

An interdepartmental program

## Neuroscience

Courses of Study:  
Major (B.A. / B.S.)  
Master of Science  
Doctor of Philosophy

### Objectives

#### Undergraduate Major

The major in neuroscience is designed to provide an interdisciplinary program of study of the neural mechanisms involved in the control of human or animal behavior. The major combines a strong foundation in basic science with more specialized courses in biology and psychology. This program is especially appropriate for students wishing to pursue further study in medicine, experimental psychology, or neuroscience.

#### Graduate Program in Neuroscience

The graduate program in neuroscience, leading to the M.S. and Ph.D. degrees, is designed to equip students with the advanced knowledge and training necessary to conduct research in this interdisciplinary field. The program comprises three broadly defined areas: behavioral neuroscience involves work with humans in neuropsychology, experimental cognitive neuroscience, and sensory psychophysics, etc.; cellular and molecular neuroscience provides training in electrophysiology, molecular biology, biophysics, and biochemistry appropriate to neurobiology; and computational and integrative neuroscience trains students in the use of experimental and theoretical methods for the analysis of brain function. A typical program will consist of laboratory rotations as well as formal relevant courses, including an advanced course in the student's area of expertise.

### How to Become an Undergraduate Major

The neuroscience major requires a strong science course load. There is a meeting each fall at which interested students can meet with neuroscience faculty to discuss the major. The requirements are listed below and include many options. It is recommended that each major meet with his or her advisor to determine which options best satisfy each student's needs. Because of the number of basic science requirements, it is recommended that students begin enrolling in these courses early, especially those listed as prerequisites for advanced courses in the major. Students interested in senior research should contact prospective mentors by the spring of their junior year.

### How to Be Admitted to the Graduate Program

The general requirements for admission to the Graduate School, given in an earlier section of this *Bulletin*, apply here. Applicants for admission to the neuroscience program are also required to take the Graduate Record Examination. The student's undergraduate curriculum should include related fundamental science courses. Students currently enrolled in other programs at Brandeis may elect to switch over to obtain a neuroscience Ph.D. if they have already met or will meet the degree requirements for the neuroscience degree.

### Faculty

#### Robert Sekuler, Chair

(Psychology, Volen National Center for Complex Systems)

#### Laurence Abbott

(Biology, Volen National Center for Complex Systems)

#### Susan Birren

(Biology, Volen National Center for Complex Systems)

#### Paul DiZio, Undergraduate Advising Head

(Psychology, Volen National Center for Complex Systems)

#### Irving Epstein

(Chemistry, Volen National Center for Complex Systems)

#### Leslie Griffith

(Biology, Volen National Center for Complex Systems)

#### Jeffrey Hall

(Biology, Volen National Center for Complex Systems)

#### Michael Kahana

(Psychology, Volen National Center for Complex Systems)

#### Don Katz

(Psychology, Volen National Center for Complex Systems)

#### James Lackner

(Psychology, Volen National Center for Complex Systems)

#### John Lisman

(Biology, Volen National Center for Complex Systems)

#### Eve Marder, Graduate Advising Head

(Biology, Volen National Center for Complex Systems)

#### Christopher Miller

(Biochemistry, Volen National Center for Complex Systems)

#### Sacha Nelson

(Biology, Volen National Center for Complex Systems)

#### Daniel Oprian

(Biochemistry, Volen National Center for Complex Systems)

#### Michael Rosbash

(Biology, Volen National Center for Complex Systems)

#### Piali Sengupta

(Biology, Volen National Center for Complex Systems)

#### Gina Turrigiano

(Biology, Volen National Center for Complex Systems)

#### Xiao-Jing Wang

(Physics, Volen National Center for Complex Systems)

#### Kalpana White

(Biology, Volen National Center for Complex Systems)

#### Arthur Wingfield

(Psychology, Volen National Center for Complex Systems)

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## Requirements for the Undergraduate Major

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**A.** All students will be required to take the core course in neurobiology, NBIO 140b, (Principles of Neuroscience) and at least one core course in quantitative methods: BIOL 51b (Biostatistics), NBIO 136b (Computational Neuroscience), NPHY 115a (Dynamical Systems, Chaos, and Fractals), NPSY 137b (Cognitive Modeling), PSYC 51a (Statistics), or PSYC 210a (Advanced Psychological Statistics). A course taken to satisfy the quantitative method requirement cannot also count as an elective course.

