COGNITIVE AND BEHAVIORAL NEUROSCIENCE (BS)

The B.S. in Cognitive/Behavioral Neuroscience focuses on the neural substrates of cognitive processes and behavior, utilizing methods from cognitive psychology, behavioral analysis, psychobiology, and computer science to account for empirical data about the brain.

Objectives

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 Introduction to Neuroscience, BIOL 362 Neurobiology (which stresses cellular and electrophysiological mechanisms of neural function), and PSYC 382/BIOL 284 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 research, particularly in neuroscience-related fields. Both options require a variety of careers, including but not limited to medicine and 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 are required to take the 1-credit hour NEUR 300 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.

Our neuroscience majors are designed to provide both breadth and depth to the neuroscience knowledge base of our students, and afford ample opportunities for developing creative and critical thinking skills needed to advance neuroscience (or any other life science field).

Curriculum

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<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Hours</th>
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<tbody>
<tr>
<td>PSYC 101</td>
<td>General Psychology</td>
<td>3</td>
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<tr>
<td>BIOL 101</td>
<td>General Biology I</td>
<td>3</td>
</tr>
<tr>
<td>BIOL 111</td>
<td>General Biology I Lab</td>
<td>1</td>
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<tr>
<td>BIOL 102</td>
<td>General Biology II</td>
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<tr>
<td>BIOL 112</td>
<td>General Biology II Lab</td>
<td>1</td>
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<tr>
<td>PSYC 304</td>
<td>Statistics</td>
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<tr>
<td>BIOL 362</td>
<td>Neurobiology</td>
<td>3</td>
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<tr>
<td>PSYC 382</td>
<td>Behavioral and Cognitive Neuroscience</td>
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Total Hours: 49
Cognitive/Behavioral Neuroscience Track

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<thead>
<tr>
<th>Code</th>
<th>Title</th>
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<tbody>
<tr>
<td>PSYC 306</td>
<td>Research Methods in Psyc</td>
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<tr>
<td>Select one of the following computer science options:</td>
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<tr>
<td>COMP 150</td>
<td>Introduction to Computing</td>
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<tr>
<td>COMP 170</td>
<td>Introduction to Object-Oriented Programming</td>
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<tr>
<td>COMP 180</td>
<td>Computing and Data Analysis for the Sciences</td>
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<tr>
<td>DSCI 101</td>
<td>Fundamentals of Modern Data Science with R</td>
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<tr>
<td>NEUR 300 / BIOL 303</td>
<td>Seminar in Neuroscience</td>
<td>1</td>
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Cognitive/Behavioral Neuroscience Lecture Electives

Select three of the following: 9

BIOL 320 Animal Behavior
BIOL 351 Sleep/Circadian Rhythms
BIOL 352 Neurobiology of Feeding in Health and Disease
BIOL 357 Neural Disease, Degeneration, and Regeneration
BIOL 395 Special Topics in Biology (Special Topics in Biology (if topics is Cellular and Gross Functional Neuroanatomy))
COMP 386 Computational Neuroscience
PSYC 240 / BIOL 240 Psych-Biol of Perception
PSYC 251 Learning and Memory
PSYC 332 Affective Neuroscience
PSYC 350 Developmental Cognitive Neuroscience
PSYC 352 Neuropsychology
PSYC 355 / PHIL 355 Neuroethics
PSYC 378 Drugs and Behavior

Cognitive/Behavioral Neuroscience Lab Electives

Select two of the following: 5-7

NEUR 301 / BIOL 373 / PSYC 388 Laboratory in Neuroscience I
PSYC 311 / BIOL 313 Lab in Psychobiology
PSYC 312 Lab in Cognitive Neuroscience
PSYC 313 Lab in Behavioral Neuroscience
PSYC 314 Lab in Exper Psych: Cognition
PSYC 316 Lab in Exper Psych:Sens & Perc
BIOL 395L Special Topics Laboratory (if topics is neuroanatomy)

May include one of the following independent research options:

PSYC 397 Independent Research (with a Cognitive/Behavioral focus)
PSYC 369 / PSYC 370 Psychology Honors Readings (with a Cognitive/Behavioral focus)
BIOL 396 Research (with a Cognitive/Behavioral focus)

Cognitive/Behavioral Neuroscience Capstone

PSYC 387 Seminar in Behavioral and Cognitive Neurosciences 3

Total Hours 24-26

Undergraduate Research

Neuroscience students have numerous opportunities to conduct scientific research in the labs of our neuroscience-affiliated faculty at Loyola’s Lake Shore Campus (https://www.luc.edu/neuroscience/aboutus/facultydirectoryandresearch/#den422313), in the labs of other faculty on any of Loyola’s campuses, or at other institutions in the Chicago area. Depending on the applicability of the research project to the student’s Neuroscience Major or Minor, independent research may be able to qualify for course credit as one of the required specialty labs (see below).

Cognitive/Behavioral Neuroscience Majors

Cognitive/Behavioral Neuroscience (NRCB) majors can earn specialty lab credit for conducting independent research that has a neuroscience or cognitive/behavioral focus in labs within the psychology or biology departments. Your research project must be approved by the NRCB Director for NRCB credit through one of the 3-credit courses below:

- PSYC 397 Independent Research (relevant research with faculty in Psychology)
- PSYC 369 Psychology Honors Readings/PSYC 370 Psychology Honors Research (relevant research with faculty in Psychology for NRCB credit; additionally must use neuroscientific technique if desire NRCB Honors)
- BIOL 396 Research (relevant research with faculty in Biology)

Please contact the NRCB Director for questions about earning credit from cognitive/behavioral or neuroscience-related research in other departments (e.g., computer science, engineering, chemistry) or at other institutions.

College of Arts and Sciences Graduation Requirements

All Undergraduate students in the College of Arts and Sciences are required to take two Writing Intensive courses (6 credit hours) as well as complete a foreign language requirement at 102-level or higher (3 credit hours) or a language competency test. More information can be found here (https://www.luc.edu/cas/college-requirements/).

Additional Undergraduate Graduation Requirements

All Undergraduate students are required to complete the University Core, at least one Engaged Learning course, and UNIV 101. SCPS students are not required to take UNIV 101. You can find more information in the University Requirements (https://catalog.luc.edu/undergraduate/university-requirements/) area.