NEUROSCIENCE

Program Description

The scientific community has been and continues to be fascinated by the prospect of unlocking the intricacies of the brain. Explorations in neuroscience often lead to questions about a human's personality, emotions, senses, diseases, or even the ability to develop artificial intelligence. There are currently many more questions than answers in this area. Neuroscience is an interdisciplinary field that has its foundation within psychology and biology, but incorporates concepts across many disciplines such as art, music, philosophy, chemistry, physics, and math to explore how our most complex organ, the brain, works.

The Neuroscience program will provide students with a foundation in Neuroscience that will allow her to formulate questions and interpret current findings about the brain. The minor in Neuroscience is a chance for students to explore the field by integrating coursework and laboratory experiments across different disciplines.

Study Abroad

Saint Mary's has a long history of providing quality international programs as an essential part of our educational mission—forming women leaders who will make a difference in the world. As this world becomes increasingly interdependent, the College offers an expanding range of semester, year, semester break, and summer study and service programs in a wide variety of countries, and encourages students to take advantage of them. Learn more about the various Study Abroad opportunities (https://catalog.saintmarys.edu/undergraduate/academic-life/international-programs/).

Programs

- Neuroscience, Bachelor of Arts - Concentration in Cognitive Science - NECS (https://catalog.saintmarys.edu/undergraduate/programs/neuroscience/cognitive-science-bachelor-arts/)
- Neuroscience, Bachelor of Science - Concentration in Neurobiology - NENB (https://catalog.saintmarys.edu/undergraduate/programs/neuroscience/neurobiology-bachelor-science/)
- Neuroscience, Bachelor of Science - Concentration in Neuropsychology - NENP (https://catalog.saintmarys.edu/undergraduate/programs/neuroscience/neuropsychology-bachelor-science/)
- Neuroscience, Minor - NEUR (https://catalog.saintmarys.edu/undergraduate/programs/neuroscience/neuroscience-minor/)

Department Chair

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Faculty

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Student Learning Outcomes

Neuroscience majors will be able to:

- demonstrate familiarity with core concepts in neuroscience.
- demonstrate in depth understanding of cellular/systems of neuroscience and behavioral/cognitive areas of neuroscience.
- demonstrate conceptual understanding and procedural knowledge of techniques commonly used in neuroscience, while working cooperatively.
- demonstrate an understanding of scientific methodology and experimental design. knows how to find relevant scientific literature. understands what constitutes good evidence in neuroscience. Able to read and interpret primary scientific articles.
- communicate scientific data to peers and instructor.
- integrate and apply the core concepts of neuroscience to other related disciplines.

Neuroscience Courses

NEUR 185 First-Year Seminar: I like brains (1)
The purpose of this course will be to provide you with a survey of concepts, principles, and theories of neuroscience, to introduce you to the breadth of the field as well as to the ways in which neuroscience can be 'connected' with many other fields of study. It is thus designed to help you understand this inherently interdisciplinary field. During the course of the semester we will discuss some of the sub-disciplines within neuroscience (e.g. molecular, cellular, cognitive, and behavioral points of view), research in neuroscience happening on-campus, how neuroscience relates to other disciplines (such as biology, physics, psychology, and the arts). We will also discuss the major as a whole, including course requirements, opportunities available outside of the classroom, and the different trajectories that you might pursue within the major.

NEUR 335 Developmental Neurobiology (3)
Developmental Neurobiology will explore the processes involved in the development of the mature nervous system that is responsible for regulating the physiology and cognition of an entire organism. We will explore how just a few cells in a zygote differentiate, migrate and connect to form a highly organized regulatory system. We will specifically study how neurons develop in an embryo including determination, targeting, cell death and the formation of connections (synapses).