Students must choose one of the two tracks described below—Option I leading to a B.A. degree in neuroscience, or Option II leading to a B.S. degree in neuroscience.

Among courses offered to fulfill the requirements of this concentration: no course may be taken pass/fail; no more than one grade of D in a semester course will be allowed.

### Option I: The B.A. Degree in Neuroscience

The standard neuroscience option is designed to provide students with a general background in neuroscience. In addition to the courses required of all candidates (listed above), students must take six semester courses from those courses listed below under Neuroscience Electives—at least two courses must be selected from Group I and two from Group II. Students must also take at least nine semester courses from the Basic Science Electives.

#### *Neuroscience Electives*

Group 1: NBIO 136b (Computational Neuroscience), 143b (Developmental Neurobiology), 145b (Systems Neuroscience), 147a (Neurogenetics), 148b (Cellular Neuroscience), NPHY 115a (formerly PHYS 115a) (Dynamical Systems, Chaos, and Fractals)

Group 2: NPSY 11b (Introduction to Behavioral Neuroscience), 12a (Sensory Processes), 22b (Introduction to Cognitive Neuroscience), 120b (Man in Space), 125a (Advanced Topics in Perception and Adaptation), 127a (Motor Control), 137b (Cognitive Modeling), 154a (Human Memory), 159a (Advanced Topics in Episodic Memory), 174a (Visual Cognition), 175a (The Neuroscience of Vision), 196b (Advanced Topics in Cognition), 197a (Advanced Topics in Behavioral Neuroscience), 199a (Human Neuropsychology)

Group 3: BCHM 100a (Introductory Biochemistry), 101a (Advanced Biochemistry: Enzyme Mechanisms), BIOL 22a (Genetics and Molecular Biology), 22b (Cell Structure and Function), 50b (Biology of Behavior), 103b (Mechanisms of Cell Functions), 105b (Molecular Biology), 111a (Developmental Biology), 149b (Molecular Pharmacology)

A student who has completed two courses in both Groups 1 and 2 may petition to substitute NEUR 98a,b (Readings in Neuroscience), or NEUR 99d (Senior Research) for one of the remaining two courses. Students must enroll in all laboratories that accompany electives used to satisfy these requirements (BIOL 18a and b must be taken along with BIOL 22a and b, but no additional concentration credit will be received).

#### *Basic Science Electives*

The basic science electives include all courses numbered 10 and above in chemistry, computer science, mathematics, and physics. Courses numbered below 10 may not be included in this group. Laboratory courses are counted as one-half of a regular semester course.

### Option II: The B.S. Degree in Neuroscience

The B.S. program is an intensive neuroscience option designed to provide students with a strong background in neuroscience and associated areas. In addition to the courses required of all candidates (listed above), students must take seven semester courses from those listed above in Neuroscience Electives, with at least two courses selected from Group 1 and two from Group 2. Candidates for the B.S. must also take at least 10 semester courses from the offerings given above in Basic Science Electives. Courses numbered below 10 may not be included in this group.

### B. Senior Research and Honors Program

Seniors can receive credit for senior research in neuroscience by petitioning the program committee during the fall of their senior year. Candidates must enroll in NEUR 99d or 99e to carry out a senior research project and submit a thesis. Candidates interested in honors must state this in their petition and also present an oral defense of their thesis.

