NEUROBIOLOGY

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Courses given in Neurobiology have the subject code NBIO. For a complete list of subject codes, see Appendix.

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 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 and lab instruction in the Department of Neurobiology conforms to the "Policy on the Use of Vertebrate Animals in Teaching Activities," the text of which is available at http://www.stanford.edu/dept/DoR/rph/8-2.html.

The department offers a one quarter course (NBIO 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.

NBIO 198. Directed Reading in Neurobiology—Prerequisite: consent of instructor.
1-18 units, Aut, Win, Spr, Sum (Staff)

NBIO 199. Undergraduate Research—Allows for qualified students to undertake investigations sponsored by individual faculty members. Prerequisite: consent of instructor.
1-18 units, Aut, Win, Spr, Sum (Staff)

NBIO 206. The Nervous System—Introduction to the 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.
7-8 units, Win (Clandinin, T)

NBIO 216. Genetic Analysis of Behavior—(Same as MCP 216.) Advanced seminar. Findings and implications of behavioral genetics as applied to invertebrate and vertebrate model systems. Topics include biological clocks, and sensation and central pattern generators. Relevant genetic techniques and historical perspective. Student presentation.
4 units, not given this year

NBIO 218. Neural Basis of Behavior—Advanced seminar. The principles of information processing in the vertebrate central nervous system, and the relationship of functional properties of neural systems with perception and behavior. Emphasis is on the visual and auditory systems. Original papers; student presentations. Prerequisite: 206 or consent of instructor.
4 units, alternate years, not given this year

NBIO 220. Central Mechanisms in Vision-based Cognition—Contemporary visual neuroscience, emphasizing the neural mechanisms underlying primate vision and visually guided behavior. Seven foundational topics in visual neuroscience; current papers concerning each topic. Student presentations. Computer-based demonstration exercises.
2-4 units, Aut (Moore, T; Newsome, W)

NBIO 221. Frontiers in Translational Medicine—Small group course for first year MSTP and M.D./Ph.D. students only. Pathways for combining science and medicine during graduate and postdoctoral training and in one's career. Practical aspects of translational medicine. Guest lecturers are physician-scientists who have advanced the frontiers of translational medicine, including Drs. Gilbert Chu, Jamie Topper, Irv Weissman, Ching Wang, Linda Giudice, Geoff Duyk, William Mobley, Judy Shizuru, and David Cox. Prerequisite: consent of instructor.
1 unit, Spr (Barres, B)

NBIO 227. Understanding Techniques in Neuroscience—This student-organized and student-taught course examines and discusses a wide spectrum of methods commonly used in the field of neuroscience. Techniques discussed range from molecular/genetic to electrophysiology and whole brain imaging. Prepares students to understand common techniques used in any neuroscience paper, seminar, or poster. Each class includes an overview lecture, brief presentations by senior graduate students who practice these techniques, and relevant examples from the literature. Optional laboratory demonstrations outside of class are provided.
2 units, Aut (Newsome, W)

NBIO 228. Mathematical Tools for Neuroscience—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.
1-3 units, Aut (Corrado, G; Cohen, M)

NBIO 254. Molecular and Cellular Neurobiology—(Same as BIOSCI 154/254.) For advanced undergraduates and graduate students. 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. Prerequisite for undergraduates: Biological Sciences core or equivalent, or consent of instructors.
4-5 units, Aut (Luo, L; Shen, K; Clandinin, T; Dolmetsch, R), alternate years, not given next year

NBIO 258. Information and Signaling Mechanisms in Neurons and Circuits—(Same as MCP 258.) 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.
5 units, Aut (Tsien, R; Baccus, S)

NBIO 299. Directed Reading in Neurobiology—Prerequisite: consent of instructor.
1-18 units, Aut, Win, Spr, Sum (Staff)

NBIO 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.

1-2 units, Aut, Win, Spr (Dolmetsch, R)

NBIO 399. Graduate Research—Allows for qualified students to undertake research sponsored by individual faculty members. Prerequisite: consent of instructor.

1-18 units, Aut, Win, Spr, Sum (Staff)

COGNATE COURSES

See respective department listings for course descriptions. See degree requirements above or the program's student services office for applicability of these courses to a major or minor program.

MCP 215. Synaptic Transmission

5 units, Aut (Staff)

PSYCH 204A. Computational Neuroimaging

1-3 units, Spr (Wandell, B)

PSYCH 250. High-level Vision

1-3 units, alternate years, not given this year