NEUR 385 Neuroscience Research Seminar (2)
The junior seminar in Neuroscience provides an opportunity for students and faculty to examine the latest research in Neuroscience. Each student will work with the instructor to choose a primary research article and accompanying review article to formally present to her classmates. All of the presentations will fit the themes of the year, but students are encouraged to find papers that interest them and fit with their particular concentration. Each week one student will provide a ~25 minute presentation of her research article with the appropriate background material. The other students in the class, having read the research and review article prior to class, will come to class prepared to discuss and critique the research being presented. One student will be assigned as the primary reviewer to help encourage discussion. This seminar format provides students the opportunity to perform three important components of science education: the reading, the oral presentation and the critique of primary research literature. Prerequisite: BIO 235 and PSYC 234.

NEUR 485 Neuroscience-Senior Research (3)
This course is designed specifically for Neuroscience majors of senior standing to complete their individual senior comprehensive project. Students will have an opportunity to design, run, and analyze a research project under direct supervision of a faculty member. Students will read and analyze literature pertinent to their project and present their work in written and oral formats. Prerequisite: NEUR 385.

NEUR 499 Internship (1-3)

Four Year Plans in Neuroscience

Students who major in Neuroscience at Saint Mary's College can choose from three different programs:

- Bachelor of Arts in Cognitive Science Concentration, Neuroscience (p. 2)
- Bachelor of Science in Neurobiology Concentration, Neuroscience (p. 3)
- Bachelor of Science in Neuropsychology Concentration, Neuroscience (p. 4)

The sample Four-Year Plans are presented below.

Cognitive Science Concentration, Neuroscience, Bachelor of Arts

We recommended the W be completed in Philosophy 110W. However, PHIL110W is not required, and students can take a W course in any discipline.

Major: There is a lot of flexibility in when students take their required supporting courses. For example, PSYC 324 could be taken in Fall of the Junior year or the Fall of Sophomore Year, and PSYC 364 and the Lab could be taken in the sophomore through senior years. It is definitely possible to take the Neuroscience major/Cognitive Science concentration in the sophomore year, as there are a lot of courses to choose from within the required electives, thus giving this concentration some flexibility.

Study abroad: We recommend study abroad in the spring of sophomore year or fall of junior year. This will allow students to be present for NEUR 385 junior seminar (spring semester).

Course	Title	Credits
First Year		
First Semester		
Gen Ed Language I (3 cr)		
BIO 155 & BIO 156	Foundations of Molecular Biology and Foundations of Ecology and Evolution	4
PSYC 156 or PSYC 157	Introduction to Psychology: Culture and Systems or Introduction to Psychology: Science for the Citizen	3
AVE 101	College in Practice	1
MATH 104	Finite Mathematics	3
Elective (1 - 3 cr)		
	Credits	**11**
Second Semester		
Gen Ed Language II (3 cr)		
BIO 157 & BIO 158	Foundations of Cellular Biology and Foundations of Form and Function	4
General Education Course (3cr)		
NEUR 185	First-Year Seminar: I like brains	1
PHIL 110	Introductory Philosophy (or PHIL 110W)	3
Elective (1 - 3 cr)		
	Credits	**8**
Second Year		
First Semester		
PSYC 234 & 234L	Neuropsychology and Neuropsychology Laboratory	4
CPSC 207	Computer Programming	3
NEUR Elective 1 (3 - 4 cr.)		3
General Education Course (3cr)		
General Education Course (3cr)		
	Credits	**10**
Second Semester		
General Education Course (3cr)		
NEUR Elective 2 (3 - 4 cr.)		3
BIO 235 & 235L	Foundations of Neuroscience and Foundations of Neuroscience Laboratory	4
Elective (3 cr.)		
Elective (3 cr.)		
	Credits	**7**
Third Year		
First Semester		
PSYC 324	Statistics in Psychology	3
NEUR Elective 3 (3 - 4 cr.)		3
General Education Course (3cr)		
Elective (3 cr.)		
Elective (3 cr.)		
	Credits	**6**
Second Semester		
NEUR 385	Neuroscience Research Seminar	2
NEUR Elective 4 (3 - 4 cr.)		3
General Education Course (3cr)		
Elective (3 cr.)		
Elective (3 cr.)		
	Credits	**5**
Fourth Year		
First Semester		
NEUR 485	Neuroscience-Senior Research	3
NEUR Elective 5 (3 - 4 credits)		3
Elective (3 cr.)		
Elective (3 cr.)		
	Credits	**6**
Second Semester		
Elective one course from biology or psychology concentration that is not represented in the core(3 cr.)		3
Elective (3 cr.)		
Elective (3 cr.)		
Elective (3 cr.)		
	Credits	**3**
	Total Credits	**56**