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## Combined B.S./M.S. Program

Candidates for honors in neuroscience may be admitted to a special four-year B.S./M.S. program upon recommendation of the Neuroscience Program and approval by the Graduate School. Application must be made by May 1 preceding the senior year. Applications should include a proposed course of study specifying how the degree requirements will be met, a transcript, a letter of recommendation from their research sponsor, and a brief description of the proposed research project. To qualify for the B.S./M.S. degree in neuroscience students must complete a total of 38 courses. These courses must include those needed to satisfy the requirements for the B.S. degree, as indicated above, plus three additional electives chosen from the neuroscience electives listed above. Of the 10 electives required for the B.S./M.S. degree, at least six must be at the graduate level (and completed with a grade of B- or above). In addition, a substantial research contribution is required and students must submit a research thesis to the neuroscience graduate committee for review. A thesis submitted for the master's degree may also be submitted for honors in neuroscience.

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## Special Notes Relating to Undergraduates

It is the policy of the neuroscience program to allow no more than two Advanced Placement courses per student to count toward the general science requirements for the neuroscience major. Please refer to the Advanced Placement chart on pages 22-23 for test score requirements.

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## Requirements for the Degree of Master of Science

Graduate students will be eligible for an M.S. in neuroscience if they complete six graduate level courses in neuroscience that must include NBIO 140b or related fields to be agreed upon with the neuroscience advising head with a grade of B- or better, and a research project. The research component can be met by satisfactory performance in four laboratory rotations (including submission of written rotation reports) or submission of a research thesis to the Neuroscience Graduate Committee for review.

### Residence Requirement

The minimum residence requirement for the M.S. degree is one year.

## Requirements for the Degree of Doctor of Philosophy

### Program of Study

NBIO 140b (Principles of Neuroscience) is required. Students must complete four, nine-week laboratory rotations. They also must complete at least six graduate-level courses relevant to their area of interest. First- and second-year students shall enroll in NBIO 250d (Neuroscience Proseminar) and all students should enroll in NBIO 306d (Topics in Neurobiology). All students are required to take CONT 300b (Ethical Practice in Health-Related Sciences), typically in the spring of their first year.

The suggested schedule of course work for the first two years is the following:

#### First Year

Fall: NBIO 140b, NBIO 148b, NBIO 250d, and NBIO 306d.  
Spring: CONT 300b, NBIO 145b, NBIO 250d, NBIO 306d, and one course selected from the Neuroscience Electives.

#### Second Year

Fall: NBIO 250d, NBIO 306d and one course selected from the Neuroscience Electives.  
Spring: NBIO 250d, NBIO 306d and one course selected from the Neuroscience Electives.

## Courses of Instruction

### (1-99) Primarily for Undergraduate Students

#### NPSY 11b Introduction to Behavioral Neuroscience

(formerly PSYC 11b)

[ sn ss ]

*Prerequisite: PSYC 1a or MATH 10a, or permission of the instructor. This course may not be repeated for credit by students who have taken PSYC 11b in previous years.*

Data and theories regarding current conceptions of brain-behavior relationships. Begins with an introduction to neural systems as classically defined (sensory, association, motor, autonomic), and moves on to examination of the biological underpinnings of various behaviors, from those relating to basic drives (reproduction, feeding) to those with a cognitive flavor. Throughout, the accent is on interactions between organisms and environment (learning). Usually offered every year. Last offered in the spring of 2003.  
Mr. Katz

#### NPSY 12a Sensory Processes

[ sn ss ]

*Prerequisite: PSYC 1a, or MATH 10a, or permission of the instructor.*

Examines the human senses, emphasizing sight and hearing, studied from standpoints of anatomy, physiology, and psychophysics. Insights from the study of special observers including developmentally immature humans, members of nonhuman species, and people with abnormal sensory systems. Usually offered every year. Will be offered in the fall of 2003.  
Mr. Sekuler

#### NPSY 22b Introduction to Cognitive Neuroscience

[ sn ss ]

*Prerequisite: PSYC 1a or MATH 10a, and sophomore standing in psychology or neuroscience.*

Cognitive factors in perception, attention, memory, and language. Experimental investigations will be emphasized. Usually offered every year. Will be offered in the fall of 2003.

