studies*), Phyllis Granoff (*Religious Studies*), Inderpal Grewal (*Women's, Gender, & Sexuality Studies*), Mushfiq Mobarak (*Economics and Management*), Kalyanakrishnan Sivaramakrishnan (*Anthropology, Forestry & Environmental Studies*), Shyam Sunder (*School of Management*), Steven Wilkinson (*Political Science*)

Associate Professors Mayur Desai (*Public Health*), Zareena Grewal (*Ethnicity, Race, & Migration*), Karuna Mantena (*Political Science*), Kishwar Rizvi (*History of Art*)

Assistant Professor Rohit De (*History*), Subhashini Kaligotla (*History of Art*), Priyasha Mukhopadhyay (*English*)

Senior Lecturer Carol Carpenter (*Anthropology, Forestry & Environmental Studies*)

Lecturers Hugh Flick, Jr. (*Religious Studies*), Supriya Gandhi (*Religious Studies*)

Senior Lectors Seema Khurana, Swapna Sharma

Language and Literature Courses

* **HNDI 110a, Elementary Hindi I** Staff

An in-depth introduction to modern Hindi, including the Devanagari script. A combination of graded texts, written assignments, audiovisual material, and computer-

based exercises provides cultural insights and increases proficiency in understanding, speaking, reading, and writing Hindi. Emphasis on spontaneous self-expression in the language. No prior background in Hindi assumed. Credit only on completion of HNDI 120. L1 1½ Course cr

HNDI 120b, Elementary Hindi II Staff

Continuation of HNDI 110. After HNDI 110 or equivalent. L2 1½ Course cr

HNDI 130a, Intermediate Hindi I Swapna Sharma and Seema Khurana

The first half of a two-term sequence designed to develop proficiency in the four language skills. 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 Hindi literary traditions. Emphasis on spontaneous self-expression in the language. After HNDI 120 or equivalent. L3 1½ Course cr

* **HNDI 132a, Accelerated Hindi I** Swapna Sharma

A fast-paced course designed for students who are able to understand basic conversational Hindi but who have minimal or no literacy skills. Introduction to the Devanagari script; development of listening and speaking skills; vocabulary enrichment; attention to sociocultural rules that affect language use. Students learn to read simple texts and to converse on a variety of everyday personal and social topics.

L3

HNDI 140b, Intermediate Hindi II Seema Khurana and Swapna Sharma

Continuation of HNDI 130. After HNDI 130 or equivalent. L4 1½ Course cr

* **HNDI 142b, Accelerated Hindi II** Swapna Sharma

Continuation of HNDI 132. 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. L4

HNDI 150a, 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 140 or permission of instructor. L5

* **HNDI 157b, Hindi in the Diaspora** Seema Khurana

An advanced language course designed to develop overall language skills through selected readings in Hindi literature and the study of popular culture in the Indian diaspora. Works by Suaham Bedi, Sunita Jain, and Umesh Agnihotri; theater, films, and other art forms; news articles and television programs related to political, social, and cultural debates.

Prerequisite: HNDI 150 or permission of instructor. L5, HU

* **HNDI 198b, 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. Work must be supervised by an adviser and must terminate in a term paper or the equivalent.

Permission to enroll requires submission of a detailed project proposal and its approval by the language studies coordinator. Prerequisite: HNDI 150 or equivalent.

*** MTBT 110a, Elementary Modern Tibetan I** Staff

Introduction to the fundamentals of Modern Tibetan in the Lhasa dialect. Development of basic speaking, listening, reading, and writing skills through the application of communicative methods and the use of authentic learning materials. Some attention to central aspects of Tibetan culture. Course taught through distance learning using videoconferencing technology from Columbia University. Enrollment limited; interested students should e-mail minjin.hashbat@yale.edu for more information. Credit only on completion of MTBT 120. L1 RP 1½ Course cr

*** MTBT 120b, Elementary Modern Tibetan II** Staff

Continuation of MTBT 110, with further development of speaking, listening, reading, and writing skills. Prerequisite: MTBT 110 or equivalent. Course taught through distance learning using videoconferencing technology from Columbia University. Enrollment limited; interested students should e-mail minjin.hashbat@yale.edu for more information. L2 RP 1½ Course cr

MTBT 130a, Intermediate Modern Tibetan I Staff

The main focus of this course will be on using the language to communicate. The goal of the course is to further develop proficiency in speaking, listening, writing and reading, while acquiring some knowledge of Tibetan culture that are necessary for language competency. MTBT 120, or equivalent. Course is taught through distance learning using videoconferencing technology from Columbia University. Enrollment limited; interested students should e-mail minjin.hashbat@yale.edu for more information. L3 RP 1½ Course cr

*** MTBT 140b, Intermediate Modern Tibetan II** Staff

The main focus of this course will be on using the language to communicate. The goal of the course is to develop elementary proficiency in speaking, listening, writing and reading, while acquiring some knowledge of Tibetan culture that are necessary for language competency. MTBT 130, or equivalent. L4 RP 1½ Course cr

*** MTBT 150a, Advanced Modern Tibetan I** Staff

Holistic study of modern Tibetan to deepen communicative abilities and develop oral fluency and proficiency. Students improve reading comprehension skills through reading selected modern Tibetan literature. Prerequisite: MTBT 140, or equivalent. Course taught through distance learning using videoconferencing technology from Columbia University. Enrollment limited; interested students should e-mail minjin.hashbat@yale.edu for more information. L5 RP

*** MTBT 160b, Advanced Modern Tibetan II** Staff

Modern Tibetan as a medium of instruction and interaction to develop oral fluency and proficiency, with as much complete immersion as possible. Prepares interested students for future work and research in Tibetan communities. MTBT 150, or equivalent. Course taught through distance learning using videoconferencing technology from Columbia University. Enrollment limited; interested students should e-mail minjin.hashbat@yale.edu for more information. L5 RP

*** PNJB 110a, Elementary Punjabi I** Staff

Introduction to the Punjabi language in its cultural context. Development of fundamental speaking, listening, reading, and writing skills through the application

of communicative methods and the use of authentic learning materials. Course taught through distance learning using videoconferencing technology from Columbia University. Enrollment limited; interested students should e-mail minjin.hashbat@yale.edu for more information. Credit only on completion of PNJB 120. L1 RP 1½ Course cr

*** PNJB 120b, Elementary Punjabi II Staff**

Continuation of PNJB 110. Further development of speaking, listening, reading, and writing skills through the application of communicative methods and the use of authentic learning materials. Prerequisite: PNJB 110 or equivalent. Course taught through distance learning using videoconferencing technology from Columbia University. Enrollment limited; interested students should e-mail minjin.hashbat@yale.edu for more information. L2 RP 1½ Course cr

*** PNJB 130a, Intermediate Punjabi I Staff**

The important target of this course is to develop basic Punjabi Language skills (reading, writing, listening and speaking). This is approached through the theme-based syllabus, discussion in small groups and paired activities on the cultural background of Punjab or Punjabi culture. As well as, the listening and speaking skills would be developed by using the media such as educational material, Punjabi movies, music and computer lab sessions. The usage of the textbooks would lead us to learn grammatical rules of the Punjabi language. The students are approached individually, since the class typically consists of students in the various backgrounds. Prerequisite: PNJB 120 or equivalent. Course taught through distance learning using videoconferencing technology from Columbia University. Enrollment limited; interested students should e-mail minjin.hashbat@yale.edu for more information. L3 RP 1½ Course cr

*** PNJB 140b, Intermediate Punjabi II Staff**

The important target of this course is to develop basic Punjabi Language skills (reading, writing, listening and speaking). This is approached through the theme-based syllabus, discussion in small groups and paired activities on the cultural background of Punjab or Punjabi culture. As well as, the listening and speaking skills would be developed by using the media such as educational material, Punjabi movies, music and computer lab sessions. The usage of the textbooks would lead us to learn grammatical rules of the Punjabi language. The students are approached individually, since the class typically consists of students in the various backgrounds. Prerequisite: PNJB 130 or equivalent. Course taught through distance learning using videoconferencing technology from Columbia University. Enrollment limited; interested students should e-mail minjin.hashbat@yale.edu for more information. L4 RP 1½ Course cr

*** SKRT 110a / LING 115a, Introductory Sanskrit I Staff**

An introduction to Sanskrit language and grammar. Focus on learning to read and translate basic Sanskrit sentences in Devanagari script. No prior background in Sanskrit assumed. L1 1½ Course cr

SKRT 120b / LING 125b, Introductory Sanskrit II Staff

Continuation of SKRT 110. Focus on the basics of Sanskrit grammar; readings from classical Sanskrit texts written in Devanagari script. After SKRT 110. L2 1½ Course cr

SKRT 130a / LING 138a, Intermediate Sanskrit I Staff

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*. After SKRT 120 or equivalent. L3

SKRT 140b / LING 148b, Intermediate Sanskrit II Staff

Continuation of SKRT 130, focusing on Sanskrit literature from the *kavya* genre. Readings include selections from the *Jatakamala* of Aryasura and the opening verses of Kalidasa's *Kumarasambhava*. After SKRT 130 or equivalent. L4

*** SKRT 150a or b, Advanced Sanskrit: Dharmasastra** Staff

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 140 or equivalent. L5

*** SNHL 110a, Elementary Sinhala I** Staff

First half of a two-term sequence focusing on all four language skills. Basic grammar, sentence construction, simple reading materials, and use of everyday expressions. Course taught through distance learning using videoconferencing technology from Cornell University. Enrollment limited; interested students should e-mail minjin.hashbat@yale.edu for more information. Credit only on completion of SNHL 120. L1 RP 1½ Course cr

*** SNHL 120b, Elementary Sinhala II** Staff

Second half of a two-term sequence focusing on all four language skills. Basic grammar, sentence construction, simple reading materials, and use of everyday expressions. Prerequisite: SNHL 110. Course taught through distance learning using videoconferencing technology from Cornell University. Enrollment limited; interested students should e-mail minjin.hashbat@yale.edu for more information. L2 1½ Course cr

*** SNHL 130a, Intermediate Sinhala I** Staff

Further development of speaking, listening, reading, and writing skills in Sinhala. Communicative approach to the exchange of ideas and information, with early emphasis on oral skills and reading comprehension. Prerequisite: SNHL 120 or equivalent. Course taught through distance learning using videoconferencing technology from Columbia University. Enrollment limited; interested students should e-mail minjin.hashbat@yale.edu for more information. L3 RP 1½ Course cr

*** SNHL 140b, Intermediate Sinhala II** Staff

Further development of speaking, listening, reading, and writing skills in Sinhala, with a communicative approach to the exchange of ideas and information. Prepares students for the transition to the study of literary Sinhala. Prerequisite: SNHL 130 or equivalent. Course taught through distance learning using videoconferencing technology from Columbia University. Enrollment limited; interested students should e-mail minjin.hashbat@yale.edu for more information. L4 RP 1½ Course cr

*** TBTN 110a, Elementary Classical Tibetan I** Staff

First half of a two-term introduction to classical Tibetan. The script and its Romanization, pronunciation, normative dictionary order, and basic grammar. Readings from Tibetan literature and philosophy. Course taught through distance

learning using videoconferencing technology from Columbia University. Enrollment limited; interested students should e-mail minjin.hashbat@yale.edu for more information. Credit only on completion of TBTN 120. L1

*** TBTN 120b, Elementary Classical Tibetan II** Staff

Second half of a two-term introduction to classical Tibetan. The script and its Romanization, pronunciation, normative dictionary order, and basic grammar. Readings from Tibetan literature and philosophy. Prerequisite: TBTN 110. Course taught through distance learning using videoconferencing technology from Columbia University. Enrollment limited; interested students should e-mail minjin.hashbat@yale.edu for more information. L2

*** TBTN 130a, Intermediate Classical Tibetan I** Staff

Continuation of TBTN 120. Introduction to more complex grammatical constructions. Further development of reading ability in various genres of Tibetan literature written prior to 1959. Prerequisite: TBTN 120 or equivalent. Course taught through distance learning using videoconferencing technology from Columbia University. Enrollment limited; interested students should e-mail minjin.hashbat@yale.edu for more information. L3 RP 1½ Course cr

*** TBTN 140b, Intermediate Classical Tibetan II** Staff

Continuation of TBTN 130. Complex grammatical constructions. Further development of reading ability in various genres of Tibetan literature written prior to 1959. Prerequisite: TBTN 130 or equivalent. Course taught through distance learning using videoconferencing technology from Columbia University. Enrollment limited; interested students should e-mail minjin.hashbat@yale.edu for more information. L4 RP 1½ Course cr

General Courses in South Asian Studies

*** SAST 059a / ENGL 025a / LITR 023a, Modern South Asian Literature, 1857-2017**
Staff

Exploration of literary texts from South Asia, 1857 to the present. Close reading of literary texts from India, Pakistan, Bangladesh, and Sri Lanka, alongside political speeches, autobiographies, and oral narratives. Topics include colonialism, history writing, migration, language, caste, gender and desire, translation, politics and the novel. Enrollment limited to first-year students. Preregistration required; see under First-Year Seminar Program. WR, HU

SAST 224b / HIST 396b, India and Pakistan since 1947 Staff

Introduction to the history of the Indian subcontinent from 1947 to the present. Focus on the emergence of modern forms of life and thought, the impact of the partition on state and society, and the challenges of democracy and development. Transformations of society, economy, and culture; state building; economic policy. HU

*** SAST 266a / ARCH 271a / HSAR 266a / MMES 126a, Introduction to Islamic Architecture** Kishwar Rizvi

Introduction to the architecture of the Islamic world from the seventh century to the present, encompassing regions of Asia, North Africa, and Europe. A variety of sources and media, from architecture to urbanism and from travelogues to paintings, are used in an attempt to understand the diversity and richness of Islamic architecture. Field trip to the Metropolitan Museum of Art in New York. HU

SAST 280a / HIST 342a / RLST 180a, Mughal India, 1500–1800 Supriya Gandhi
Exploration of religion and the state in Mughal India, focusing on the period between 1500–1800. Topics include sacred sovereignty, orthodoxy, Sufism, vernacular literary and religious cultures, and the early colonial encounter. HU

* **SAST 306a / ANTH 322a / EVST 324a, Environmental Justice in South Asia**
Kalyanakrishnan Sivaramakrishnan

Study of South Asia's nation building and economic development in the aftermath of war and decolonization in the 20th century. How it generated unprecedented stress on natural environments; increased social disparity; and exposure of the poor and minorities to environmental risks and loss of homes, livelihoods, and cultural resources. Discussion of the rise of environmental justice movements and policies in the region as the world comes to grips with living in the Anthropocene. SO

* **SAST 323a / HIST 313Ja, British Raj and the Indian Nation (1757-1947)** Rohit De
Drawing on a wide genre of primary sources, this seminar explores the consolidation of British rule over the Indian subcontinent; the transformations brought about by colonial policies; the subsequent rise of resistance movements; the growth of mass nationalism and partition and independence. WR, HU

SAST 440b / AFAM 195b / PLSC 424b, Gandhi, King, and the Politics of Nonviolence
Karuna Mantena

A study of the theory and practice of nonviolent political action, as proposed and practiced by M. K. Gandhi and Martin Luther King, Jr. The origins of nonviolence in Gandhian politics and the Indian independence movement; Gandhian influences on the Civil Rights movement; King's development of nonviolent politics; the legacies and lessons for nonviolent politics today. SO

* **SAST 476b / ECON 483b, The Economics of India** Ray Fair

The history and contemporary status of India's economy, including policy debates and growth potential. The Indian economy during the colonial era, the period of Nehruvian socialism, and the subsequent crisis and reforms; modern industry, services, agriculture, and finance; the development of human capital in India through health and education programs. Case studies from current economic research. Prerequisites: intermediate microeconomics and econometrics. SO

* **SAST 486a, Directed Study** Staff

A one-credit, single-term course on topics not covered in regular offerings. To apply for admission, a student should present a course description and syllabus to the director of undergraduate studies, along with written approval from the faculty member who will direct the study.

