Curriculum and Requirements

Interdisciplinary

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Department Homepage

Neuroscience Faculty

Neuroscience studies brain-behavior relationships in order to understand the roles they play in regulating both animal and human behavior. A thorough knowledge of the functions of the nervous system is essential to understanding the vicissitudes of psychological experience, general behavior, and clinical disorders. Therefore, the study of the nervous system and the brain--anatomically, physiologically, and biophysically, at both the microscopic and macroscopic levels--is central to the Neuroscience Program.

In recent years, neuroscience has become the most rapidly developing interdisciplinary area in the sciences. This field integrates the knowledge, research methods, and modern laboratory technology of biology, chemistry, psychology, and other scientific fields toward the common goal of understanding animal and human behavior. For this reason, the program's curriculum and list of instructors reflect a diversity of subdisciplines within a variety of departments. A primary objective of this program is to prepare students for entrance into graduate training or research occupations in neuroscience, neurochemistry, neurobiology, anatomy, physiology, physiological psychology, clinical psychology, behavioral science, and the health sciences (medicine and allied fields).

First-Year and New Students

Students who are considering a concentration or a major in neuroscience should inquire about the program from any of the affiliated faculty members and should consult with Professor McFarlane, the program's director.

NEUR 112 Introduction to Neuroscience
This first-semester, entry-level course begins by emphasizing that neuroscience is truly an interdisciplinary field. Consistent with this view, a number of faculty members from various departments give lectures and lead discussions throughout the semester. After covering brain evolution and the genetic basis of behavior, there is a review of the organization of the nervous system and the processes responsible for neural conduction and synaptic transmission. This knowledge is then applied to a comprehensive examination of the neurochemical, sensory, motor, developmental, motivational, cognitive, and emotional processes and structures that influence both normal and abnormal behavior. No prerequisites.

Neuroscience Major: Curriculum and Requirements

The neuroscience major is intended primarily for students who are planning to attend graduate school in the many specialized fields of neuroscience, such as medical neuroscience, developmental neuroscience, cognitive neuroscience, or behavioral neuroscience. It is also an excellent major for students who are seriously interested in pursuing research careers or becoming clinical practitioners concerned with the biochemical or the biopsychological aspects of the nervous system or behavior (e.g., psychopharmacology, psychiatry, clinical neuropsychology).

Despite the need for uniform curriculum requirements for the neuroscience major, two tracks are available to fulfill the major: (a) a biochemical track, and (b) a bio-psychological track. Both tracks require 4.5 units of neuroscience core courses, plus 2.75 to 3 units of courses in one of the two tracks, for a total of 7.25 to 7.5 units for the major. The core courses, as well as the required courses for each of the tracks, are as follows:

Neuroscience Core Courses: 4.5 units
NEUR 112 (.5 unit) Introduction to Neuroscience
NEUR 471 (.5 unit) Current Research Topics in Neuroscience
BIOL 115 and BIOL 116 (1 unit) Energy in Living Systems, and Information in Living Systems
BIOL 358 (.5 unit) Neurobiology
CHEM 121, 124/125 (or CHEM 122, 124/125) (1 unit) Introductory Chemistry I, II (or Honors Introductory Chemistry I, II)
PSYC 305 (.5 unit) Physiological Psychology
PSYC 401 (.5 unit) Research Methods in Biopsychology, or PSYC 403 (.5 unit) Research Methods in Learning and Motivation, or PSYC 406 (.5 unit) Research Methods in Sensation and Perception

Biochemical Track: 2.75 units
One selected biology course from the concentration list (see section on neuroscience concentration, below) (.5 unit)
BIOL 359 (.25 unit) Experimental Neurobiology, or CHEM 371 (.25 unit) Biochemistry Laboratory
CHEM 231, 232 (1 unit) Organic Chemistry I, II
Recommended courses:

CHEM 123 and 126
CHEM 233, 234
CHEM 256

One selected psychology course from the concentration list (below) (.5 unit)
MATH 111 (.5 unit) Calculus

Biopsychological Track: 2.75 to 3 units

One selected biology course from the concentration list (below) (.5 unit)
BIOL 359 (.25 unit) Experimental Neurobiology, or PSYC 405 (.5 unit) Research Methods in Physiological Psychology

