

NEUROSCIENCE

The Interdisciplinary Neuroscience Majors and Minor

The Interdisciplinary Neuroscience Majors and Minor provide students with an unusual flexibility. For students committed to in-depth neuroscience education, they can major in either of two tracks: a cognitive/behavioral track that emphasizes the outcome of neural processing and circuit level mechanisms supporting cognition and behavior, and a molecular/cellular track that emphasizes the genetic, biochemical, and cell biological underpinnings of the development and function of the nervous system. Students who wish to focus on another area of study, but gain substantial exposure to the field of neuroscience, may minor in neuroscience.

For additional information, please contact:

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- Dr. Bill Rochlin, wrochli@luc.edu Director, Molecular/Cellular Neuroscience

Coursework

All three options require three core courses in neuroscience fundamentals: Introduction to Neuroscience (NEUR 101), Neurobiology (BIOL 362), and Behavioral and Cognitive Neuroscience (PSYC 382/BIOL 284). After completing these courses, students may choose among numerous upper-level lecture and lab courses that span the field. Neuroscience majors must also complete basic science and math foundation courses, 2-3 track-specific courses, and a track-specific capstone course.

Undergraduate Research

In addition, there are currently 20 neuroscience faculty conducting research on the LUC Lake Shore Campus (<https://www.luc.edu/neuroscience/aboutus/facultydirectoryandresearch/>), providing opportunities for independent undergraduate research. Students are also welcome to arrange research internships with faculty at the Stritch School of Medicine (<https://www.luc.edu/stritch/pharmacology/people/faculty/>) or at other research institutions in the Chicago area.

Objectives for Neuroscience Coursework

Because the nervous system is the organ for behavior, neuroscience cuts across traditional fields in the biological and behavioral sciences. Owing to this breadth, we have designed two major tracks for students who wish to focus on neuroscience in their course of study at LUC. Completing either of these options will prepare students well for a variety of careers, including but not limited to medicine and life sciences research, particularly in neuroscience-related fields. Both options require at least two semesters of courses in biology, chemistry, and physics.

Lecture Course Objectives

Both of the majors require three courses in neuroscience fundamentals: NEUR 101 (<https://catalog.luc.edu/search/?P=NEUR%20101>) Introduction to Neuroscience, BIOL 362 (<https://catalog.luc.edu/search/?P=BIOL%20362>) Neurobiology (which stresses cellular and electrophysiological mechanisms of neural function), and PSYC 382 (<https://catalog.luc.edu/search/?P=PSYC%20382>)/BIOL 284 (<https://catalog.luc.edu/search/?P=BIOL%20284>) Behavioral and Cognitive

Neuroscience (which stresses the neural substrates underlying mental processing and behavior). After completing this sequence, majors can design their own course of study within cognitive/behavioral or molecular/cellular neuroscience. There is some overlap in the list of lecture courses from which students may choose to complete their elective requirements, but there is also great diversity in the topics that are available in each major track.

Lab Course Objectives

Aside from first-year labs in chemistry and biology, and organic chemistry lab for molecular/cellular neuroscience majors, neuroscience majors choose their own lab experiences. Because the nervous system is cellular, computational, and a control center, the range of techniques that are useful is extremely broad, from cellular/molecular to behavioral, and the student can decide which techniques will be most helpful in answering the questions they want to address. Students who are interested in conducting independent neuroscience research have several neuroscience labs from which to choose, and may also seek permission to carry out a neuroscience-relevant project in a lab that is not focused on neuroscience. Independent research is the best preparation for doctoral programs, and is also regarded highly by medical, dental and other life science professional schools. For this reason, getting an independent research position in a lab is competitive.

Seminar Courses

There are three seminar style courses available to neuroscience undergraduates. In these courses, students tackle the primary literature and react to seminars given by neuroscientists on their research. Cognitive/Behavioral Neuroscience majors and Neuroscience minors are required (and Molecular/Cellular Neuroscience majors are invited) to take the 1-credit hour NEUR 300 (<https://catalog.luc.edu/search/?P=NEUR%20300>) Seminar in Neuroscience course, providing basic exposure to the primary literature and a wide range of research talks. Both major tracks culminate with a required capstone seminar class, which immerses the students in the primary literature and encourages development of critical thinking and presentation skills.

