

Neurobiology

Courses offered by the Department of Neurobiology are listed under the subject code NBIO on the (<http://explorecourses.stanford.edu/CourseSearch/search?view=catalog&catalog=&page=0&q=NBIO&filter-catalognumber-NBIO=on>) Stanford Bulletin's (<http://explorecourses.stanford.edu/CourseSearch/search?view=catalog&catalog=&page=0&q=NBIO&filter-catalognumber-NBIO=on>) ExploreCourses web site (<http://explorecourses.stanford.edu/CourseSearch/search?view=catalog&catalog=&page=0&q=NBIO&filter-catalognumber-NBIO=on>).

Graduate Program in Neurobiology

Graduate students in the Department of Neurobiology obtain the Ph.D. degree through the interdepartmental Neurosciences Ph.D. program (<http://exploreddegrees.stanford.edu/schoolofmedicine/neurosciences/#doctoraltext>). Accepted students receive funding for tuition and a living stipend. Applicants should familiarize themselves with the research interests of the faculty and, if possible, indicate their preference on the application form which is submitted directly to the Neurosciences Program.

Medical students also are encouraged to enroll in the Ph.D. program. The requirements of the Ph.D. program are fitted to the interests and time schedules of the student. Postdoctoral training is available to graduates holding Ph.D. or M.D. degrees, and further information is obtained directly from the faculty member concerned.

Research interests of the department include information processing in vertebrate retina; structure, function, and development of auditory and visual systems; development and regeneration in the central and peripheral nervous system; neural mechanisms mediating higher nervous system functions, including perception, learning, attention and decision making.

Faculty

Emeritus: Denis Baylor, Uel J. McMahan, Eric Shooter, Lubert Stryer

Chair: Ben Barres

Professors: Eric I. Knudsen, Thomas Clandinin, Tirin Moore, William T. Newsome

Associate Professors: Stephen Baccus, Jennifer Raymond

Assistant Professor: Lisa Giocomo, Michael Z. Lin

Courses

NBIO 101. Social and Ethical Issues in the Neurosciences. 2-4 Units. Influences on public debate and policy of scientific advances in the study of the brain and behavior: theories of brain function; philosophical and scientific approaches; advances in the neurosciences, possible uses in medical therapy, and interventions involving genetic screening, genetic selection, enhancement of neurological functioning, and manipulation of behavior; questions related to medical therapy, social policy, and broader considerations of human nature such as consciousness, free will, personal identity, and moral responsibility. May be taken for 2 units without a research paper. Prerequisite: Neuroscience, Biology, or Symbolic Systems major; or Human Biology core; or consent of instructor. Same as: NBIO 201

NBIO 198. Directed Reading in Neurobiology. 1-18 Unit. Prerequisite: consent of instructor. (Staff).

NBIO 199. Undergraduate Research. 1-18 Unit. Investigations sponsored by individual faculty members. Prerequisite: consent of instructor.

NBIO 201. Social and Ethical Issues in the Neurosciences. 2-4 Units. Influences on public debate and policy of scientific advances in the study of the brain and behavior: theories of brain function; philosophical and scientific approaches; advances in the neurosciences, possible uses in medical therapy, and interventions involving genetic screening, genetic selection, enhancement of neurological functioning, and manipulation of behavior; questions related to medical therapy, social policy, and broader considerations of human nature such as consciousness, free will, personal identity, and moral responsibility. May be taken for 2 units without a research paper. Prerequisite: Neuroscience, Biology, or Symbolic Systems major; or Human Biology core; or consent of instructor. Same as: NBIO 101

NBIO 206. The Nervous System. 7-8 Units. Structure and function of the nervous system, including neuroanatomy, neurophysiology, and systems neurobiology. Topics include the properties of neurons and the mechanisms and organization underlying higher functions. Framework for general work in neurology, neuropathology, clinical medicine, and for more advanced work in neurobiology. Lecture and lab components must be taken together.

NBIO 218. Neural Basis of Behavior. 5 Units. Advanced seminar. The principles of information processing in the nervous system and the relationship of functional properties of neural systems with perception, behavior, and learning. Original papers; student presentations. Prerequisite: NBIO 206 or consent of instructor.

NBIO 220. Central Mechanisms in Vision-based Cognition. 2-4 Units. Contemporary cognitive neuroscience, emphasizing the use of the primate visual and oculomotor systems to explore neural mechanisms underlying perception, attention, learning, and decision-making. Eight foundational topics in cognitive neuroscience; intensive study and critical discussion of selected papers from the contemporary literature. Student presentations, seminar-style discussions. Class enrollment is limited to 12 students. First priority will be given to students from the neurosciences graduate program.

NBIO 227. Understanding Techniques in Neuroscience. 2 Units. Topics include molecular, genetic, behavioral, electrophysiological, imaging, and computational approaches used in the field of neuroscience. Presentations and discussions led by senior graduate students, assigned readings from the primary neuroscience literature, and optional laboratory demonstrations. Intended for graduate students from any discipline and for advanced undergraduates in the biosciences, engineering, or medicine.

NBIO 228. Mathematical Tools for Neuroscience. 2 Units. Student-instructed. For students with no math background beyond basic calculus, or as a review for more advanced students. Techniques useful for analysis of neural data including linear algebra, Fourier transforms, probability and statistics, signal detection, Bayesian inference, and information theory.

NBIO 254. Molecular and Cellular Neurobiology. 3-5 Units. For graduate students. Includes lectures for BIO 154. Cellular and molecular mechanisms in the organization and functions of the nervous system. Topics: wiring of the neuronal circuit, synapse structure and synaptic transmission, signal transduction in the nervous system, sensory systems, molecular basis of behavior including learning and memory, molecular pathogenesis of neurological diseases. Same as: BIO 254

NBIO 258. Information and Signaling Mechanisms in Neurons and Circuits. 4 Units. How synapses, cells, and neural circuits process information relevant to a behaving organism. How phenomena of information processing emerge at several levels of complexity in the nervous system, including sensory transduction in molecular cascades, information transmission through axons and synapses, plasticity and feedback in recurrent circuits, and encoding of sensory stimuli in neural circuits.

NBIO 299. Directed Reading in Neurobiology. 1-18 Unit. Prerequisite: consent of instructor.

NBIO 370. Medical Scholars Research. 4-18 Units.

Provides an opportunity for student and faculty interaction, as well as academic credit and financial support, to medical students who undertake original research. Enrollment is limited to students with approved projects.

NBIO 399. Graduate Research. 1-18 Unit.

Investigations sponsored by individual faculty members. Prerequisite: consent of instructor.