Messrs. Kahana and Wingfield

#### NEUR 98a Readings in Neuroscience

*Signature of the instructor required.*

Usually offered every year.

Staff

#### NEUR 98b Readings in Neuroscience

*Signature of the instructor required.*

Usually offered every year.

Staff

#### NEUR 99d Senior Research

*Signature of the instructor and the senior honors coordinator required.*

A year-long, two-semester course involving the student in an independent research project conducted under the supervision of a staff member and serving as an intensive introduction to specific methods of neuroscience research. In cases where students are able to do unusually long, intensive work in the laboratory, they may request a third course credit during the petition process; if this request is approved by the senior honors coordinator, students should register for NEUR 99d (fall) followed by NEUR 99e (spring). The combined enrollments for Senior Research may not exceed three semester course credits. To fulfill the NEUR 99 requirements, students must (1) submit to their research sponsor, at the conclusion of their first NEUR 99 semester, a paper that reviews the literature

### Qualifying Examination

Complete two proposition-type qualifying exams. One of these shall be in the field of neuroscience, but not directly related to the student's thesis work (end of first year). One shall be in the form of a formal thesis proposal (end of second year).

### Teaching Requirement

As part of their Ph.D. training, students act as teaching fellows for two semesters, typically in their second year, in courses taught by neuroscience faculty.

### Residence Requirement

The minimum residence requirement is three years.

### Dissertation and Final Oral Examination

Complete a Ph.D. thesis in the field of neuroscience. Normally this work would be carried out in the laboratory of one of the members of the neuroscience training faculty. After submission of the dissertation, the candidate will be expected to present the principal results of his or her work and its significance during an examination in defense of the dissertation. A public seminar to the University community is also required.

pertinent to their field of research, and (2) submit to their research sponsor, at the conclusion of their second NEUR 99 semester, a senior thesis that includes an abstract, an introduction, a review of materials and methods, results, discussion, and references. Usually offered every year.  
Staff

#### NEUR 99e Senior Research

*Signature of the instructor and the senior honors coordinator required.*

See NEUR 99d for course description.

Usually offered every year.

Staff

### (100-199) For Both Undergraduate and Graduate Students

#### NPHY 115a Dynamical Systems, Chaos, and Fractals

(formerly PHYS 115a)

[ sn ]

*Prerequisite: PHYS 10a or 11a, MATH 21a, MATH 36a, or approved equivalents.*

Advanced introduction to the theory of nonlinear dynamical systems, bifurcations, chaotic behaviors, and fractal patterns. Concepts and analysis are illustrated by examples from physics, chemistry, and biology. The course will be complemented by a significant number of computer labs. Usually offered every second year. Last offered in the spring of 2003.

Mr. Wang

**NPSY 120b Man in Space**

[ sn ss ]

*Enrollment limited to 25.*

Topics include how orbital flight is achieved, spacecraft life support systems, circulatory dynamics, sensory-motor control and vestibular function in free fall, and the physiological and psychological adaptations necessary in space flight, and how astronauts must readapt on return to Earth. Usually offered every year. Will be offered in the spring of 2004.

Mr. Lackner

**NPSY 125a Advanced Topics in Perception and Adaptation**

[ sn ss ]

*Enrollment limited to 10.*

Covers current issues and theories in vision, vestibular function, proprioception, and adaptation to unusual force environments from psychological and biological perspectives. Usually offered every third year. Will be offered in the fall of 2003.

