

# Neuroscience (BA/BS)

Neuroscience is for undergraduate students interested in studying the relationship between the brain and behavior. Coursework is jointly taught by biology, human physiology and psychology faculty to provide well-rounded training. Foundational courses are in biology, chemistry, human physiology, math, physics, and psychology. Upper division coursework focuses on three main areas of neuroscience: molecular/cellular neuroscience, systems neuroscience, and cognitive neuroscience. Students can also take advanced skills courses in programming or computational techniques. They may also conduct cutting-edge research in a neuroscience lab.

Neuroscience graduates will have a strong understanding of the structure and function of the nervous system, demonstrate critical thinking, quantitative and analytical skills, and communicate effectively about neuroscience research.

## Program Learning Outcomes

Upon successful completion of this program, students will be able to:

- Demonstrate broad-based content knowledge and understanding of terminology and concepts in neuroscience at multiple levels of organization.
- Critically read and evaluate scientific information.
- Apply data analysis skills to understand neuroscience information.
- Communicate clearly and effectively about neuroscience information.

## Neuroscience Major

As outlined below, the Neuroscience majors consists of the following components: 1) foundation courses in the natural sciences; 2) math and statistics coursework; 3) life science fundamentals; 4) a core neuroscience sequence; 5) upper-division elective courses; and 6) advanced skills courses and/or research experience. The total number of credits is 104-107 (depending on whether majors complete the General Biology Sequence or the Biology Honors Sequence).

Code	Title	Credits
<b>Foundation Courses in Natural Sciences:</b>		<b>46-49</b>
BI 211 & BI 212 & BI 214	General Biology I: Cells and General Biology II: Organisms and General Biology IV: Biochemistry and Genetics	
or BI 281H & BI 282H & BI 283H	Honors Biology I: Cells, Biochemistry and Physiology and Honors Biology II: Genetics and Molecular Biology and Honors Biology III: Evolution, Diversity and Ecology	
CH 221 & CH 222 & CH 223	General Chemistry I and General Chemistry II and General Chemistry III	
or CH 224H & CH 225H & CH 226H	Advanced General Chemistry I and Advanced General Chemistry II and Advanced General Chemistry III	
PHYS 201 & PHYS 202 & PHYS 203	General Physics and General Physics and General Physics	

or PHYS 251 Foundations of Physics I  
& PHYS 252 and Foundations of Physics I  
& PHYS 253 and Foundations of Physics I

CH 227 General Chemistry Laboratory  
& CH 228 and General Chemistry Laboratory  
& CH 229 and General Chemistry Laboratory  
or PHYS 204 Introductory Physics Laboratory  
& PHYS 205 and Introductory Physics Laboratory  
& PHYS 206 and Introductory Physics Laboratory

PSY 201 Mind and Brain

### Math and Statistics Courses: 8

MATH 246 Calculus for the Biological Sciences I  
or MATH 25 Calculus I

PSY 302 Statistical Methods in Psychology  
or MATH 425 Statistical Methods I  
or ANTH 470 Statistical Analysis of Biological Anthropology

### Life Science Fundamentals: 8

HPHY 211 Medical Terminology

HPHY 212 Scientific Investigation in Physiology

### Core Neuroscience: Sequence order is recommended but not required 18

HPHY 321 Human Anatomy I  
& HPHY 322 and Human Physiology I (Fall)

PSY 304 Biopsychology (Winter)

BI 360 Neurobiology (Spring)

### Upper Division Electives: 1 16

Molecular/Cellular/Developmental

BI 320 Molecular Genetics

BI 322 Cell Biology

BI 328 Developmental Biology

BI 356 Animal Physiology

BI 422 Protein Toxins in Cell Biology

BI 427 Molecular Genetics of Human Disease

BI 466 Developmental Neurobiology

HPHY 432 Neural Development

Systems

BI 353 Sensory Physiology

BI 399 Special Studies: [Topic]

BI 410 Experimental Course: [Topic]

BI 461 Systems Neuroscience

HPHY 333 Motor Control

HPHY 412 Sleep Physiology

HPHY 433 Neurophysiology of Concussion

HPHY 434 Movement Disorders

HPHY 436 Clinical Neuroscience

PSY 445 Brain Mechanisms of Behavior

PSY 450 Hormones and Behavior

Cognitive

BI 410 Experimental Course: [Topic] (Neural Basis of Cognition)