Senior Essay Courses

* **SAST 491a, Senior Essay** Staff

A yearlong research project completed under faculty supervision and resulting in a substantial paper. Credit for SAST 491 only on completion of SAST 492. ½ Course cr

Southeast Asia Studies

Chair: Michael R. Dove, Kroon 134, 432-3463, michael.dove@yale.edu; program administrator: Kristine Mooseker, 311 LUCE, 432-3431, kristine.mooseker@yale.edu; cseas.yale.edu/

The Council on Southeast Asia Studies offers an interdisciplinary program that brings together faculty and students sharing an interest in Southeast Asia and contributes to the curriculum with language courses, a weekly seminar series, periodic conferences, cultural events, and special lectures. Yale maintains extensive library and research collections on Southeast Asia, including online archives of periodicals and newspapers from all parts of the region.

Yale does not offer a degree in Southeast Asia studies, but majors in any department may consult with Council faculty regarding a senior essay on a Southeast Asian topic, and in certain circumstances students who have a special interest in the region may consider a Special Divisional Major. Students interested in pursuing field research or language study in Southeast Asia may apply to the Council for summer fellowship support.

Courses featuring Southeast Asian content are offered within a variety of departments each year including Anthropology, Environmental Studies, History, History of Art, Music, Philosophy, Political Science, and the School of Forestry and Environmental Studies. A list of courses for the current year can be obtained through the Council office or departmental website.

Language instruction at all levels is offered in two Southeast Asian languages, Indonesian and Vietnamese. Other Southeast Asian languages may be available in any given year via video conference through the Yale Shared Course Initiative. Check the SEAS Language Studies page on the Southeast Asia Website for updated information. The Council on Southeast Asia Studies supports language tables and independent study in other Southeast Asian languages through the Directed Independent Language Study Program.

FACULTY ASSOCIATED WITH THE COUNCIL ON SOUTHEAST ASIA STUDIES

Professors Michael R. Dove (*Forestry & Environmental Studies*), J. Joseph Errington (*Anthropology*), Benedict Kiernan (*History*), James Scott (*Political Science*), Frederick Wherry (*Sociology*), Mimi Yiengpruksawan (*History of Art*)

Associate Professor Erik Harms (*Anthropology*)

Senior Lecturers Carol Carpenter (*Forestry & Environmental Studies, Anthropology*), Amity Doolittle (*Forestry & Environmental Studies*)

Curator Ruth Barnes (*Art Gallery*)

Senior Lector II Quang Phu Van

Senior Lector Indriyo Sukmono

Lector Dinny Risri Aletheiani

Indonesian Courses

* **INDN 110a, Elementary Indonesian I** Indriyo Sukmono

An introductory course in standard Indonesian with emphasis on developing communicative skills through a systematic survey of grammar and graded exercises. Credit only on completion of INDN 120. Enrollment limited to 15 per section. L1
1½ Course cr

* **INDN 120b, Elementary Indonesian II** Indriyo Sukmono

Continuation of INDN 110. Introduction to reading, leading to mastery of language patterns, essential vocabulary, and basic cultural competence. After INDN 110 or equivalent. Enrollment limited to 15 per section. L2 1½ Course cr

* **INDN 130a, Intermediate Indonesian I** Dinny Risri Aletheiani

Continued practice in colloquial Indonesian conversation and reading and discussion of texts. After INDN 120 or equivalent. Limited enrollment. L3 1½ Course cr

* **INDN 140b, Intermediate Indonesian II** Dinny Risri Aletheiani

Continuation of INDN 130. After INDN 130 or equivalent. Limited enrollment. L4
1½ Course cr

* **INDN 150a, Advanced Indonesian I** Indriyo Sukmono

Development of advanced fluency through discussion of original Indonesian sociohistorical, political, and literary texts and audiovisual sources. Extension of cultural understanding of Indonesia. Prerequisite: INDN 140 or equivalent. May not be taken after INDN 153. L5

* **INDN 160b, Advanced Indonesian II** Indriyo Sukmono

Continuation of INDN 150. Prerequisite: INDN 150 or equivalent. L5

* **INDN 170a, Advanced Indonesian: Special Topics** Dinny Risri Aletheiani

Continuation of INDN 160. Students advance their communicative competence in listening, speaking, reading, and writing. Use of Indonesian book chapters, Web pages, printed and electronic articles, social networking posts, newsgroups, and letters. Prerequisite: INDN 160.

* **INDN 180b, Research and Creative Project on Indonesia** Dinny Risri Aletheiani

Continuation of INDN 170. Advancement in students' competence in listening, speaking, reading, and writing. Reading materials include book chapters, Web sites, print and electronic articles, e-mail messages, blogs, and social networking posts. Prerequisite: INDN 170.

* **INDN 470a and INDN 471b, Independent Tutorial** Dinny Risri Aletheiani

For students with advanced Indonesian language skills who wish to engage in concentrated reading and research on material not otherwise offered in courses. The work must be supervised by an adviser and must terminate in a term paper or its equivalent. After INDN 160. Permission to enroll requires submission of a detailed project proposal and its approval by the program adviser.

Vietnamese Courses

VIET 110a, Elementary Vietnamese I Quang Phu Van

Students acquire basic working ability in Vietnamese, developing skills in speaking, listening, writing (Roman script), and reading. Discussion of aspects of Vietnamese

society and culture. Credit only on completion of VIET 120. Intended for students with no previous knowledge of Vietnamese. L1 1½ Course cr

VIET 120b, Elementary Vietnamese II Quang Phu Van

Continuation of VIET 110. L2 1½ Course cr

*** VIET 132a, Accelerated Vietnamese** Quang Phu Van

This course follows a community-based language model designed for heritage students or speakers who comprehend and speak informal Vietnamese on topics related to everyday situations but do not read or write Vietnamese. Study of interpersonal, interpretive, and presentational communicative modes, as well as standard foreign language education (communication, cultures, connections, comparisons, and communities). Students will engage with Vietnamese American communities in New Haven and beyond. Admits to VIET 140. L3

*** VIET 142b, Accelerated Vietnamese II** Quang Phu Van

An accelerated course designed for heritage students who wish to build a higher level of proficiency and develop sociocultural competence in speaking, reading, and writing. Topics include health care, rituals, community, linguistic landscape, education, mass communication, literature, history, values, and traditional and pop cultures. VIET 132 or equivalent. L4

VIET 150a, Advanced Vietnamese Quang Phu Van

Students improve their fluency and accuracy in Vietnamese and solidify their reading, writing, speaking, and listening skills. Topics include social, economic, and cultural practices, gender issues, notions of power, and taboo. Prerequisite: VIET 140 or equivalent. L5

VIET 220b / ER&M 209b / LITR 279b, Introduction to Vietnamese Culture, Values, and Literature Staff

Introduction to Vietnamese culture and values. Topics include cultural and national identity, aesthetics, the meaning of life, war, and death. Selected readings from Zen poems, folklore, autobiographies, and religious and philosophical writings. Course is taught in English and is an alternative to Western perspectives. Readings in translation. No previous knowledge of Vietnamese required. HU TR

*** VIET 470a and VIET 471b, Independent Tutorial** Quang Phu Van

For students with advanced Vietnamese language skills who wish to engage in concentrated reading and research on material not otherwise offered in courses. The work must be supervised by an adviser and must terminate in a term paper or its equivalent. Permission to enroll requires submission of a detailed project proposal and its approval by the program adviser.

Spanish

Director of undergraduate studies: Noël Valis, Rm. 216, 82–90 Wall St., 432-1157, noel.valis@yale.ed (noel.valis@yale.edu); language program director: Ame Cividanes, Rm. 210, 82–90 Wall St., 432-1159, ame.cividanes@yale.edu; span-port.yale.edu

The Department of Spanish and Portuguese provides instruction in the languages, literatures, and cultures of the Hispanic and Luso-Brazilian worlds. Courses in Portuguese and the requirements of the major are described under Portuguese (p. 642); the names of faculty teaching Portuguese courses are included in the faculty roster.

The major in Spanish is a liberal arts major that offers a wide range of courses in the language, literatures, and cultures of the twenty Spanish-speaking countries in Europe, Latin America, and the Caribbean. Today, Spanish is the second language of the United States, one of the three most widely spoken languages in the world, and one of the five diplomatic languages of the United Nations. The program in Spanish offers students the opportunity to acquire thorough linguistic proficiency as well as in-depth knowledge of both cultural and literary topics. The major explores literature, history, philosophy, art, and cultural studies, and provides excellent preparation for careers in law, diplomacy, medicine, business, the arts, academics, journalism, and education.

COURSE NUMBERING

Courses numbered SPAN 110–199 include beginning and intermediate language courses designed to help students develop fluency in understanding, speaking, reading, and writing Spanish. Courses numbered SPAN 200–299 seek to provide students with a broad but solid introduction to the fields of Hispanic literatures and cultures while strengthening their linguistic competence. Courses numbered 300–499 allow students to perfect their linguistic and critical skills through study of a specific problem or issue, e.g., a literary genre, a type of literary or cultural representation, or a specific writer or text. Students desiring more information about either language or literature offerings should consult the DUS.

PREREQUISITE

Prerequisite to the major is SPAN 140, 142, or 145, or the equivalent through advanced placement or study abroad. Equivalent preparation to SPAN 140, 142, or 145 may be demonstrated by the test scores indicated below under "Language Courses and Placement Procedures."

LANGUAGE COURSES AND PLACEMENT PROCEDURES

Students with no previous formal or informal Spanish study ordinarily enroll in SPAN 110. Students who take SPAN 110 are strongly encouraged to continue with 120 in the following term. Students wishing to take intensive beginning Spanish may, with the instructor's permission, enroll in SPAN 125, which covers the same material as SPAN 110 and 120, but in one term. SPAN 132 and 142 are designed for heritage speakers and are available only to them. Admission to SPAN 132 and 142 is based on results of the departmental placement examination; interested students should contact the instructor.

All students, including native speakers, who have previously studied Spanish formally or informally must take the departmental placement examination in order to enroll in a Spanish course. The only exception to this rule is made for students who have demonstrated advanced ability in the language by 1) receiving a score of 5 on either of the Spanish Advanced Placement tests, 2) receiving a score of 6 or 7 on the Advanced-Level International Baccalaureate examination, or 3) attaining a proficiency level of C1 in the Common European Framework of Reference for Languages. These students may enroll directly in any L5 course.

Information about the departmental placement examination and about preregistration procedures for Spanish L1–L4 language courses is available on the departmental website.

REQUIREMENTS OF THE MAJOR

The major for the Class of 2022 and subsequent classes A maximum of one course taught in English may be counted toward the major requirements. With DUS approval, students who declared their major under previous requirements may also avail themselves of this change.

Beyond the prerequisite, ten term courses numbered SPAN 200 or higher are required, five of which must be numbered SPAN 300 or higher. SPAN 491, The Senior Essay, counts as one of the ten required courses. A maximum of one course may be numbered SPAN 200–230. First-year seminars taught in Spanish count toward the major in the SPAN 231–299 range.

Intensive major Students in the intensive major fulfill the requirements for the standard major, and take an additional two courses numbered SPAN 300 or higher.

SENIOR REQUIREMENT

Seniors write the senior essay in SPAN 491 in the spring of their senior year under the individual direction of a faculty adviser. Students expecting to complete their degree requirements in December write the senior essay in SPAN 491 in the fall of their senior year. Seniors in SPAN 491 are expected to submit their completed essay to the DUS at 82–90 Wall Street by 4 p.m. on December 7 in the fall term, or by 4 p.m. on April 19 in the spring term. If the essay is submitted late without an excuse from the student's residential college dean, the penalty is one letter grade, though no essay that would otherwise pass will be failed because it is late.

ADVISING

Two majors Students electing Spanish as one of two majors should consult the DUS about a specialized course of study.

Courses in the Graduate School Juniors and seniors majoring in Spanish may, with permission of the instructor and the director of graduate studies, enroll in graduate literature courses in Spanish. A list of pertinent graduate courses is available at the office of the DUS.

STUDY ABROAD

Students at the intermediate level of language study are encouraged to apply to the eight-week summer language courses offered by Yale Summer Session in New Haven and Bilbao, Spain. Advanced students may apply for the five-week Yale Summer

Session course offered in Valencia, Spain. More information about these programs is available on the Yale Summer Session Website. For information about the Year or Term Abroad program, see under Special Arrangements (p. 64) in the Academic Regulations. Students who wish to count courses taken abroad toward the major should consult with the DUS before going abroad.

