Neuroscience, B.S.

Learning Outcomes

Students will:

• learn how molecules and cells generate brain circuits that build human behavior and cognition;
• design effective experiments;
• think critically about scientific data;
• communicate effectively about neuroscience; and
• be 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 64 s.h. of work for the major. Coursework 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 GE CLAS Core.

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 coursework.

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Cognate Requirements</td>
<td>23-26</td>
</tr>
<tr>
<td></td>
<td>Introductory Courses</td>
<td>8</td>
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<tr>
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<td>Core Courses</td>
<td>17</td>
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<tr>
<td></td>
<td>Laboratory Course</td>
<td>4-5</td>
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<tr>
<td></td>
<td>Neuroscience Electives</td>
<td>12-15</td>
</tr>
<tr>
<td><strong>Total Hours</strong></td>
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<td><strong>64-71</strong></td>
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Cognate Requirements

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<tbody>
<tr>
<td></td>
<td>One of these options:</td>
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</tr>
<tr>
<td>BIOL:3110</td>
<td>Biochemistry</td>
<td>3</td>
</tr>
<tr>
<td>BIOL:3120 &amp; BIOL:3130</td>
<td>Biochemistry and Molecular Biology I-II (both of these)</td>
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<tr>
<td>CHEM:1110 &amp; CHEM:1120</td>
<td>Principles of Chemistry I-II</td>
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<tr>
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<td>One of these sequences:</td>
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<tr>
<td>PHYS:1511- PHYS:1512</td>
<td>College Physics I-II (preferred)</td>
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<tr>
<td>PHYS:1611- PHYS:1612</td>
<td>Introductory Physics I-II</td>
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<td>MATH:1460</td>
<td>Calculus for the Biological Sciences (preferred)</td>
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<tr>
<td>MATH:1380</td>
<td>Calculus and Matrix Algebra for Business</td>
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Introductory Courses

<table>
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<tr>
<td>BIOL:1411</td>
<td>Foundations of Biology</td>
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<tr>
<td>PSY:2701</td>
<td>Introduction to Behavioral Neuroscience</td>
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Core Courses

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<tr>
<td>BIOL:3253</td>
<td>Neurobiology I</td>
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<tr>
<td>BIOL:3254</td>
<td>Neurobiology II</td>
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<tr>
<td>PSY:2811-PSY:2812</td>
<td>Research Methods and Data Analysis in Psychology I-II</td>
<td>6</td>
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<tr>
<td>PSY:2975</td>
<td>Introduction to Cognitive Neuroscience</td>
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Laboratory Course

<table>
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<tr>
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<tr>
<td>One of these:</td>
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<td></td>
</tr>
<tr>
<td>BIOL:3244</td>
<td>Animal Behavior (with lab)</td>
<td>5</td>
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<tr>
<td>BIOL:3655</td>
<td>Neurogenetics Laboratory</td>
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<tr>
<td>BIOL:3656</td>
<td>Neurobiology Laboratory</td>
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<tr>
<td>PSY:4025</td>
<td>Laboratory in Cognitive Neuroscience</td>
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Neuroscience Electives

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<tbody>
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<td>A minimum of four courses (12 s.h.) from these:</td>
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<tr>
<td>BIOL:1412</td>
<td>Diversity of Form and Function</td>
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<td>BIOL:2254</td>
<td>Endocrinology</td>
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<td>BIOL:2512</td>
<td>Fundamental Genetics</td>
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<td>BIOL:2603</td>
<td>Mechanisms of Aging</td>
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<td>BIOL:2723</td>
<td>Cell Biology</td>
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<td>BIOL:3343</td>
<td>Animal Physiology</td>
<td>3</td>
</tr>
<tr>
<td>BIOL:4333</td>
<td>Genes and Development</td>
<td>3</td>
</tr>
<tr>
<td>BIOL:4353</td>
<td>Neurophysiology: Cells and Systems</td>
<td>3-4</td>
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<tr>
<td>PCOL:3101</td>
<td>Pharmacology I: A Drug’s Fantastic Journey</td>
<td>2-3</td>
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<tr>
<td>PHIL:3510</td>
<td>Neuroethics</td>
<td>3</td>
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<tr>
<td>PSY:3035</td>
<td>Science of Emotion</td>
<td>3</td>
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<tr>
<td>PSY:3040</td>
<td>Psychology of Learning</td>
<td>3</td>
</tr>
<tr>
<td>PSY:3055</td>
<td>Interdisciplinary Science of Sound and Hearing</td>
<td>3</td>
</tr>
<tr>
<td>PSY:3060</td>
<td>Sensation and Perception</td>
<td>3</td>
</tr>
<tr>
<td>PSY:3250</td>
<td>Neuroscience of Learning and Memory</td>
<td>3</td>
</tr>
<tr>
<td>PSY:3265</td>
<td>Cognitive and Clinical Neuroscience of Executive Functions</td>
<td>3</td>
</tr>
<tr>
<td>PSY:3270</td>
<td>Neurobiology of Stress</td>
<td>3</td>
</tr>
<tr>
<td>PSY:3275</td>
<td>The Science of Sleep</td>
<td>3</td>
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</tbody>
</table>
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to attend medical school, or to enter other health-related
graduate work in neuroscience or related life sciences,
a degree in neuroscience will be well prepared to pursue
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background in neuroscience, from the cellular and molecular
The major provides students with a rigorous and broad
academic plans to directly enter the workforce in biotechnology industries, academic
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writing.
The Pomerantz Career Center offers multiple resources to help
students find internships and jobs.

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 semester
immediately prior to the final semester of honors research.
• An acceptable honors thesis describing the 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
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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 Experiential
Learning requirement of the University honors curriculum.
Membership in the UI Honors Program is not required to earn
honors in the neuroscience major.

