NEUROSCIENCE MAJOR

Interdisciplinary Major

The Neuroscience major at Washington College reflects the interdisciplinary nature of the field of neuroscience by integrating the fields of biology, chemistry and psychology to promote a deeper understanding of the brain and its emergent properties. Students will explore the brain at the level of molecules and electrical signals and will extend that knowledge to the networks that create behaviors, memories, and consciousness. They will also apply their knowledge through hands-on laboratory activities in most courses for the major. Courses that deal with the underlying chemical, biochemical, and physiological principles that dictate how neurons function are housed in the Physical Properties of the Nervous System category. Courses that focus on how the networks of neurons in central nervous systems combine to produce behavior, emotions, and self-awareness are housed in the Emergent Properties of the Nervous System category.

NEU SCE Senior Capstone Experience 2 Credits
The culmination of the academic experience, the Neuroscience SCE provides an opportunity to deeply explore a Neuroscience research topic. In consultation with a faculty mentor, a process of active inquiry is facilitated requiring critical thinking, integration of acquired knowledge and skills, and mastery of intellectual accomplishment beyond the classroom. A theoretical review of a problem/question in the field or a data-driven research project is completed. Students are advised by a Biology, Chemistry, or Psychology faculty member. Students are assigned a SCE faculty advisor. Seniors present the results of the project in a poster session open to the College community. The SCE has guidelines that are distributed to both junior and senior Neuroscience majors each Fall. Students must enroll in Neuroscience SCE their final semester. Graded A-F.
Term(s) Offered: All Terms, All Years

NEU 294 Special Topics 2 Credits
View Available Sections for titles and descriptions of Special Topics offered this semester.
Term(s) Offered: All Terms, All Years

NEU 295 On-Campus Guided Research 2 Credits
Term(s) Offered: All Terms, All Years

NEU 300 Neuroscience Junior Seminar 2 Credits
Neuroscience majors should take this seminar course in the spring of their junior year. The course is designed to prepare students for their senior capstone experiences by practicing foundational skills such as searching and critically evaluating primary literature, and developing a proposal for their senior project. This course may also include exploration of career opportunities and professional preparation for post-college careers. If NEU 300 is not offered, Neuroscience majors may substitute a junior seminar for one of the three contributing disciplines to the major: BIO 392, CHE 392, or PSY 399. If students take a substitute junior seminar, they will be matched with an SCE advisor within that discipline and must follow that discipline's guidelines for completing their Senior Capstone Experience.

NEU 394 Special Topics 2 Credits
View Available Sections for titles and descriptions of Special Topics offered this semester.
Term(s) Offered: All Terms, All Years

NEU 395 On-Campus Guided Research 2 Credits
Term(s) Offered: All Terms, All Years

NEU 397 Neurology Independent Study 4 Credits
An agreement between a sponsoring faculty and a student letting the student study a topic of interest not offered at WC. 45 hours are required per credit.
Term(s) Offered: All Terms, All Years

Neuroscience Major Requirements

The B.S. in Neuroscience major requires six introductory courses, one core course, six advanced courses (two each in biology, chemistry, and psychology), one quantitative course, and a Neuroscience Senior Capstone Experience for a total of 60 credits. Majors must also complete a Junior Seminar approved by the program director.

Code	Title	Credits	Notes
Introductory courses [1]		**24**	_____
Students are required to take all six courses. Students are also encouraged to take 2 semesters of introductory physics if they intend to pursue a post-bachelor's degree.			_____
BIO 111 & BIO 113	General Biology I with Lab and General Biology I Lab		_____
BIO 112 & BIO 114	General Biology II with Lab and General Biology II Lab		_____