REQUIREMENTS OF THE MAJOR

Prerequisite 1 from SPAN 140, 142, 145, or equivalent

Number of courses 10 term courses (including senior requirement)

Distribution of courses 10 term courses numbered SPAN 200 or higher, 5 of which are numbered SPAN 300 or higher; max of one course numbered SPAN 200–230; max of one SPAN course taught in English with DUS approval

Senior requirement Senior essay (SPAN 491)

Intensive major 2 addtl courses numbered SPAN 300 or higher, totaling 12 term courses

FACULTY OF THE DEPARTMENT OF SPANISH AND PORTUGUESE

Professors Rolena Adorno, Howard Bloch (*Chair*), Roberto González Echevarría, Aníbal González, K. David Jackson, Noël Valis

Associate Professor Leslie Harkema

Senior Lectors II Sybil Alexandrov, Margherita Tortora, Sonia Valle

Senior Lectors I María Pilar Asensio-Manrique, Mercedes Carreras, Ame Cividanes, Sebastián Díaz, María de la Paz García, María Jordán, Rosamaría León, Juliana Ramos-Ruano, Lissette Reymundi, Lourdes Sabé-Colom, Virginia Santos, Terry Seymour

Lecturers Marina Henriques Gomes de Andrade, Carolina Baffi, Deborah K. Symons Roldán, Giseli Tordin, María M. Vázquez

Courses

* **SPAN 060a, First-Year Colloquium: Literary Studies in Spanish** Noël Valis

Introduction to the study of literature in general and to some of the most important texts in Hispanic literature. Selected texts in Spanish include short stories, essays, lyric, and theater. Open to students who have placed into L₅ courses. Counts toward the requirements of the Spanish major with permission of the director of undergraduate studies. Enrollment limited to first-year students. Preregistration required; see under First-Year Seminar Program. L₅, HU

* **SPAN 110a, Elementary Spanish I** Staff

For students who wish to begin study of the Spanish language. Development of basic skills in understanding, speaking, reading, and writing through a functional approach to the teaching of Spanish grammar. Includes an introduction to the cultures (traditions, art, literature, music) of the Spanish-speaking world. Audiovisual materials are incorporated into class sessions. Conducted in Spanish. To be followed immediately by SPAN 120. Credit only on completion of SPAN 120. L₁ RP 1½ Course cr

SPAN 120a, Elementary Spanish II Staff

Further development of understanding, speaking, reading, and writing skills. Class sessions incorporate short authentic texts in Spanish, audiovisual materials, and film.

Cultural topics of the Spanish-speaking world (traditions, art, literature, music) are included. Conducted in Spanish. After SPAN 110 or in accordance with placement results. Admits to SPAN 130 or 145. L2 RP 1½ Course cr

*** SPAN 125a, Intensive Elementary Spanish** Staff

An intensive beginning course in spoken and written Spanish that covers the material of SPAN 110 and 120 in one term. Conducted in Spanish. Admits to SPAN 130 or 145. Not open to students who have completed SPAN 110 or 120. L1, L2 RP 2 Course cr

SPAN 130a, Intermediate Spanish I Staff

Development of language proficiency in listening, speaking, reading, and writing through communicative activities rather than a sequence of linguistic units. Authentic Spanish language texts, films, and videos serve as the basis for the functional study of grammar and the acquisition of a broader vocabulary. Cultural topics are presented throughout the term. Conducted in Spanish. Admits to SPAN 140. L3 RP 1½ Course cr

*** SPAN 132a, Spanish for Heritage Speakers I** Sybil Alexandrov

A language course designed for students who have been exposed to Spanish—either at home or by living in a Spanish-speaking country—but who have little or no formal training in the language. Practice in all four communicative skills (comprehension, speaking, reading, writing), with special attention to basic grammar concepts, vocabulary building, and issues particular to heritage speakers. Admission in accordance with placement results. L3

SPAN 140a, Intermediate Spanish II Staff

Continuation of SPAN 130. Development of increased proficiency in the four language skills. Greater precision in grammar usage, vocabulary enrichment, and expanded cultural awareness are achieved through communicative activities based on authentic Spanish-language texts, including a short novel. Conducted in Spanish. Admits to L5 courses. L4 RP 1½ Course cr

SPAN 150a, Advanced Oral and Written Communication in Spanish Staff

Instruction in refining reading, writing, aural, and oral skills. Students reach proficiency at the advanced high level (according to ACTFL guidelines) in the four language skills of listening, speaking, reading, and writing. Conducted in Spanish. Open to heritage speakers placed at the L5 level. Can count toward the major at the discretion of the DUS. Prerequisite: SPAN 140 or 145, or in accordance with placement results. L5 RP

*** SPAN 222a / LAST 222a, Legal Spanish** Mercedes Carreras

An introduction to Spanish and Latin American legal culture with a focus on the specific traits of legal language and on the development of advanced language competence. Issues such as human rights, the death penalty, the jury, contracts, statutory instruments, and rulings by the constitutional courts are explored through law journal articles, newspapers, the media, and mock trials. Enrollment limited to 18. A maximum of one course in the 200-230 range may count as an elective toward the Spanish major. L5

* **SPAN 223a / LAST 223a, Spanish in Film: An Introduction to the New Latin American Cinema** Margherita Tortora

Development of proficiency in Spanish through analysis of critically acclaimed Latin American films. Includes basic vocabulary of film criticism in Spanish as well as discussion and language exercises. Enrollment limited to 18. L5

* **SPAN 227a / LAST 227a, Creative Writing** Staff

An introduction to the craft and practice of creative writing (fiction, poetry, and essays). Focus on the development of writing skills and awareness of a variety of genres and techniques through reading of exemplary works and critical assessment of student work. Emphasis on the ability to write about abstract ideas, sentiments, dreams, and the imaginary world. Enrollment limited to 18. A maximum of one course in the 200–230 range may count as an elective toward the Spanish major. L5

* **SPAN 243a / LAST 243a, Advanced Spanish Grammar** Staff

A comprehensive, in-depth study of grammar intended to improve students' spoken and written command of Spanish. Linguistic analysis of literary selections; some English-to-Spanish translation. Enrollment limited to 18. L5

* **SPAN 266a / LAST 266a, Studies in Latin American Literature I** Rolena Adorno

Origins of Latin American literary tradition from preconquest Aztec poetry to Baroque poetry of the seventeenth century. Study of works that helped define the future Latin America, from the Caribbean, to Mexico, and to the Andes of South America. Readings from the works of fifteenth century Texcocan poet, prince Nezahualcoyotl, through to seventeenth century Mexican Baroque poet, Sor Juana Inés de la Cruz. L5, HU

SPAN 267b / LAST 267b, Studies in Latin American Literature II Rolena Adorno

An introduction to Latin American literature from the nineteenth century to the present. Works by Borges, García Márquez, Paz, Neruda, Cortázar, and others. L5, HU

* **SPAN 282b / JDST 282b / LITR 437b / RLST 238b, Judeo-Spanish Culture, Language, and Literature** Allyson Gonzalez

This course explores the rich body of culture, language, and literature that emerged in the Sephardi (Judeo-Spanish) diaspora following the expulsion of Jews from Iberia in 1492, and continuing to the present. This course is taught in English. TR HU

* **SPAN 324b, Lorca: Poetry and Plays** Noël Valis

A reading of several Lorca plays and selected poetry and an examination of the Lorca legend. Topics include Lorca's place in Spanish and world literature; myths and realities of Lorca as a cultural icon; sexuality and gender in the plays and poetry; and social issues and aesthetic practices. Open to students who have placed into L5 courses or who have successfully completed an L4 course in Spanish. Counts toward the Spanish major. L5, HU

* **SPAN 355a, Truth to Power: Introduction to Roberto Bolaño** Aníbal González Perez

Readings of the poetry, short stories, novellas, novels, and essays of the Chilean-Mexican author (1953–2003), regarded as a founding figure of early 21st-century Spanish American narrative. Topics explored include: issues of truth and reality; ethics; materiality; self-fictionalization; post-nationalism; gender; Bolaño's politics; humor; fractals; and narrative. Prerequisite: L5 competency in Spanish. L5, HU

* **SPAN 387a / LITR 287a, The Borges Effect** Roberto González Echevarría
 Study of the decisive influence of Jorge Luis Borges on literature and literary theory; his recognizable and often acknowledged presence in the work of novelists and short-story writers, as well as in that of philosophers and literary theorists. A Borges "effect" is studied in the works of John Barth, Julio Cortázar, Gabriel García Márquez, Italo Calvino, and Umberto Eco, and in Maurice Blanchot, Michel Foucault, Gérard Genette, and Jacques Derrida, among others. Class discussions in English and readings in English or the French, Spanish or Italian originals. HU

* **SPAN 388a / LITR 304a, Law and Literature in Modern Latin America** Roberto González Echevarría

A study of major modern narrative works in Latin America from the independence and post-independence period in the nineteenth century to the age of drug trafficking and the AIDS epidemic today. The course begins with the Cuban Cirilo Villaverde's antislavery novel *Cecilia Valdés* (1880), moves on to the regionalist classic *Doña Bárbara* (1929) by the Venezuelan Rómulo Gallegos, and the dictator novel *El señor presidente* (1946) by the Guatemalan Miguel Ángel Asturias; peaks with Gabriel García Márquez's total novel *Cien años de soledad* (1967), and finishes with the Colombian's Fernando Vallejo's *La virgen de los sicarios* (1994) and the Mexican Mario Bellatin's *Salón de Belleza* (2009). The course follows the thematics of the law, particularly Roman Law, and the way in which the characters are controlled or driven by civil and criminal law issues that constitute the plots of the novels. Prerequisite: SPAN 140, 142, 145 or equivalent. L5, HU

* **SPAN 392b / LAST 391b / LITR 289b, Literature of the Americas, North and South** Rolena Adorno

Readings of U.S. and Latin American short stories and novels to explore related themes and narrative structures. Topics include the literary dialogue between Anglo and Latin American writers and their comparative treatments of history, myth, memory, and war. Paired readings of Poe and Cortázar; Bierce and Fuentes; Crane and Borges; and Faulkner's *Absalom, Absalom!* and García Márquez's *One Hundred Years of Solitude*. Conducted in English; a section in Spanish available depending on demand. Readings of Latin American texts in Spanish for Spanish and Literature majors. Prerequisite: SPAN 140, 142, 145, or equivalent. HU

* **SPAN 478a and SPAN 479b, Directed Readings and/or Individual Research** Noël Valis

Individual study under faculty supervision. The student must submit a bibliography and a written plan of study approved by the faculty adviser to the director of undergraduate studies. No reading or research course credit is granted without prior approval from the director of undergraduate studies. The student must meet with the instructor at least one hour a week. A final examination or essay is required.

* **SPAN 491a or b, The Senior Essay** Noël Valis

A research project completed under faculty supervision and resulting in a paper of considerable length, in Spanish.

Special Divisional Majors

Director of undergraduate studies: Sarah Mahurin, Dean's Office TD, 432-0754, sarah.mahurin@yale.edu

A Special Divisional Major affords an alternative for students whose academic interests cannot be met by an existing departmental or special major. Students may, with the approval of the Committee on Honors and Academic Standing, design majors of their own in consultation with members of the faculty and in accordance with the procedures outlined below.

Special Divisional Majors differ so widely in content that there is no uniform format, but two patterns prevail. Some majors combine two disciplines (e.g., music and English, religious studies and anthropology), while others draw from several departments to focus on a particular culture, period, or problem (e.g., French studies, medieval studies, urban studies). Students interested in pursuing a Special Divisional Major in Renaissance studies should visit the Renaissance Studies program website. A Special Divisional Major may not be offered as one of two majors.

Students considering a Special Divisional Major should be aware of its particular demands and risks. They face the challenges of interdisciplinary work and must grapple with the conceptual processes of disparate disciplines. They must establish criteria for selecting courses and organize their courses in order to obtain an adequate base in the fields necessary for advanced work on a specific topic.

Students in a Special Divisional Major may get little help in designing their programs. Because they are in separate, independent programs, they forfeit some of the services normally provided as part of a departmental or special major. They must, for example, find their own advisers. They need to ask the help of faculty members already committed to other departments and programs who may not share their interdisciplinary interests. They must acquire the necessary background and sustain their interest without the help of any special seminar. They may lose other advantages of departmental affiliation, such as priority for acceptance in restricted-enrollment courses, opportunities to meet students and faculty members with similar interests, and participation in a program easily understood by graduate schools and others. Their transcripts will carry only the notation "Special Divisional Major," without specifying the student's field of concentration.

Before applying for a Special Divisional Major, students are urged to consult the directors of undergraduate studies in their fields of major interest, who can advise them whether a Special Divisional Major is necessary. Special interests can usually be accommodated within an existing major.

PREREQUISITES

Because of the variety of programs, there are no uniform prerequisites. All students must satisfy their prospective advisers and the committee that they have obtained adequate preparation for the advanced courses and senior projects they propose.

REQUIREMENTS OF THE MAJOR

The major ordinarily comprises at least twelve advanced term courses and a senior project. Advanced courses include all but prerequisites for majors, beginning language

courses, and comparable courses. When appropriate, approval is granted for graduate courses, tutorials, and residential college seminars. No distinction is made in the Special Divisional Major between standard and intensive majors.

The director of undergraduate studies in the Special Divisional Major presents proposals for the major to the Committee on Honors and Academic Standing. General problems connected with a student's program may be discussed with the director of undergraduate studies. Students who revise their original proposal or change faculty advisers must obtain the committee's approval. The committee advises the Yale College Faculty whether or not the student has completed a major and may not be able to recommend students for the degree who have changed their programs without proper consultation.

Credit/D/Fail Courses taken Credit/D/Fail may not be counted toward the major.

SENIOR REQUIREMENT

No later than midterm of their seventh term of enrollment, and after consultation with their faculty advisers, students provide the committee with an outline of their plans for the senior project. There are several options: a written or oral examination, a senior essay or project, or, in some circumstances, a graduate course or a tutorial. A senior essay usually offers the most effective means of integrating material from more than one discipline, and students in a Special Divisional Major typically request one course credit in each term of the senior year in SPEC 491, 492, The Senior Project.

Students who offer a yearlong senior project must, in order to continue the course into the second term, provide their advisers with substantial written evidence of their progress (i.e., a draft or detailed outline) by the end of their seventh term. The project must be completed no later than two weeks before the last day of classes in the student's eighth term of enrollment. At least two faculty members evaluate it.

ADVISING AND APPLICATION TO THE MAJOR

Advisers Candidates must arrange for faculty advisers before applying. Directors of undergraduate studies or department chairs can usually suggest advisers. The committee expects each student to obtain a primary adviser from the department that forms the principal component of the major, as well as one or more adjunct advisers from other fields. The primary adviser must be a regular member of the Yale College faculty. Members of the faculties of other schools of the University and visiting faculty members may serve as adjunct advisers.

