

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;
- 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 must also 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.

In planning coursework, students should be guided by the College of Liberal Arts and Sciences maximum hours rule: students earning a BS may apply a maximum of 56 s.h. earned in one department to the minimum 120 s.h. required for graduation, whether or not the coursework is accepted toward requirements for the major; students who earn more than 56 s.h. from one department may use the additional semester hours to satisfy requirements for the major (if the department accepts them), and the grades they earn become part of their grade-point average, but they cannot apply the additional semester hours to the minimum 120 s.h. required for graduation.

The BS with a major in neuroscience requires the following coursework.

Requirements	Hours
Cognate Requirements	20
Introductory Courses	8
Core Courses	17
Laboratory Course	4
Neuroscience Electives	15

Cognate Requirements

Course #	Title	Hours
This sequence:		
CHEM:1110 & CHEM:1120	Principles of Chemistry I and Principles of Chemistry II	8
One of these sequences:		
PHYS:1511 & PHYS:1512	College Physics I and College Physics II (preferred)	8

PHYS:1611 & PHYS:1612	Introductory Physics I and Introductory Physics II	8
One of these:		
MATH:1460	Calculus for the Biological Sciences (preferred)	4
MATH:1550	Engineering Calculus I	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 and Research Methods and Data Analysis in Psychology 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 five courses (15 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:4123	Cell Biology of the Nervous System	3
BIOL:4333	Genes and Development	3
CHEM:2210	Organic Chemistry I	3
PCOL:3101	Pharmacology I: A Drug's Fantastic Journey	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:3275	The Science of Sleep	3
PSY:3360	The Psychosis Spectrum	3
PSY:3575	Social Cognition in Autism	3
PSY:4090	Psychology Seminar (when topic is social cognitive neuroscience or learning and decision making)	3
May include one of these:		
BIOL:3999/ PSY:3999	Independent Research in Neuroscience	3
BIOL:4995/ PSY:4995	Honors Research in Neuroscience	3
May include one of these:		
PCOL:3102	Pharmacology II: Mechanisms of Drug Action	3
PSY:3230	Psychopharmacology	3
May include one of these:		
BMB:3110	Biochemistry	3
BMB:3120	Biochemistry and Molecular Biology I	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 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 a neuroscience laboratory in either Biology or Psychological and Brain Sciences or 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 both semesters.
- 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. This proposal should be 2-3 pages, double-spaced.
- 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. The final thesis should be no longer than 10 pages, double-spaced, excluding any figures or references. This must be turned in by the last Friday of regular classes during that semester.
- An oral presentation of the honors research findings during the student's final semester.

Honors students are also 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 alert their academic advisor as early as possible, preferably during their sophomore or junior year. In case there are questions about the steps towards honors in the major that are not answered here, students should email the director of the major, Dr. Jan Wessel, at jan-wessel@uiowa.edu.

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, attend medical school, or enter other health-related programs such as a physician's assistant program, public health, or nursing. Graduates will also 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.

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 third semester begins: BIOL:1411 Foundations of Biology, CHEM:1110 Principles of Chemistry I, CHEM:1120 Principles of Chemistry II, MATH:1460 Calculus for the Biological Sciences (can also be taken during the third semester) or MATH:1550 Engineering Calculus I or MATH:1850 Calculus I, and PSY:2701 Introduction to Behavioral Neuroscience.

Before the fifth semester begins: PHYS:1511 College Physics I or PHYS:1611 Introductory Physics I, PSY:2811 Research Methods and Data Analysis in Psychology I, PSY:2812 Research Methods and Data Analysis in Psychology II, and PSY:2975 Introduction to Cognitive Neuroscience.

Before the seventh semester begins: one of the five approved laboratory courses and PHYS:1512 College Physics II or PHYS:1612 Introductory Physics II.

Before the eighth semester begins: BIOL:3253 Neurobiology I and three required neuroscience electives.

During the eighth semester: BIOL:3254 Neurobiology II, remaining required neuroscience electives, 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.

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Course	Title	Hours
Academic Career		
Any Semester		
GE CLAS Core: Sustainability ^a		
Hours		0
First Year		
Fall		
PSY:1001	Elementary Psychology ^b	3
PSY:2701	Introduction to Behavioral Neuroscience	4
CHEM:1110	Principles of Chemistry I ^c	4
ENGL:1200 or RHET:1030	Interpreting Literature or Rhetoric: Writing and Communication	3 - 4
CSI:1600	Success at Iowa	1
Hours		15-16
Spring		
BIOL:1411	Foundations of Biology	4
CHEM:1120	Principles of Chemistry II	4
RHET:1030 or ENGL:1200	Rhetoric: Writing and Communication or Interpreting Literature	3 - 4
GE CLAS Core: Values and Society ^d		3
Hours		14-15
Second Year		
Fall		
PSY:2811	Research Methods and Data Analysis in Psychology I	3
PSY:2975	Introduction to Cognitive Neuroscience	3
MATH:1460	Calculus for the Biological Sciences ^e	4
GE CLAS Core: World Languages First Level Proficiency or elective course ^f		4 - 5
Hours		14-15
Spring		
PHYS:1511	College Physics I	4
PSY:2812	Research Methods and Data Analysis in Psychology II	3
Major Elective: neuroscience elective ^g		3 - 4
GE CLAS Core: World Languages Second Level Proficiency or elective course ^f		4 - 5

Elective course ^h	3
Hours	17-19

Third Year

PHYS:1512	College Physics II	4
Major Elective: neuroscience elective ^g		3 - 4
GE CLAS Core: Historical Perspectives ^d		3
GE CLAS Core: World Languages Third Level Proficiency or elective course ^f		4 - 5
Elective course ^h		3
Hours		17-19

Spring

Major Elective: neuroscience lab course ^g		4
Major Elective: neuroscience elective ^g		3 - 4
GE CLAS Core: Understanding Cultural Perspectives ^d		3
GE CLAS Core: World Languages Fourth Level Proficiency or elective course ^f		4 - 5
Hours		14-16

Fourth Year

Fall		
BIOL:3253	Neurobiology I	4
Major Elective: neuroscience elective ^g		3 - 4
Major Elective: neuroscience elective ^g		3 - 4
GE CLAS Core: International and Global Issues ^d		3
Elective course ^h		3
Hours		16-18

Spring

BIOL:3254	Neurobiology II	4
Major Elective: neuroscience elective ^g		3 - 4
Major Elective: neuroscience elective ^g		3 - 4
GE CLAS Core: Literary, Visual, and Performing Arts ^d		3
Elective course ^h		3
Degree Application: apply on MyUI before deadline (typically in February for spring, September for fall) ⁱ		
Hours		16-18

Total Hours	123-136
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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 or Formal Reasoning; Social Sciences; Historical Perspectives; International and Global Issues; Literary, Visual, and Performing Arts; or Values and Society.

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 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.

e Enrollment in math courses requires completion of a placement exam.

f 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.

g See General Catalog for a list of courses.

h Students may use elective courses to earn credit toward the total s.h. required for graduation or to complete a double major, minors, or certificates.

i Please see Academic Calendar, on 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.