PSY 305 Cognition

PSY 348 Music and the Brain

PSY 383 Psychoactive Drugs

PSY 433 Learning and Memory

PSY 436	Human Performance
PSY 438	Perception
PSY 449	Cognitive Neuroscience
PSY 458	Decision-Making
PSY 475	Cognitive Development
<b>Advanced Skills Courses and Research Experience</b>	<b>8</b>
BI 401	Research: [Topic]
BI 403	Thesis
BI 407	Seminar: [Topic]
BI 410	Experimental Course: [Topic] (Introduction to Programming for Biologists)
BI 410	Experimental Course: [Topic] (Matlab for Biologists)
BI 410	Experimental Course: [Topic] (Analysis Neural Data)
BI 485	
CS 472	Machine Learning
HPHY 401	Research: [Topic]
HPHY 403	Thesis
PSY 401	Research: [Topic]
PSY 403	Thesis
PSY 412	Applied Data Analysis
<b>Total Credits</b>	<b>104-107</b>

<sup>1</sup> 16 required credits with at least 12 credits from 400-level courses; at least one course from each of the three area

### Additional Requirements

- All courses counted towards the Neuroscience Major requirements must be taken for a letter grade and passed with a grade of C or better.
- At least 34 credits of coursework applied to the major must be taken at the University of Oregon.

### Criteria for Honors

To graduate with Honors in Neuroscience, the following requirements must be met:

1. A completed Neuroscience Honors application with signature of a faculty research advisor from BI, HPHY or PSY
2. Completion of all Neuroscience major requirements
3. A minimum 3.5 GPA in all courses applied to the major
4. At least three credits in BI 403, HPHY 403, or PSY 403 Thesis (*These credits may be applied to the advanced skills courses and research experience requirement*).
5. Completion of an honors thesis under supervision of a committee, consisting of one BI, HPHY, or PSY faculty member and at least one other committee member (Ph.D. student, postdoctoral scholar, or faculty) from BI, HPHY, or PSY.

### Four-Year Degree Plan

The degree plan shown is only a sample of how students may complete their degrees in four years. There are alternative ways. Students should consult their advisor to determine the best path for them.

### Neuroscience Bachelor of Arts

Course	Title	Credits	Milestones
<b>First Year</b>			
<b>Fall</b>			
CH 111	Introduction to Chemical Principles	4	
MATH 111Z	Precalculus I: Functions	4	
WR 121Z	Composition I	4	
Language 101		4	
		<b>Credits</b>	<b>16</b>
<b>Winter</b>			
CH 221	General Chemistry I	4	
CH 227	General Chemistry Laboratory	2	
MATH 112Z	Precalculus II: Trigonometry	4	
WR 123	College Composition III	4	
Language 102		4	
		<b>Credits</b>	<b>18</b>
<b>Spring</b>			
CH 222	General Chemistry II	4	
CH 228	General Chemistry Laboratory	2	
MATH 246	Calculus for the Biological Sciences I	4	
Language 103		4	
		<b>Credits</b>	<b>14</b>
<b>Second Year</b>			
<b>Fall</b>			
BI 211	General Biology I: Cells	5	
CH 223	General Chemistry III	4	
CH 229	General Chemistry Laboratory	2	
HPHY 211	Medical Terminology	3	
Language 201		4	
		<b>Credits</b>	<b>18</b>
<b>Winter</b>			
BI 212	General Biology II: Organisms	5	
HPHY 212	Scientific Investigation in Physiology	4	
PSY 201	Mind and Brain	4	
Language 202		4	
		<b>Credits</b>	<b>17</b>
<b>Spring</b>			
BI 214	General Biology IV: Biochemistry and Genetics	5	
PSY 302	Statistical Methods in Psychology	4	
Core education course		4	
Language 203		4	
		<b>Credits</b>	<b>17</b>
<b>Third Year</b>			
<b>Fall</b>			
HPHY 321	Human Anatomy I	5	
HPHY 322	Human Physiology I	5	
PHYS 201	General Physics	4	

BI 401	Research: [Topic]	2
or	or Research: [Topic]	
HPHY 401	or Research: [Topic]	
or		
PSY 401		

**Credits** **16**

**Winter**

PSY 304	Biopsychology	4
PHYS 202	General Physics	4
Core education course		4
BI 401	Research: [Topic]	2
or	or Research: [Topic]	
HPHY 401	or Research: [Topic]	
or		
PSY 401		