Neurobiology Concentration, Neuroscience, Bachelor of Science

We have recommended a W course for the fall of sophomore year, specifically Philosophy 110W, but PHIL110W is not required. Students can take a W course in any discipline. However, if students do not place into Calculus there is more flexibility in the schedule for taking a W in the first year.

Major: There is flexibility in when students take their required supporting courses. Calculus could be taken in the first or second year. General Chemistry could be taken in the first year or second year and Physics in the third or fourth year. Although it is possible to begin a Neuroscience major with a Neurobiology Concentration in the sophomore year, it may be difficult to complete without a summer course. Just as the case in the Neuropsychology Concentration, the courses are sequenced and have prerequisites, which adds to the complication of starting the major in the sophomore year. However, if a student begins as a psychology, biology, chemistry, or physics major and switches to the Neurobiology Concentration in their sophomore year, they could likely finish without a summer course.

Study abroad: We recommend study abroad in the spring of sophomore year or fall of junior year. This will allow students to be present for NEUR 385 junior seminar (spring semester). Study abroad may disrupt the math, physics and/or general chemistry sequences. Students will need to plan accordingly and take a summer course or complete the sequence over two years instead of one.

Course	Title	Credits
First Year		
First Semester		
Gen Ed I (3 cr)		
MATH 131 or MATH 113	Calculus I or Survey of Calculus	4
BIO 155 & BIO 156	Foundations of Molecular Biology and Foundations of Ecology and Evolution	4
CHEM 121 & 121L	Principles of Chemistry I and Principles of Chemistry I Laboratory	4
AVE 101	College in Practice	1
	Credits	**13**
Second Semester		
Gen Ed Language II (3 cr)		
MATH 132 or MATH 214	Calculus II or Introduction to Statistics	4
BIO 157 & BIO 158	Foundations of Cellular Biology and Foundations of Form and Function	4
CHEM 122 & 122L	Principles of Chemistry II and Principles of Chemistry II Laboratory	4
NEUR 185	First-Year Seminar: I like brains	1
	Credits	**13**
Second Year		
First Semester		
PSYC 156 or PSYC 157	Introduction to Psychology: Culture and Systems or Introduction to Psychology: Science for the Citizen	3
BIO 221 & 221L	Introduction to Genetics and Introduction to Genetics Laboratory	4
CHEM 221 & 221L	Organic Chemistry I and Organic Chemistry I Laboratory	4
Gen Ed W (4 cr)		
	Credits	**11**
Second Semester		
BIO 235 & 235L	Foundations of Neuroscience and Foundations of Neuroscience Laboratory	4
Neuroscience connections (3 cr)		3
General Education Course (3cr)		
General Education Course (3cr)		
General Education Course (3cr)		
	Credits	**7**
Third Year		
First Semester		
PSYC 234 & 234L	Neuropsychology and Neuropsychology Laboratory	4
PHYS 111 & 111L	College Physics I: Mechanics and College Physics I Laboratory	4
Elective A (3 cr)		3
General Education Course (3cr)		
General Education Course (3cr)		
	Credits	**11**
Second Semester		
NEUR 385	Neuroscience Research Seminar	2
PHYS 112 & 112L	College Physics II: Waves, Temperature, and Electricity and College Physics II Lab	4
Elective B (3 or 4 cr)		3
General Education Course (3cr)		
Elective		3
	Credits	**12**
Fourth Year		
First Semester		
NEUR 485	Neuroscience-Senior Research	3
General Education Course (3cr)		
Elective (3-4 cr)		
Elective (3-4 cr)		
Elective (3-4 cr)		
	Credits	**3**
Second Semester		
Elective (3-4 cr)		
Elective (3-4 cr)		
Elective (3-4 cr)		
General Education Course (3cr)		
General Education Course (3cr)		
	Credits	**0**
	Total Credits	**70**

Neuropsychology Concentration, Neuroscience, Bachelor of Science

We recommended the W be completed in Philosophy 110W, however, PHIL110W is not required, and students can take a W course in any discipline.

