Why Neuroscience at Brandeis?

The undergraduate major in neuroscience is designed to provide an interdisciplinary program of study of the neural mechanisms involved in human and animal behavior. Understanding the brain is one of the greatest challenges of modern science and requires methodologies ranging from the psychological analysis of behavior to the molecular biology of neurons, including construction of mathematical models. Students are encouraged to take courses in the psychology of behavior, cellular and systems neuroscience, molecular neurobiology, and computational neuroscience, and will combine this breadth with a strong foundation in basic science.

Curriculum Overview

There are three categories of required neuroscience courses:

- **Core courses**—All students must take Principles of Neuroscience (NBIO 140b) and a one-semester course in quantitative methods (statistics or modeling).
- **Basic science electives**—Students must complete nine (for BA degree) or 10 (for BS degree) semester courses from chemistry, computer science, mathematics, and physics. Only courses numbered 10 and above qualify. Laboratory courses associated with basic science electives must be taken and are counted as one-half of a regular semester course.
- **Neuroscience electives**—Students must select six (for a BA degree) or seven (for a BS degree) one-semester electives. Two must be chosen from within a group of biology courses specialized for neuroscience, two from a group of psychology courses specialized for neuroscience, and the rest from either of these two groups, or from a third group of biology courses that are fundamental for understanding principles of neuroscience.

**Senior honors thesis.** Seniors who do collaborative research with a faculty member may receive academic credit for completing a two-semester, independent research project during their senior year. They develop a cutting-edge research proposal, obtain approval, perform the project, write a thesis, and orally defend it. Most theses are published, giving students insight into the excitement of a research career.

**BS/MS program.** Highly motivated students may petition in their junior year to receive a combined BS/MS degree in four years. This requires satisfying the BS course requirements, plus three additional neuroscience electives (of the ten electives required for the BS/MS degree, at least six must be at the graduate level). Students must also complete a senior honors thesis or equivalent research.
Features of the Neuroscience Program

• Brandeis is an exciting place for neuroscience research and study because we have an outstanding and highly interactive research community.
• Research experience is encouraged, and ample opportunities exist in faculty laboratories.
• Neuroscience faculty are affiliated with six participating departments (biology, biochemistry, psychology, physics, chemistry, and computer science).
• Most neuroscience laboratories are housed within the Volen Center for Complex Systems and adjoining buildings.

Career and Education Options

The most common paths of further study pursued by neuroscience majors are medicine and graduate studies in experimental psychology or neuroscience. Many students double major in other science and nonscience disciplines, opening up additional opportunities.

Faculty

Following is a list of faculty members and their areas of specialization:

• John Lisman, chair
  Mechanisms of phototransduction

• Jeff Agar
  Development of mass spectrometry methods for the comprehensive identification of proteins and their post-translational modifications

• Susan Birren, undergraduate advising head
  Developmental neurobiology

• Paul DiZio
  Human spatial orientation and motor control

• Irving Epstein
  Nonlinear chemical dynamics

• József Fiser
  Visual information processing

• Paul Garrity
  Neural development and behavior

• Leslie Griffith, graduate advising head
  Biochemistry of synaptic plasticity

• Jeffrey Hall
  Neurogenetics and molecular neurobiology of higher behaviors in Drosophila

• Donald Katz
  Neural dynamics of gustatory perception and learning

• James Lackner
  Spatial orientation, human movement control

• Eve Marder
  Neurotransmitter modulation of neural circuits

• Christopher Miller
  Structure and function of ion channel proteins

• Sacha Nelson
  Synaptic integration in the visual cortex

• Daniel Oprian
  Structure-function studies of visual pigments and other cell surface receptors

• Michael Rosbash
  RNA processing of molecular neurobiology

• Robert Sekuler
  Visual perception, cognitive processes

• Piali Sengupta
  Developmental neurobiology in C. elegans

• Gina Turrigiano
  Activity-dependent regulation of neuronal properties

• Kalpana White
  Developmental neurogenetics

• Arthur Wingfield
  Human memory