Both advisers and students assume special responsibilities when designing and completing a major that falls outside existing programs. The special nature of the program and the student's loss of departmental affiliation make it particularly important for the faculty adviser to meet regularly with the student to help plan the program and to supervise its completion, including the senior project.

The primary adviser assumes chief responsibility for reporting the student's progress to the Committee and for assigning a grade to the senior project. The primary adviser also consults the student's other advisers and works with them in directing, evaluating, and grading the senior project.

Application Students considering a Special Divisional Major are invited to talk with directors of undergraduate studies and with their residential college deans at any stage

in their planning. Candidates may apply for admission as early as their fourth term of enrollment, but must have done so no later than one month after their seventh term of enrollment begins. The committee's experience suggests that the last term of the sophomore or the first term of the junior year is the best time to apply.

Lucidity, coherence, and completeness in an application are of primary importance to a student's candidacy, since they are indications of a thoughtfully prepared program of study and of the qualities of eagerness and initiative essential to a successful Special Divisional Major. The committee expects that applicants will have worked in close collaboration with the director of undergraduate studies of the Special Divisional Major in developing their proposals, and it will normally view failure to do so as grounds for rejection of the application.

Application forms are available at the Timothy Dwight College Dean's Office. They are submitted, along with letters of support from faculty advisers, to the Committee on Honors and Academic Standing, in care of the Timothy Dwight College Dean's Office. The Committee meets to consider proposals several times a year. All students in good standing are eligible, although the committee must be satisfied that candidates have particular aptitude and preparation for the work they propose.

In approving or rejecting proposals for a Special Divisional Major, the committee looks principally at the quality of the student's planning. What are the objectives of the program? What are the principles for selecting courses and organizing material? Is the program comparable in breadth and depth to other majors in Yale College? What provisions have been made to guide and evaluate the student's progress? What sort of senior project would focus and integrate the program? Finally, are the objectives of the program best served by a Special Divisional Major? The committee will not approve a major if the student can accomplish the desired aims in an existing major; the committee may consult directors of undergraduate studies and other faculty members to judge whether or not this is the case.

REQUIREMENTS OF THE MAJOR

Prerequisite Approval of 2 faculty advisers and Committee on Honors and Academic Standing

Number of courses 13 term courses (incl one-term senior essay) or 14 term courses (incl two-term senior essay)

Distribution of courses Advanced courses in 2 or more appropriate depts; grad courses, college sems, or tutorials with DUS permission

Senior requirement Senior essay or project (SPEC 491 and/or 492), or, with DUS permission, written or oral exam, grad course, or tutorial

Statistics and Data Science

Directors of undergraduate studies: Sekhar Tatikonda, Rm. 338, 17 Hillhouse Ave., 432-4714, sekhar.tatikonda@yale.edu; statistics.yale.edu

Statistics is the science and art of prediction and explanation. The mathematical foundation of statistics lies in the theory of probability, which is applied to problems of making inferences and decisions under uncertainty. Practical statistical analysis also uses a variety of computational techniques, methods of visualizing and exploring data, methods of seeking and establishing structure and trends in data, and a mode of questioning and reasoning that quantifies uncertainty. Data science expands on statistics to encompass the entire life cycle of data, from its specification, gathering, and cleaning through its management and analysis, to its use in making decisions and setting policy. It is a natural outgrowth of statistics that incorporates advances in machine learning, data mining, and high-performance computing, along with domain expertise in the social sciences, natural sciences, engineering, management, medicine, and digital humanities.

Students majoring in Statistics and Data Science take courses in both mathematical and practical foundations. They are also encouraged to take courses in the discipline areas listed below.

The B.A. in Statistics and Data Science is designed to acquaint students with fundamental techniques in the field. The B.S. prepares students to participate in research efforts or to pursue graduate school in the study of Data Science.

Requirements of the Statistics Major for the Class of 2019 With DUS approval, the following changes to the requirements of the major may be fulfilled by students who declared their major under previous requirements.

Requirements of the Statistics and Data Science Major for the Class of 2020 and subsequent classes The requirements of the new Statistics and Data Science major are indicated below.

COURSES FOR NONMAJORS AND MAJORS

S&DS 100 and S&DS 101 through 109 only assume knowledge of high-school mathematics. Students who complete one of these courses should consider taking S&DS 230. This sequence provides a solid foundation for the major. Other courses for non-majors include S&DS 110 and 160.

PREREQUISITES

Multivariable calculus and linear algebra are required and should be taken before or during the sophomore year. This requirement may be satisfied by one of MATH 120, ENAS 151, MATH 230, or the equivalent.

REQUIREMENTS OF THE MAJOR

Students who wish to major in Statistics and Data Science are encouraged to take S&DS 220. But, students may also enter the major by taking a 100-level course followed by S&DS 230. Students should complete the calculus prerequisite and linear algebra requirement as early as possible, as they provide mathematical background that is required in many courses.

B.A. degree program The B.A. degree program requires eleven courses, ten of which are from the seven discipline areas described below: MATH 222 or 225 from Mathematical Foundations and Theory; two courses from Core Probability and Statistics; two courses that provide Computational Skills; two courses on Methods of Data Science; and three courses from any of the discipline areas. The remaining course is fulfilled through the senior requirement.

B.S. degree program The B.S. degree program requires fourteen courses, including all the requirements for the B.A. degree as well as S&DS 242, which counts as one of the required courses from Core Probability and Statistics. The two remaining courses may be chosen from Core Probability and Statistics; Computational Skills; Methods of Data Science; Mathematical Foundations and Theory; or Efficient Computation and Big Data discipline areas.

Discipline Areas The seven discipline areas are listed below.

Core Probability and Statistics These are essential courses in probability and statistics. Every major should take at least two of these courses, and should probably take more. Students completing the B.S. degree must take S&DS 242. Examples of such courses include: S&DS 238, 241, 242, 312, 351

Computational Skills Every major should be able to compute with data. While the main purpose of some of these courses is not computing, students who have taken at least two of these courses will be capable of digesting and processing data. While there are other courses that require more programming, at least two courses from the following list are essential. Examples of such courses include: S&DS 220 or 230; 262, 425, CPSC 100 or 112, or ENAS 130 (substitution of CPSC 201 or 223 is permitted)

Methods of Data Science These courses teach fundamental methods for dealing with data. They range from practical to theoretical. Every major must take at least two of these courses. Examples of such courses include: S&DS 313, 361, 363, 365, 430, 468, EENG 400, CPSC 477

Mathematical Foundations and Theory All students in the major must know linear algebra as taught in MATH 222 or 225. Students who have learned linear algebra through other courses (such as MATH 230, 231) may substitute another course from this category. Students pursuing the B.S. degree must take at least two courses from this list and those students contemplating graduate school should take additional courses from this list as electives. Examples of such courses include: S&DS 364, 400, 410, 411, CPSC 365, 366, 469, MATH 222, 225, 244, 250, 260, 300, or 301

Efficient Computation and Big Data These courses are for students focusing on programming or implementation of large-scale analyses and are not required for the major. Students who wish to work in the software industry should take at least one of these. Examples of such courses include: CPSC 223, 323, 424, 437

Data Science in Context Students are encouraged to take courses that involve the study of data in application areas. Students learn how data are obtained, how reliable they are, how they are used, and the types of inferences that can be made from them. These course selections should be approved by the DUS. Examples of such courses

include: ANTH 376, EVST 362, GBLB 191, 195, LING 229, 234, 380, PLSC 454, PSYC 258

Methods in Application Areas These are methods courses in areas of applications. They help expose students to the cultures of fields that explore data. These course selections should be approved by the DUS. Examples of such courses include: CPSC 453, 470, 475, ECON 136, 420, EENG 445, S&DS 352, LING 227

Substitution Some substitution, particularly of advanced courses, may be permitted with DUS approval.

Credit/D/Fail A maximum of one course taken Credit/D/Fail may be counted toward the requirements of the major, with permission of the DUS.

SENIOR REQUIREMENT

Students in both the B.A. degree program and B.S. degree program complete the senior requirement by taking a capstone course (S&DS 425) or an individual research project. Research projects include S&DS 490, S&DS 491, or S&DS 492, and must be advised by a member of the department of Statistics and Data Science or by a faculty member in a related discipline area. Students must complete a research project to be eligible for Distinction in the Major.

ADVISING

Statistics and Data Science can be taken either as a primary major or as one of two majors, in consultation with the DUS. Appropriate majors to combine with Statistics and Data Science include programs in the social sciences, natural sciences, engineering, computer science, or mathematics. A Statistics concentration is also available within the Applied Mathematics major.

REQUIREMENTS OF THE MAJOR

Prerequisites *Both degrees* – MATH 120, ENAS 151, MATH 230, or equivalent

Number of courses *B.A.* – 11 term courses beyond prereqs (incl senior req); *B.S.* – 14 term courses beyond prereqs (incl senior req)

Specific courses required *B.A.* – MATH 222 or 225; *B.S.* – same, plus S&DS 242

Distribution of courses *B.A.* – 2 courses from Core Probability and Statistics, 2 courses from Computational Skills, 2 courses from Methods of Data Science, and 3 electives chosen from any discipline area with DUS approval; *B.S.* – same, plus 2 additional electives from any discipline area (except Data Science in Context and Methods in Application Areas) with DUS approval

Substitution permitted With DUS approval

Senior requirement *Both degrees* – Senior Seminar (S&DS 490) or Senior Project (S&DS 491 or S&DS 492) or Statistical Case Studies (S&DS 425)

FACULTY OF THE DEPARTMENT OF STATISTICS AND DATA SCIENCE

Professors †Donald Andrews (*Economics*), Andrew Barron, Joseph Chang, Katarzyna Chawarska (*Child Study Center*), Xiaohong Chen (*Economics*), Nicholas Christakis (*Sociology*), Ronald Coifman (*Mathematics*), James Duncan (*Radiology & Biomedical Imaging*), John Emerson (*Adjunct*), Debra Fischer (*Astronomy*), Alan Gerber (*Political Science*), Mark Gerstein (*Molecular Biophysics & Biochemistry*), John Hartigan (*Emeritus*), †Theodore Holford (*Public Health & Biostatistics*), Edward Kaplan (*School*

of Management & Operations Research), Harlan Krumholz (*Internal Medicine*), John Lafferty, †Peter Phillips (*Economics*), David Pollard, Daniel Spielman (*Acting Chair*), Hemant Tagare (*Radiology & Biomedical Engineering*), Van Vu (*Mathematics*), †Heping Zhang (*Public Health & Biostatistics*), †Hongyu Zhao (*Public Health & Biostatistics*), Steven Zucker (*Computer Science*)

Associate Professors Peter Aronow (*Political Science*), Donald Lee (*School of Management & Operations*), Sekhar Tatikonda

Assistant Professors Timothy Armstrong (*Economics*), Jessi Cisewski, Amin Karbasi (*Electrical Engineering*), Vahideh Manshadi (*School of Management & Operations*), Sahand Negahban, Fredrik Savje (*Political Science*), Yihong Wu

Senior Lecturer Jonathan Reuning-Scherer

Lecturers Russell Barbour, William Brinda, Derek Feng, Winston Lin, Susan Wang

†A joint appointment with primary affiliation in another department or school.

S&DS 101–106, Introduction to Statistics and Data Science

A basic introduction to statistics, including numerical and graphical summaries of data, probability, hypothesis testing, confidence intervals, and regression. Each course in this group 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 of classes are attended by all students in S&DS 101–106 together, as general concepts and methods of statistics are developed. The remaining weeks are divided into field-specific sections that 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. No prerequisites beyond high school algebra. May not be taken after S&DS 100 or 109.

Students enrolled in S&DS 101–106 who wish to change to S&DS 109, or those enrolled in S&DS 109 who wish to change to S&DS 101–106, must submit a course change notice, signed by the instructor, to their residential college dean by Monday, October 2. The approval of the Committee on Honors and Academic Standing is not required.

S&DS 101a / E&EB 210a, Introduction to Statistics: Life Sciences Jonathan Reuning-Scherer and Walter Jetz

Statistical and probabilistic analysis of biological problems, presented with a unified foundation in basic statistical theory. Problems are drawn from genetics, ecology, epidemiology, and bioinformatics. QR

S&DS 102a / EP&E 203a / PLSC 452a, 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. QR

S&DS 103a / EP&E 209a / PLSC 453a, 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. QR

S&DS 105a, Introduction to Statistics: Medicine Jonathan Reuning-Scherer

Statistical methods used in medicine and medical research. Practice in reading medical literature competently and critically, as well as practical experience performing statistical analysis of medical data. QR

Courses in Statistics and Data Science

S&DS 100b, Introductory Statistics Staff

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. May not be taken after S&DS 101–106 or 109. QR

S&DS 109a, Introduction to Statistics: Fundamentals Jonathan Reuning-Scherer

General concepts and methods in statistics. Meets for the first half of the term only. May not be taken after S&DS 100 or 101–106. ½ Course cr

[S&DS 110, An Introduction to R for Statistical Computing and Data Science]

S&DS 123b / S&DS 523b, YData: An Introduction to Data Science Jessica Cisewski and Staff

Computational, programming, and statistical skills are no longer optional in our increasingly data-driven world; these skills are essential for opening doors to manifold research and career opportunities. This course aims to dramatically enhance knowledge and capabilities in fundamental ideas and skills in data science, especially computational and programming skills along with inferential thinking. YData is an introduction to Data Science that emphasizes the development of these skills while providing opportunities for hands-on experience and practice. YData is accessible to students with little or no background in computing, programming, or statistics, but is also engaging for more technically oriented students through extensive use of examples and hands-on data analysis. Python 3, a popular and widely used computing language, is the language used in this course. The computing materials will be hosted on a special purpose web server. QR

*** S&DS 160b / AMTH 160b / MATH 160b, The Structure of Networks** Staff

Network structures and network dynamics described through examples and applications ranging from marketing to epidemics and the world climate. Study of social and biological networks as well as networks in the humanities. Mathematical graphs provide a simple common language to describe the variety of networks and their properties. QR

S&DS 220b, Introductory Statistics, Intensive Xiaofei Wang

Introduction to statistical reasoning 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 taught and used extensively, as well as application of

statistical concepts to analysis of real-world data science problems. MATH 115 is helpful, but not a required. QR

S&DS 230a 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. Prerequisite: a 100-level Statistics course or equivalent, or with permission of instructor. QR

