Neuroscience

neuroscience.as.miami.edu

Dept. Code (NEUR)

Introduction
Neuroscience is the study of the nervous system (i.e., the brain, spinal cord, and peripheral nerves), the mechanisms of behavior, and the nature of mind and consciousness. The Neuroscience Program is a rigorous, interdisciplinary program between the Department of Psychology (http://www.psy.miami.edu/), the Department of Biology, and the Miller School of Medicine. The neuroscience major provides a broad-based liberal arts background that can be applied to a variety of career fields. It is also excellent preparation for medical school or graduate study in neuroscience, psychology, biology or behavioral medicine.

Educational Objectives
The neuroscience major seeks to provide students with exposure to and a fundamental understanding of the neural and bio behavioral sciences by delivering an integrative educational experience and promoting interactions among faculty, graduate students, and undergraduate students in basic scientific inquiry, advising, and mentoring.

Degree Programs
All neuroscience majors are required to pursue a Bachelor of Science (B.S.) degree.

Departmental Honors
Students can earn Departmental Honors in Neuroscience by demonstrating excellence in their coursework and completing a Senior Honors Thesis in Neuroscience.

1. **Excellence in Coursework** – A minimum 3.3 combined GPA and a minimum 3.5 neuroscience GPA is required.
2. **Senior Honors Thesis in Neuroscience** – This is an independent empirical research project that is completed across two semesters (i.e., NEU 580 and NEU 581) under the supervision of a faculty mentor in the Neuroscience Program. At least one year of prior research experience with the faculty mentor is highly recommended. Written approval from the faculty mentor and the Director of Undergraduate Academic Services in the Department of Psychology is also required.

Additional Information
The office of Undergraduate Academic Services for Psychology (UASP) provides comprehensive advising services to all students on a walk-in basis from 9:00 a.m. to 4:30 p.m., Monday through Friday, in Flipse 508. Appointments are only necessary during the official advising period for registration.

Freshmen and Transfer Students
All freshmen psychology majors in the College of Arts and Sciences are required to participate in the Department of Psychology's year-long orientation, advising, and mentoring program, FACT FORUM (Freshmen Advising Contact Term and Faculty Overview of Research and Undergraduate Mentoring). These courses are one credit hour general electives designed to enable students to take ownership of their education by familiarizing them with the academic rules and regulations of the University of Miami, helping them think critically about their curriculum, providing them with in-depth exposure to research, and preparing them to enter the professional world.

New transfer students are highly encouraged to participate in a similar one semester program called TUMS (Transfer to the University of Miami). This course is specifically designed to ease the transition for new transfer students to the University of Miami.

Students who declare a psychology major after matriculation may be required to take part in an advising seminar prior to declaring the psychology major.

Prerequisites
Students must adhere to all prerequisites. They are also required to earn a minimum grade of C- in any PSY course that is to serve as a prerequisite for another course in the psychology major. Students who enroll in PSY courses without the specified prerequisites may be dropped.

Advanced Writing and Communication Requirement
To satisfy the College of Arts and Sciences Advanced Writing and Communication requirement, psychology majors must take 4 writing-designated courses, including 1 writing-designated course in the PSY area. Writing courses are already built into the required courses of the B.S. track of the psychology major; however, students who follow the B.A. track of the psychology major will need to plan accordingly to incorporate a writing-designated PSY course into their graduation plans.
**Research Experience for Course Credit**

Research experience is considered an integral part of the psychology major. Students may earn course credit (i.e., PSY 280, PSY 380, and/or PSY 480) by working in the laboratory of a Department of Psychology faculty mentor. Students can repeat PSY 280, PSY 380, and PSY 480 without penalty. A minimum 2.8 combined and psychology GPA is required to earn research credit. Written permission from a faculty mentor and UASP is also required. Note: Students may volunteer in a research laboratory by completing the appropriate volunteer paperwork with UASP if they are unable to register for research credit.

**Research Participation in PSY 110**

As an introduction to behavioral science, all students enrolled in PSY 110 may be required to participate as subjects in research studies conducted by faculty and/or graduate students, or by reading selected research reports and writing article critiques. Refer to the course syllabus for more details. Note: This introductory research participation requirement is not sufficient for students interested in attending graduate school in psychology.

**Senior Assessment**

As part of the Department of Psychology's accreditation plan, all senior psychology majors will be required to take part in a senior assessment that may last up to four hours. Assessment scores will not affect the students’ graduation status; however, failure to complete the assessment may delay or prevent graduation.

**Transfer Courses**

Courses from other colleges or universities may be assigned PSY credit at UM with written approval by UASP.

**Cognates**

Neuroscience majors may not use a cognate with a Responsible Academic Unit (RAU) of Psychology to fulfill their People and Society (P & S) area of knowledge.

- **NEU 100. Introduction to Neuroscience (EXP). 3 Credit Hours.**
  Students examine the basic aspects of neuroscience research, specifically targeting neurological disorders. Tools and techniques used in the area of neuroscience such as biochemistry, molecular biology, electrophysiology, light and electron microscopy, confocal microscopy, and image analysis will be addressed. Discussions will also include topics in lab diagnostic techniques as well as state of the art instrumentation.
  
  **Components:** LEC.
  **Grading:** GRD.

- **NEU 190. Faculty Overview of Research and Undergraduate Mentoring (FORUM). 1 Credit Hour.**
  Critical discussion of research reports in neuroscience.
  
