

# NEUROSCIENCE, B.S.

Neuroscience is an interdisciplinary field of study that employs the tools and perspectives of biology, psychology, chemistry, physics, mathematics, philosophy and medicine to achieve a better understanding of brain structure, function and behavior.

A degree in neuroscience places students in an excellent position to address the basic science of brain function, along with a myriad of possibilities for applications within medicine, science and industry. Saint Louis University's neuroscience major offers courses that further the understanding of psychiatric, neurological and developmental disorders, with a goal toward the development of innovative treatment options through basic and applied research.

Neuroscience is an appropriate major for students planning to continue their postgraduate education in neuroscience or related professional fields.

Additional program highlights include:

- SLU provides a genuinely interdisciplinary degree in neuroscience.
- Neuroscience is a growing field, with new initiatives aimed at the development of innovative technologies to foster a better understanding of brain function.
- SLU's neuroscience program offers a rigorous and interdisciplinary curriculum with an emphasis in pre-professional training.

## Leadership

Tony W. Buchanan, Ph.D.

*Co-Director*

Judith M. Ogilvie, Ph.D.

*Co-Director*

## Curriculum Overview

Courses in SLU's neuroscience major include lectures, seminars and laboratory experiences. The curriculum includes four core neuroscience courses: Introduction to Neuroscience: Molecular, Cellular and Systemic, Introduction to Neuroscience: Behavioral and Cognitive, a neuroscience lab course and a senior seminar.

Additionally, students are required to take related courses from the biology department and from the psychology department as well as courses in chemistry, physics, mathematics and philosophy. Students must also complete SLU's College of Arts and Sciences core requirements.

Neuroscience students are required to complete a capstone learning experience, consisting of several options including research, practica or advanced coursework, all of which are designed to give students exposure to the breadth of the field of neuroscience and the potential for understanding its applications in the real world.

## Fieldwork and Research Opportunities

The neuroscience program features opportunities for internships through existing collaborations with the biology and psychology departments.

## Careers

Graduates have a strong outlook for future employment and will be able to find work in industries such as medicine, veterinary medicine,

pharmaceuticals, biotechnology, education, computer science and artificial intelligence.

An undergraduate degree in neuroscience provides a solid base for students interested in attending graduate school, medical school, or working in fields related to psychology, biology, chemistry, physics, biomedical engineering, law, medicine or philosophy.

## Admission Requirements

### Freshman

Begin your application for this program at [www.slu.edu/apply](http://www.slu.edu/apply). Saint Louis University also accepts the Common App.

All applications are thoroughly reviewed with the highest degree of individual care and consideration to all credentials that are submitted. Solid academic performance in college preparatory course work is a primary concern in reviewing a freshman applicant's file. College admission test scores (ACT or SAT) are used as an additional indicator of the student's ability to meet the academic rigors of Saint Louis University and are used as qualifiers for certain University scholarship programs. To be considered for admission to any Saint Louis University undergraduate program, the applicant must be graduating from an accredited high school or have an acceptable score on the General Education Development (GED) test.

Begin Your Application (<http://www.slu.edu/apply.php>)

### Transfer

Begin your application for this program at [www.slu.edu/apply](http://www.slu.edu/apply).

Applicants must be a graduate of an accredited high school or have an acceptable score on the GED. An official high school transcript and official test scores are required only of those students who have attempted fewer than 24 transferable semester credits (or 30 quarter credits) of college credit. Those having completed 24 or more of college credit need only submit a transcript from previously attended college(s). In reviewing a transfer applicant's file, the office of admission holistically examines the student's academic performance in college-level coursework as an indicator of the student's ability to meet the academic rigors of Saint Louis University.

### International Applicants

Begin your application for this program at [www.slu.edu/apply](http://www.slu.edu/apply).

