

# NEUROSCIENCE

**Department Website: Neuroscience** (<https://www-stage.gonzaga.edu/college-of-arts-sciences/departments/neuroscience/>)

Neuroscience is the study of the nervous system, encompassing aspects of biology, psychology, chemistry, physics and medicine to understand the complex mechanisms that underlie behavior, cognition, and disease. To prepare students for neuroscience-oriented careers in fields such as medicine, research, biotechnology, neuropsychology, and education, we offer a curriculum that integrates theoretical knowledge with practical experiences. Through rigorous coursework and hands-on laboratory training, students develop a deep understanding of neural function, from molecular and cellular levels to systems and behavior.

Students earning a Neuroscience degree at Gonzaga obtain:

- A comprehensive liberal arts education (through the university core curriculum)
- A foundational understanding of neuroscience principles (through core neuroscience courses)
- Interdisciplinary knowledge supporting neuroscience research (including courses in biology, chemistry, physics, human physiology, and psychology)
- The opportunity to explore specialized topics in depth through upper-division electives
- Practical skills and research experience, preparing them for graduate or professional programs, careers in healthcare, laboratory research, or combining their scientific training with other fields such as law, business, or the arts

## Neuroscience (BS) Major Program Requirements

Code	Title	Hours
<b>Lower Division</b>		
BIOL 105	Information Flow in Biological Systems	3
BIOL 105L	Information Flow in Biological Systems Lab	1
BIOL 106	Energy Flow in Biological Systems	3
BIOL 207 & 207L	Genetics and Genetics Lab	4
NEUR 201	Introduction to Neuroscience	3
CHEM 101 & 101L	General Chemistry I and General Chemistry I Lab	4
CHEM 230 & 230L	Organic Chemistry I and Organic Chemistry Lab I	4
PSYC 101	General Psychology	3
Select one of the following:		5
PHYS 111 & 111L	General Physics I and General Physics I Lab	
PHYS 121 & 121L	Physics I and Physics I Lab	
Select one of the following:		5
PHYS 112 & 112L	General Physics II and General Physics II Lab	
PHYS 122 & 122L	Physics II and Physics II Lab	
Select one of the following:		3

PSYC 202	Statistics for Psychology	
MATH 121	Introductory Statistics	
MATH 221	Applied Statistics	
HPHY 205	Experimental Design and Statistics	3

### Upper Division

NEUR 399	Scientific Communications	3
NEUR 499	Neuroscience and Society	3
BIOL 376	Cellular Neurophysiology	3
HPHY 451	Systems Neurophysiology	3
HPHY 453	Neuroanatomy	3

Choose at least nine credits from any of these courses in any combination from any area. Additional courses may count toward elective credits upon permission from the Neuroscience Director. Note: Some of these courses have prerequisites that are not required by the Neuroscience major and must be fulfilled before registration.

<b>Cellular and Molecular</b>		
BIOL 331	Parasitology	
BIOL 335	Advanced Genetics:	
BIOL 337	Developmental Biology	
BIOL 341 & 341L	Human Physiology and Human Physiology Lab	
BIOL 351	Advanced Cell Biology	
BIOL 370 & 370L	Microbiology and Microbiology Lab	
BIOL 371 & 371L	Vertebrate Biology and Anatomy and Vertebrate Biology and Anatomy Lab	
BIOL 374	Immunology	
BIOL 375	Virology	
BIOL 441	Advanced Physiology	
BIOL 451 & 451L	Comparative Endocrinology and Comparative Endocrinology Lab	
BIOL 456 & 456L	Molecular Biology and Molecular Biology Lab	
CHEM 307 & 307L	Biochemistry I and Biochemistry I Lab	
HPHY 402	Clinical Exercise Physiology	
HPHY 376 & 376L	Exercise Physiology and Exercise Physiology Lab	
HPHY 452	Neuromuscular Control	
HPHY 478	Physiology of Aging	
HPHY 479	Cell and Molecular Physiology	
HPHY 485	Biomedical Engineering	
<b>Philosophical</b>		
PHIL 406	Philosophy of Mind	
PHIL 437	Philosophy of Time	
PHIL 478	Philosophy of Technology	
<b>Computational</b>		
BIOL 305	Biological Data Analysis	
CPSC 436	Biomedical Informatics and Computing	
CPSC 475	Speech and Natural Language Processing	
PHYS 456	Biophysical Systems and Modeling	
PSYC 450	Advanced Statistics in Psychology	
<b>Behavioral</b>		
BIOL 313	Animal Behavior	

PSYC 305	Sensation and Perception
PSYC 310	Cognition
PSYC 315	Learning
PSYC 390	Psychopathology
PSYC 395	Clinical Neuropsychology
PSYC 364	Abnormal Child Psychology
Neuroscience	
NEUR 304-498	
<b>Total Hours</b>	<b>65</b>

## Courses

### NEUR 201. Introduction to Neuroscience. (3 Credits)

This course provides a comprehensive introduction to the field of neuroscience, covering topics such as the structure and function of the nervous system, neural signaling and communication, sensory and motor systems, learning and memory, and neurological disorders. Students will also learn about research in neuroscience and the methods used to study the brain.