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

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.

Honors and Experiential Learning

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offered by departments other than the major department.


Before the seventh semester begins: BIO:3120 Biochemistry and Molecular Biology I and BIO:3130 Biochemistry and Molecular Biology II; BIOL:3253 Neurobiology I, BIOL:3244 Animal Behavior (with lab) or BIOL:3656 Neurobiology Laboratory; BIOL:3254 Neurobiology II; 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 coursework in the major, all remaining GE CLAS Core courses, and a sufficient number of semester hours to graduate.

Sample Plan of Study
Sample plans represent one way to complete a program of
study. Actual course selection and sequence will vary and
should be discussed with an academic advisor. For additional
sample plans, see MyUI.

Neuroscience, B.S.

Course First Year Title Hours
Fall CHEM:1110 Principles of Chemistry I a, b 4
PSY:1001 Elementary Psychology a, c 3
PSY:2701 Introduction to Behavioral Neuroscience 4
ENGL:1200 or RHET:1030 The Interpretation of Literature or Rhetoric 3 - 4
CSI:1600 Success at Iowa 2 Hours 16-17
Spring BIOL:1411 Foundations of Biology a 4
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<thead>
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<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
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<tbody>
<tr>
<td>CHEM:1120</td>
<td>Principles of Chemistry II (a)</td>
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<tr>
<td>MATH:1460</td>
<td>Calculus for the Biological Sciences (a, d)</td>
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</tr>
<tr>
<td>RHET:1030 or ENGL:1200</td>
<td>Rhetoric or The Interpretation of Literature</td>
<td>3 - 4</td>
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### Second Year

#### Fall

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<tr>
<th>Course Code</th>
<th>Course Title</th>
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<tbody>
<tr>
<td>PSY:2811</td>
<td>Research Methods and Data Analysis in Psychology I</td>
<td>3</td>
</tr>
<tr>
<td>PSY:2975</td>
<td>Introduction to Cognitive Neuroscience</td>
<td>3</td>
</tr>
<tr>
<td>PHYS:1511</td>
<td>College Physics I</td>
<td>4</td>
</tr>
<tr>
<td>GE CLAS Core: World Languages First Level Proficiency or elective course (e)</td>
<td>4 - 5</td>
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#### Hours | 15-16 |

#### Spring

<table>
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<th>Course Title</th>
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<tbody>
<tr>
<td>PSY:2812</td>
<td>Research Methods and Data Analysis in Psychology II</td>
<td>3</td>
</tr>
<tr>
<td>PHYS:1512</td>
<td>College Physics II</td>
<td>4</td>
</tr>
<tr>
<td>BIOC:3120 or BIOC:3110</td>
<td>Biochemistry and Molecular Biology I (f) or Biochemistry</td>
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<tr>
<td>GE CLAS Core: World Languages Second Level Proficiency or elective course (e)</td>
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#### Hours | 14-15 |

### Third Year

#### Fall

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<tr>
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<td>Neurobiology I</td>
<td>4</td>
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<td>Major: neuroscience elective I</td>
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<tr>
<td>BIOC:3130</td>
<td>Biochemistry and Molecular Biology II (f)</td>
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<tr>
<td>GE CLAS Core: World Languages Second Level Proficiency or elective course (e)</td>
<td>4 - 5</td>
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#### Hours | 14-16 |

#### Spring

<table>
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<tr>
<td>BIOL:3254</td>
<td>Neurobiology II</td>
<td>4</td>
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<tr>
<td>Major: neuroscience elective II</td>
<td>3 - 4</td>
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<tr>
<td>GE CLAS Core: Diversity and Inclusion (g)</td>
<td>3</td>
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</tr>
<tr>
<td>GE CLAS Core: World Languages Fourth Level Proficiency or elective course (e)</td>
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#### Hours | 14-16 |

### Fourth Year

#### Fall

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<tbody>
<tr>
<td>Major: neuroscience elective III</td>
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</tr>
<tr>
<td>Major: neuroscience lab course or neuroscience elective IV</td>
<td>3 - 5</td>
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<tr>
<td>GE CLAS Core: International and Global Issues (g)</td>
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<tr>
<td>GE CLAS Core: Values and Culture (g)</td>
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#### Hours | 12-15 |

#### Spring

<table>
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</tr>
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<tbody>
<tr>
<td>Major: neuroscience lab course or neuroscience elective IV</td>
<td>3 - 4</td>
<td></td>
</tr>
<tr>
<td>GE CLAS Core: Historical Perspectives (g)</td>
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</tr>
<tr>
<td>GE CLAS Core: Literary, Visual, and Performing Arts (g)</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Elective course (h)</td>
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### Degree Application

- **Total Hours**: 111-123

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**Notes:**

- \(a\) Fulfills a major requirement and may fulfill a GE requirement.
- \(b\) Enrollment in chemistry courses requires completion of a placement exam.
- \(c\) It is strongly recommended that neuroscience majors take this course as their GE CLAS Core: Social Science requirement and that they do so in their first semester.
- \(d\) Enrollment in math courses requires completion of a placement exam.
- \(e\) Students who have completed four years of a single language in high school have satisfied the GE CLAS Core World Languages requirement. Enrollment in world languages courses requires a placement exam, unless enrolling in a first-semester-level course.
- \(f\) If BIOC:3120 is taken, students will also have to complete BIOC:3130 to meet this requirement.
- \(g\) GE CLAS Core 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.
- \(h\) Students may use elective courses to earn credit towards the total s.h. required for graduation or to complete a double major, minors, or certificates.
- \(i\) Please see Academic Calendar, Office of the Registrar website for current degree application deadlines. Students should apply for a degree for the session in which all requirements will be met. For any questions on appropriate timing, contact your academic advisor or Graduation Services.