

NEUROSCIENCE

Faculty

Krys Strand, program director

Jason Askvig

Susan J. Larson

Julie R. Mach

Dwight J. Peterson

Darin J. Ulness

Neuroscience is a broad and diverse field at the frontier of science today. The goal of neuroscience is to understand how the brain and nervous system acquire, process, and integrate information from the environment and how this information brings about behavior of the organism. Neuroscience is truly an integrative discipline in which chemistry, biology, psychology, physics, mathematics, and other disciplines provide us with insight into how the nervous system functions from the basic molecular processes to the sophisticated behavior of higher organisms. The neuroscience program at Concordia emphasizes integrating the molecular and physical bases of neuroscience with systems and behavioral approaches.

Students completing the neuroscience major or minor will be able to:

- demonstrate an understanding of the nature of science: its methods of inquiry, social practice, and articular viewpoints
- describe and apply facts, concepts, and theories of neuroscience
- think critically about neuroscience research, theory, and topics; and be familiar with the literature in the field
- utilize laboratory skills that provide a foundation for answering research questions in the field of neuroscience
- integrate material from several disciplines in the study of the nervous system and understand that problem solving involves the use of many disciplinary perspectives.

Programs Offered

Major

- Neuroscience Major (<https://catalog.concordiacollege.edu/arts-sciences/neuroscience/neuroscience-major/>)

Minor

- Neuroscience Minor (<https://catalog.concordiacollege.edu/arts-sciences/neuroscience/neuroscience-minor/>)

Courses

NEU 109 - Introduction to Neuroscience, 4 credits.

This course will serve as the introductory course for the program and it will cover the basics of neuroscience, which will be expanded upon in other neuroscience courses. Three lectures and three hours of laboratory per week.

Frequency: Every Year - Second Semester

Core designations: Natural Science N

NEU 252 - Physical Neuroscience, 4 credits.

This course will build upon the physical principles underlying neuroscience that were surveyed in NEU 109 - Introduction to Neuroscience. Topics include passive and active potential propagation, membrane and ion channel energetics, and the physical events underlying neurotransmitter release and binding.

Frequency: Alternate Years - 2nd Semester

Prerequisites: NEU 109

NEU 328 / PSYC 328 - Human Neuropsychology, 4 credits.

This course will provide a comprehensive understanding of brain and nervous system physiology. The focus will be on how the nervous system governs behavioral and cognitive processes. Functional and dysfunctional physiology and what this tells us about maladaptive behaviors will also be discussed.

Frequency: Alternate Years - 2nd Semester

Prerequisites: NEU 109 or (PSYC 319 or PSYC 321)

Corequisites: PEAK 400

This course is PEAK Required

NEU 380 - Special Topics, 0-4 credits.

Courses covering various topics of interest in this particular discipline are offered regularly. Contact program chair for more information.

Frequency: Not offered on a Regular Basis

Repeatable: Yes

NEU 390 - Academic Internship, 1-8 credits.

Frequency: Every Semester

Repeatable: Yes

NEU 400 / BIOL 400 - Neurobiology, 4 credits.

This course expands upon content covered in NEU 109 and BIO 222 and explores a variety of topics including neuroanatomy, neural cell characteristics and communication, and mechanisms of nervous system injury and repair. There is an emphasis on active learning, experimental design, and reading scientific literature. Three lectures and four hours of laboratory per week.

Frequency: Every Year - First Semester

Prerequisites: BIOL 222 or NEU 109

Core designations: Natural Science N

NEU 406 - Senior Seminar, 1 credits.

This senior-level course will serve as the capstone for the major and is recommended for the minor. The purpose of this class is to summarize and integrate experiences from the neuroscience major by revisiting numerous topics of study. It is expected that students will have completed most other requirements for the neuroscience major before enrolling in this course.

Frequency: Every Year - Second Semester

Prerequisites: NEU 109

NEU 475 / CHEM 475 - Neurochemistry, 4 credits.

This junior/senior level course studies the chemical and biochemical aspect of neuroscience including ligand binding, pharmacokinetics and second messenger cascades.

Frequency: Every Year - Second Semester

Prerequisites: (NEU 109 and CHEM 142) or CHEM 373

NEU 480 - Independent Study, 1-4 credits.

This course provides an opportunity for individual students to conduct in-depth study of a particular topic under the supervision of a faculty member. Contact the program chair for more information.

Frequency: Not offered on a Regular Basis

Repeatable: Yes

NEU 487 - Directed Research, 1-4 credits.

This course provides an opportunity for individual students to conduct research in a specific area of study, completed under the direction of a faculty mentor. Specific expectations of the research experience to be determined by the faculty. Repeatable for credit. PEAK optional with certain instructors. Prerequisite: consent of instructor.

Frequency: *Not offered on a Regular Basis*

Repeatable: Yes