All admission policies and requirements for domestic students apply to international students along with the following:

- Demonstrate English Language Proficiency (<http://catalog.slu.edu/academic-policies/office-admission/undergraduate/english-language-proficiency>)
- Proof of financial support must include:
  - A letter of financial support from the person(s) or sponsoring agency funding the time at Saint Louis University
  - A letter from the sponsor's bank verifying that the funds are available and will be so for the duration of study at the University
- Academic records, in English translation, of students who have undertaken postsecondary studies outside the United States must include the courses taken and/or lectures attended, practical laboratory work, the maximum and minimum grades attainable, the grades earned or the results of all end-of-term examinations, and any honors or degrees received. WES and ECE transcripts are accepted.

## Scholarships and Financial Aid

There are two principal ways to help finance a Saint Louis University education:

- Scholarships: awarded based on academic achievement, service, leadership and financial need.
- Financial Aid: provided in the form of grants and loans, some of which require repayment.

For priority consideration for merit-based scholarships, applicants should apply for admission by Dec. 1 and complete a Free Application for Federal Student Aid (FAFSA) by March 1.

For information on other scholarships and financial aid, visit the student financial services office online at <https://finaid.slu.edu>.

## Learning Outcomes

1. Graduates will be able to identify core concepts of neuroscience.
2. Graduates will be able to synthesize information to formulate hypotheses, design experiments and engage in scientific research.
3. Graduates will be able to communicate neuroscientific information in a clear, reasoned manner, both verbally and in writing.
4. Graduates will have the foundation to successfully pursue post baccalaureate education and/or professional career.

## Requirements

Neuroscience students must complete a minimum total of **73 credit hours** for the major.

Code	Title	Credits
College core requirements (p. 3)		54-63
For additional information about core courses ( <a href="http://catalog.slu.edu/colleges-schools/arts-sciences/#coretext">http://catalog.slu.edu/colleges-schools/arts-sciences/#coretext</a> )		
<b>Required Courses in Neuroscience</b>		
NEUR 3400	Introduction to Neuroscience 1: Cellular, Molecular and Systemic	3
NEUR 3500	Introduction to Neuroscience 2: Cognitive and Behavioral	3
NEUR 3550	Neuroscience Laboratory	1
NEUR 4900	Neuroscience Seminar	3
<b>Required Courses in Biology</b>		
BIOL 1240 & BIOL 1245	Principles of Biology I and Principles of Biology I Laboratory	4
BIOL 1260 & BIOL 1265	Principles of Biology II and Principles of Biology II Laboratory	4
BIOL 3020	Biochemistry and Molecular Biology	3
BIOL 3040	Cell Structure & Function	3
<b>Required Courses in Psychology</b>		
PSY 1010	General Psychology	3
PSY 2050	Foundations of Research Methods and Statistics	4
PSY 3100	Brain, Mind & Society	3
<b>Neuroscience Electives Courses</b>		19
Students will take 19 credits of electives including a minimum of 7 credits from Biology, 6 credits from Psychology, and one lab course. Courses that meet these requirements are listed under Biology and Psychology Elective Courses.		

### Required Courses in Chemistry

CHEM 1110 & CHEM 1115	General Chemistry 1 and General Chemistry 1 Laboratory	4
CHEM 1120 & CHEM 1125	General Chemistry 2 and General Chemistry 2 Laboratory	4

### Required Courses in Mathematics

MATH 1510	Calculus I	4
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### Required Course in Philosophy

PHIL 4280	Biology and Mind	3
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### Required Course in Physics

PHYS 1310 & PHYS 1320	Physics I and Physics I Laboratory	4
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### Capstone/Inquiry/Honors Project

1-3

All neuroscience majors must complete a capstone or equivalent project (e.g., Psychology Capstone course, Biology Senior Inquiry, Honors Thesis, etc.). The rationale for this requirement is to provide the opportunity to integrate coursework with an active learning experience, such as research. Courses that meet this requirement are listed under Capstone/Inquiry/Honors Project List courses.