Mr. Lackner

**NPSY 127a Motor Control**

[ sn ss ]

*Prerequisites: NPSY 11b (formerly PSYC 11b) and NPSY 12a or permission of the instructor. Enrollment limited to 20.*

Surveys control of posture, movement, gesture, and speech from various perspectives including muscle properties, reflex organization, central neural mechanisms, spatial representations, and learning, and development. Emphasizes research in physiology, psychology, biomechanics, and artificial intelligence. Usually offered every second year. Last offered in the fall of 2001.

Mr. DiZio

**NBIO 136b Computational Neuroscience**

[ sn ]

*Prerequisites: MATH 10a or PHYS 10a or approved equivalents.*

An introduction to methods and results in mathematical and computer modeling of neural systems. Topics include the basic biophysics of ion conduction, single- and multi-compartment neuron models, information theory and neural codes, the representation and processing of images by the visual system, and models of synaptic plasticity, learning, and memory. Usually offered every second year. Last offered in the spring of 2002.

Mr. Abbott

**NPSY 137b Cognitive Modeling**

[ sn ss ]

*Prerequisites: MATH 10b and PSYC 51a or NPSY 136b. Enrollment limited to 18.*

A general introduction to the construction and simulation of mathematical models of human cognitive processes. The major emphasis will be on models of human learning and memory. Students will be expected to have some background in computer programming. Usually offered every second year. Will be offered in the spring of 2004.

Mr. Kahana

**NBIO 140b Principles of Neuroscience**

[ sn ]

*Prerequisite: BIOL 22b or permission of the instructor.*

Basic principles of neurobiology. Topics include ion channels and their role in generating resting and action potentials; basics of synaptic physiology and pharmacology; neural circuits underlying behavior, learning, and mental illness. Usually offered every year. Will be offered in the fall of 2003.

Ms. Turrigiano

**NBIO 143b Developmental Neurobiology**

[ sn ]

*Prerequisite: BIOL 22b or permission of the instructor.*

Discusses the mechanisms used in the development of the nervous system. Topics include determination of neuronal cell fates, neuronal differentiation and pattern formation, neuron survival and growth, and mechanisms responsible for generation of connectivity in the nervous system. Usually offered every second year. Last offered in the spring of 2002.

Ms. Sengupta

**NBIO 145b Systems Neuroscience**

[ sn ]

*Prerequisite: NBIO 140b. Enrollment limited to 25.*

The neural basis of sensation and animal behavior studied at the level of individual neurons and neural circuits. Students will read and discuss papers from the scientific literature. Usually offered every year. Last offered in the spring of 2003.

Mr. Nelson

**NBIO 147a Neurogenetics**

[ sn ]

*Prerequisites: BIOL 18a and BIOL 22a (formerly BIBC 22a). Signature of the instructor required.*

Development and function of the nervous system and responses of excitable cells studied in neurological and behavioral mutants. Characterization and manipulation of genes, defined by these mutations and using molecular biological tools. Organisms: microbes, roundworms, fruit flies, mammals. Neurobiological areas: embryonic neural development, nerve cell differentiation and pattern formation, membrane excitability, responses to visual and chemical stimuli, biological rhythms, and reproductive behavior. Usually offered every third year. Last offered in the spring of 2001.

Mr. Hall

**NBIO 148b Cellular Neuroscience**

(formerly NBCH 148b)

[ sn ]

*Prerequisite: NBIO 140b or permission of the instructor. May be taken concurrently with NBIO 140b. This course may not be repeated for credit by students who have taken NBCH 148b in previous years.*

Focuses on the ionic and molecular basis of action and synaptic potentials with special emphasis on cellular mechanisms of plasticity. Students examine the Hodgkin-Huxley experiments on axonal action potentials and the original research literature dealing with many aspects of synaptic transmission, neuronal excitability, and plasticity. Usually offered every year. Will be offered in the fall of 2003.

Ms. Griffith

**NPSY 154a Human Memory**

[ sn ss ]

*Prerequisite: NPSY 22b. Enrollment limited to 18.*

Presents a systematic analysis of current memory research and theory with an emphasis on list learning experiments and neural network models. Usually offered every third year. Last offered in the spring of 2000.