Undergraduate Programs

- Cognitive and Behavioral Neuroscience (BS) (<https://catalog.luc.edu/undergraduate/arts-sciences/neuroscience/cognitive-behavioral-neuroscience-bs/>)
- Molecular and Cellular Neuroscience (BS) (<https://catalog.luc.edu/undergraduate/arts-sciences/neuroscience/molecular-cellular-neuroscience-bs/>)
- Neuroscience Minor (<https://catalog.luc.edu/undergraduate/arts-sciences/neuroscience/neuroscience-minor/>)

Neuroscience Department Policies

Double-Dipping with Other Majors/Minors

For students in either track of the Neuroscience Major or the Neuroscience Minor, any courses taken that count toward their Neuroscience Major/Minor may also count toward the following majors and minors:

- BS in Biology (BIOL-BS) (<https://catalog.luc.edu/undergraduate/arts-sciences/biology/biology-bs/>)
- BS in Biology with Ecology Emphasis (BIOE-BS) (<https://catalog.luc.edu/undergraduate/arts-sciences/biology/biology-ecology-emphasis-bs/>)

- BS in Biology with Molecular Emphasis (BIOM-BS) (<https://catalog.luc.edu/undergraduate/arts-sciences/biology/biology-molecular-biology-emphasis-bs/>)
- BS in Psychology (PSYC-BS) (<https://catalog.luc.edu/undergraduate/arts-sciences/psychology/psychology-bs/>)
- Minor in Biology (BIOL-MINR) (<https://catalog.luc.edu/undergraduate/arts-sciences/biology/biology-minor/>)
- Minor in Psychology (PSYC-MINR) (<https://catalog.luc.edu/undergraduate/arts-sciences/psychology/psychology-minor/>)

Students may not double-major in both tracks of the Neuroscience Major or combine the Neuroscience Major with the Neuroscience Minor. For all other majors/minors, the CAS Academic Council's double-dipping policy (<https://catalog.luc.edu/undergraduate/arts-sciences/#policiestext>) shall apply.

Undergraduate Policies and Procedures

Please see Undergraduate Policies and Procedures (<https://catalog.luc.edu/academic-standards-regulations/undergraduate/>) for academic policies that supersede those of academic units within the University.

Neuroscience (NEUR)

NEUR 101 Introduction to Neuroscience (3 Credit Hours)

Pre-requisites: None; Recommended: BIOL 101 and PSYC 101

This course will introduce students to basic concepts and the variety of topics in the field of neuroscience, including neuroanatomy (gross and cellular), physiology, neural basis of behavior, malfunctions due to disease and injury, and methods used to study these areas laying a foundation for advanced coursework in neuroscience.

Interdisciplinary Option: Neuroscience

Course equivalencies: X-BIOL 202/PSYC202/NEUR 101

Outcomes:

Knowledge of the organization of the nervous system, cellular events that underlie emotions, learning, and behavior, and awareness of classical and modern methods for advancing the field

NEUR 300 Seminar in Neuroscience (1 Credit Hour)

Pre-requisites: NEUR 101 with grade of C- or better

The seminar introduces students to the interdisciplinary nature of modern neuroscience with an emphasis on the various neuroscience research activities that take place at Loyola University Chicago, and reviews current neuroscience research topics. NEUR 300 is cross-listed with BIOL 303.

Interdisciplinary Option: Neuroscience

Course equivalencies: X-BIOL303/NEUR300

Outcomes:

Students will demonstrate understanding of the interdisciplinary and multidisciplinary nature of modern neuroscience, and the research questions and experimental approaches used at the Lakeshore and Medical Center campuses; Students will complete one midterm essay and one final essay exam that will reflect their understanding of the topics discussed in the seminars

NEUR 301 Laboratory in Neuroscience I (4 Credit Hours)

Pre-requisites: NEUR 101, BIOL 251; and students must be either a Molecular/Cellular Neuroscience Major, a Cognitive/Behavioral Neuroscience major, or a Neuroscience Minor

Students will be trained in various anatomical, physiological, behavioral, and neurobiological modeling techniques used to study the nervous system and the brain in the laboratory. This course is cross-listed as NEUR 301 & PSYC 388.

Interdisciplinary Option: Neuroscience

Course equivalencies: X-NEUR301/PSYC388/BIOL373

Outcomes:

Students will demonstrate understanding of several research designs and methodologies of use in neuroscience research and will gain experience with basic neuroscience laboratory techniques

NEUR 302 Laboratory in Neuroscience II (3 Credit Hours)

Pre-requisites: NEUR 301

Students will receive additional training and experience in specialized laboratory methods and techniques used by Loyola faculty in their Neuroscience research. This experience will help prepare them to contribute creatively to neuroscience research. Students will be assessed as to the quality of 3 items: 1) a written proposal for the independent research project; 2) a 'meeting quality' scientific poster; and 3) a written 'publication quality' scientific paper summarizing the work done for the independent research project.

Interdisciplinary Option: Neuroscience

Course equivalencies: X-BIOL374/NEUR302/PSYC389

Outcomes:

Students will have the opportunity to conduct independent research projects in faculty and student laboratories