Total Credits 127-138

## Biology Elective Courses

Students must take one lab course

Code	Title	Credits
BIOL 3010	Evolutionary Biology	
BIOL 3030	Principles of Genetics	
BIOL 3060	Cell Structure & Function Laboratory <sup>1</sup>	
BIOL 3100	Experiments in Genetics Lab <sup>1</sup>	
BIOL 3420	Comparative Anatomy of the Vertebrates <sup>1</sup>	
BIOL 3470	General Physiology Laboratory <sup>1</sup>	
BIOL 3480	Exercise Physiology	
BIOL 4010	Sex, Evolution, and Behavior	
BIOL 4030	Introduction to Genomics	
BIOL 4050	Molecular Technique Lab <sup>1</sup>	
BIOL 4070	Advanced Biological Chemistry	
BIOL 4080	Advanced Cell Biology	
BIOL 4150	Nerve Cell Mechanisms in Behavior	
BIOL 4250	Neurobiology of Disease	
BIOL 4360 & BIOL 4370	Animal Behavior and Animal Behavior Lab <sup>1</sup>	
BIOL 4410	Comparative Animal Physiology	
BIOL 4440	Vertebrate Histology: Structure and Function of Tissues <sup>1</sup>	
BIOL 4500	Introductory Endocrinology	
BIOL 4510	Behavioral Endocrinology	
BIOL 4520	Biochemical Pharmacology	
BIOL 4540	Human Systemic Physiology	
BIOL 4600 & BIOL 4610	Developmental Biology and Developmental Biology Lab <sup>1</sup>	
BIOL 4630	Foundations of Immunobiology	
BIOL 4700	Molecular Biology	

<sup>1</sup> Lab Course

### Psychology Elective Courses

Code	Title	Credits
PSY 3120	Cognitive Psychology	
PSY 3160	Learning & Memory	
PSY 3210	Developmental Psych: Child	
PSY 3230	Developmental Psychology: Adolescence	
PSY 3300	Social Psychology	
PSY 3310	Personality Theory	
PSY 4140	Psychopharmacology	
PSY 4150	Science of Sleep	
PSY 4350	Health Psychology	
PSY 4390	Abnormal Psychology	

### Capstone/Inquiry/Honors Project Courses

Code	Title	Credits
BIOL 4890	Senior Inquiry: Comprehensive Examination	
BIOL 4970	Library Project	
BIOL 4980	Advanced Independent Study	
PSY 4960	Advanced Research Methodology and Statistics	
PSY 4965	Capstone Practicum Project	
PSY 4967	Capstone Research Project	
PSY 4969	Critical Thinking about Psych	

### Pre-Professional Health

Students taking a pre-professional health curriculum will be required to complete additional course requirements for medical or other professional schools as outlined by the Pre-Professional Health Studies Program.

### Non-Course Requirements

All majors are required to participate in first-year mentoring.

### Continuation Standards

Students must have a minimum of a 3.0 GPA in the following required major courses by the conclusion of two semesters at Saint Louis University:

Code	Title	Credits
PSY 1010	General Psychology	
BIOL 1240 & BIOL 1245	Principles of Biology I and Principles of Biology I Laboratory	
BIOL 1260 & BIOL 1265	Principles of Biology II and Principles of Biology II Laboratory	
CHEM 1110 & CHEM 1115	General Chemistry 1 and General Chemistry 1 Laboratory	
CHEM 1120 & CHEM 1125	General Chemistry 2 and General Chemistry 2 Laboratory	

Students that fall below a 3.00 GPA will be placed on program probation. In order to continue as a neuroscience major after four semesters at Saint Louis University, students must obtain at least a 3.00 GPA in the following required major courses:

Code	Title	Credits
PSY 1010	General Psychology	
PSY 2050	Foundations of Research Methods and Statistics	

BIOL 1240 & BIOL 1245	Principles of Biology I and Principles of Biology I Laboratory
BIOL 1260 & BIOL 1265	Principles of Biology II and Principles of Biology II Laboratory
BIOL 3020	Biochemistry and Molecular Biology
BIOL 3040	Cell Structure & Function
CHEM 1110 & CHEM 1115	General Chemistry 1 and General Chemistry 1 Laboratory
CHEM 1120 & CHEM 1125	General Chemistry 2 and General Chemistry 2 Laboratory
NEUR 3400	Introduction to Neuroscience 1: Cellular, Molecular and Systemic

Transfer students will be assessed on a case-by-case basis.