**Prerequisites:** BIOL 105 with a minimum grade of D and BIOL 105L with a minimum grade of D and CHEM 101 with a minimum grade of D and CHEM 101L with a minimum grade of D

Enrollment is limited to students with a program in Neuroscience.

### NEUR 304. Teaching Assistance. (1 Credit)

**May be repeated for credit.**

students gain teaching experience by assisting instructors as a teaching assistant (TA) in a lecture or laboratory course. Duties may include laboratory/class set-up, in-class mentoring, grading, and quiz preparation. May be repeated. A maximum of two credits may be applied to Neuroscience electives. Usually limited to students who have earned an A or Bin the lecture portion of the course for which the student is to TA. A maximum of six credits of any combination of NEUR 304, NEUR 490, NEUR 497, and NEUR 498 can be applied to Neuroscience electives. Fall and spring. By permission only. Fall and Spring.

**Prerequisites:** NEUR 201 with a minimum grade of C-  
Enrollment limited to students with a semester level of Fourth Year (96+ credits) or Third Year (60-95.99 credits).

### NEUR 380. Special Topics. (3-4 Credits)

**May be repeated for credit.**

Theory, research or application topics to be determined by faculty. This course may be repeated as long as the content is different than other occurrences of enrollment.

**Prerequisites:** NEUR 201 with a minimum grade of C-

### NEUR 395. Research Assistantship. (0 Credits)

**May be repeated for credit.**

Undergraduate research assistantships are opportunities for students to earn a stipend while performing independent research in the laboratory of a Neuroscience faculty member.

### NEUR 399. Scientific Communications. (3 Credits)

This course focuses on developing effective scientific communication skills within the field of neuroscience. Through critical analysis of primary literature, class discussions, and presentations, students will learn to communicate scientific ideas clearly and effectively. Additionally, students will develop skills in scientific writing and learn to prepare research articles, grant proposals, and other scientific documents.

**Prerequisites:** NEUR 201 with a minimum grade of D  
Enrollment limited to students with a semester level of Fourth Year (96+ credits) or Third Year (60-95.99 credits).

Enrollment is limited to students with a program in Neuroscience.

### NEUR 480. Advanced Special Topics. (3-4 Credits)

**May be repeated for credit.**

Advanced theory, research or application topic to be determined by faculty. This course may be repeated as long as the content is different than other occurrences of enrollment.

**Prerequisites:** NEUR 201 with a minimum grade of C-

### NEUR 490. Directed Research. (1-3 Credits)

**May be repeated for credit.**

Reading material will be selected by the student after consultation with a faculty member in the program. May be repeated. A maximum of three credits may be applied to Neuroscience electives. A maximum of six credits of any combination of NEUR 304, NEUR 490, NEUR 497, and NEUR 498 can be applied to Neuroscience electives. By permission only. Fall and Spring.

**Prerequisites:** NEUR 201 with a minimum grade of C-

### NEUR 497. Neuroscience Internship. (1-3 Credits)

**May be repeated for credit.**

Professional work experience in a neuroscience-related field (i.e. Neurology offices, sleep centers, neuropsychology clinics, etc.). Students are responsible for arranging placement opportunities, and gaining approval from the Neuroscience Program Director. May be repeated. A maximum of two credits may be applied to Neuroscience electives. A maximum of six credits of any combination of NEUR 304, NEUR 490, NEUR 497, and NEUR 498 can be applied to Neuroscience electives. By permission only. Fall and Spring.

**Prerequisites:** NEUR 201 with a minimum grade of C-

### NEUR 498. Undergraduate Research. (1-3 Credits)

**May be repeated for credit.**

This course provides the motivated student with the opportunity to conduct an independent Neuroscience research project under the direction of a faculty member. May be repeated. A maximum of six credits may be applied to Neuroscience electives. A maximum of six credits of any combination of NEUR 304, NEUR 490, NEUR 497, and NEUR 498 can be applied to Neuroscience electives. By permission only. Fall and Spring.

**Prerequisites:** NEUR 201 with a minimum grade of C-

**NEUR 499. Neuroscience and Society. (3 Credits)**

In this senior capstone course, students will critically examine the intersection of neuroscience and society. Through readings, discussions, and presentations, students will explore how scientific advances in neuroscience impact and shape our understanding of everyday life. Students will integrate knowledge from their neuroscience major and liberal arts core to develop a comprehensive understanding of the societal implications of neuroscience research.

**Prerequisites:** NEUR 201 with a minimum grade of D

Enrollment limited to students with a semester level of Fourth Year (96+ credits).

Enrollment is limited to students with a program in Neuroscience.