Mr. Kahana

**NPSY 159a Advanced Topics in Episodic Memory**

[ sn ss ]

*Prerequisite: NBIO 140b or NPSY 154a, and permission of the instructor. Signature of the instructor required.*

Deals with current topics in the study of episodic memory. Discussions and readings on topics such as memory for temporal order, category learning, associative symmetry, item versus associative recognition, theories of search in free recall, and the memory systems controversy. Usually offered every second year. Last offered in the spring of 2003.

Mr. Kahana

**NPSY 174b Visual Cognition**

[ sn ss ]

*Prerequisite: NPSY 12a or permission of the instructor.*

Higher-order processes in vision. Visual impact of cognitive and other top-down influences, including attention, expectation, plasticity, and learning. Focus on visual recognition, contour formation, segmentation, temporal binding, face and object perception. Studies of visual perception in brain-damaged individuals. Usually offered every second year. Last offered in the spring of 2002.

Mr. Sekuler

**NPSY 175b The Neuroscience of Vision**

[ sn ss ]

*Prerequisite: NPSY 12a or permission of the instructor.*

Examines the neural basis of human vision from several complementary perspectives. Relates visual capacities of human observers to the structure and function of the visual system. Considers computational and functional neuroimaging approaches to vision. Usually offered every second year. Will be offered in the spring of 2004.

Mr. Sekuler

**NPSY 196b Advanced Topics in Cognition**

[ sn ss ]

*Prerequisite: NPSY 159a or permission of the instructor. Signature of the instructor required.*

This seminar covers current issues and research in memory, speech perception, and processing resource limitations. Emphasis will be placed on the current literature in the field. Usually offered every year. Will be offered in the fall of 2003.

Mr. Wingfield

**NPSY 197a Advanced Topics in Behavioral Neuroscience**

[ sn ss ]

*Prerequisites: NPSY 11b (formerly PSYC 11b) or NBIO 140b, or permission of the instructor. Signature of the instructor required.*

Covers current research and issues pertaining to the neurobiology of perception (focusing mainly but not exclusively on perception of chemosensory signals) as well as the neurobiology of simple learning. Usually offered every year. Will be offered in the fall of 2003.

Mr. Katz

**NPSY 199a Human Neuropsychology**

[ sn ss ]

*Prerequisite: NPSY 22b or NBIO 140b, or permission of the instructor.*

Designed as an introduction to human neuropsychology. Topics include cerebral dominance, neuroanatomical mapping, and localization of function, with special reference to language, memory, and related cognitive function. Usually offered every second year. Will be offered in the spring of 2004.

Mr. Wingfield

**(200 and above) Primarily for Graduate Students****NPSY 207b Seminar in Perception**

(Formerly PSYC 207b)

Examines the various aspects of visual, vestibular, motor, and proprioceptive information by which objects and events in three-dimensional space are perceived by human observers. Current research in psychology and in artificial intelligence is considered. Usually offered every second year.

Mr. Lackner

**NBIO 250d Neuroscience Proseminar***Limited to first- and second-year neuroscience Ph.D. students.*

Required seminar for first- and second-year graduate students in the neuroscience Ph.D. program. Discusses relevant papers from the current literature with an emphasis on increasing oral presentation skills, experimental design, and proposal writing. Usually offered every year.

Mr. Katz

**NEUR 298a and b Readings in Neuroscience**

Usually offered every year.

Staff

**NEUR 299a and b Master's Research Project**

Usually offered every year.

Staff

**NEUR 300d Laboratory Rotations**

Staff

**NBIO 306d Topics in Neurobiology**

Usually offered every year.

Ms. Turrigiano

**NBIO 340d Computational and Systems Neurosciences**

Usually offered every year.