CHE 120 & CHE 122	Chem Principles Org Molecules with Lab and Chemical Principals Orgnc Molecules Lab		_____
CHE 140 & CHE 142	Reactions of Organic Molecules with Lab and Reactions of Organic Molecules Lab		_____
PSY 111	General Psychology		_____
PSY 112	General Psychology		_____
Students must take one of these.		**4**	_____
BIO 311	Neurobiology with Lab		_____
PSY 210	Biopsychology with Lab		_____
Select 6 Advanced Courses From Below [2]		**24**	_____
The courses must be from three different departments; at least two courses must be from each category; and at least four courses must be at-or-above the 300 level.			_____
Physical Properties of the Nervous System			_____
BIO 205	Cell & Molecular Biology with Lab		_____
BIO 209	Genetics with Lab		_____
BIO 301	Integrative Human Anatomy with Lab		_____
BIO 302	Developmental Biology with Lab		_____
BIO 350	Introduction to Toxicology with Lab [4]		_____
BIO 394	Special Topics		_____
BIO 424	Integrative Human Physiology with Lab		_____
CHE 220	Quantitative Chemical Analysis with Lab		_____
CHE 303	Chem of Biological Compounds with Lab		_____
CHE 309/BIO 409	Biochemistry with Lab [4]		_____
CHE 320	Introduction to Medicinal Chemistry		_____
NEU 294	Special Topics		_____
or NEU 394	Special Topics		_____
NEU 295	On-Campus Guided Research		_____
or NEU 395	On-Campus Guided Research		_____
Emergent Properties of the Nervous System			_____
BIO 328	Behavioral Ecology with Lab		_____
PSY 233	Traditional Psychiatric Disorders		_____
or PSY 234	Medical and Developmental Disorders		_____
PSY 305	Psychopharmacology with Lab		_____
PSY 313	Learning & Appl Behavioral Anal. w/ Lab		_____
PSY 316	Cognitive Neuroscience with Lab		_____
PSY 317	Princ of Sensation & Perception w/ Lab		_____
PSY 410	Neuroscience Research Methods w/ Lab		_____
NEU 294	Special Topics		_____
or NEU 394	Special Topics		_____
NEU 295	On-Campus Guided Research		_____
or NEU 395	On-Campus Guided Research		_____
Select a Quantitative Courses From Below [3]		**4**	_____

MAT 109	Statistical Inference & Data Analysis I		_____
PSY 209	Statistics & Research Design I with Lab		_____
Junior Seminar		**0-2**	_____
NEU 300	Neuroscience Junior Seminar (2 credits)		_____
or BIO 392	Biology Junior Seminar		_____
or CHE 392	Junior Seminar		_____
or PSY 399	Junior Seminar		_____
Senior Capstone Experience (NEU SCE)		**2-4**	_____
Total Credits		**58-62**	_____

1 Students are required to take all six courses. Students are encouraged to take 2 semesters of Introductory Physics if they intend to pursue a graduate degree.

2 The courses must be from three different departments; at least two courses must be from each category; and at least four courses must be at-or-above the 300 level.

3 Students are also encouraged to take PSY 309 Statistics & Research Design II With Lab.

4 BIO 205 Cell & Molecular Biology with Lab is a pre-requisite.

Course Recommendations

Science students are highly encouraged to take Computer Science (CSI) courses to augment their undergraduate education. Especially recommended are a basic computing course such as CSI 100 Basics of Computing CSI 100 Basics of Computing , and valuable foundational courses such as CSI 111 Computer Science I CSI 111 Computer Science I and CSI 220 Data Science CSI 220 Data Science. Students interested in applying to graduate neuroscience programs, medical, health science, or veterinary schools should choose CHE 220 Quantitative Chemical Analysis with Lab CHE 220 Quantitatve Chemical Analysis with Lab and CHE 309 Biochemistry with Lab CHE 309 Biochemistry with Lab/BIO 409 Biochemistry with Lab as two of their electives within the Neuroscience major and should also take Calculus and General Physics courses. Students interested in such programs should consult with the Pre-Med advisor and their Neuroscience major advisor.

College-wide Writing Program

Students must complete the college-wide writing distribution requirement. Currently, this is accomplished through successful completion of four courses. The W1 course can be fulfilled through a First Year Seminar (FYS 101 First-Year Seminar). The W2 requirement can be fulfilled through General Biology II (BIO 112 General Biology II with Lab). The W3 requirement can be fulfilled through a selection of designated courses offered by the departments of biology, chemistry, and psychology such as Integrative Human Physiology (BIO 424 Integrative Human Physiology with Lab), or Statistics and Research Design II (PSY 309 Statistics & Research Design II With Lab). The W4 requirement is fulfilled through successful completion of a Senior Capstone Experience (NEU SCE Senior Capstone Experience).

