Neuroscience, B.S.

Neuroscience Learning Outcomes

• Students learn how molecules and cells generate brain circuits that build human behavior and cognition.
• Students design effective experiments.
• Students think critically about scientific data.
• Students communicate effectively about neuroscience.
• Students are prepared for graduate education in neuroscience or related life-science fields; for medical school or other health-related programs such as public health or nursing; or for a first step in a career, including work in biomedical industries, academic laboratories, and science education.

Requirements

The Bachelor of Science with a major in neuroscience requires a minimum of 120 s.h., including at least 63 s.h. of work for the major. Course work includes neuroscience, chemistry, biochemistry, mathematics, and physics courses. Students must maintain a g.p.a. of at least 2.00 in all courses for the major and in all UI courses for the major. They also must complete the College of Liberal Arts and Sciences General Education Program.

Students who major in neuroscience may not earn a major in biology or psychology, but may earn a minor in biology or psychology as long as no more than 3 s.h. are double-counted.

The B.S. with a major in neuroscience requires the following course work.

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<tr>
<th>Cognate Requirements</th>
<th>23-26</th>
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<tr>
<td>Introductory Courses</td>
<td>8</td>
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<td>Core Courses</td>
<td>19</td>
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<tr>
<td>Laboratory Course</td>
<td>4-5</td>
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<tr>
<td>Required Neuroscience Electives</td>
<td>9-10</td>
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<tr>
<td>Total Hours</td>
<td>63-68</td>
</tr>
</tbody>
</table>

Cognate Requirements

One of these options:

- BIOC:3110 Biochemistry 3
- BIOC:3120 & BIOC:3130 Biochemistry and Molecular Biology I-II (both of these) 6

This sequence:

- CHEM:1110 & CHEM:1120 Principles of Chemistry I-II 8

One of these sequences:

- PHYS:1511-1512 College Physics I-II (preferred) 8
- PHYS:1611-1612 Introductory Physics I-II 8

One of these:

- MATH:1460 Calculus for the Biological Sciences (preferred) 4
- MATH:1380 Calculus and Matrix Algebra for Business 4
- MATH:1550 Engineering Mathematics I: Single Variable Calculus 4
- MATH:1850 Calculus I 4

Introductory Courses

Both of these:

- BIOL:1411 Foundations of Biology 4
- PSY:2701 Introduction to Behavioral Neuroscience

Core Courses

All of these:

- BIOL:3253 Neurobiology 4
- BIOL:3343 Animal Physiology 3
- BIOL:3753 Developmental Neurobiology 3
- PSY:2811-PSY:2812 Research Methods and Data Analysis in Psychology I-II 6
- PSY:2975 Introduction to Cognitive Neuroscience 3

Laboratory Course

One of these:

- BIOL:3244 Animal Behavior (with lab) 5
- BIOL:3656 Neurobiology Laboratory 4

Required Neuroscience Electives

A minimum of three courses (9 s.h.) from these:

- BIOL:1412 Diversity of Form and Function 4
- BIOL:2254 Endocrinology 3
- BIOL:2512 Fundamental Genetics 4
- BIOL:2603 Mechanisms of Aging 3
- BIOL:2723 Cell Biology 3
- BIOL:4333 Genes and Development 3
- BIOL:4353 Neurophysiology: Cells and Systems 3-4
- PSY:3040 Psychology of Learning 3
- PSY:3065 The Aging Mind and Brain 3
- PSY:3230 Psychopharmacology 3
- PSY:3240 Motivation, Addiction, and the Brain 3
- PSY:3250 Neuroscience of Learning and Memory 3
- PSY:3270 Neurobiology of Stress 3

Honors

Honors in the Major

Students majoring in neuroscience have the opportunity to graduate with honors in the major. Departmental honor students must maintain a major g.p.a. and a UI g.p.a. of at least 3.33.

In order to earn honors in the neuroscience major, students must complete the following:

A minimum of 6 s.h. over two or more semesters of an independent laboratory research project undertaken in the laboratory of an Iowa Neuroscience Institute (INI) faculty member chosen from a list of approved mentors. Students enroll in BIOL:4995/PSY:4995 Honors Research in Neuroscience.
A brief initial research proposal summarizing the background and goals of the planned honors investigations research, submitted to the honors coordinator, typically at the end of the first semester of honors research.

An acceptable honors thesis describing this research submitted to the honors coordinator near the end of the final semester of enrollment in BIOL:4995/PSY:4995 Honors Research in Neuroscience.

An oral presentation of the honors research findings during the student’s final semester.

Honors students also are encouraged to participate in the Iowa Center for Research by Undergraduates (ICRU) and to apply for research scholarships, including the Iowa Neuroscience Institute (INI) Summer Scholars Fellowships.

Neuroscience majors interested in graduating with honors in the major should contact the honors coordinator as early as possible, preferably during their sophomore or junior year.

University of Iowa Honors Program

In addition to honors in the major, students have opportunities for honors study and activities through membership in the University of Iowa Honors Program. Visit Honors at Iowa to learn about the University’s honors program.

Students who satisfy the requirements for honors in the neuroscience major also satisfy the Level Two: Learning by Doing requirement of the University Honors Curriculum.

Membership in the UI Honors Program is not required to earn honors in the neuroscience major.

Academic Plans

Four-Year Graduation Plan

The following checkpoints list the minimum requirements students must complete by certain semesters in order to stay on the University’s Four-Year Graduation Plan. Courses in the major are those required to complete the major; they may be offered by departments other than the major department.


