

Course Catalog

Neuroscience

Faculty

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Overview

The Bachelor of Science in Neuroscience is a multi-disciplinary program designed to provide an understanding of the nature and functioning of the nervous system from the molecular to the behavioral level. Courses, taught by faculty from the Biology, Psychology, Chemistry, and Physics and Astronomy departments, offer a broad spectrum of topics and approaches to the study of neural systems, structure, and function. The major offers an opportunity for students to engage in supervised research in neuroscience and related areas and provides valuable experience to students interested in pursuing careers in the health professions or graduate study. Double majors in neuroscience and biology are not permitted.

Requirements

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The Major

The requirements for the degree of Bachelor of Science with a major in neuroscience are as follows:

I. Specific degree requirements (52-56 credit hours)

A. Core curriculum in neuroscience (9 hours):

NEUR 2310	Introduction to Neuroscience
NEUR 2110	Neuroscience Laboratory
NEUR 3457	Neurobiology
NEUR 4000	Neuroscience Seminar (three semesters)
NEUR 4100	Neuroscience Capstone Seminar

B. Supporting courses in biology (12 hours):

BIOL 1311	Integrative Biology I
BIOL 1111	Introductory Biology Laboratory
BIOL 2312	Cells and Cell Systems
BIOL 2112	Cell Systems Laboratory
BIOL 3413	Genes, Phenotypes, and Evolutionary Dynamics

C. Supporting courses in chemistry (8 hours):

CHEM 1318	General Chemistry
CHEM 1118	Introduction to Analytical Methods
CHEM 2319	Organic Chemistry
CHEM 2119	Laboratory Methods in Organic Chemistry

D. Supporting courses in psychology (11 hours):

PSYC 1300	Principles of Psychology
PSYC 2401	Statistics and Methods I
PSYC 2402	Statistics and Methods II

E. Four elective courses from the following (12-16 hours).

Students must, in consultation with a Neuroscience advisor, develop a program of study, provide a written articulation of their academic and vocational goals, and discuss how their proposed program of study will move them toward these goals. The program of study will be presented to the committee when the major is declared. The committee will approve the program or suggest changes.

Biology

BIOL 3420	Animal Behavior
BIOL 3462	Vertebrate Physiology

BIOL 3463 Developmental Biology

BIOL 3459 Endocrinology

BIOL 3466 Cell Biology

Chemistry

CHEM 3330 Biochemistry I

CHEM 4347 Advanced Interdisciplinary Topics: Neurochemistry

Neuroscience

NEUR 3310 Neuroethics

NEUR 4390 Research in Neuroscience

Philosophy

PHIL 3431 Philosophy of Mind

PHIL 3432 Philosophy of Science

PHIL 3459 Biomedical Ethics

Physics

PHYS 3311

Principles of Biophysics

Psychology

PSYC 2330 Fundamentals of Cognition

PSYC 3311 Sensation and Perception

PSYC 3312 Principles of Learning

PSYC 3431 Memory and Cognition

PSYC 3340 Psychopathology

II. University Requirements: completion of all other required elements of the Pathways curriculum and at least 124 credit hours.

Guidelines for Acceptance of Majors

Full acceptance in the major is granted when the following requirements are met:

- I. Completion of NEUR 2310/2110 and PSYC 2401 with grades of C or better in each class.
- II. Completion of BIOL 1311/1111 and CHEM 1318/1118 with grades of C- or better in each class.
- III. An overall grade point average of at least 2.0.

A student may not earn a major in Neuroscience and another major in Biology. A student may not earn a major in Neuroscience and a minor in Psychology. If a student wishes to major in both Neuroscience and Psychology, a maximum of two Psychology elective courses can be used to satisfy requirements for the Neuroscience major.

Honors Program

To be eligible for graduation with Honors in Neuroscience, students must earn a grade point average of at least 3.33 in all courses taken prior to the semester before graduation, a grade point average in neuroscience courses (core and supporting) of at least 3.50, and "A" in NEUR 4395 and NEUR 4396.

To apply for graduation with Honors in Neuroscience, students should address a written request for consideration to the Faculty Advisory Committee. The request must be received no later than the first full week of the student's final semester before graduation. The decision to confer or not to confer Honors will be made by the Faculty Advisory Committee and the Research Supervisor and will be based on the quality of the written thesis and its oral presentation in a colloquium.