Major: There is flexibility in when students take their required supporting courses. For example, calculus could be taken in the first or second year, general Chemistry could be taken in the first year or second year, and Physics in the third or fourth year. Although it is possible to begin a Neuroscience major with a Neuropsychology Concentration in the sophomore year, it may be difficult to complete without a summer course. Just as the case in biology, the courses are sequenced and have prerequisites, which adds to the complication of starting the major in the sophomore year. However, if a student began as a psychology, biology, chemistry, or physics major and switches to Neuroscience in their sophomore year, they are likely to finish without a summer course.

Study abroad: We recommend study abroad in the spring of sophomore year or fall of junior year. This will allow students to be present for NEUR 385 junior seminar (spring semester). Study abroad will likely disrupt the math, physics and/or general chemistry sequences, so students will need to plan accordingly and take a summer course or complete the sequence over two years instead of one.

Course	Title	Credits
First Year		
First Semester		
Gen Ed Language I (3cr)		
BIO 155 & BIO 156	Foundations of Molecular Biology and Foundations of Ecology and Evolution	4
PSYC 156 or PSYC 157	Introduction to Psychology: Culture and Systems or Introduction to Psychology: Science for the Citizen	3
AVE 101	College in Practice	1
MATH 131 or MATH 113	Calculus I or Survey of Calculus	4
Elective (1 - 3 cr)		
	Credits	**12**
Second Semester		
Gen Ed Language II (3cr)		
Gen Ed W (4cr)		
BIO 157 & BIO 158	Foundations of Cellular Biology and Foundations of Form and Function	4
NEUR 185	First-Year Seminar: I like brains	1
General Education Course (3cr)		
Elective (1 - 2 cr)		
	Credits	**5**
Second Year		
First Semester		
PSYC 234 & 234L	Neuropsychology and Neuropsychology Laboratory	4
BIO 228 & 228L	General Physiology and General Physiology Lab	4
CHEM 121	Principles of Chemistry I	4
NEUR Connection (3 - 4 cr)		3
	Credits	**15**
Second Semester		
General Education Course (3cr)		
NEUR Elective A (3 - 4 cr)		3
CHEM 122 & 122L	Principles of Chemistry II and Principles of Chemistry II Laboratory	4
BIO 235 & 235L	Foundations of Neuroscience and Foundations of Neuroscience Laboratory	4
Elective (3 cr)		
	Credits	**11**
Third Year		
First Semester		
General Education Course (3cr)		
PSYC 324	Statistics in Psychology	3
PHYS 111 & 111L	College Physics I: Mechanics and College Physics I Laboratory	4
CHEM 221 & 221L	Organic Chemistry I and Organic Chemistry I Laboratory	4
Elective (3 cr)		
	Credits	**11**
Second Semester		
General Education Course (3cr)		
NEUR 385	Neuroscience Research Seminar	2
PHYS 112 & 112L	College Physics II: Waves, Temperature, and Electricity and College Physics II Lab	4
NEUR Elective B (4 cr)		3
General Education Course (3cr)		
	Credits	**9**
Fourth Year		
First Semester		
NEUR 485	Neuroscience-Senior Research	3
NEUR Elective C (3 - 4 cr.)		3
General Education Course (3cr)		
General Education Course (3cr)		
Elective (3 cr.)		
	Credits	**6**
Second Semester		
General Education Course (3cr)		
General Education Course (3cr)		
Elective (3 or 4 cr.)		
Elective (3 or 4 cr.)		
Elective (3 or 4 cr.)		
	Credits	**0**
	Total Credits	**69**