S&DS 238a, Probability and Statistics Joseph Chang

Fundamental principles and techniques of probabilistic thinking, statistical modeling, and data analysis. Essentials of probability, including conditional probability, random variables, distributions, law of large numbers, central limit theorem, and 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 for calculations, simulations, and analysis of data. After MATH 118 or 120. QR

S&DS 241a / MATH 241a, Probability Theory Yihong Wu

Introduction to probability theory. Topics include probability spaces, random variables, expectations and probabilities, conditional probability, independence, discrete and continuous distributions, central limit theorem, Markov chains, and probabilistic modeling. After or concurrently with MATH 120 or equivalent. QR

S&DS 242b / MATH 242b, Theory of Statistics Andrew Barron

Study of the principles of statistical analysis. Topics include maximum likelihood, sampling distributions, estimation, confidence intervals, tests of significance, regression, analysis of variance, and the method of least squares. Some statistical computing. After S&DS 241 and concurrently with or after MATH 222 or 225, or equivalents. QR

S&DS 262a / AMTH 262a / CPSC 262a, Computational Tools for Data Science Staff

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, programming. Prerequisites: after or concurrently with MATH 222, 225, or 231; after or concurrently with MATH 120, 230, or ENAS 151; after or concurrently with CPSC 100, 112, or ENAS 130. QR

S&DS 312a, Linear Models Winston Lin

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. After S&DS 242 and MATH 222 or 225. QR

S&DS 351b / EENG 434b / ENAS 496b / MATH 251b, Stochastic Processes Yihong Wu

Introduction to the study of random processes including linear prediction and Kalman filtering, Poisson counting process and renewal processes, Markov chains, branching processes, birth-death processes, Markov random fields, martingales, and random walks. Applications chosen from communications, networking, image reconstruction,

Bayesian statistics, finance, probabilistic analysis of algorithms, and genetics and evolution. Prerequisite: S&DS 241 or equivalent. QR

S&DS 361b / AMTH 361b, Data Analysis Staff

Selected topics in statistics explored through analysis of data sets using the R statistical computing language. Topics include linear and nonlinear models, maximum likelihood, resampling methods, curve estimation, model selection, classification, and clustering. After S&DS 242 and MATH 222 or 225, or equivalents. QR

S&DS 363b, Multivariate Statistics for Social Sciences Jonathan Reuning-Scherer
Introduction to the analysis of multivariate data as applied to examples from the social sciences. Topics include principal components analysis, factor analysis, cluster analysis (hierarchical clustering, k-means), discriminant analysis, multidimensional scaling, and structural equations modeling. Extensive computer work using either SAS or SPSS programming software. Prerequisites: knowledge of basic inferential procedures and experience with linear models. QR

S&DS 364b / AMTH 364b / EENG 454b, Information Theory Andrew Barron
Foundations of information theory in communications, statistical inference, statistical mechanics, probability, and algorithmic complexity. Quantities of information and their properties: entropy, conditional entropy, divergence, redundancy, mutual information, channel capacity. Basic theorems of data compression, data summarization, and channel coding. Applications in statistics and finance. After STAT 241. QR

S&DS 365a or b, Applied Data Mining and Machine Learning Staff

Techniques for data mining and machine learning from both statistical and computational perspectives, including support vector machines, bagging, boosting, neural networks, and other nonlinear and nonparametric regression methods. Discussion includes 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 to apply them to data. After S&DS 242. QR

S&DS 400b / MATH 330b, Advanced Probability Sekhar Tatikonda

Measure theoretic probability, conditioning, laws of large numbers, convergence in distribution, characteristic functions, central limit theorems, martingales. Some knowledge of real analysis assumed. QR

S&DS 410a, Statistical Inference Zhou Fan

A systematic development of the mathematical theory of statistical inference covering methods of estimation, hypothesis testing, and confidence intervals. An introduction to statistical decision theory. Prerequisite: level of S&DS 241.

* **S&DS 425b, 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 statistical software. Prerequisites: prior course work in probability and statistics, and a data analysis course at the level of STAT 361, 363, or 365 (or STAT 220, 230 if supported by other course work). QR

*** S&DS 430a / AMTH 437a / ECON 413a / EENG 437a, 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. Prerequisites: MATH 120 and 222, or equivalents. May not be taken after AMTH 237. QR

*** S&DS 480a or b, Individual Studies** Staff

Directed individual study for qualified students who wish to investigate an area of statistics not covered in regular courses. A student must be sponsored by a faculty member who sets the requirements and meets regularly with the student. Enrollment requires a written plan of study approved by the faculty adviser and the director of undergraduate studies.

[S&DS 490, Senior Seminar and Project]**S&DS 491a and S&DS 492b, Senior Project** Sekhar Tatikonda

Individual research that fulfills the senior requirement. Requires a faculty adviser and DUS permission. The student must submit a written report about results of the project.

GRADUATE COURSES OF PARTICULAR INTEREST TO UNDERGRADUATES

Courses in the Graduate School are open to qualified undergraduates. Descriptions of graduate courses in Statistics & Data Science are available on the departmental website. Permission of the instructor and of the director of graduate studies is required.

Study of the City

Courses

* **STCY 176b / ARCH 230b, Introduction to the Study of the City** Alexander Garvin

An examination of forces shaping American cities and strategies for dealing with them.

Topics include housing, commercial development, parks, zoning, urban renewal, landmark preservation, new towns, and suburbs. The course includes games, simulated problems, fieldwork, lectures, and discussion. so

Theater Studies

Director of undergraduate studies: Nathan Roberts, Rm. 102, 220 York St., 432-1310; nathan.roberts@yale.edu; theaterstudies.yale.edu; theaterstudies.yale.edu/dance-studies-yale

As a branch of the humanities and as a complex cultural practice, theater claims a rich history and literature and an equally rich repertoire of embodied knowledge and theory. Theater Studies emphasizes the reciprocal relationship between practice and scholarly study. The major combines practical training with theory and history, while stressing creative critical thinking. Students are encouraged to engage intellectual and physical approaches to explore diverse cultural forms, historical traditions, and contemporary life. As the study of theater is interdisciplinary in scope and global in perspective, students are expected to take courses in cognate disciplines such as history, philosophy, anthropology, political science, film, art, literature, and foreign languages. Faculty members are affiliated with a range of departments; their diverse expertise lends breadth and depth to course offerings and enables students to devise a course of study reflective of their developing interests.

Special features of the program are the production seminars, guided independent study projects, and senior project. Each production seminar concentrates on study, through practice, of one aspect of work in the theater; examples are approaches to acting, directing, writing, dance, design, or digital media in performance. Each seminar involves numerous projects that grow out of the term's work. For example, the project may be the production of a play or several plays, adaptation or translation of existing works, or creation of original plays, performance pieces, or set design. Independent study projects give the student freedom to pursue individual and group-generated projects under the guidance of a Theater Studies faculty member. All production seminars require permission of the instructor (by application or audition). Independent study project courses are open only to majors.

PREREQUISITES

The prerequisites for the major are THST 110 and THST 111.

REQUIREMENTS OF THE MAJOR

The major consists of ten term courses beyond the introductory prerequisites (THST 110, 111), one of which must be THST 210, Introduction to Performance Concepts. Students are encouraged to enroll in a balanced combination of courses involving studio work and courses with literature, history, and theory content. Of the ten required term courses, four must focus on dramatic literature or theater history. At least one of the four courses should include dramatic literature originating in a language other than English. Students are urged to read plays in the original languages whenever possible. Students should choose additional courses to develop the perspectives achieved in the production and literature courses.

Credit/D/Fail Courses taken Credit/D/Fail may not be counted toward the requirements of the major in Theater Studies.

SENIOR REQUIREMENTS

Majors satisfy the senior project requirement in one of two ways. They may undertake a one-term senior project (THST 491) or, with the approval of the director of undergraduate studies, they may take one of the dramatic literature or theater history courses, or a production seminar, as a senior seminar. Senior projects may take the form of directing, designing, writing a play or musical, performing a role, choreographing a dance piece, or writing a critical essay. Performance-oriented projects are in addition to a senior essay, which is an integral requirement of THST 491. For students interested in mounting a production as part of their senior project, collaboration with fellow seniors is strongly encouraged, and collaborative projects will be given preference in the selection process. While collaboration is an important criterion considered by the faculty, it in itself does not guarantee that a project will be selected for inclusion in the curricular season. Proposals for senior project productions will normally be approved only for students who have previously served as producers of other students' senior projects.

Students wishing to undertake a senior project must submit a proposal before the deadline announced by the DUS. This deadline typically falls before spring break of the junior year; students in the junior year will be provided with information and guidance towards the preparation of this rigorous proposal in the months leading up to the deadline. Each proposal is submitted to a faculty committee for approval.

ADVISING

Courses in the School of Drama Majors in Theater Studies are encouraged to consider taking selected courses in design, dramaturgy, and theater management, with permission of the instructor, the director of undergraduate studies, and the registrar of the School of Drama. Undergraduates may not, however, enroll in acting or directing courses offered by the School of Drama. Students enrolling in School of Drama courses should note that a maximum of four term courses from the professional schools may be offered toward the bachelor's degree. Students also should note that the academic calendars of the School of Drama and of Yale College differ. The School of Drama calendar should be consulted for scheduling.

REQUIREMENTS OF THE MAJOR

Prerequisites THST 110, 111

Number of courses 10 term courses beyond prereqs (incl senior req)

Specific course required THST 210

Distribution of courses 4 courses in dramatic lit or theater hist, 1 with reading in lit other than English

Senior requirement Senior seminar or senior project (THST 491)

FACULTY ASSOCIATED WITH THE PROGRAM OF THEATER STUDIES

Professors Christopher Bayes (*Practice*) (*School of Drama, Theater Studies*), Daphne Brooks (*African American Studies, American Studies, Theater Studies*), James Bundy (*School of Drama, Theater Studies*), David Chambers (*Adjunct*), *Toni Dorfman (*Adjunct*) (*Theater Studies*), *Daniel Harrison (*Music*), Joan MacIntosh (*Practice*) (*Theater Studies, School of Drama*) *Lawrence Manley (*English*), *Deb Margolin (*Practice*) (*Theater Studies*), Donald Margulies (*Adjunct*) (*English, Theater Studies*), *Charles Musser (*Film & Media Studies, American Studies, Theater Studies*), Tavia

Nyong'o (*Theater Studies, American Studies*), *Marc Robinson (*School of Drama, Theater Studies, English*), Gregory Wallace (*Practice*) (*School of Drama, Theater Studies*)

Assistant Professors Erich Bolton (*Adjunct*) (*School of Drama, Theater Studies*), Emily Coates (*Adjunct*) (*Theater Studies, School of Drama*), Elise Morrison (*Theater Studies*)

Lecturers Hal Brooks, Lacina Coulibaly, Daniel Egan, Grant Herreid, Irène Hultman, Annette Jolles, Michael Korie, Bronwen MacArthur, Marsha Norman, Lynda Paul, Nathan Roberts, Renee Robinson, Brian Seibert, Shilarna Stokes

*Member of the Executive Committee for the program.

Core Curriculum in Theater Studies

THST 110a and THST 111b, Survey of Theater and Drama Elise Morrison

An introduction to theater history, plays, aesthetic theories, and performance techniques. From antiquity to the Restoration period in the fall and continuing through to the present in the spring. HU

* **THST 210a, Introduction to Performance Concepts** Staff

A studio introduction to the basic techniques of acting, including the actor's vocabulary and performance tools. Improvisation, performance exercises, and scene work based on Stanislavsky, Vakhtangov, Michael Chekhov, Strasberg, Adler, Meisner, and Hagen. Admission by audition. Open to Theater Studies majors only. Required for Theater Studies majors in the year immediately following THST 110, 111. RP

Drama and Dance: History, Theory, Literature

* **THST 097a, Anatomy in Motion** Bronwen MacArthur

The connection between advances in human anatomy and kinesiology – the science of human movement – and dance practices from the early 1900s to the present. Study of seminal texts and practical exercises that drove the research of Frederick M. Alexander, Mabel Elsworth Todd, Barbara Clark, and Lulu Sweigard and the application of their ideas in contemporary movement practices today. Topics include the synthesis of dance and science; the reeducation of alignment, posture and balance; the use of imagery; and the unification of mind and body. No prior dance experience required. Enrollment limited to freshmen. Preregistration required; see under Freshman Seminar Program.

HU

* **THST 099b / FILM 045b, Dance on Film** Emily Coates

An examination of dance on film from c. 1920 to the present, including early Hollywood pictures, the rise of Bollywood, avant-garde films of the postwar period, translations of stage choreography to screen, music videos, and dance film festivals. The impact of industry, circulation and audience, aesthetic lineages, and craft in the union of the two mediums. Students develop an original short film for a final class project. No prior dance or filmmaking experience necessary. Enrollment limited to first-year students. Preregistration required; see under First-Year Seminar Program. WR, HU

* **THST 228b / ENGL 244b / FILM 397b, Writing about the Performing Arts**

Margaret Spillane

Introduction to journalistic reporting on performances as current events, with attention to writing in newspapers, magazines, and the blogosphere. The idea of the audience explored in relation to both a live act or screening and a piece of writing about such an

event. Students attend screenings and live professional performances of plays, music concerts, and dance events. WR, HU

* **THST 235b / ART 235b, Dance Theater** Irene Hultman Monti

A practical and theoretical survey of dance theater history. Introduction to movement vocabularies, physical techniques, and repertoire from post-1950 modern and postmodern dance theater. Open to students of all levels and majors. HU

* **THST 236a / MUSI 185a, American Musical Theater History** Daniel Egan

Critical examination of relevance and context in the history of the American musical theater. Historical survey, including nonmusical trends, combined with text and musical analysis. WR, HU

* **THST 326a / EAST 405a, Chinese Opera** Staff

This course introduces students to varieties of Chinese opera through plays, Chinese theories of music and acting, modern scholarship, and recorded media. Furthermore, students learn strategies to evaluate written and performed aspects of Chinese opera in a manner that can be extended to Western opera, film, and other performed genres. HU

* **THST 329a / ENGL 361a, Theater Now** Marc Robinson

Study of the drama, performance, and dance theater created in the last ten years, with special attention to work produced in 2017-2018. Readings from both published and unpublished American and British plays, contemporary criticism and theory, interviews, and essays by the artists themselves. Video of works created by companies such as Elevator Repair Service and the Nature Theater of Oklahoma. May include attendance of productions at performance spaces in and around New York City. HU

* **THST 333b / MUSI 377b, Stephen Sondheim and the American Musical Theater Tradition** Daniel Egan