### Bachelor of Science Core Curriculum Requirements

Code	Title	Credits
<b>Core Components and Credits</b>		
	Foundations of Discourse ( <a href="http://catalog.slu.edu/colleges-schools/arts-sciences/bs-core/foundations-discourse">http://catalog.slu.edu/colleges-schools/arts-sciences/bs-core/foundations-discourse</a> )	3
	Diversity in the U.S. ( <a href="http://catalog.slu.edu/colleges-schools/arts-sciences/bs-core/cultural-diversity">http://catalog.slu.edu/colleges-schools/arts-sciences/bs-core/cultural-diversity</a> )	3
	Global Citizenship ( <a href="http://catalog.slu.edu/colleges-schools/arts-sciences/bs-core/global-citizenship">http://catalog.slu.edu/colleges-schools/arts-sciences/bs-core/global-citizenship</a> )	3
	Foreign Language ( <a href="http://catalog.slu.edu/colleges-schools/arts-sciences/bs-core/foreign-language">http://catalog.slu.edu/colleges-schools/arts-sciences/bs-core/foreign-language</a> )	0-9
	Fine Arts ( <a href="http://catalog.slu.edu/colleges-schools/arts-sciences/bs-core/fine-arts">http://catalog.slu.edu/colleges-schools/arts-sciences/bs-core/fine-arts</a> )	3
	Literature ( <a href="http://catalog.slu.edu/colleges-schools/arts-sciences/bs-core/literature">http://catalog.slu.edu/colleges-schools/arts-sciences/bs-core/literature</a> )	6
	Mathematics ( <a href="http://catalog.slu.edu/colleges-schools/arts-sciences/bs-core/mathematics">http://catalog.slu.edu/colleges-schools/arts-sciences/bs-core/mathematics</a> )	4
	Science ( <a href="http://catalog.slu.edu/colleges-schools/arts-sciences/bs-core/sciences">http://catalog.slu.edu/colleges-schools/arts-sciences/bs-core/sciences</a> )	8
	Philosophy ( <a href="http://catalog.slu.edu/colleges-schools/arts-sciences/bs-core/philosophy">http://catalog.slu.edu/colleges-schools/arts-sciences/bs-core/philosophy</a> )	6
	Social Science ( <a href="http://catalog.slu.edu/colleges-schools/arts-sciences/bs-core/social-science">http://catalog.slu.edu/colleges-schools/arts-sciences/bs-core/social-science</a> )	6
	Theology ( <a href="http://catalog.slu.edu/colleges-schools/arts-sciences/bs-core/theology">http://catalog.slu.edu/colleges-schools/arts-sciences/bs-core/theology</a> )	6
	World History ( <a href="http://catalog.slu.edu/colleges-schools/arts-sciences/bs-core/world-history">http://catalog.slu.edu/colleges-schools/arts-sciences/bs-core/world-history</a> )	6
Total Credits		54-63

### Graduation Requirements

- Complete a minimum of 120 credits (excluding pre-college level courses [numbered below 1000]).
- Complete either the College of Arts and Sciences Bachelor of Arts or Bachelor of Science Core Curriculum Requirements
- Complete Major Requirements: minimum 30 credits required.
- Complete remaining credits with a second major, minor, certificate, and/or elective credits to reach the minimum of 120 credits required for graduation.
- Achieve at least a 2.00 cumulative grade point average, a 2.00 grade point average in the major(s) and a 2.00 grade point average in the minor/certificate, or related elective credits.

- Complete Dept/Program specific academic and performance requirements.
- Complete at least 50% of the coursework for the major and 75% for the minor/certificate through Saint Louis University or an approved study abroad program.
- Complete 30 of the final 36 credits through Saint Louis University or an approved study abroad program.
- Complete an online degree application by the required University deadline.

## Roadmap

Roadmaps are recommended semester-by-semester plans of study for programs and assume full-time enrollment unless otherwise noted.

Courses and milestones designated as critical (marked with !) must be completed in the semester listed to ensure a timely graduation. Transfer credit may change the roadmap.