Internship and Research Opportunities

Neuroscience majors are strongly encouraged to participate in internships during their undergraduate education. These experiences afford students the opportunity to enhance their understanding of neuroscience concepts, gain additional laboratory experience, and/or network with other scientists and professionals. Internships may be located on or off-campus and may occur at any point during the academic year. Students wishing to earn course credit for an internship must gain approval from the Neuroscience program director prior to beginning the internship. Several stipend-bearing internships and research opportunities exist for neuroscience majors. Summer on-campus research projects as well as summer and semester-long off-campus internships not only provide additional laboratory experience, but also allow students the opportunity to explore areas of neuroscience not covered in-depth by the core curriculum. Off-campus and on- campus internships may or may not bear credit.

Advanced Placement Credit

Students should consult either the Biology, Chemistry, or Psychology Department catalog section to determine if Advanced Placement or IB credit will transfer.

Transfer Credit

Students are instructed to consult either the Biology, Chemistry, or Psychology Department catalog section to determine the policy on transfer credit.

Neuroscience Major Four-Year Plan

First Year

Fall	Credits	Spring	Credits
BIO 111 & BIO 113	4	BIO 311	4
CHE 120 (CHE 122)	4	CHE 140 & CHE 142	4
PSY 111	4	PSY 112	4
FYS 101	4	General Ed Course	4
	16		**16**

Second Year

Fall	Credits	Spring	Credits
BIO, CHE, NEU Physical Properties	4	BIO, NEU, PSY Emergent Prop. Elec.	4
MAT 109	4	General Ed Course	4
General Ed Course	4	General Ed Course	4
General Ed Course	4	Elective Course	4
	16		**16**

Third Year

Fall	Credits	Spring	Credits
BIO, CHE, NEU Physical Properties Elective	4	BIO, NEU, PSY Emergent Prop. Elec.	4
BIO 311 or PSY 210	4	General Ed Course	4
General Ed Course	4	General Ed Course	4
Elective Course	4	Elective Course	4
	16		**16**

Fourth Year

Fall	Credits	Spring	Credits
BIO, CHE, NEU Physical Properties Elective	4	BIO, CHE, NEU Physical Prop. Elec.	4
Elective Course	4	Elective Course	4
Elective Course	4	Elective Course	4
Elective Course	4	NEU SCE	4
	16		**16**

Total Credits 128

Mala Misra, Director

Biology Faculty Members
Aaron Krochmal
Jennie Rinehimer

Chemistry Faculty Members
Jeremy Bard, Advisory Board Member
Leslie Sherman

Psychology Faculty Members
Cindy Gibson, Advisory Board Member (Spring 2025)
Daniel Kochli, Interim Advisory Board Member (Fall 2024)
Audrey Weil

Major

- Biochemistry and Molecular Biology Major (https://catalog.washcoll.edu/catalog/interdisciplinary/biochemistry-molecular-biology-major/)
- Biology Major (https://catalog.washcoll.edu/catalog/departments-programs/biology/biology-major/)
- Chemistry ACS-certified Major (https://catalog.washcoll.edu/catalog/departments-programs/chemistry/chemistry-acs-certified-major/)
- Chemistry Non-ACS certified Major (https://catalog.washcoll.edu/catalog/departments-programs/chemistry/chemistry-non-acs-certified-major/)
- Psychology (Experimental) Major (https://catalog.washcoll.edu/catalog/departments-programs/psychology/experimental-psychology-major/)
- Psychology Major, Behavioral Neuroscience Concentration (https://catalog.washcoll.edu/catalog/departments-programs/psychology/psychology-behavioral-neuroscience-concentration-major/)
- Psychology Major, Clinical/Counseling Concentration (https://catalog.washcoll.edu/catalog/departments-programs/psychology/psychology-clinical-counseling-concentration-major/)

Minor

- Biology Minor (https://catalog.washcoll.edu/catalog/departments-programs/biology/biology-minor/)
- Chemistry Minor (https://catalog.washcoll.edu/catalog/departments-programs/chemistry/chemistry-minor/)
- Psychology Minor (https://catalog.washcoll.edu/catalog/departments-programs/psychology/psychology-minor/)