The musical theater of Stephen Sondheim, both as a popular phenomenon of the contemporary Broadway stage and in relation to models and forms employed in the past. HU RP

* **THST 340a or b, Ballet Now** Staff

A practical investigation of seminal ballets in the repertoire of New York City Ballet. Tracing a sweeping history of artistic innovation from the early twentieth century to the present, this course covers the technique and aesthetic details that constitute New York City Ballet's style and follow the ways that these stylistic strengths are applied and transformed in the contemporary ballets of the 21st century. Repertory excerpts move through foundational works by George Balanchine and Jerome Robbins to ballets created in the past fifteen years by some of the most prominent ballet choreographers working today. Prior dance training required. Admission is by audition. HU

* **THST 370b / PLSH 248b, Polish Theater and Its Traditions** Krystyna Illakowicz

Exploration of the rebellious, defiant, and explosive nature of Polish theater, including ways in which theater has challenged, ridiculed, dissected, and disabled oppressive political power. Polish experimental and absurdist traditions that resulted from a merger of the artistic and the political; environmental and community traditions of the Reduta Theatre; Polish-American theater connections. Includes attendance at live theater events as well as meetings with Polish theater groups and actors. HU TR

* **THST 380b / AMST 370b, The History of Dance** Brian Seibert

An examination of major movements in the history of concert and social dance from the late nineteenth century to the present, including ballet, tap, jazz, modern, musical theater, and different cultural forms. Topics include tradition versus innovation, the influence of the African diaspora, and interculturalism. Exercises are used to illuminate analysis of the body in motion. WR, HU

* **THST 388b / HUMS 178b, Revenge Tragedy and Moral Ambiguity** Toni Dorfman

A study of plays and films variously construed as revenge tragedy that raise aesthetic and ethical issues, including genre, retribution, "just wars," public vs. private justice, and the possibility of resolution. How questions of crime, punishment, and justice have been posed in drama, from classical Greece through the twentieth century. HU

* **THST 402a / ART 386a, Experimental Writing and Performance** Emily Coates and Elise Morrison

A practical and theoretical exploration of formal experiments in writing as means of creating and analyzing contemporary performance. The course considers a broad range of written forms, including the artist-essayist, performative writing, writing for virtual and blended reality scenarios, and ethnographic and experimental writing for performance. Guest artists and field trips to see performances augment class time. Admission is by application, with a writing sample included. WR, HU

* **THST 406a / AFAM 428a, Dance and Black Popular Culture** Brian Seibert

Examination of dance in black popular culture and of black dance in American popular culture, more generally, from 19th-century slave dances and blackface minstrelsy through MTV and Beyoncé's *Lemonade*. Course materials include primary source documents from the white and black press, theoretical and historical essays, and film. WR, HU

* **THST 420b / AFAM 413b / AMST 448b / WGSS 415b, Race, Sex, and Gender in Downtown New York City 1945–1984** Tavia Nyong'o

Archivally-driven exploration of the post-war downtown scene in New York City. Particular attention to the intersections of jazz, nightlife, avant-garde performance, literature, and visual art, within the context of social movements for black and brown power and women's and gay liberation. HU

Playwriting, Production, and Performance

* **THST 095a or b, The Process of New Play Development in American Theater** Hal Brooks

How does a play move from concept to page to production? What are the steps involved along the way? What are the techniques within each phase that playwrights, directors, and actors utilize towards developing a play? This course seeks to show potential theater studies majors the practical aspects of new play development beyond the role of actor. Students are introduced to voices and stories that have recently emerged, treating the script more as a fluid blueprint rather than an unchangeable text. Students will analyze and compare various versions of a playscripts through reading, staging and discussion. Each student will explore texts through the eyes of directors, playwrights, actors, designers and dramaturgs - and will at times adopt those roles within exercises. The course will highlight the last fifteen years in American theater which has seen an unprecedented explosion of new plays, playwrights and new play

development incubators. Works by playwrights Will Eno, Annie Baker, Danai Gurira, Sarah Ruhl, Branden Jennings-Jacobs and Sam Hunter will be investigated, analyzed, and explored.

*** THST 098a, Composing and Performing the One Person Play** Hal Brooks

First-year actors, playwrights, directors, and even students who have never considered taking a theater class, create their own work through a combination of reading, analysis, writing, and on-your-feet exercises. Students read texts and view performances that are generated by one actor in an attempt to discover the methodology that works best for their own creations. The course culminates with a midterm and final presentation created and performed by the student. Enrollment limited to freshmen. Preregistration required; see under Freshman Seminar Program.

*** THST 207b, Introduction to Dramaturgy** Lynda Paul

Introduction to the discipline of dramaturgy. Study of dramatic literature from the ancient world to the contemporary, developing the core skills of a dramaturg. Students analyze plays for structure and logic; work with a director on production of a classical text; work with a playwright on a new play; and work with an ensemble on a devised piece. WR, HU

*** THST 211b, Intermediate Acting** Joan MacIntosh

Continued study of acting as an art, building on performance concepts introduced in THST 210. Various approaches to the actor's task, requiring deeper understanding of conceptual issues and increasing freedom and individuality in building a character. Exercises, monologues, and scene work. Admission by audition. Prerequisite: THST 210. HU RP

*** THST 212a or b, Community Engaged Theater: US Companies, Productions, and Practices** Staff

This seminar introduces students to the contemporary art and practice of community engaged theater, which connect professional artists to people from various walks of life who have stories to tell and ideas to express, and who want to explore performance as a medium of communication. Alongside readings that introduce students to the historical, theoretical, ethical, and artistic contexts of community-engaged theater in the United States, students learn about several major companies currently producing work in this field: Theatre of the Oppressed-NYC, Cornerstone Theater Company, Roadside Theater, Sojourn Theatre, Albany Park Theatre Project, and Urban Bush Women. In addition to studying their productions and processes through readings and visual materials, students have regular opportunities to acquire "on-your-feet" practice with techniques used by these companies as well as opportunities to converse with artists in the field. HU

*** THST 224a / MUSI 228a, Musical Theater Performance I** Andrew Gerle

The structure and meaning of traditional and contemporary musical theater repertoire. Focus on ways to "read" a work, decipher compositional cues for character and action, facilitate internalization of material, and elicit lucid interpretations. For singers, pianists, and directors. Prerequisites: MUSI 211 and 219, or with permission of instructor. Admission by audition only. May be repeated for credit. For audition information e-mail dan.egan@yale.edu. HU RP

* **THST 226b / MUSI 229b, Musical Theater Performance II** Annette Jolles

The collaborative process and its effect on musical theater performance. Choreography, music direction, and origination of new works. Analysis of texts, scripts, and taped or filmed performances; applications in students' own performance. May be repeated for credit. For audition information e-mail dan.egan@yale.edu. RP

* **THST 230b, Advanced Acting and Scene Study** Joan MacIntosh

Combination of exercises and scene study to deepen the understanding and playing of action. Admission by audition. Open to junior and senior Theater Studies majors only. May be taken more than once. Prerequisite: THST 211. RP

* **THST 231a, Chekhov in Performance** Gregory Wallace

A studio-based exploration of the world of Anton Chekhov, focusing on acting technique through scene work as well as character analysis and development. Admission by audition only. HU

* **THST 300a, The Director and the Text I** Toni Dorfman

Basic exercises in approaching dramatic or other literary texts from the director's perspective. Particular attention to the many roles and functions of the director in production. Rehearsal and production of workshop scenes. Open to junior and senior Theater Studies majors, and to nonmajors with permission of the instructor. Prerequisite: THST 210. HU RP

* **THST 301b, The Director and the Text II** David Chambers

Advanced study of the director's role to bring together all production elements of a play into one unified vision and honor the intentions of the playwright. Focus on staging and ground plan exercises; how to meet and work with writers of new work; text analysis for directors; pitching to producers; casting; and the director's design process. Outside rehearsals are required. THST 300 or permission of instructor. May be taken more than once. Intended primarily for junior and senior Theater Studies majors, open to sophomores and nonmajors when space permits and with permission of the instructor. HU

* **THST 315a, Acting Shakespeare** James Bundy

A practicum in acting verse drama, focusing on tools to mine the printed text for given circumstances, character, objective, and action; noting the opportunities and limitations that the printed play script presents; and promoting both the expressive freedom and responsibility of the actor as an interpretive and collaborative artist in rehearsal. The course will include work on sonnets, monologues, and scenes. Admission by audition. Preference to seniors and juniors; open to nonmajors. HU RP

* **THST 319a / AFAM 313a, Embodying Story** Renee Robinson

The intersection of storytelling and movement as seen through historical case studies, cross-disciplinary inquiry, and studio practice. Drawing on eclectic source materials from different artistic disciplines, ranging from the repertory of Alvin Ailey to journalism, architectural studies, cartoon animation, and creative processes, students develop the critical, creative, and technical skills through which to tell their own stories in movement. No prior dance experience necessary. HU

* **THST 320a / ENGL 453a, Playwriting** Donald Margulies

A seminar and workshop on reading for craft and writing for the stage. In addition to weekly prompts and exercises, readings include modern American and British plays by

Pinter, Mamet, Churchill, Kushner, Nottage, Williams, Hansberry, Hwang, Vogel, and Wilder. Emphasis on play structure, character, and conflict. RP

* **THST 321a, Production Seminar: Playwriting** Deborah Margolin

A seminar and workshop in playwriting. Emphasis on developing an individual voice. Scenes read and critiqued in class. Admission by application, with priority to Theater Studies majors. A writing sample and statement of purpose should be submitted to the instructor before the first class meeting. RP

* **THST 322b / ENGL 481b, Advanced Playwriting** Deborah Margolin

A seminar and workshop in advanced playwriting that furthers the development of an individual voice. Study of contemporary and classical plays to understand new and traditional forms. Students write two drafts of an original one-act play or adaptation for critique in workshop sessions. Familiarity with basic playwriting tools is assumed. Open to juniors and seniors, nonmajors as well as majors, on the basis of their work; priority to Theater Studies majors. Writing samples should be submitted to the instructor before the first class meeting. Prerequisite: THST 320 or 321, or a college seminar in playwriting, or equivalent experience. RP

* **THST 327b / ENGL 468b, Advanced Playwriting Workshop** Donald Margulies

An intensive workshop in advanced playwriting techniques. Discussion of works by contemporary playwrights. In addition to weekly exercises, students write a full-length play. Admission by application only. Application details and forms are available at english.yale.edu/undergraduate/applications-and-deadlines. RP

* **THST 335b / AFST 435b, West African Dance: Traditional to Contemporary** Lacinia Coulibaly

A practical and theoretical study of the traditional dances of Africa, focusing on those of Burkina Faso and their contemporary manifestations. Emphasis on rhythm, kinesthetic form, and gestural expression. The fusion of modern European dance and traditional African dance. Admission by audition during the first class meeting. HU RP

THST 405b, Physical Comedy and Clown Technique Christopher Bayes

A practical study of physical acting and clown technique. Exercises in musicality, playful abandon, and active listening; simplicity and vulnerability through the connection of body and voice. Examination of each actor's unique relationship to the clown and the comic world. Preference to Theater Studies majors; open to nonmajors with permission of the instructor.

* **THST 412b, Libretto Writing for Musical Theater** Marsha Norman

Practical instruction in book writing for musical theater combined with close reading of historical and contemporary examples of the genre. Weekly exercises focus on issues of craft, creativity, and collaboration. RP

* **THST 414a, Lyric Writing for Musical Theater** Michael Korie

The craft of lyric writing in musical theater, opera, and crossover works. Both historical models and new composition used as objects of study. Analysis of song form and placement, and of lyric for character, tone, and diction. Creation of lyrics in context.

Limited enrollment. Interested students should write to dan.egan@yale.edu for application requirements. May not be repeated for credit. HU RP

* **THST 427a / AMST 349a, Technologies of Movement Research** Emily Coates
Marshaling both artistic and academic methods, and with dance as the focal point, this course examines technologies that traverse disciplinary boundaries. Topics include: somatic practices that emphasize internal sense perception; choreographic notation; dance dramaturgy; digital motion capture; the intersection of cognitive science and dance; and ethnographies that draw strategies from the arts to probe social problems. Open to all students.

* **THST 428a, Projection Design and Technology** Erich Bolton
An introduction to projection design and technology. Media as a storytelling tool; emerging trends in projection design technology. Engagement with and analysis of projection designs in current productions. Students create original storyboards and media based on reading and analysis of both classic and contemporary texts.

Special Projects

* **THST 491a or b, Senior Project in Theater Studies** Nathan Roberts and Daniel Egan

Students must submit proposals for senior projects to the Theater Studies office by the deadline announced by the director of undergraduate studies. Attendance at weekly section meetings is required for all students undertaking production projects. Application forms are available in the Theater Studies office, 220 York St.

Urban Studies

FACULTY ASSOCIATED WITH URBAN STUDIES

Professors Katerina Clark (*Literature, Slavic Languages & Literatures*), Kathryn Dudley (*Anthropology, American Studies*), Keller Easterling (*School of Architecture*), Matthew Jacobson (*African American Studies, History, American Studies*), Jennifer Klein (*History*), Alan Plattus (*School of Architecture*), Douglas Rae (*School of Management, Political Science*), Michael Rowe (*School of Medicine*), Helen Siu (*Anthropology*), Robert Solomon (*Law School*), Jay Winter (*History*)

Associate Professors Laura Barraclough (*American Studies*), Elihu Rubin (*School of Architecture, American Studies*)

Lecturers Karla Britton (*Architecture*), Gordon Geballe (*Forestry & Environmental Studies*), Jay Gitlin (*History*), Virginia Jewiss (*Humanities*)

Courses related to urban studies may be found in a number of different departments and programs, particularly American Studies, Anthropology, Architecture, Environmental Studies, History, Humanities, Political Science, and Sociology. The course, STCY 176, Introduction to the Study of the City, is offered each year; details may be found under the heading Study of the City (p. 719).

Urban studies can be incorporated into a number of major programs. The Architecture major includes an Urban Studies track. Students majoring in American Studies and in Ethics, Politics, and Economics are required to select an area of concentration, and urban studies meets this requirement. Political Science majors who select the optional interdisciplinary concentration may focus on urban studies.

Students interested in pursuing a concentration in urban studies within a particular major are encouraged to contact their director of undergraduate studies. Faculty members listed above are available to help students identify appropriate sequences and combinations of courses and may also be willing to meet with students who are writing senior essays on interdisciplinary urban topics.

