

# Neuroscience (Interdepartmental Concentration)

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## Administration:

Program Director: Arynah Pradhan  
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The Graduate Program in Neuroscience offers work leading to the graduate Interdepartmental Concentration in Neuroscience. Students in the following graduate programs may be eligible to complete the Interdepartmental Concentration in Neuroscience:

Graduate Program	Level
Anatomy and Cell Biology	PhD
Biochemistry and Molecular Genetics	PhD
Biomedical Engineering	PhD
Biological Sciences	PhD
Chemistry	PhD
Hispanic Linguistics Concentration, Hispanic Studies	PhD
Nursing	PhD
Philosophy	PhD
Physiology and Biophysics	PhD
Psychology	PhD
Rehabilitation Sciences	PhD

## Concentration Requirements

**Course**                      **Title**

### Required Courses

Select one of the following:

Option 1:

NEUS 501	Foundations of Neuroscience I
NEUS 502	Foundations of Neuroscience II

At least 12 additional hours of neuroscience courses at the 400- or 500-level<sup>a</sup>

Option 2:

BIOS/PHIL/PSCH 484	Neuroscience I
BIOS/PHIL/PSCH 485	Neuroscience II

At least 10 additional hours of neuroscience courses at the 400- or 500-level<sup>a</sup>

### Electives

Neuroscience electives will be assessed and approved by the Graduate Studies Committee of the Graduate Program in Neuroscience.

a *Research, departmental seminars (journal clubs), and independent study cannot be included in these 10–12 hours of course credit. Of these 10–12 hours, at least 50% must be outside the student's major department and must be divided among at least two other departments.*

- Students must submit the topic of their doctoral dissertation and a list of the courses in neuroscience that they have successfully completed (a grade of B or better) to the Graduate Studies Committee of the Program in Neuroscience for approval no later than the time of the preliminary examination.

### NEUS 403. Human Neuroanatomy. 3 hours.

Morphological organization of the nervous system. Functional correlations of neural structures. Course Information: Same as ANAT 403. Meets eight weeks of the semester. Prerequisite(s): Graduate standing and consent of the instructor. Must be in a degree program. Class Schedule Information: To be properly registered, students must enroll in one Laboratory and one Lecture.

### NEUS 444. Data Literacy in Neuroscience. 3 hours.

This course provides an overview of experimental design, statistics, data mining, modeling and informatics with an emphasis on the types of experiments pursued in neuroscience.

### NEUS 483. Neuroanatomy. 4 hours.

Organization of the nervous system, with an emphasis on mammals. Course Information: Same as BIOS 483 and PSCH 483. Animals used in instruction. Prerequisite(s): BIOS 272 or BIOS 286 or BIOS 325 or PSCH 262; or consent of the instructor. Class Schedule Information: To be properly registered, students must enroll in one Laboratory and one Lecture.

### NEUS 501. Foundations of Neuroscience I. 3 hours.

Provides a core understanding of modern neuroscience. Focuses on topics in cell and molecular neuroscience. Taught by faculty from multiple units. Course Information: Same as BIOS 584. Recommended background: Credit or concurrent registration in GCLS 503.

### NEUS 502. Foundations of Neuroscience II. 3 hours.

A core understanding of modern neuroscience. Focus is on topics in systems, cognitive and behavioral neuroscience. Will be taught by faculty from multiple units. Continuation of NEUS 501. Course Information: Same as BIOS 585. Prerequisite(s): NEUS 501 or BIOS 584. Recommended background: Credit or concurrent registration in NEUS 403.

### NEUS 506. Research Rotations in Neuroscience. 3-6 hours.

Research rotation course in which first year students from the Neuroscience program will undertake research projects in laboratories affiliated with this program. Course Information: May be repeated. Animals used in instruction. Prerequisite(s): Open only to Ph.D. degree students.

**NEUS 511. Experimental Foundations of Psychopharmacology. 2 hours.**

An introduction to the molecular mechanisms underlying synaptic transmission; review of the principal neurotransmitter systems and the biochemical, anatomical and behavioral methods used to study these systems. Course Information: Same as ANAT 511. Prerequisite(s): Grade of B or better or concurrent registration in NEUS 501 and Grade of B or better or concurrent registration in NEUS 502; or Grade of B or better or concurrent registration in BIOS 484 and Grade of B or better or concurrent registration in BIOS 485; or consent of the instructor.

**NEUS 512. Biomedical Neuroscience II: Aspects of Brain Function in Health and Disease. 2 hours.**

An integrated view of brain function in health and disease; the anatomical and functional pathophysiological aspects underpinning major neurological and psychiatric disorders. Course Information: Prerequisite(s): NEUS 501; or consent of the instructor.