This roadmap should not be used in the place of regular academic advising appointments. All students are encouraged to meet with their advisor/mentor each semester. Requirements, course availability and sequencing are subject to change.

### Traditional Track

Course	Title	Credits
<b>Year One</b>		
<b>Fall</b>		
!PSY 1010	General Psychology	3
! BIOL 1240 & BIOL 1245	Principles of Biology I and Principles of Biology I Laboratory	4
! CHEM 1110 & CHEM 1115	General Chemistry 1 and General Chemistry 1 Laboratory	4
UNIV 1010	Enhancing First-Year Success	1
A&S Core		3
Credits		15
<b>Spring</b>		
Participation in First-Year Mentoring Events		
! BIOL 1260 & BIOL 1265	Principles of Biology II and Principles of Biology II Laboratory	4
! CHEM 1120 & CHEM 1125	General Chemistry 2 and General Chemistry 2 Laboratory	4
!PSY 2050	Foundations of Research Methods and Statistics	4
MATH 1510	Calculus I	4
Credits		16
<b>Year Two</b>		
<b>Fall</b>		
!BIOL 3020	Biochemistry and Molecular Biology	3
PSY 3100	Brain, Mind & Society	3
A&S Core		3
A&S Core		3
A&S Core		3
Credits		15
<b>Spring</b>		
!BIOL 3040	Cell Structure & Function	3

!NEUR 3400	Introduction to Neuroscience 1: Cellular, Molecular and Systemic	3
A&S Core		3
A&S Core		3
A&S Core		3
Credits		15
<b>Year Three</b>		
<b>Fall</b>		
NEUR 3500	Introduction to Neuroscience 2: Cognitive and Behavioral	3
NEUR 3550	Neuroscience Laboratory	1
PHYS 1310 & PHYS 1320	Physics I and Physics I Laboratory	4
Biology or Psychology Elective (p. 2)		2-5
A&S Core		3
Credits		13-16
<b>Spring</b>		
Biology or Psychology Elective (p. 2)		2-5
Biology or Psychology Elective (p. 2)		2-5
A&S Core		3
A&S Core		3
A&S Core		3
Credits		13-19
<b>Year Four</b>		
<b>Fall</b>		
PHIL 4280	Biology and Mind	3
Biology or Psychology Elective (p. 2)		2-5
Biology or Psychology Elective (p. 2)		2-5
A&S Core		3
Elective (if needed)		3
Credits		13-19
<b>Spring</b>		
NEUR 4900	Neuroscience Seminar	3
Biology or Psychology Elective (p. 2)		2-5
Capstone/Inquiry/Honors Project (p. 3)		1-3
A&S Core		3
Elective (if needed)		3
Elective (if needed)		3
Credits		15-20
Total Credits		115-135

### Pre-Professional Health Track

Course	Title	Credits
<b>Year One</b>		
<b>Fall</b>		
!PSY 1010	General Psychology	3
! BIOL 1240 & BIOL 1245	Principles of Biology I and Principles of Biology I Laboratory	4
! CHEM 1110 & CHEM 1115	General Chemistry 1 and General Chemistry 1 Laboratory	4
UNIV 1010	Enhancing First-Year Success	1

ENGL 1900	Advanced Strategies Of Rhetoric and Research	3
Credits		15

**Spring**

Participation in First-Year Mentoring Events		
! BIOL 1260 & BIOL 1265	Principles of Biology II and Principles of Biology II Laboratory	4
! CHEM 1120 & CHEM 1125	General Chemistry 2 and General Chemistry 2 Laboratory	4
!PSY 2050	Foundations of Research Methods and Statistics	4
MATH 1510	Calculus I	4
Credits		16

**Year Two**

**Fall**

!BIOL 3020	Biochemistry and Molecular Biology	3
CHEM 2410 & CHEM 2415	Organic Chemistry 1 and Organic Chemistry 1 Laboratory	4
PSY 3100	Brain, Mind & Society	3
A&S Core		3
A&S Core		3
Credits		16