Courses

NEUR-2310 Introduction to Neuroscience

A survey of basic neuroscience, starting with fundamentals of neuronal structures and ending with higher brain functions and their relations to mind and behavior. (Also listed as PSYC 2310.) Prerequisite: PSYC 1300

NEUR-2110 Neuroscience Laboratory

The neuroscience laboratory provides students with a hands-on approach to understanding the scientific method through neuroscientific techniques and data analysis, including anatomical electrophysiological, and computer simulations. Students will engage in laboratory exercises as well as in solving problem sets. This course is appropriate for both non-majors and science majors Spring semester only. (Also listed as PSYC 2110.) Prerequisite

or Corequisite: NEUR/PSYC 2310.

NEUR-3310 Neuroethics

In this course students review and discuss ethical theories and principles, and then discuss ethical dilemmas arising from several currently devoted topics relevant to the brain, cognition, and behavior. Relevant bioethical and philosophical principles will be applied to each issue allowing students to acquire and develop skills in ethical analysis. In addition, relevant neuroanatomy, neurophysiology, and neurotechnologies will be discussed. (Also listed as PSYC 3310.) (Offered every other year.) Prerequisite: PSYC 1300 and PSYC/NEUR 2310 or Permission of Instructor

NEUR-3360 Special Topics in Neuroscience

A specialized course periodically offered in Neuroscience Program and participating departments (Biology, Chemistry, Physics and Astronomy, and Psychology). May be repeated for up to 6 hours credit when topics vary. Prerequisite: Consent of Instructor

NEUR-3457 Neurobiology

Neurobiology focuses on the organization and function of nervous tissues and systems. The course begins with an anatomical overview, followed by an examination of neural system function at the level of signaling and synaptic transmission, sensory systems, and central system integration and control. With this foundation, the course explores brain development and plasticity. Additional hours are required to monitor experiments. (also listed as BIOL 3457.) (Offered every year). Prerequisites: BIOL 3413, NEUR 2310, and CHEM 2319, 2119

NEUR-3-90 Lab Experience in Neuroscience

This course is designed to provide students the background skills and experiences needed to conduct research in Neuroscience. Students will engage in research-related activities including reading empirical manuscripts, data collection and transcription, data analysis, and learning project protocols. May be repeated up to a maximum total of 6 credit hours. (Offered every semester.) Prerequisite: Consent of instructor, and NEUR 2310.

NEUR-4000 Neuroscience Seminar

This course is built around student presentations of independent research in neuroscience (NEUR 4390) and seminars from occasional external speakers. Neuroscience majors are required to register for this course each semester of their junior and senior years. The course is also open to other students interested in neuroscience.

NEUR-4100 Neuroscience Capstone Seminar

During the Capstone Seminar students will reflect on their Program of Study, articulate any modifications or additions made to this plan, and discuss the progress made toward meeting objectives and goals. Additionally, students are expected to attend the Neuroscience Seminar each week, participate in discussion with guest speakers, participate in professional development activities (such as preparing a c.v., personal statement), and give a presentation during Neuroscience Seminar. The underlying philosophy of the course is designed to encourage reflection and critical thinking, and to enhance written and oral communication skills. (Offered every semester.) Prerequisites: Graduating senior status and three semesters of NEUR 4000.

NEUR-4390 Research in Neuroscience

Independent empirical research arranged with a faculty member on problems in neuroscience. Results of the project are presented in written and oral form. (Offered every semester.) Prerequisites: Consent of instructor, and NEUR 3-90.

NEUR-4395 Thesis I

This course provides an opportunity for independent research and scholarly investigation in conjunction with faculty supervisors within the Neuroscience program. With NEUR 4396, this will result in the preparation of a written thesis. Students must submit a formal research proposal to the Program Chair prior to the semester of enrollment in the course. (Offered every semester.) Prerequisites: NEUR 3-90, senior standing, permission of the Program Chair

NEUR-4396 Thesis II

This course is a continuation of research projects begun under NEUR 4395. Students are required to write a thesis and give an oral presentation of the project in the Neuroscience Seminar. (Offered every semester.) Prerequisite: NEUR 4395 and consent of instructor.