CHEM 123 and 126 (.5 unit)
Introductory Chemistry Laboratory I, II
PSYC 200 (.5 unit) Statistical Analysis in Psychology
Two selected psychology courses from the concentration list (below) (1 unit)

Senior Exercise

The Senior Exercise consists of an original research proposal, written in a format appropriate for a scientific grant. The exercise can be completed at one of two times, at the option of the student. It is due some time within the first two months of either the first or second semester of the student's senior year. This Senior Exercise is evaluated by two members: the Senior Exercise advisor and one member of the Neuroscience Program from another department.

In preparation for the Senior Exercise, students can gain research experience by participating in Individual Study (NEUR 493) under the supervision of a faculty advisor. Although independent study courses are not required for the major, conducting research is a valuable educational experience, particularly for students planning to pursue graduate or medical training.

Honors

Seniors participating in the Honors Program (NEUR 497Y-498Y) must complete an honors project and pass an oral exam. Assessment of the honors candidates is conducted by two members of the advisor's department, one member of the Neuroscience Program from another department, and an outside examiner brought in by the advisor's department.

Neuroscience Concentration: Curriculum and Requirements

Required neuroscience courses: 1 unit

NEUR 112 (.5 unit) Introduction to Neuroscience
This course also serves in lieu of PSYC 101 for all advanced psychology courses that are listed in the neuroscience curriculum. This multidisciplinary, introductory course is offered during the first semester.

NEUR 471 (.5 unit) Current Research Topics in Neuroscience
This culminating seminar for juniors and seniors is offered first semester for students who intend to fulfill the requirements for the concentration.

Required basic science courses: 2 units minimum
BIOL 115 Energy in Living Systems and BIOL 116 Information in Living Systems
CHEM 109 Neurochemistry (or CHEM 121 and 124/125 or CHEM 122 and 124/125)
PSYC 305 Physiological Psychology

Selected advanced science courses: 1 unit selected from the following:

Biology courses
BIOL 243 Comparative Animal Physiology

BIOL 261 Animal Behavior
BIOL 263 Molecular Biology and Genomics
BIOL 321 Developmental Biology
BIOL 358 Neurobiology
BIOL 366 Cell Physiology

Chemistry courses
CHEM 231, 232 Organic Chemistry I, II
CHEM 256 Biochemistry
CHEM 341 Instrumental Analysis

Psychology courses
PSYC 301 Cognitive Psychology
PSYC 302 Comparative Psychology
PSYC 303 Psychology of Learning and Motivation
PSYC 304 Neuropsychology
PSYC 307 Sensation and Perception
PSYC 347 Psychopharmacology

Anthropology courses
ANTH 111 Introduction to Biological Anthropology
ANTH 321 Evolution and Human Evolution

NEUR COURSES AND DIVERSIFICATION REQUIREMENTS
The following courses may be paired to satisfy the natural sciences requirement:

- NEUR 105 and NEUR 112
- NEUR 105 and BIOL 103
- NEUR 105 and BIOL 105

Neuroscience

Note: This page contains **all** of the regular courses taught by this department. Not all courses are offered every year. Check the searchable schedule to see which courses are being offered in the upcoming semester.

NEUR 105 Topics in Neuroscience

Credit: 0.5

This introductory course will explore a range of topics and issues in the study of neuroscience. Specifically, the course will focus on the relationship between neuroscience, the arts and humanities. The course will treat the humanities and sciences as partners working together on the same problems. Usually, three topics are covered per semester. Examples of topics covered include: the neuroscience of emotions, play behavior, film, visual and artistic perspective, space, time. Other topics may be covered. Assignments will include weekly quizzes, class discussion, and a thesis paper. Prerequisite: None. NEUR 105 is a non-majors introductory course geared towards first and second year students, although others may take it. Anyone who plans to major or concentrate in Neuroscience will need to take Introduction to Neuroscience (NEUR 112). NEUR 105 can be paired with NEUR 112 (Introduction to Neuroscience), BIOL 103 (Biology in Science Fiction) or BIOL 105 (Biology of Exercise) in order to satisfy the Natural Science distribution requirement. This course is repeatable for credit. However, this course taken twice or with a NEUR special topic does not satisfy the natural sciences diversification.