**Spring**

!BIOL 3040	Cell Structure & Function	3
CHEM 2420 & CHEM 2425	Organic Chemistry 2 and Organic Chemistry 2 Laboratory	4
!NEUR 3400	Introduction to Neuroscience 1: Cellular, Molecular and Systemic	3
A&S Core		3
A&S Core		3
Credits		16

**Year Three**

**Fall**

NEUR 3500	Introduction to Neuroscience 2: Cognitive and Behavioral	3
NEUR 3550	Neuroscience Laboratory	1
PHYS 1310 & PHYS 1320	Physics I and Physics I Laboratory	4
Biology or Psychology Elective (p. 2)		2-5
A&S Core		3
Credits		13-16

**Spring**

PHYS 1330 & PHYS 1340	Physics II and Physics II Laboratory	4
Biology or Psychology Elective (p. 2)		2-5
Biology or Psychology Elective (p. 2)		2-5
A&S Core		3
A&S Core		3
Credits		14-20

**Year Four**

**Fall**

PHIL 4280	Biology and Mind	3
Biology or Psychology Elective (p. 2)		2-5

Biology or Psychology Elective (p. 2)	2-5	
A&S Core	3	
Elective (if needed)	3	
Credits		13-19

**Spring**

NEUR 4900	Neuroscience Seminar	3
Biology or Psychology Elective (p. 2)		2-5
Capstone/Inquiry/Honors Project (p. 3)		1-3
A&S Core		3
Elective (if needed)		3
Elective (if needed)		3
Credits		15-20
Total Credits		118-138

**Program Notes**

**Biology Elective Courses**

Students must take one lab course

Code	Title	Credits
BIOL 3010	Evolutionary Biology	
BIOL 3030	Principles of Genetics	
BIOL 3060	Cell Structure & Function Laboratory <sup>1</sup>	
BIOL 3100	Experiments in Genetics Lab <sup>1</sup>	
BIOL 3420	Comparative Anatomy of the Vertebrates <sup>1</sup>	
BIOL 3470	General Physiology Laboratory <sup>1</sup>	
BIOL 3480	Exercise Physiology	
BIOL 4010	Sex, Evolution, and Behavior	
BIOL 4030	Introduction to Genomics	
BIOL 4050	Molecular Technique Lab <sup>1</sup>	
BIOL 4070	Advanced Biological Chemistry	
BIOL 4080	Advanced Cell Biology	
BIOL 4150	Nerve Cell Mechanisms in Behavior	
BIOL 4250	Neurobiology of Disease	
BIOL 4360 & BIOL 4370	Animal Behavior and Animal Behavior Lab <sup>1</sup>	
BIOL 4410	Comparative Animal Physiology	
BIOL 4440	Vertebrate Histology: Structure and Function of Tissues <sup>1</sup>	
BIOL 4500	Introductory Endocrinology	
BIOL 4510	Behavioral Endocrinology	
BIOL 4520	Biochemical Pharmacology	
BIOL 4540	Human Systemic Physiology	
BIOL 4600 & BIOL 4610	Developmental Biology and Developmental Biology Lab <sup>1</sup>	
BIOL 4630	Foundations of Immunobiology	
BIOL 4700	Molecular Biology	

<sup>1</sup> Lab Course

**Psychology Elective Courses**

Code	Title	Credits
PSY 3120	Cognitive Psychology	
PSY 3160	Learning & Memory	
PSY 3210	Developmental Psych: Child	

PSY 3230	Developmental Psychology: Adolescence
PSY 3300	Social Psychology
PSY 3310	Personality Theory
PSY 4140	Psychopharmacology
PSY 4150	Science of Sleep
PSY 4350	Health Psychology
PSY 4390	Abnormal Psychology

### Capstone/Inquiry/Honors Project Courses

Code	Title	Credits
BIOL 4890	Senior Inquiry: Comprehensive Examination	
BIOL 4970	Library Project	
BIOL 4980	Advanced Independent Study	
PSY 4960	Advanced Research Methodology and Statistics	
PSY 4965	Capstone Practicum Project	
PSY 4967	Capstone Research Project	
PSY 4969	Critical Thinking about Psych	