**Credits** **14**

**Spring**

BI 360	Neurobiology	4
PHYS 203	General Physics	4
Core education course		4
BI 401	Research: [Topic]	2
or	or Research: [Topic]	
HPHY 401	or Research: [Topic]	
or		
PSY 401		

**Credits** **14**

**Fourth Year****Fall**

Upper-division NEURO elective		4
Core education course		4
Core education course		4
BI 401	Research: [Topic]	2
or	or Research: [Topic]	
HPHY 401	or Research: [Topic]	
or		
PSY 401		

**Credits** **14**

**Winter**

Upper-division NEURO elective		4
Upper-division NEURO elective		4
Core education course		4
Elective course		1

**Credits** **13**

**Spring**

Upper-division NEURO elective		4
Core education course		4
Core education course		4

**Credits** **12**

**Total Credits** **183**

**Neuroscience Bachelor of Science**

Course	Title	Credits	Milestones
<b>First Year</b>			
<b>Fall</b>			
CH 111	Introduction to Chemical Principles	4	
MATH 111Z	Precalculus I: Functions	4	
WR 121Z	Composition I	4	
Core education course		4	
<b>Credits</b>		<b>16</b>	
<b>Winter</b>			
CH 221	General Chemistry I	4	
CH 227	General Chemistry Laboratory	2	
MATH 112Z	Precalculus II: Trigonometry	4	
WR 123	College Composition III	4	
<b>Credits</b>		<b>14</b>	
<b>Spring</b>			
CH 222	General Chemistry II	4	
CH 228	General Chemistry Laboratory	2	
MATH 246	Calculus for the Biological Sciences I	4	
PSY 201	Mind and Brain	4	
Elective course		1	
<b>Credits</b>		<b>15</b>	
<b>Second Year</b>			
<b>Fall</b>			
BI 211	General Biology I: Cells	5	
CH 223	General Chemistry III	4	
CH 229	General Chemistry Laboratory	2	
HPHY 211	Medical Terminology	3	
<b>Credits</b>		<b>14</b>	
<b>Winter</b>			
BI 212	General Biology II: Organisms	5	
HPHY 212	Scientific Investigation in Physiology	4	
Core education course		4	
Core education course		4	
<b>Credits</b>		<b>17</b>	
<b>Spring</b>			
BI 214	General Biology IV: Biochemistry and Genetics	5	
PSY 302	Statistical Methods in Psychology	4	
Core education course		4	
Elective or Cultural Literacy course		4	
<b>Credits</b>		<b>17</b>	
<b>Third Year</b>			
<b>Fall</b>			
HPHY 321	Human Anatomy I	5	
HPHY 322	Human Physiology I	5	
PHYS 201	General Physics	4	

BI 401	Research: [Topic]	2
or	or Research: [Topic]	
HPHY 401	or Research: [Topic]	
or		
PSY 401		
<b>Credits</b>		<b>16</b>
<b>Winter</b>		
PSY 304	Biopsychology	4
PHYS 202	General Physics	4
Core education course		4
BI 401	Research: [Topic]	2
or	or Research: [Topic]	
HPHY 401	or Research: [Topic]	
or		
PSY 401		
Elective course		1
<b>Credits</b>		<b>15</b>
<b>Spring</b>		
BI 360	Neurobiology	4
PHYS 203	General Physics	4
Core education course		4
BI 401	Research: [Topic]	2
or	or Research: [Topic]	
HPHY 401	or Research: [Topic]	
or		
PSY 401		
<b>Credits</b>		<b>14</b>
<b>Fourth Year</b>		
<b>Fall</b>		
Upper-division NEURO elective		4
Upper-division NEURO elective		4
Core education course		4
BI 401	Research: [Topic]	2
or	or Research: [Topic]	
HPHY 401	or Research: [Topic]	
or		
PSY 401		
<b>Credits</b>		<b>14</b>
<b>Winter</b>		
Upper-division NEURO elective		4
Upper-division NEURO elective		4
Core education course		4
Elective or Cultural Literacy course		4
<b>Credits</b>		<b>16</b>
<b>Spring</b>		
Upper-division NEURO elective		4
Elective courses		9
<b>Credits</b>		<b>13</b>
<b>Total Credits</b>		<b>181</b>