NEUROSCIENCE (NEUR)

NEUR 110 — Introduction to Neuroscience Course count: 1
This course is a broad introduction to neuroscience including topics in comparative vertebrate and invertebrate neuroanatomy, neurophysiology, sensory and motor systems, behavioral neurobiology, neuropharmacology, and neural basis of cognition. Important general principles of nervous system structure and function will be emphasized, as well as broad scientific proficiency as a foundation for further interdisciplinary study of the neural basis of behavior.

Students who have taken PSYC 221 or 235 may not enroll in this course.
GPA units: 1
Common Area: Natural Science
Typically Offered: Fall

NEUR 210 — Neuroethology with Physics Course count: 1
How does the nervous system of an organism produce natural, adaptive behaviors? A bat emits ultrasonic sounds and then uses the echoes to map objects in the space around it. A toad detects a specific set of stimulus features to identify a fly as prey and executes a swift, precise predatory behavioral pattern. A species of migratory bird uses cues based on the earth's magnetic field to navigate over continental distances. In the natural world, animals exhibit elegant behaviors in response to relevant sensory phenomena. Neuroethology is the study of the neural mechanisms that serve these behaviors. Learning about these mechanisms in turn informs our understanding of how the human nervous system might produce complex behaviors. Students will be introduced to basic functional neuroanatomy of invertebrate and vertebrate systems, neurophysiology, and relevant topics in physics.

Prerequisite: NEUR 110 or BIOL 161 and permission of the Instructor.
GPA units: 1.5
Common Area: Natural Science
Typically Offered: Alternate Years

NEUR 220 — Neural Circuits & Systems Course count: 1
Neurons form complex networks that compute behaviorally relevant information for an organism. What are the principles from which these neural computations arise? How can computer simulations aid our conceptual understanding of ideas central to neuroscience, biology, psychology, and related fields? In this course, students will engage with basic principles of neural computation through a series of projects. The course will also introduce basic principles of programming and mathematical modeling relevant to understanding the function of the nervous system.

Prerequisite: (One of NEUR 110, NEUR 210, BIOL 269, PSYC 221), or (BIOL 161 and one of CSCI 131, PSYC 220, PSYC 222, PSYC 235) and instructor permission.
GPA units: 1.5
Common Area: Natural Science
Typically Offered: Alternate Years, Fall

NEUR 310 — Adv Seminar in Neuroscience Course count: 1
This seminar will explore important concepts in Neuroscience, beginning with philosophical and historical origins and including readings from contemporary primary literature. Students will be engaged in a series of group projects and an individual final project to delve into controversies and emerging ideas in the field. Course activities will require students to integrate their learning from previous coursework across multiple disciplines and draw upon their unique perspectives. This seminar is intended for 3rd and 4th year students pursuing focused programs of study in Neuroscience.

Prerequisite: 200-level neuroscience course (BIOL 267, BIOL 269, PSYC 220, PSYC221, or PSYC 235).
GPA units: 1
Typically Offered: Annually

NEUR 320 — The Other Half of the Brain: Glial Cells Course count: 1
The human nervous system is composed primarily of two broad classes of cells: neurons and glial cells. Surprisingly, there are as many, or more, glial cells as there are neurons! In this class, we will examine the many roles that glial cells may play in health and disease. We will discuss the characteristics that are used to define cells as glia, explore the many ways in which glial cells help to maintain a stable and functional nervous system, examine the potential role of glial cells in a variety of diseases, and explore how glial cells may also be used to restore nervous system function. An emphasis will be placed on the cellular and molecular properties of glial cells and their interactions with neurons. Students will read and discuss a mixture of review and primary research papers on these topics.

Prerequisite: BIOL 269 or NEUR 210 or PSYC 221 or BIOL 161 NEUR 210
GPA units: 1
Typically Offered: Alternate Years, Spring

NEUR 399-F01 — Neurodevelopment Course count: 1
This course will cover how the brain develops from conception through life. We will discuss basic neurogenetics related to development, the stages of embryonic development, and brain development after birth, including critical and sensitive periods. We will cover some of the problems that can arise during different neurodevelopmental stages, both intrinsic and extrinsic influences, and how these can lead to developmental disorders. We will discuss comparative neuroanatomy and neurodevelopment, along with other developmental neuroscience methods, like brain imaging, genetic modeling, and developmental testing. Students will be asked to read and discuss review papers and primary literature to further their understanding, and will complete a final project focusing on developmental disorders and their relationships with the neurodevelopmental stages.

Prerequisite: BIOL 267 or BIOL 269 or PSYC 221 or Instructor consent
GPA units: 1

NEUR 399-S01 — Human Electrophysiology Course count: 1
This course is a practical introduction to human neuroscience research with an emphasis on electroencephalography (EEG). EEG measures changes in brain activity from electrodes placed on the surface of the scalp. The temporal precision of the EEG signal makes it ideally suited to study the timing and organization of cognitive processes that underlie both conscious and unconscious human behavior, including thoughts, perception, emotions, and actions. Additionally, EEG has several practical applications, such as its use in medicine and brain-computer interfaces. Through readings, discussion, and hands-on data analysis, students will gain familiarity with EEG methodology to study the neural basis of human cognition and behavior.

Prerequisite: BIOL 269 or NEUR 210 or NEUR 220 or PSYC 221 or STAT 220 or equivalent.
GPA units: 1

NEUR 480 — Research Projects Course count: 1
Students may undertake an independent research project under the direction of a particular faculty member.

GPA units: 1
Typically Offered: Fall, Spring