

# NEUROSCIENCE

## CURRICULUM COMMITTEE:

*Amy Jo Stavnezer (Psychology), Chair*

*Dean Fraga (Biology)*

*Gary Gillund (Psychology)*

*Sharon Lynn (Biology)*

Neuroscience is an exceptionally diverse and interdisciplinary field that incorporates aspects of biology, psychology, chemistry, philosophy, computer science, and other disciplines in the study of the nervous system. Neuroscientists seek to understand the function of the brain, spinal cord and peripheral nervous system at multiple levels, from the complex processes that occur in single neurons to the expansive cellular networks that ultimately give rise to perception, emotion, cognition, and even social behavior. The Neuroscience Program is thus a multidisciplinary program with the curriculum consisting of a combination of nine required foundational courses currently required for majors in Chemistry, Biology, and Psychology. Neuroscience continues to draw from, inform and expand the disciplines of Biology and Psychology in a variety of ways, and therefore emphasizes these areas in its curriculum. Students can choose from a variety of upper level electives according to their personal interests and career goals. The goals of the Neuroscience Program are to provide students with the essential foundational knowledge, skills, confidence and research experiences that will allow them to identify and meet their intellectual and professional goals. In addition, it will produce liberally educated scientists who are well-versed in scientific methodology and its application, who possess a thorough knowledge of fundamental neuroscientific concepts, and who are able to express themselves with clarity, both orally and in writing.

## Major in Neuroscience

Consists of fifteen courses:

- PSYC 10000
- CHEM 12000
- BIOL 20000
- BIOL 20100
- PSYC 23000
- One of the following courses: PSYC 25000 or MATH 10200
- NEUR 32300
- NEUR 38000
- Four elective courses, from two or more departments, from cross-listed courses accepted for NEUR credit
- Junior Independent Study: NEUR 40100
- Senior Independent Study: NEUR 45100
- Senior Independent Study: NEUR 45200

## Special Notes

- See Chemistry Department information on placement exams for CHEM 11000/12000.
- First year students are advised to complete all 100-level courses and at least one 200-level course by the end of the first year.
- The Core courses (PSYC 10000, 23000, 25000, BIOL 20000, 20100, CHEM 12000, NEUR 32300 and 38000) and at least two electives should be completed by the end of the Junior year.

- The electives BIOL 34400, 35200, and 37700 require BIOL 20200 as a prerequisite or special permission of instructor.
- The laboratory and classroom components are closely integrated in the upper-level Biology and Psychology courses and must therefore be taken concurrently. The course and laboratory grades will be identical and are based on performance in both components; the relative weights of the two components are stated in each course syllabus.
- For I.S., students can work with faculty advisers that are on the Neuroscience curriculum committee or other faculty members in Psychology, Biology, Chemistry or Biochemistry and Molecular Biology, with their permission.
- Students are also encouraged to take the following courses, which are requirements for many graduate, medical and other pre-professional programs: CHEM 21100 and 21200 (Organic Chemistry sequence), CHEM 33100 and 33200 (Biochemistry sequence), PHYS 20300, and MATH 11100 (OR both MATH 10700 and 10800).
- A double-major with Biochemistry and Molecular Biology, Biology, Chemistry or Psychology is not an option.
- If a student majors in Neuroscience, a minor in Biochemistry and Molecular Biology, Biology, Chemistry or Psychology must consist of six courses that do not double-count with the Neuroscience major.
- No minor in Neuroscience is offered.
- Only grades of C- or better are accepted for the major.

## NEUROSCIENCE COURSES

**PSYC 10000. INTRODUCTION TO PSYCHOLOGY** [HSS]

**CHEM 12000. PRINCIPLES OF CHEMISTRY** [Q, MNS]

**BIOL 20000. FOUNDATIONS OF BIOLOGY** [MNS]

**BIOL 20100. GATEWAY TO MOLECULAR AND CELLULAR BIOLOGY** [Q, MNS]

**PSYC 23000. HUMAN NEUROPSYCHOLOGY** [HSS]

**PSYC 25000. INTRODUCTION TO STATISTICS AND EXPERIMENTAL DESIGN** [Q]

**NEUR 32300. BEHAVIORAL NEUROSCIENCE (Communication, Psychology)**

An introduction to the anatomical and physiological basis of animal and human behavior. Content areas include basic neuronal physiology and brain anatomy, neural/endocrine interactions, methods in neuroscience, control of movement, sexual development and behavior, sleep, learning and memory, and physiological correlates of psychopathology. Includes a 3-hour laboratory in addition to class. The laboratory and classroom components are closely integrated and must be taken concurrently. (1.25 course credits) Prerequisite: PSYC 25000. Annually. Fall. [W]

**NEUR 38000. CELLULAR NEUROSCIENCE (Biochemistry and Molecular Biology, Biology)**

This course focuses on the cellular and molecular aspects of the nervous system. Topics include nerve cell physiology, synapse structure and formation, axon guidance, simple pattern generators, and the cellular basis of learning and memory. Three lecture periods and one laboratory period weekly. Recommended: one upper-level Biology course or NEUR 32300. Prerequisite: C- or better in BIOL 20100, CHEM 12000 or permission of instructor. Annually. Spring.

**NEUR 40100. INTRODUCTION TO INDEPENDENT STUDY**

Students will attend weekly classroom meetings which focus on science writing, accessing and evaluating primary literature, and experimental design. The major paper will include a literature review and a detailed research proposal related to their I.S. thesis research. Students will also participate in the peer review process as well as present an oral research proposal presentation at the end of the semester. Annually. Spring.

**NEUR 45100. SENIOR INDEPENDENT STUDY – SEMESTER ONE**

The first semester of the Senior Independent Study project, in which each student engages in creative and independent research guided by a faculty mentor and which culminates in a thesis and an oral examination in the second semester. *Prerequisite: NEUR 40100.*

**NEUR 45200. SENIOR INDEPENDENT STUDY – SEMESTER TWO**

The second semester of the Senior Independent Study project, which culminates in the thesis and an oral examination. *Prerequisite: NEUR 45100.*

**CROSS-LISTED COURSES ACCEPTED  
FOR NEUROSCIENCE CREDIT**

**BIOLOGY**

- BIOL 30400. HUMAN PHYSIOLOGY
- BIOL 30500. CELL PHYSIOLOGY [W+]
- BIOL 30600. GENES AND GENOMES
- BIOL 30700. DEVELOPMENT
- BIOL 34400. COMPARATIVE ANIMAL PHYSIOLOGY
- BIOL 35200. BEHAVIORAL ECOLOGY
- BIOL 37700. BEHAVIORAL ENDOCRINOLOGY

**INTERDEPARTMENTAL**

- IDPT 20011. NEUROSCIENCE OF LEARNING AND MEMORY [MNS]

**PHILOSOPHY**

- PHIL 21500. BIOMEDICAL ETHICS [AH]
- PHIL 30400. PHILOSOPHY OF MIND AND COGNITIVE SCIENCE [AH]

**PSYCHOLOGY**

- PSYC 21200. ABNORMAL PSYCHOLOGY [HSS]
- PSYC 32100. LEARNING AND BEHAVIOR [W]
- PSYC 32200. MEMORY AND COGNITION [W]
- PSYC 33500. PERCEPTION AND ACTION [W]