Instructors: McFarlane,Richeimer

NEUR 112 Introduction to Neuroscience

Credit: 0.5

This course begins with a definition of neuroscience as an interdisciplinary field, in the context of the philosophy of science. Consistent with this view, a number of faculty members from various departments are responsible for giving lectures and leading discussions throughout the semester. After covering the basics of cellular neurophysiology, the course examines the development and organization of the human nervous system in terms of sensory, motor, motivational, emotional, and cognitive processes. The neurological and biochemical bases of various brain and behavioral disorders are also examined. This course can be used as a substitute for the PSYC 101 prerequisite for all advanced-level psychology courses listed for the neuroscience concentration. However, this course does not count towards Natural Sciences diversification. No prerequisites.

Instructor: Niemiec, Staff

NEUR 471 Topics in Neuroscience

Credit: 0.5

This capstone seminar is required of all students who plan to graduate with a neuroscience concentration or major. The seminar is intended to bring together the knowledge acquired from courses required for, or relevant to, the concentration and major. During the course of the semester, each student will submit a critique of a published article and write a research proposal with the assistance of the instructor. Oral presentations are given in conjunction with each of these exercises. This seminar is limited to juniors or seniors who have taken NEUR 112 and completed two of the three required basic science courses for the concentration.

NEUR 493 Individual Study

Credit: 0.25-0.5

Students conduct independent research under the supervision of one of the faculty members affiliated with the Neuroscience Program. This course is restricted to juniors or seniors who are neuroscience majors or have taken (or are concurrently enrolled in) courses required for the neuroscience concentration. Prerequisites: permission of instructor and neuroscience director, along with demonstrated special interest.

NEUR 497Y Senior Honors

Credit: 0.5

This program for senior honors students culminates in the completion of a senior honors research project. The research is expected to be on a topic of particular relevance to the student's postgraduate plans. Students must select a research advisor from the faculty members in the Neuroscience Program. They are expected to have done a thorough bibliographic search of the literature, written a short review paper, and formulated some tentative hypotheses during the spring semester of their junior year. Prerequisites: The student must have a 3.33 overall GPA, a 3.5 GPA in the neuroscience core courses, and have completed at least 5 units toward the major. Permission must be granted by the director of the Neuroscience Program.

NEUR 498Y Senior Honors

Credit: 0.5

See course description for NEUR 497Y.

Instructor: Staff

Additional courses that meet the requirements for this major/concentration

ANTH 111: Introduction to Biological Anthropology
ANTH 321: Evolution and Human Evolution
BIOL 115: Energy in Living Systems
BIOL 116: Information in Living Systems
BIOL 243: Animal Physiology
BIOL 261: Animal Behavior
BIOL 263: Molecular Biology and Genomics
BIOL 266: Cell Biology
BIOL 321: Developmental Biology
BIOL 358: Neurobiology
BIOL 359: Experimental Neurobiology
CHEM 109: Neurochemistry
CHEM 121: Introductory Chemistry
CHEM 122: Chemical Principles
CHEM 123: Introductory Chemistry Lab I
CHEM 124: Introductory Chemistry II
CHEM 126: Introductory Chemistry Lab II
CHEM 231: Organic Chemistry I
CHEM 232: Organic Chemistry II
CHEM 233: Organic Chemistry Lab I
CHEM 234: Organic Chemistry Lab II
CHEM 256: Biochemistry
CHEM 335: Chemical Kinetics and Thermodynamics
CHEM 341: Instrumental Analysis
CHEM 371: Advanced Lab: Biochemistry
MATH 111: Calculus I
PSYC 200: Statistical Analysis in Psychology
PSYC 301: Cognitive Psychology
PSYC 302: Comparative Psychology
PSYC 303: Learning and Motivation
PSYC 304: Neuropsychology
PSYC 305: Physiological Psychology
PSYC 307: Sensation and Perception
PSYC 347: Psychopharmacology
PSYC 401: Research Methods: Biopsychology
PSYC 403: Research Methods in Learning and Motivation
PSYC 406: Research Methods in Sensation and Perception