  **Components:** LEC.
  **Grading:** GRD.

- **NEU 200. Introduction to Psychiatry (EXP). 3 Credit Hours.**
  The course will cover basic aspects of Psychiatry and behavioral sciences. We will emphasize the impact of evidence-based findings on the diagnosis, etiology, management and treatment of all major psychiatric disorders. Concepts such as history of psychiatry, evolution of the psychiatric nomenclature, childhood and adult development, brain circuitry, neurotransmitters, psychotherapies and pharmacological mechanisms of most commonly used medications will be discussed. We will utilize lectures, small group discussions as well as videos and live patient interviews. Students will be able to observe a patient interview by a faculty.
  
  **Components:** LEC.
  **Grading:** GRD.

  **Typically Offered:** Spring.

- **NEU 280. Introduction to Research Projects I. 1-3 Credit Hours.**
  Students assist on a research project in neuroscience under supervision of a faculty member. Activities include library research, data collection and management, and attendance at research team meetings.
  
  **Components:** LEC.
  **Grading:** GRD.

  **Typically Offered:** Fall, Spring, & Summer.

- **NEU 342. Neural Mechanisms of Disease. 3 Credit Hours.**
  Cellular and molecular mechanisms underlying nervous system dysfunction and mental illness. Biological bases, including clinical and therapeutic aspects, of specific neurological disorders.
  
  **Prerequisite:** BIL 268 or PSY 220 or PSY 425.
  
  **Components:** LEC.
  **Grading:** GRD.

  **Typically Offered:** Fall & Spring.
NEU 380. Introduction to Research Projects II. 1-3 Credit Hours.
Students assist on a research project in neuroscience under supervision of a faculty member. Activities include library research, data collection and management, and attendance at research team meetings.
Prerequisite: PSY 291 or PSY 292. Requisite: UASP and Faculty Permission, 2.5 NEU GPA.
Components: LEC.
Grading: GRD.
Typically Offered: Fall, Spring, & Summer.

NEU 400. Neurogenetics. 3 Credit Hours.
This course examines the role of genetics/epigenetics in the development of neurological diseases in humans. The availability of the complete human genome sequence and a compendium of genetic variants distributed throughout the human genome in a readily accessible database, together with genetic modification technologies have greatly accelerated the discovery of genes involved in disease. We will discuss how genetic or epigenetic variations can affect the nervous system, leading to a range of genetic disorders. Examples from single-gene recessive defects to complex diseases will be presented. Methods to identify genes involved in disease as well as pathogenesis studies and therapeutic approaches will also be discussed. Lastly, an introduction to the ethical challenges of obtaining and dealing with human genetic information will be presented.
Components: LEC.
Grading: GRD.
Typically Offered: Offered by Announcement Only.

NEU 403. Neuroscience laboratory. 4 Credit Hours.
Research methods and laboratory experiments in contemporary neuroscience from individual cells to behavior. Scientific report writing and computer applications in experimental design and analysis.
Prerequisite: PSY 390, BIL 268 or PSY 425. Or Corequisite: PSY 425. Requisite: Senior Status.
Components: LAB.
Grading: GRD.
Typically Offered: Fall & Spring.

NEU 440. Neural Mechanisms of Psychiatric Disorders. 3 Credit Hours.
Analysis of different neuropsychiatric disorders including, but not limited to, schizophrenia, depression, post-traumatic stress disorder, drug dependence and abuse, and obsessive-compulsive disorders. Lectures are derived from current research articles looking at in depth mechanisms of these disorders. It is expected that students have a good understanding of neuroscience before registering for this course. This course will include active learning and grades are based upon two projects including writing a script and creating a short video that highlights drugs and other treatments used for these disorders and preparing a poster based upon a published article and presenting it to the class in a poster session format. In addition, there will be two exams designed to test the student's knowledge of the material presented in class and in the readings.
Prerequisite: BIL 268 or PSY 220 or PSY 425. and USAP Permission.
Components: LEC.
Grading: GRD.
Typically Offered: Fall.

NEU 465. Cellular and Molecular Neuroscience. 3 Credit Hours.
Biophysical, biochemical, and structural features of nerve muscle and sensory cells. Basic cellular processes underlying function and development of nervous system.
Prerequisite: BIL 255, BIL 268 or PSY 220, and CHM 202.
Components: LEC.
Grading: GRD.
Typically Offered: Fall & Spring.

NEU 468. Developmental Neuroscience. 3 Credit Hours.
Cellular and molecular aspects of nervous system including neuronal differentiation.
Prerequisite: BIL 255, BIL 268 or PSY 220, and CHM 202.
Components: LEC.
Grading: GRD.
Typically Offered: Spring.

NEU 480. Research with Writing Credit. 1-3 Credit Hours.
Students assist on a research project in neuroscience under supervision of a faculty member. Activities include library research, data collection and management, and attendance at research team meetings.
Components: LEC.
Grading: GRD.
Typically Offered: Fall, Spring, & Summer.
NEU 580. Senior Honors in Neuroscience I. 3 Credit Hours.
Students work closely with a faculty member to design a unique research study and write a scientific paper to report on the results. Limited to undergraduate students only.
Components: LEC.
Grading: GRD.
Typically Offered: Fall, Spring, & Summer.

NEU 581. Senior Honors in Neuroscience II. 3 Credit Hours.
Students work closely with a faculty member to design a unique research study and write a scientific paper to report on the results. Limited to undergraduate students only.
Components: LEC.
Grading: GRD.
Typically Offered: Fall, Spring, & Summer.