Mr. Abbott

**NPHY 341b Neural Computation**

An advanced graduate seminar on current theoretical issues dealing with the dynamics and information processing of neural systems. Usually offered every year.

Mr. Wang

**NEUR 401d Dissertation Research**

Independent research for the Ph.D. degree. Specific sections for individual faculty members as requested.

Staff

**CONT 300b Ethical Practice in Health-Related Sciences***Required of all first-year graduate students in health-related science programs. Not for credit.*

Ethics is an essential aspect of scientific research. This course, taught by University faculty from several graduate disciplines, will cover major ethical issues and practices germane to the broader scientific enterprise, including areas or applications from a number of fields of study. Usually offered every year.

Ms. Press

**Cross-Listed Courses****BIOL 149b**

Molecular Pharmacology

An interdepartmental program

Courses of Study:  
Minor

## Peace, Conflict, and Coexistence Studies

### Objectives

Since the end of World War II, peace and conflict studies (PAX) has emerged as an interdisciplinary area of inquiry drawing on social science, the humanities, the creative arts, and science in efforts to understand reasons for wars and possible ways of resolving conflicts without resorting to violence. In the last few years, for many people the primary focus of inquiry is shifting from the Cold War and the nuclear threat to conflict resolution in small and large contexts. Along with the larger goal of ending war altogether, the Brandeis program reflects this tendency.

This is a time to examine the many meanings of "security," to investigate the nature of power and political participation and to develop ideas and ways of addressing conflicts that honor the integrity of all parties involved. This is a time, in other words, to learn alternatives to violence and a time to learn the ways of disarmament and ending of war.

### How to Become a Minor

Students who wish to take peace and conflict studies as a minor in addition to their major can construct an individually tailored minor in consultation with program advisors on the Peace, Conflict, and Coexistence Studies Committee.

### Committee

**Gordon Fellman, Chair**  
(Sociology)

**Silvia Arrom**  
(Latin American Studies)

**Seyom Brown**  
(Politics)

**Steven Burg**  
(Politics)

**Cynthia Cohen**  
(International Center for Ethics, Justice and  
Public Life)

**David Cunningham**  
(Sociology)

**Reuven Kimelman**  
(Near Eastern and Judaic Studies)

**Robert Lange**  
(Physics)

**Richard Parmentier**  
(Anthropology)

**John Schrecker**  
(History)

**Silvan Schweber**  
(Physics)

**Andreas Teuber**  
(Philosophy)

**Dessima Williams**  
(Sociology)

### Requirements for the Minor

Students are to take six required courses, configured this way:

**A. Two core requirements** (comprehensive course or project).

1. SOC 119a (War and Possibilities of Peace).
2. *Either* PAX 92a/b (Internship in Peace and Conflict Studies) *or* a senior honors thesis.

The internship consists of at least 10 hours a week in a social change organization in the greater Boston area or, if the student is abroad, an appropriate equivalent. The intern is supervised by a PAX professor or staff person, keeps a daily journal, presents and does the reading of a bibliography on the topic of the internship and its larger framework, and writes a paper of 15-20 pages at the end of the internship. The student is expected to meet weekly or biweekly with the supervisor and to email weekly or biweekly if doing the work abroad. Internships are organized around but not limited to those we find through the Hiatt Career Center.

The senior thesis is undertaken in the student's major, on a topic central to peace and conflict studies. With the department's permission, a member of the PAX Faculty Committee will serve on and represent the PAX Program on the thesis committee.

**B. Two or more core electives:** At least two courses (and up to four) from this list. Core electives must be taken in at least two different departments.

Core electives include courses that offer critical analyses of violence and non-violence and that consider information, ideas, and examples of productive ways of resisting violence and working toward peace and justice (what in the peace studies field is called "positive peace," as distinct from "negative peace," which is the absence of war but not of conditions that appear to lead to war). These courses offer perspectives on major institutions and possible alternatives, explore some strategies for change, and encourage students to envision and work toward a world based more on positive peace than on negative peace or war.