Before the seventh semester begins: BIOC:3110 Biochemistry, or BIOC:3120 Biochemistry and Molecular Biology I and BIOC:3130 Biochemistry and Molecular Biology II; BIOL:3253 Neurobiology; BIOC:3244 Animal Behavior (with lab) or BIOL:3656 Neurobiology Laboratory; BIOL:4753 Developmental Neurobiology; and PHYS:1512 College Physics II or PHYS:1612 Introductory Physics II.

Before the eighth semester begins: two required neuroscience electives.

During the eighth semester: one required neuroscience elective, enrollment in all remaining course work in the major, all remaining General Education courses, and a sufficient number of semester hours to graduate.

Sample Plan of Study

Neuroscience (B.S.)

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>First Year</strong></td>
<td><strong>Fall</strong></td>
<td></td>
</tr>
<tr>
<td>CHEM:1110</td>
<td>Principles of Chemistry I (GE: Natural Sciences with a lab)</td>
<td>4</td>
</tr>
<tr>
<td>PSY:1001</td>
<td>Elementary Psychology (GE: Social Sciences)</td>
<td>3</td>
</tr>
<tr>
<td>PSY:2701</td>
<td>Introduction to Behavioral Neuroscience</td>
<td>4</td>
</tr>
<tr>
<td>RHET:1030</td>
<td>Rhetoric (GE: Rhetoric or other General Education course)</td>
<td>4</td>
</tr>
<tr>
<td>CSI:1600</td>
<td>Success at Iowa</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Hours</td>
<td>17</td>
</tr>
<tr>
<td><strong>Spring</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BIOL:1411</td>
<td>Foundations of Biology (GE: Natural Sciences with a lab)</td>
<td>4</td>
</tr>
<tr>
<td>CHEM:1120</td>
<td>Principles of Chemistry II (GE: Natural Sciences with a lab)</td>
<td>4</td>
</tr>
<tr>
<td>MATH:1460</td>
<td>Calculus for the Biological Sciences (GE: Quantitative or Formal Reasoning)</td>
<td>4</td>
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<tr>
<td>GE: Diversity and Inclusion</td>
<td></td>
<td>3</td>
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<tr>
<td></td>
<td>Hours</td>
<td>15</td>
</tr>
<tr>
<td><strong>Second Year</strong></td>
<td><strong>Fall</strong></td>
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<tr>
<td>ENGL:1200</td>
<td>The Interpretation of Literature (GE: Interpretation of Literature)</td>
<td>3</td>
</tr>
<tr>
<td>PSY:2811</td>
<td>Research Methods and Data Analysis in Psychology I</td>
<td>3</td>
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<tr>
<td>PSY:2975</td>
<td>Introduction to Cognitive Neuroscience</td>
<td>3</td>
</tr>
<tr>
<td>GE: Literary, Visual, and Performing Arts</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>GE: World Languages or elective course</td>
<td></td>
<td>3-5</td>
</tr>
<tr>
<td></td>
<td>Hours</td>
<td>15-17</td>
</tr>
<tr>
<td><strong>Spring</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BIOL:3343</td>
<td>Animal Physiology</td>
<td>3</td>
</tr>
<tr>
<td>PHYS:1511</td>
<td>College Physics I</td>
<td>4</td>
</tr>
<tr>
<td>PSY:2812</td>
<td>Research Methods and Data Analysis in Psychology II</td>
<td>3</td>
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<tr>
<td>GE: Values and Culture</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>GE: World Languages or elective course</td>
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<td>3-5</td>
</tr>
<tr>
<td></td>
<td>Hours</td>
<td>16-18</td>
</tr>
<tr>
<td><strong>Third Year</strong></td>
<td><strong>Fall</strong></td>
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<tr>
<td>BIOL:3253</td>
<td>Neurobiology</td>
<td>4</td>
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<tr>
<td>BIOL:3656</td>
<td>Neurobiology Laboratory</td>
<td>4</td>
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<tr>
<td>PHYS:1512</td>
<td>College Physics II</td>
<td>4</td>
</tr>
<tr>
<td>GE: World Languages or elective course</td>
<td></td>
<td>3-5</td>
</tr>
<tr>
<td></td>
<td>Hours</td>
<td>15-17</td>
</tr>
</tbody>
</table>
Spring
BIOC:3110  Biochemistry  3
BIOL:3753  Developmental Neurobiology  3
GE: Historical Perspectives  3
GE: World Languages or elective course  3-5
Elective course  3

Hours  15-17

Fourth Year
Fall
Major: two required neuroscience elective courses  6
GE: International and Global Issues  3
Elective course  3
Elective course  3

Hours  15

Spring
Major: required neuroscience elective course  3
Elective course  3
Elective course  3
Elective course  3

Hours  12

Total Hours  120-128

1 Enrollment in chemistry and math courses require completion of placement exams.
2 It is strongly recommended that neuroscience majors take this course as their GE: Social Science requirement and they do so in the first semester.
3 General Education (GE) courses may be completed in any order unless used as a prerequisite for another course. Students should consult with an advisor about the best sequencing of courses. For more information, view the General Education Program.
4 Students who have completed four years of a single language in high school have satisfied the College of Liberal Arts and Sciences GE: World Languages requirement. Enrollment in world languages courses requires a placement exam, unless enrolling in a first-semester-level course.
5 Students may use their elective courses to complete a double major, minors, or certificates.

Career Advancement

The major provides students with a rigorous and broad background in neuroscience, from the cellular and molecular levels to the behavioral and cognitive levels. Students earning a degree in neuroscience will be well prepared to pursue graduate work in neuroscience or related life sciences, to attend medical school, or to enter other health-related programs such as a physician's assistant program, public health, or nursing. Graduates also will be prepared to directly enter the workforce in biotechnology industries, academic life science laboratories, or in science education, and science writing.

The Pomerantz Career Center offers multiple resources to help students find internships and jobs.