Women's, Gender, and Sexuality Studies

Director of undergraduate studies: Andrew Dowe, andrew.dowe@yale.edu; wgss.yale.edu

Genders and sexualities are powerful organizing forces: they shape identities and institutions, nations and economies, cultures and political systems. Careful study of gender and sexuality thus explains crucial aspects of our everyday lives on both intimate and global scales. The scholarship in Women's, Gender, and Sexuality Studies is interdisciplinary and wide-ranging, drawing on history, literature, cultural studies, social sciences, and natural science to study genders and sexualities as they intersect with race, ethnicity, class, nationality, transnational processes, disability, and religion.

Students majoring in Women's, Gender, and Sexuality Studies take a series of core courses, develop an individual area of concentration, and write a two-term senior essay. The program encourages work that is interdisciplinary, intersectional, international, and transnational. Individual concentrations evolve along with students' intellectual growth and academic expertise. Recent examples of concentrations include literature and queer aesthetics; transnational feminist practices; the intellectual history of civil rights activism; AIDS health policies; gender, religion, and international NGOs; women's health; food, sexuality, and lesbian community; and gender and sexuality in early education.

REQUIREMENTS OF THE MAJOR

Women's, Gender, and Sexuality Studies requires twelve term courses and may be taken either as a primary major or as one of two majors. Requirements include two intermediate courses: WGSS 205 and WGSS 206. Majors are required to take both, preferably prior to the junior sequence. The major also includes one transnational perspectives course, one methodology course, courses in an area of concentration, the junior sequence, and the senior sequence. The area of concentration consists of at least five courses, the majority of which should be drawn from program offerings. Courses for the area of concentration may also fulfill the requirements in transnational perspectives and methodology. Substitutions to the major requirements may be made only with the written permission of the director of undergraduate studies.

Transnational perspectives course Ideally, each student's course work engages a broad diversity of cultural contexts, ethnicities, and global locations. Such study illuminates the links among nations, states, cultures, regions, and global locations. Most students take several classes that focus on genders and sexualities outside the U.S. context; majors are required to take at least one. WGSS 206 may count for the transnational perspectives course.

Methodology course Given its interdisciplinary nature, Women's, Gender, and Sexuality Studies necessarily relies on a wide range of methodologies: literary criticism, ethnography, visual analysis, historiography, and quantitative data analysis, among others. Each student is expected to acquire competence in at least one methodology relevant to his or her own concentration and planned senior essay. In preparation for the senior essay, students are advised to complete the methods requirement in the junior year.

Junior sequence The two-term junior sequence consists of WGSS 340 and WGSS 398. All students in the major must take both courses. (Individualized alternatives are found for students who study abroad during the junior year.)

SENIOR REQUIREMENT

The two-term senior sequence consists of the Senior Colloquium (WGSS 490), in which students begin researching and writing a senior essay, followed by the Senior Essay (WGSS 491), in which students complete the essay. The senior essay is developed and written under the guidance and supervision of a WGSS-affiliated faculty member with expertise in the area of concentration. Students are expected to meet with their essay advisers on a regular basis.

REQUIREMENTS OF THE MAJOR

Prerequisites None

Number of courses 12 term courses (incl senior req)

Specific courses required WGSS 205, 206, 340, 398

Distribution of courses 1 transnational perspectives course; 1 methodology course; electives in area of concentration

Senior requirement Senior colloq and senior essay (WGSS 490, 491)

FACULTY ASSOCIATED WITH THE PROGRAM OF WOMEN'S, GENDER, AND SEXUALITY STUDIES

Professors Julia Adams (*Sociology*), Carol Armstrong (*History of Art*), Seyla Benhabib (*Political Science, Philosophy*), Jill Campbell (*English*), Hazel Carby (*African American Studies, American Studies*), Kang-i Sun Chang (*East Asian Languages & Literatures*), Deborah Davis (*Sociology, East Asian Studies*), Kathryn Dudley (*Anthropology, American Studies*), Ron Eyerman (*Sociology*), Crystal Feimster (*African American Studies*), Glenda Gilmore (*History*), Jacqueline Goldsby (*African American Studies, American Studies, English*), Inderpal Grewal (*American Studies, Ethnicity, Race, and Migration, Women's, Gender, and Sexuality Studies*), Dolores Hayden (*School of Architecture, American Studies*), Margaret Homans (*Chair*) (*English, Women's, Gender, and Sexuality Studies*), Marcia Inhorn (*Anthropology, Global Affairs*), Jennifer Klein (*History*), Marianne LaFrance (*Psychology, Women's, Gender, and Sexuality Studies*), Kathryn Lofton (*American Studies, History, Religious Studies*), Mary Lui (*American Studies, History*), Deb Margolin (*Adjunct*) (*Theater Studies*), Kobena Mercer (*History of Art, African American Studies*), Joanne Meyerowitz (*American Studies, History*), Priyamvada Natarajan (*Astronomy*), Sally Promey (*American Studies, Institute of Sacred Music*), Frances Rosenbluth (*Political Science*), Alicia Schmidt Camacho (*American Studies*), Michael Warner (*English, American Studies*), Laura Wexler (*American Studies, Women's, Gender, and Sexuality Studies*), Elisabeth Wood (*Political Science*), Ana Ramos Zayas (*Ethnicity, Race, and Migration*)

Associate Professors Rene Almeling (*Sociology*), Joseph Fischel (*Women's, Gender, and Sexuality Studies*), Moira Fradinger (*Comparative Literature*), Zareena Grewal (*American Studies, Religious Studies*), Janet Henrich (*School of Medicine*), Angel David Nieves (*Women's, Gender, and Sexuality Studies*), Naomi Rogers (*History, History of Science, Medicine, and Public Health*)

Assistant Professors Greta LaFleur (*American Studies*), Vida Maralani (*Sociology*), Eda Pepi (*Women's, Gender, and Sexuality Studies*), Dixia Ramirez (*American Studies*), Evren Savci (*Women's, Gender, and Sexuality Studies*)

Senior Lecturers Becky Conekin (*History*), Rebecca Tannenbaum (*History*), Maria Trumpler (*Women's, Gender, and Sexuality Studies*)

Lecturers Melanie Boyd (*Women's, Gender, and Sexuality Studies*), Igor De Souza (*English, Humanities*), Andrew Dowe (*Women's, Gender, and Sexuality Studies*), Ziv Eisenberg (*History*), Graeme Reid (*Women's, Gender, and Sexuality Studies*), George Syrimis (*Hellenic Studies*)

Gateway Course

* WGSS 222b / AMST 206b / ER&M 221b, Introduction to Critical Refugee Studies

Quan Tran

Reconfiguring refugees as fluid subjects and sites of social, political, and cultural critiques. Departing from dominant understandings of refugees as victims, consideration instead of refugees as complex historical actors, made visible through processes of colonization, imperialism, war, displacement, state violence, and globalization, as well as ethical, social, legal, and political transformations. Focus on second-half of the twentieth century. SO

Intermediate Courses

* WGSS 205a, Bodies and Pleasures, Sex and Genders Eda Pepi

This seminar engages cultural analyses of embodiment, its pleasures—and by extension its pains—to interrogate sex, sexuality, and gender as analytical categories. Its aim is to critically evaluate formative concepts and theories that have been subject to debates within gender studies, psychoanalysis, philosophy, anthropology, critical race studies, and history. Readings by Freud, Foucault, Berlant, Butler, Rubin, and others help explain how terms like “women” and “men,” “femininity” and “masculinity,” as well as “homosexuality” and “heterosexuality,” “gender” and “transgender” have structured people’s experiences and their perceptions of their bodies. The potential our bodies have for “hanging on to ourselves” occupies a central position within scholarly canons, revealing also how these canons are always already imbricated in racialized hierarchies. SO

* WGSS 206b, Transnational Approaches to Gender & Sexuality Evren Savci

Examination of transnational debates about gender and sexuality as they unfold in specific contexts. Gender as a category that can or cannot travel; feminist critiques of liberal rights paradigms; globalization of particular models of gender/queer advocacy; the role of NGOs in global debates about gender and sexuality. WR

Junior Seminars

* WGSS 340a / ENGL 357a / LITR 426a, Feminist and Queer Theory Jill Richards

Historical survey of feminist and queer theory from the Enlightenment to the present, with readings from key British, French, and American works. Focus on the foundations and development of contemporary theory. Shared intellectual origins and concepts, as well as divergences and conflicts, among different ways of approaching gender and sexuality. WR, HU

* **WGSS 398a, Junior Research Seminar** Eda Pepi

An interdisciplinary approach to studying gender and sexuality. Exploration of a range of relevant theoretical frameworks and methodologies. Prepares students for the senior essay. WR, SO

Senior Courses

* **WGSS 490a or b, The Senior Colloquium** Andrew Dowe

A research seminar taken during the senior year. Students with diverse research interests and experience discuss common problems and tactics in doing independent research.

* **WGSS 491a or b, The Senior Essay** Andrew Dowe

Independent research on, and writing of, the senior essay.

Electives

* **WGSS 025b / AMST 025b, The American Essay Tradition** Greta LaFleur

Exploration of the American essay tradition, from some of its earliest moments to more recent iterations. Consideration of the essay as a rhetorical form, a political tool, and a literary tradition. Authors include Thomas Paine, Claudia Rankine, Benjamin Franklin, Virginia Woolf, James Baldwin, Cherrie Moraga, Sherman Alexie, and Hilton Als. Students will write political essays, as well as develop competencies in literary analysis. Enrollment limited to first-year students. Preregistration required; see under First-Year Seminar Program. HU

* **WGSS 030a, Neoliberalism and Sexuality** Evren Savci

Sexuality is often imagined as a private and intimate affair, experienced individually, marked by personal histories and preferences. This course argues otherwise. Specifically, we consider the intersections between the current dominant political economic mode, referred to as neoliberal capitalism, and sexuality as a field of power. We analyze how subjectivities are formed under this current system, how desires are produced and discourses incited, and how the particular *moralization* of economic behavior has implications for a range of issues including reproductive justice, definitions of kinship, sexual liberation movements, and contemporary states of war and emergency. Thinking of sexuality as a field of power that is predicated on notions of normality and abnormality enables us to see what other “undesirable” subjects are produced under conditions of neoliberal capitalist modernity with whom sexual others are always in kinship. Enrollment limited to first-year students. Preregistration required; see under First-Year Seminar Program. SO

* **WGSS 032b, History of Sexuality** Maria Trumpler

Exploration of scientific and medical writings on sexuality over the past century. Focus on the tension between nature and culture in shaping theories, the construction of heterosexuality and homosexuality, the role of scientific studies in moral discourse, and the rise of sexology as a scientific discipline. Enrollment limited to first-year students. Preregistration required; see under First-Year Seminar Program. WR, HU

* **WGSS 033a / HIST 033a, Fashion in London and Paris, 1750 to the Present** Staff

Introduction to the history of Western fashion from the mid-eighteenth century to the present, with a focus on Paris and London. Approaches, methods, and theories scholars

have historically employed to study fashion and dress. Enrollment limited to first-year students. Preregistration required; see under First-Year Seminar Program. WR, HU

*** WGSS 146b / HUMS 142b / LITR 184b, Women and the Supernatural in Medieval Literature** Johanna Fridriksdottir

Study of medieval texts from a wide geographic and chronological range, all of which prominently feature female characters that exhibit supernatural features or practice magic. Narratives about fairies, witches, hags, and monstrous women analyzed in order to explore intersections of gender and sexuality, Otherness, ethics, violence, fantasy, and related themes in medieval culture. HU

WGSS 207a, Gender, Justice, Power, Institutions Inderpal Grewal

Examination of how inequalities based on gender, race, caste, class, sexuality as well as a host of other identities are embedded in institutions that make up our social world. From the family and the home to the workplace, from the University, and the Corporation, to the Military and Media, we track how inequalities emerge and are sustained by power and institutional structures. We also see how they are challenged and what sorts of instruments are needed to challenge them. In particular, we focus on sexual politics and sexual violence as a key issue to understanding the gendered workings of institutions, in order to examine structures that sustain inequality. Through the semester, we hope to consider many domains of life—bedrooms and boardrooms, international borders and feminist movements—to understand the stubborn and sticky forms and hierarchies of power that are challenged and contested by activists, scholars, and communities. TR

*** WGSS 209a / CLCV 216a / LITR 239a / MGRK 216a, Dionysus in Modernity**
George Syrimis

Modernity's fascination with the myth of Dionysus. Questions of agency, identity and community, and psychological integrity and the modern constitution of the self. Manifestations of Dionysus in literature, anthropology, and music; the Apollonian-Dionysiac dichotomy; twentieth-century variations of these themes in psychoanalysis, surrealism, and magical realism. HU

*** WGSS 210b / HUMS 203b / JDST 358b, Feminism and Judaism** Igor De Souza

The impact of feminism in three key areas of contemporary Jewish life: religion, Zionism, and identity. The critique of Zionism, in a trend known as post-Zionism, from feminist lenses. Feminism and Zionism in the construction of sexualized and racialized Jewish identities (LGBT Jews/Jews of color).

*** WGSS 220a / PLSC 220a, Gender Politics** Andrea Aldrich

Exploration of theoretical and empirical work in political science to study the relationship between gender and politics in the United States and around the world. Topics include women's representative in legislative and executive branch politics in democratic regimes; the impact of gender stereotypes on elections and public opinion; conditions that impact the supply and demand of candidates across genders; and the underrepresentation of women in political institutions. SO

*** WGSS 230a / ANTH 230a, Evolutionary Biology of Women's Reproductive Lives**
Claudia Valeggia

Evolutionary and biosocial perspectives on female reproductive lives. Physiological, ecological, and social aspects of women's development from puberty through menopause and aging, with special attention to reproductive processes such as

pregnancy, birth, and lactation. Variation in female life histories in a variety of cultural and ecological settings. Examples from both traditional and modern societies. SC

* **WGSS 245b / FILM 243b / MGRK 218b, Family in Greek Literature and Film**

George Syrimis

The structure and multiple appropriations of the family unit, with a focus on the Greek tradition. The influence of aesthetic forms, including folk literature, short stories, novels, and film, and of political ideologies such as nationalism, Marxism, and totalitarianism. Issues related to gender, sibling rivalry, dowries and other economic factors, political allegories, feminism, and sexual and social violence both within and beyond the family. WR, HU TR

* **WGSS 260b, Food, Identity and Desire** Maria Trumpler

Exploration of how food—ingredients, cooking practices, and appetites—can intersect with gender, ethnicity, class, and national origin to produce profound experiences of identity and desire. Sources include memoir, cookbooks, movies, and fiction.