**NEUS 513. Biomedical Neuroscience III: Introduction to Therapeutics and Psychopharmacology. 1 hour.**

Basic principles of psychopharmacology, major classes of psychopharmacological agents and their properties, and the biochemistry and physiology crucial to understanding pharmacological therapies for psychiatric illnesses. Course Information: Prerequisite(s): Consent of the instructor. Recommended background: NEUS 501 and NEUS 502 and Credit or concurrent registration in NEUS 511.

**NEUS 514. Biomedical Neuroscience IV: Intermediate Psychopharmacology. 2 hours.**

Designed to build upon information presented in NEUS 513 and develop a more comprehensive knowledge of psychopharmacology and treatment strategies, as well as the relevant clinical neuroscience of the major neuropsychiatric disorders. Course Information: This is a College of Medicine course that does not follow the regular academic calendar. Contact the instructor in the Spring for more specific information regarding the scheduling and requirements for this course in the Fall. Prerequisite(s): Consent of the instructor. Recommended background: NEUS 511 and Credit or concurrent registration in NEUS 512 and Credit or concurrent registration in NEUS 513.

**NEUS 524. Neuroscience of Addiction. 3 hours.**

Focuses on the mechanisms underlying addiction. Covers the anatomy, circuitry, and signaling of reward and motivated behaviors. Also addresses the neuropsychopharmacology of all major classes of abused drugs. Prerequisite(s): NEUS 501; and consent of the instructor.

**NEUS 525. Molecular and Cellular Mechanisms of Neurodegenerative Diseases. 2 hours.**

Molecular, cellular and physiological mechanisms underlying neuropathology in neurodegenerative diseases and trauma to the central and peripheral nervous system of humans. Course Information: Same as ANAT 525. Recommended background: A basic course in neuroscience.

**NEUS 527. Cellular and Systems Neurobiology. 3 hours.**

Molecular and cellular properties of ion channels in neurons and sensory cells and their relationship to brain and sensory systems. Course Information: Same as ANAT 527 and BIOS 527. Prerequisite(s): Credit in one neuroscience course or consent of the instructor.

**NEUS 561. Current Topics in Visual Neuroscience. 2 hours.**

Discussion of current research and theoretical issues in visual neuroscience by staff, students and guest lecturers. Course Information: May be repeated. Prerequisite(s): Consent of the instructor.

**NEUS 582. Methods in Modern Neuroscience. 2 hours.**

Underlying principles and applications of techniques used to analyze nervous system organization and function. Behavioral, electrophysiological, anatomical, and biochemical approaches are considered. Course Information: Same as BIOS 582. Animals used in instruction.

**NEUS 588. Human Neuroscience: Functional Magnetic Resonance Imaging. 3 hours.**

Lectures and demonstrations present the principles of magnetic resonance imaging for understanding cognitive, sensory and motor function of the human brain in health and disease. Course Information: Extensive computer use required. Laboratory work required. Prerequisite(s): Consent of the instructor. Recommended background: PHYS 142; and MATH 181 or equivalent classroom experience in college physics and math.

**NEUS 589. Human Neuroscience: Sensory-Motor and Cognitive Systems. 3 hours.**

Lectures and demonstrations focus on investigations of sensory-motor and cognitive systems in the human brain using neuroimaging. Course Information: Extensive computer use required. Prerequisite(s): Consent of the instructor. Recommended background: NEUS 588.

**NEUS 595. Neuroscience Journal Club. 1 hour.**

Oral presentations are made by students each session on timely journal articles, followed by in-depth discussions of the reported research. Presentation of research by invited lecturers. Course Information: Satisfactory/Unsatisfactory grading only. May be repeated.

**NEUS 596. Independent Study. 1-4 hours.**

Independent study under the direction of a faculty member. Course Information: May be repeated. Students may register in more than one section per term. Prerequisite(s): Consent of the instructor.

**NEUS 598. Master's Thesis Research in Neuroscience. 0-16 hours.**

Thesis research under the direction of a faculty member. Course Information: Satisfactory/Unsatisfactory grading only. May be repeated. Prerequisite(s): NEUS 501 and NEUS 502 and NEUS 506; successful completion of first year core courses; and consent of the instructor. Open only to Master's degree students in neuroscience.

**NEUS 599. Doctoral Research in Neuroscience. 0-16 hours.**

Independent research, directed by a faculty member. Course Information: Satisfactory/Unsatisfactory grading only. May be repeated. Prerequisite(s): NEUS 501 and NEUS 502 and NEUS 506; successful completion of first year core courses; and consent of the instructor. Open only to PhD degree students in neuroscience.