**C. Maximum of two related electives:** No more than two courses from this list can count to meet requirements for the minor, and they must be taken in different departments.

These courses relate directly or indirectly to international, domestic, organizational, intergroup, interpersonal, or personal conflict and also include consideration of perspectives that promote understanding, reconciliation, and transformation. They need not focus on violence and non-violence, positive peace, or encouraging students to envision positive peace. Students may apply courses from the "core electives" list that they have not taken to fulfill core requirements, to this requirement.

**D. Students are urged to take at least one course from a school other than social science to fulfill their PAX requirements.**

**E. Students may petition the PAX Committee for special consideration of courses not listed here that the student wishes to propose as appropriate for her/his PAX minor.**

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## Courses of Instruction

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### PAX 92a and b Internship in Peace and Conflict Studies

*Signature of the instructor required.*  
Usually offered every year.  
Staff

### PAX 110a International Nonviolent Initiatives

[ ss ]  
Explores the potential of nonviolent struggle and related efforts to reduce violence worldwide. The sociological mechanisms and ethical outlooks of forms of "nonviolence" are studied, as well as the workings of "people power" on five continents. Usually offered every year.  
Mr. Irwin

### PAX 120b Inner Peace and Outer Peace

[ ss ]  
*Enrollment limited to 20.*  
Examines the relationship between inner state and effective peace-making at levels ranging from the self within itself to interpersonal, intergroup, and international relations. Addresses concerns about structural change and the relationship between inner state, peace-building, and justice seeking. Special one-time offering.  
Staff

### PAX 186a Introduction to Intercommunal Coexistence

[ ss ]  
*Enrollment limited to 15. Required for students selected as Ethics and Coexistence Fellows.*  
Investigates the emerging field of intercommunal coexistence, partly through case studies, and by analyzing "coexistence," "tolerance," "reconciliation," and related concepts. Investigates methods of intercommunal work, including encounter, dialogue, activism, and the arts. Considers tensions between coexistence and values of equity and justice. Usually offered every spring.  
Ms. Cohen

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## Core Requirements

### PAX 92a and b Internship in Peace and Conflict Studies

*Signature of the instructor required.*  
Usually offered every year.  
Staff

### SOC 119a War and Possibilities of Peace

[ ss ]  
Ponders the possibility of a major "paradigm shift" under way from adversarialism and war to mutuality and peace. Examines war culture and peace culture and points in between, with emphases on the role of imagination in social change, growing global interdependence, and political, economic, gender, social class, and social psychological aspects of war and peace. Usually offered every year.  
Mr. Fellman

The following courses are approved for the minor. Not all are given in any one year. Please consult the *Course Schedule* each semester.

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## Core Elective Courses

### LGLS 130a

Conflict Analysis and Intervention

### PAX 110a

International Nonviolent Initiatives

### PAX 186a

Introduction to Intercommunal Coexistence

### PHIL 19a

Human Rights

### PHIL 111a

"What is Justice?"

### POL 127b

Seminar: Managing Ethnic Conflict

### POL 161b

Causes and Prevention of War

### POL 163a

Seminar: Human Rights and International Relations

### SOC 112b

Social Class and Social Change

### SOC 153a

Sociology of Empowerment

### WMNS 5a

Women in Culture and Society: A Multidisciplinary Perspective

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## Related Elective Courses

### AAAS 60a

Economics of Third World Hunger

### AAAS 80a

Economy and Society in Africa

### AAAS 123a

Third World Ideologies

### AAAS 126b

Political Economy of the Third World

### AMST 143a

War and the American Imagination

### AMST 175a

Violence in American Life

### ANTH 139b

Language, Ethnicity, and Nationalism

### BISC 2a

Human Reproduction, Population Explosion, Global Consequences

### BIOL 17b

Conservation Biology

### BUS 70a

Business in the Global Economy

### CHSC 3a

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