WGSS 272a / AMST 272a / ER&M 282a / HIST 183a, Asian American History, 1800 to the Present Mary Lui

An introduction to the history of East, South, and Southeast Asian migrations and settlement to the United States from the late eighteenth century to the present. Major themes include labor migration, community formation, U.S. imperialism, legal exclusion, racial segregation, gender and sexuality, cultural representations, and political resistance. HU

* **WGSS 291a / HIST 287Ja / RLST 347a / SOCY 331a, Sexual Minorities from Plato to the Enlightenment** Igor De Souza

This interdisciplinary course surveys the history of homosexuality from a cross-cultural, comparative perspective. Students study contexts where homosexuality and sodomy were categorized, regulated, and persecuted and examine ancient and medieval constructions of same-sex desire in light of post-modern developments, challenging ideas around what is considered normal and/or natural. Ultimately, we ask: what has changed, and what has remained the same, in the history of homosexuality? What do gays and lesbians today have in common with pre-modern sodomites? Can this history help us ground or rethink our sexual selves and identities? Primary and secondary historical sources, some legal and religious sources, and texts in intellectual history are studied. Among the case studies for the course are ancient attitudes among Jews, early Christians, and Greeks; Christian theologians of the Middle Ages; Renaissance Florence; the Inquisition in Iberia; colonial Latin America; and the Enlightenment's condemnation of sodomy by Montesquieu and Voltaire, and its defense by Bentham.

HU

* **WGSS 293b / CLCV 319b / HIST 242Jb / MGRK 300b, The Olympic Games, Ancient and Modern** George Syrimis

Introduction to the history of the Olympic Games from antiquity to the present. The mythology of athletic events in ancient Greece and the ritual, political, and social ramifications of the actual competitions. The revival of the modern Olympic movement in 1896, the political investment of the Greek state at the time, and specific games as they illustrate the convergence of athletic cultures and sociopolitical transformations in the twentieth century. HU

* **WGSS 304b / ANTH 484b, Men, Manhood, and Masculinity** Andrew Dowe
Cultural and historic constructions of masculinity explored through an investigation of male bodies, sexualities, and social interactions. Multiple masculinities; the relationship between hegemonic, nonhegemonic, and subordinate masculinities. SO

* **WGSS 306b / AMST 314b, Gender and Transgender** Greta LaFleur
Introduction to transgender studies, an emergent field that draws on gender studies, queer theory, sociology, feminist science studies, literary studies, and history. Representations of gender nonconformity in a cultural context dominated by a two-sex model of human gender differentiation. Sources include novels, autobiographies, films, and philosophy and criticism. RP

WGSS 315a / PSYC 342a, Psychology of Gender Marianne LaFrance
Exploration of the relationship between gender and psychological processes at individual, interpersonal, institutional, and cross-cultural levels. SO

* **WGSS 339a / ENGL 385a, Fiction and Sexual Politics** Margaret Homans
Historical survey of works of fiction that have shaped and responded to feminist, queer, and transgender thought from the late eighteenth century to the present. Authors include Wollstonecraft, C. Bronte, H. Jacobs, C. P. Gilman, R. Hall, Woolf, Wittig, Walker, Anzaldua, Morrison, Kingston, Winterson, and Bechdel. WR, HU

* **WGSS 352b / ENGL 359b, Feminist and Queer Literary Methods** Margaret Homans
This course explores feminist and queer literary criticism and theory, the use of feminist and queer literary methods across disciplines, and the uses of literary evidence in gender and sexuality studies. Rather than covering a particular period or genre of literature, the course uses a selection of primary texts in English from Shakespeare to the present, from multiple literary genres (fiction, poetry, drama, memoir, creative nonfiction), and from popular culture and non-literary sources as well as canonical texts. Most of the reading, however, will be in literary criticism and theory and in scholarly writing that makes use of literary methods. Topics include the power of narrative and of representation to create norms; the intersectional gender politics of language, including issues of access, code-switching, and appropriation; the uses of narrative as a scholarly tool and of narrative methods across disciplines; historicisms and presentisms; and art as activism. Students learn to do research in literary criticism and theory, and practice thinking broadly about the cultural work that literature does and about the uses of literary methods and practices in other fields. WR, HU

* **WGSS 355b, Gender, Development and Technology** Inderpal Grewal
Will technology lift all boats? Can it help address global inequalities and solve social and environmental problems? From solar power in Puerto Rico, to biometric ID cards believed to efficiently deliver welfare, to new cookstoves in India that promise to help women, how is technology imagined to furthering the project of 'development' that is often seen as synonymous with progress and economic growth? This course surveys a wide range of perspectives, histories, and dilemmas with the goal of understanding how to think of 'development' and 'technology for development' as subjects of study. We examine the gendered targets of development projects, as well as those who create and imagine these projects. We are especially interested in examining relations between development and economy, development and politics, development and technology. In addition to examining gender (often understood to mean just women) as a key aspect of development, this course uses a critical feminist lens to explore a range of issues,

including discourses and practices of development within struggles over power, history and culture, the relation between development projects of today in relation to colonial projects and ideologies of 'improvement' and 'the civilizing mission' that were built on particularly racialized, sexualized, and gendered ideas. We also consider how the issue of gender and development has changed over time to include questions of gay rights, disability, and protections for children. In this way, we explore how 'macro' agendas have shaped the lives of millions of men and women living across the globe.

*** WGSS 359b / RLST 357b, Buddhism and Sexuality** Staff

Critical examination of the relation of religion and sexuality with special attention to Buddhism. Discussion of religious interpretations of sex, sexuality, and gender; the codification and normalization of these rules through texts, symbols, and practices; and recent challenges to these interpretations. Topics include homosexuality, same-sex marriage, abortion, contraception, gender equality, clerical marriage, married clerics' wives, and clerical sexual abuse. Draws on religious theory, gender theory, and critical theory. Places Buddhism in conversation with Jewish, Christian, and Islamic traditions.

HU

WGSS 378b / ANTH 381b, Sex and Global Politics Graeme Reid

Global perspectives on the sexual politics of gender identity, sexual orientation, and human rights. Examination of historical, cultural, and political aspects of sexual orientation and gender identity in the context of globalization. SO

*** WGSS 387b, Gender, Sexuality, and Islam** Evren Savci

The use of critical texts that span a wide range of disciplines to examine gender and sexuality in the context of predominantly Muslim countries and cultures, as well as the larger transnational discourses that shape the ways in which Islam is imagined in relationship to gender and sexuality. By putting gender and sexuality at the center of our analysis, we are able to tease out the complex relationships between religion, culture, nation-states, and racialization, and think about how particular constructions of gender and sexuality have been central to the production and reproduction of each of these social structures. A critical knowledge of Orientalism, colonialism, and global inequalities is crucial for a careful and nuanced understanding of the different roles gender and sexuality have played, and continue to play in representations of Islam, and Muslims. This also underlines the current place of Islam not only as a world religion, or a set of beliefs and practices, but also as a "signifier." Students develop a historical understanding of many contemporary discussions around Islam and what gets referred to as "Muslim cultures" and should be able to critically engage with and complicate the terms and issues such as "cultural difference," "women's and LGBT rights," and "modernity/civilization" that are widely and easily deployed in current political and moral discourses around the Middle East and Islam.

*** WGSS 390b / ER&M 360b / HLTH 370b / HSHM 432b / SOCY 390b, Politics of Reproduction** Rene Almeling

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

*** WGSS 401a / EAST 401a, Gender in Modern Korea: History and Representation**
Staff

This seminar examines the cinematic representation of Korean masculinity and femininity through history: from the appearance of the New Woman in the early twentieth century to the commercialized woman under the wave of neoliberalism more recently. By contextualizing these themes within the history of modern Korea, this class introduces students to major filmic texts and encourages them to historicize the dominant representations of gender by identifying the relevant, preferred categories and aesthetics of particular periods. Students are expected to engage in critical reading, analysis, and writing. Students also analyze and interpret the cinematic depictions to ask how these films illuminate issues of gender within the context of major historical themes such as national identity, external relations, and political and social conflict. Korean history presents a special opportunity for such an exercise because of South Korea's very sophisticated popular culture industry, and because of this industry's welcome dedication to re-imagining historical figures, events, and settings. HU

WGSS 405a / EALL 211a / LITR 174a, Women and Literature in Traditional China
Kang-i Sun Chang

A study of major women writers in traditional China, as well as representations of women by male authors. The power of women's writing; women and material culture; women in exile; courtesans; Taoist and Buddhist nuns; widow poets; cross-dressing women; the female body and its metaphors; footbinding; notions of love and death; the aesthetics of illness; women and revolution; 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. Formerly CHNS 201. HU TR

*** WGSS 408a / AMST 345a / ER&M 409a, Latinx Ethnography** Ana Ramos-Zayas
Consideration of ethnography within the genealogy and intellectual traditions of Latinx Studies. Topics include: questions of knowledge production and epistemological traditions in Latin America and U.S. Latino communities; conceptions of migration, transnationalism, and space; perspectives on "(il)legality" and criminalization; labor, wealth, and class identities; contextual understandings of gender and sexuality; theorizations of affect and intimate lives; and the politics of race and inequality under white liberalism and conservatism in the United States. SO

*** WGSS 410b / AFAM 410b / AMST 310b, Interdisciplinary Approaches to African American Studies** Anthony Reed

An interdisciplinary, thematic approach to the study of race, nation, and ethnicity in the African diaspora. Topics include class, gender, color, and sexuality; the dynamics of reform, Pan-Africanism, neocolonialism, and contemporary black nationalism. Use of a broad range of methodologies. WR, HU, SO

*** WGSS 415b / AFAM 413b / AMST 448b / THST 420b, Race, Sex, and Gender in Downtown New York City 1945–1984** Tavia Nyong'o

Archivally-driven exploration of the post-war downtown scene in New York City. Particular attention to the intersections of jazz, nightlife, avant-garde performance, literature, and visual art, within the context of social movements for black and brown power and women's and gay liberation. HU

* **WGSS 427b / HIST 127Jb, Witchcraft in Colonial America** Rebecca Tannenbaum
The social, religious, economic, and gender history of British North America as manifested through witchcraft beliefs and trials. WR, HU

* **WGSS 430b / MMES 399 / MMES 430b / WGSS 399, Gender and Citizenship in the Middle East** Eda Pepi
Examination of the gendered and sexual dimensions of war, conflict, and partition, and the codification of modern citizenship in the Middle East – from Syria, to the Middle East conflict, to Western Sahara, among others – this course presents ethnographic, historical, and literary scholarship that theorizes the role of kinship and citizenship in narratives of the nation and sovereignty. SO

* **WGSS 453a / HIST 142Ja / HSHM 445a, Women and Medicine in America from the Colonial Era to the Present** Naomi Rogers
American women from the colonial era to the present as midwives, patients, healers, reformers, revolutionaries, innovators, and entrepreneurs. Ways that women have shaped American health care and medical research. WR, HU

* **WGSS 459b / ANTH 455b, Masculinity and Men's Health** Staff
Ethnographic approaches to masculinity and men's health around the globe. Issues of ethnographic research design and methodology; interdisciplinary theories of masculinity; contributions of men's health studies from Western and non-Western sites to social theory, ethnographic scholarship, and health policy. SO RP

* **WGSS 462b / AMST 484b / HSAR 493b, Visual Kinship, Families, and Photography** Laura Wexler
Exploration of the history and practice of family photography from an interdisciplinary perspective. Study of family photographs from the analog to the digital era, from snapshots to portraits, and from instrumental images to art exhibitions. Particular attention to the ways in which family photographs have helped establish gendered and racial hierarchies and examination of recent ways of reconceiving these images. HU

* **WGSS 471a or b, Independent Directed Study** Staff
For students who wish to explore an aspect of women's, gender, and sexuality studies not covered by existing courses. The course may be used for research or directed readings and should include one lengthy or several short essays. Students meet with their adviser regularly. To apply for admission, students present a prospectus to the director of undergraduate studies along with a letter of support from the adviser. The prospectus must include a description of the research area, a core bibliography, and the expected sequence and scope of written assignments.

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.). 203 432-9300 <http://admissions.yale.edu>

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.). 203 432-2771 <http://gsas.yale.edu>

School of Medicine Est. 1810. Courses for college graduates and students who have completed requisite training in approved institutions. Doctor of Medicine (M.D.). Postgraduate study in the basic sciences and clinical subjects. Five-year combined program leading to Doctor of Medicine and Master of Health Science (M.D./M.H.S.). Combined program with the Graduate School of Arts and Sciences leading to Doctor of Medicine and Doctor of Philosophy (M.D./Ph.D.). Master of Medical Science (M.M.Sc.) from the Physician Associate Program and the Physician Assistant Online Program. 203 785-2643 <http://medicine.yale.edu/education/admissions>

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.). 203 432-5360 <http://divinity.yale.edu>

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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. 203 785-2844 <http://publichealth.yale.edu>

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. 203 432-2296 <http://architecture.yale.edu>

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. 203 785-2389 <http://nursing.yale.edu>

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.). 203 432-1507 <http://drama.yale.edu>

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. <http://som.yale.edu>

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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, 4th Floor, 203.432.0849. For additional information, see www.yale.edu/equalopportunity.

Title IX of the Education Amendments of 1972 protects people from sex discrimination in educational programs and activities at institutions that receive federal financial assistance. Questions regarding Title IX may be referred to the University's Title IX Coordinator, Stephanie Spangler, at 203.432.4446 or at titleix@yale.edu, or to the U.S. Department of Education, Office for Civil Rights, 8th Floor, 5 Post Office Square, Boston MA 02109-3921; tel. 617.289.0111, fax 617.289.0150, TDD 800.877.8339, or ocr.boston@ed.gov.

In accordance with federal and state law, the University maintains information on security policies and procedures and prepares an annual campus security and fire safety report containing three years' worth of campus crime statistics and security policy statements, fire safety information, and a description of where students, faculty, and staff should go to report crimes. The fire safety section of the annual report contains information on current fire safety practices and any fires that occurred within on-campus student housing facilities. Upon request to the Office of the 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>.

For all other matters related to admission to Yale College, please write to the Office of Undergraduate Admissions, Yale University, PO Box 208234, New Haven CT 06520-8234; telephone, 203.432.9300; website, <http://admissions.yale.edu>.

Yale University's website is www.yale.edu; the Yale College Programs of Study is online at <http://catalog.yale.edu/ycps>.

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