

# NEUROBIOLOGY

*Chair:* Howard Schulman

*Professors:* Denis A. Baylor, Eric I. Knudsen, Uel J. McMahan, William T. Newsome, Howard Schulman, Eric M. Shooter, Lubert Stryer

*Associate Professor:* Ben Barres

*Assistant Professor:* Jennifer Raymond

*Visiting Assistant Professor:* Kajiwara Kazuto

## GRADUATE PROGRAM

Graduate students in the Department of Neurobiology obtain the Ph.D. degree through the interdepartmental Neurosciences Ph.D. program. 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 individual 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: mechanisms of visual transduction and information transmission in vertebrate retina; structure, function, and development of auditory and visual systems; integrative mechanisms and regeneration in the central and peripheral nervous system; mechanisms of ion channel function; and neuronal growth and differentiation.

## COURSES

Course work and lab instruction in the Department of Neurobiology conform to the Policy on the Use of Vertebrate Animals in Teaching Activities as stated in the front of this catalog.

The department offers a one-quarter course (Neurobiology 200) on the structure and function of the nervous system, which is open to medical and graduate students, and advanced undergraduates. Advanced courses are open to students who have completed the basic course.

**199. Directed Reading (Undergraduate)**—Prerequisite: consent of instructor.

*1-18 units, any quarter (Staff)*

**200. The Nervous System**—Introduction to the structure and function of the nervous system, including neuroanatomy, neurophysiology, and neurochemistry. Topics range from the properties of neurons to the mechanisms and organization underlying higher functions. Coherent framework prepares for general work in neurology, neuropathology, clinical medicine, and for more advanced work in neurobiology. Lecture and lab components must be taken together.

*9 units, Win (Barres, Baylor, Knudsen, McMahan, Newsome, Raymond, Schulman, Shooter, Stryer)*

**218. Neural Basis of Behavior**—Advanced seminar exploring the principles of information processing by the central nervous system of vertebrates, and the relationship of functional properties of neural systems with perception and behavior. Emphasis is on the visual and auditory systems. Study of original papers, directed group discussions, and student presentations. Prerequisite: Neurobiology 200 or consent of instructor.

*4 units, Spr (Knudsen, Newsome) alternate years, not given 2001-02*

**230. Signal Transduction Mechanisms**—Molecular mechanisms of the transduction of sensory and hormonal stimuli by prokaryotes and eukaryotes. Topics: bacterial chemotaxis and phototaxis; vision in invertebrates and vertebrates; olfaction; and hormonal actions mediated by G-proteins, e.g., adenylate cyclase cascade and the phosphoinositide cascade; molecular evolution of transducing proteins. The structure and interplay of receptors, enzymes, and ion channels mediating these processes. Experimental approaches include gene cloning and site-specific mutagenesis, isolation and reconstitution of functional transducing assemblies, and patch clamping and other electrophysiological methods. Emphasis is on recurring motifs of excitation and adaptation, and transduction and their evolution.

*4 units (Stryer) alternate years, given 2001-02*

**254. Molecular and Cellular Neurobiology**—(Same as Biological Sciences 154/254.) Lecture/seminar for advanced undergraduates and graduate students, focusing on cellular and molecular mechanisms in the organization and functions of the nervous system. Topics: cell biology of the neuron, wiring of the neuronal network, synapse structure and synaptic transmission, signal transduction in the nervous system, the molecular basis of behavior including learning and memory, and the molecular pathogenesis of neurological diseases. Prerequisite for undergraduates: Biological Sciences core or equivalent, plus at least one of 118, 119, 128, 129, or 153, or consent of the instructors.

*4 units, Aut (Luo, Schulman)*

**299. Directed Reading**—Prerequisite: consent of instructor.

*1-18 units, any quarter (Staff)*

**300. Professional Development and Integrity in Neuroscience**—Required of Neurosciences Ph.D. students every quarter. Develops professional skills in critical assessment and oral presentation of findings from current neuroscience literature in the visual presentation of quantitative data and writing research grants. The role of animals in lab research, fraud in science, the responsibility of authors and reviewers, science in a multicultural environment, and the relationship between student and mentor. Student and faculty presentations and discussions.

*2 units, Aut, Win, Spr (Schulman)*

**399. Individual Research**—Prerequisite: consent of instructor.

*1-18 units, any quarter (Staff)*