Neuroscience, BS

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; and
• 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 grade-point average 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 BS with a major in neuroscience requires the following coursework.

Cognate Requirements

Course # Title Hours
BMB:3110 Biochemistry 3
BMB:3120 & BMB:3130 Biochemistry and Molecular Biology I-II (both of these) 6
CHEM:1110 & CHEM:1120 Principles of Chemistry I-II 8

One of these sequences:

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

One of these:

MATH:1460 Calculus for the Biological Sciences (preferred) 4
MATH:1550 Engineering Mathematics I: Single Variable Calculus 4
MATH:1850 Calculus I 4

Introductory Courses

Course # Title Hours
Both of these:
BIOL:1411 Foundations of Biology 4
PSY:2701 Introduction to Behavioral Neuroscience 4

Core Courses

Course # Title Hours
All of these:
BIOL:3253 Neurobiology I 4
BIOL:3254 Neurobiology II 4
PSY:2811-PSY:2812 Research Methods and Data Analysis in Psychology I-II 6
PSY:2975 Introduction to Cognitive Neuroscience 3

Laboratory Course

Course # Title Hours
One of these:
BIOL:3245 Animal Behavior Laboratory 4
BIOL:3655 Neurogenetics Laboratory 4
BIOL:3656 Neurobiology Laboratory 4
PSY:4025 Laboratory in Cognitive Neuroscience 4
PSY:4035 Laboratory in Computational Neuroscience 4

Neuroscience Electives

Course # Title Hours
A minimum of four courses (12 s.h.) from these:
BIOL:1412 Diversity of Form and Function 4
BIOL:2254 Endocrinology 3
BIOL:2512 Fundamental Genetics 4
BIOL:2723 Cell Biology 3
BIOL:3244 Animal Behavior 3
BIOL:3343 Animal Physiology 3
BIOL:4333 Genes and Development 3
PCOL:3101 Pharmacology I: A Drug's Fantastic Journey 3
PHIL:3510 Neuroethics 3
PSY:3035 Science of Emotion 3
PSY:3040 Psychology of Learning 3
PSY:3055 Interdisciplinary Science of Sound and Hearing 3
PSY:3060 Sensation and Perception 3
PSY:3075 The Damaged Brain 3
PSY:3250 Neuroscience of Learning and Memory 3
PSY:3265 Cognitive and Clinical Neuroscience of Executive Functions 3
PSY:3270 Neurobiology of Stress 3
PSY:3275 The Science of Sleep 3
PSY:3360 The Psychosis Spectrum 3
PSY:3575 Social Cognition in Autism 3
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.

## 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 grade-point average (GPA) and a UI GPA 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 Office of Undergraduate Research (OUR) 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 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,
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
<th>Credits</th>
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<tbody>
<tr>
<td>BIOL:1411</td>
<td>Foundations of Biology</td>
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<tr>
<td>CHEM:1120</td>
<td>Principles of Chemistry II</td>
<td>4</td>
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<td>RHET:1030 or ENGL:1200</td>
<td>Rhetoric or The Interpretation of Literature</td>
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<td>MATH:1460</td>
<td>Calculus for the Biological Sciences</td>
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<td>PSY:2811</td>
<td>Research Methods and Data Analysis in Psychology I</td>
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<td>PSY:2975</td>
<td>Introduction to Cognitive Neuroscience</td>
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<td>PHYS:1511</td>
<td>College Physics I</td>
<td>4</td>
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<td>GE CLAS Core: World Languages First Level Proficiency or elective course</td>
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<td>PSY:2812</td>
<td>Research Methods and Data Analysis in Psychology II</td>
<td>3</td>
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<tr>
<td>BMB:3120 or BMB:3110</td>
<td>Biochemistry and Molecular Biology I or Biochemistry</td>
<td>3</td>
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<td>PHYS:1512</td>
<td>College Physics II</td>
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<tr>
<td>BIOL:3253</td>
<td>Neurobiology I</td>
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<tr>
<td>BMB:3130</td>
<td>Biochemistry and Molecular Biology II</td>
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<td>BIOL:3254</td>
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<td>GE CLAS Core: World Languages Fourth Level Proficiency or elective course</td>
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<td>BIOL:1600</td>
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<td>Hours</td>
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<td><strong>16-17</strong></td>
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**Second Year**

**Fall**
- PSY:2811: Research Methods and Data Analysis in Psychology I
- PSY:2975: Introduction to Cognitive Neuroscience
- PHYS:1511: College Physics I
- GE CLAS Core: World Languages First Level Proficiency or elective course

**Hours**: **15-16**

**Spring**
- PSY:2812: Research Methods and Data Analysis in Psychology II
- BMB:3120 or BMB:3110: Biochemistry and Molecular Biology I or Biochemistry
- PHYS:1512: College Physics II
- GE CLAS Core: World Languages Second Level Proficiency or elective course

**Hours**: **14-15**

**Third Year**

**Fall**
- BIOL:3253: Neurobiology I
- BMB:3130: Biochemistry and Molecular Biology II
- Major: neuroscience elective I
- GE CLAS Core: World Languages Third Level Proficiency or elective course

**Hours**: **14-16**

**Spring**
- BIOL:3254: Neurobiology II
- Major: neuroscience elective II
- GE CLAS Core: Diversity and Inclusion
- GE CLAS Core: World Languages Fourth Level Proficiency or elective course

**Hours**: **14-16**

**Fourth Year**

**Fall**
- Major: neuroscience elective III
- Major: neuroscience lab course
- GE CLAS Core: International and Global Issues
- GE CLAS Core: Values and Culture

**Hours**: **13-14**

**Spring**
- Major: neuroscience elective IV
- GE CLAS Core: Historical Perspectives
- GE CLAS Core: Literary, Visual, and Performing Arts

**Hours**: **3**

**Elective course**: **3**

**Degree Application**: apply on MyUI before deadline (typically in February for spring, September for fall)

**Hours**: **12-13**

**Total Hours**: **112-122**

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**Notes**
- a Sustainability must be completed by choosing a course that has been approved for Sustainability AND for one of these General Education areas: Natural Sciences; Quantitative and Formal Reasoning; Social Sciences; Historical Perspectives; International and Global Issues; Literary, Visual, and Performing Arts; or Values and Culture.
- b 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.
- c Enrollment in chemistry courses requires completion of a placement exam.
- d Enrollment in math courses requires completion of a placement exam.
- e Students who have completed four levels of a single language or two levels of two different languages in high school or college have satisfied the GE CLAS Core World Languages requirement. Students who have completed three levels of a single language may complete a fourth-level course in the same language or may choose an approved World Language and Cultural Exploration course. Enrollment in world languages courses requires a placement exam, unless enrolling in a first-semester-level course. Contact your academic advisor or CLAS Undergraduate Programs Office with questions concerning the World Languages requirement.
- f If BMB:3120 is taken, students will also have to complete BMB:3130 to meet this requirement.
- g See General Catalog for a list of courses.
- h 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.
- i 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.
- j 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 Degree Services.