

# NEUROSCIENCE, B.S.

The Bachelor of Science in Neuroscience degree brings together multiple scientific disciplines focusing on the nervous system. This interdisciplinary program offers students a solid foundation in science alongside specialization within a specific concentration area and extensive opportunities for hands-on research experience. The degree is ideal for students who intend to pursue graduate studies in neuroscience, animal behavior, psychology or medicine.

In particular, the B.S. in Neuroscience is designed to provide students with the necessary background for entry into graduate programs in neuroscience as well as facilitate completion of pre-med requirements for entry into medical school. Majors can also apply to the B.S. with Distinction in Neuroscience to complete additional research culminating in a senior thesis.

## Learning Outcomes

1. Students will demonstrate a solid base of knowledge in the core areas of neuroscience, including both the cellular/molecular level and the cognitive/behavioral level.
2. Students will demonstrate a clear grasp of the core concepts within the major concentration they have selected
3. Students will demonstrate the ability to use scientific methodology in the critical evaluation of information, including identifying assumptions, creating and evaluating hypotheses, designing relevant experiments, and evaluating the results of analyses and experiments
4. Students will demonstrate the ability to analyze, synthesize, and evaluate scientific literature and communicate effectively, orally and in writing, about neuroscience concepts and principles.
5. Students will demonstrate preparedness for relevant careers or entry into graduate or professional programs

## Admissions

### Entrance Requirements

New freshmen who meet University admissions standards are eligible for admission to degree programs offered by the college. A student who wishes to enter the College of Arts and Sciences from another college on the Columbia campus must be in good standing and have a cumulative GPA of 2.00 or higher. A student who wishes to enter the College of Arts and Sciences from another USC campus must fulfill one of the following requirements:

1. Be in good standing, meet the admission requirements for a baccalaureate degree on the Columbia campus, and have a cumulative GPA of 2.00 or higher.
2. Be in good standing and have completed 30 semester hours with a GPA of 2.00 or higher on a USC campus.

Some programs in the College of Arts and Sciences have special admission requirements established by the department or committee that supervises the specific degree program, for example, Cardiovascular Technology, Biological Sciences, Chemistry, Biochemistry and Molecular Biology, Economics, Environmental Science, the Bachelor of Arts in Interdisciplinary Studies, and the Bachelor of Science in Interdisciplinary Studies. These requirements are listed in the sections of this bulletin that describe department and special degree programs.

## Degree Requirements (120 hours)

### Program of Study

Requirements	Credit Hours
Carolina Core	32-46
College Requirements	15-18
Program Requirements	20-37
Major Requirements	36

### Founding Documents Requirement

All undergraduate students must take a 3-credit course or its equivalent with a passing grade in the subject areas of History, Political Science, or African American Studies that covers the founding documents including the United State Constitution, the Declaration of Independence, the Emancipation Proclamation and one or more documents that are foundational to the African American Freedom struggle, and a minimum of five essays from the Federalist papers. This course may count as a requirement in any part of the program of study including the Carolina Core, the major, minor or cognate, or as a general elective. Courses that meet this requirement are listed here (<https://academicbulletins.sc.edu/undergraduate/founding-document-courses/>).

## Carolina Core (32-46 hours)

### CMW – Effective, Engaged, and Persuasive Communication: Written (6 hours)

*Must be passed with a grade of C or higher.*

- ENGL 101\*
- ENGL 102\*

### ARP – Analytical Reasoning and Problem Solving (6-8 hours)

- MATH 122 (<https://academicbulletins.sc.edu/search/?P=MATH%20122>)\*or MATH 141 (<https://academicbulletins.sc.edu/search/?P=MATH%20141>)\*
- MATH 142 (<https://academicbulletins.sc.edu/search/?P=MATH%20142>)\* or MATH 170 (<https://academicbulletins.sc.edu/search/?P=MATH%20170>)\* or MATH 172 (<https://academicbulletins.sc.edu/search/?P=MATH%20172>)\*

### SCI – Scientific Literacy (8 hours)

- BIOL 101 (<https://academicbulletins.sc.edu/search/?P=BIOL%20101>)\* & BIOL 101L (<https://academicbulletins.sc.edu/search/?P=BIOL%20101L>)\*
- BIOL 102 (<https://academicbulletins.sc.edu/search/?P=BIOL%20102>)\* & BIOL 102L (<https://academicbulletins.sc.edu/search/?P=BIOL%20102L>)\*

### GFL – Global Citizenship and Multicultural Understanding: Foreign Language (0-6 hours)

Demonstration of proficiency in one foreign language equivalent to the minimal passing grade on the exit examination in the 122 course is required. Students can demonstrate this proficiency by successfully completing Phase II of the Proficiency Test or by successfully completing the 122 course, including the exit exam administered as part of that course.

- CC-GFL courses (<https://academicbulletins.sc.edu/undergraduate/carolina-core-courses/>)

*It is strongly recommended that students continuing the study of a foreign language begin college-level study of that language in their first semester and continue in that language until their particular foreign language requirement is completed.*

### GHS – Global Citizenship and Multicultural Understanding: Historical Thinking (3 hours)

- any CC-GHS course (<https://academicbulletins.sc.edu/undergraduate/carolina-core-courses/>)

### GSS – Global Citizenship and Multicultural Understanding: Social Sciences (3 hours)

- PSYC 101\*

### AIU – Aesthetic and Interpretive Understanding (3 hours)

- any CC-AIU course (<https://academicbulletins.sc.edu/undergraduate/carolina-core-courses/>)

### CMS – Effective, Engaged, and Persuasive Communication: Spoken Component <sup>1</sup> (3 hours)

- any overlay or stand-alone CC-CMS course (<https://academicbulletins.sc.edu/undergraduate/carolina-core-courses/>)

### INF – Information Literacy <sup>1</sup> (0-3 hours)

- any overlay or stand-alone CC-INF course (<https://academicbulletins.sc.edu/undergraduate/carolina-core-courses/>)

### VSR – Values, Ethics, and Social Responsibility (3 hours)

- any overlay or stand-alone CC-VSR course (<https://academicbulletins.sc.edu/undergraduate/carolina-core-courses/>)
  - PHIL 321\* (recommended for Pre-Med)

## College Requirements (15-18 hours)

### Foreign Language (0-3 hours)

- only if needed to meet 122-level proficiency

### Analytical Reasoning (6 hours)

- STAT 205, STAT 509, or STAT 515\*
- GSCE 102 or higher\*

Note: For the statistics requirement, students who have previously completed PSYC 220 and STAT 201 with a grade of C or better **before** declaring the Neuroscience major may use STAT 201 to fulfill this requirement.

### History (3 hours)

The College of Arts and Sciences requires one additional GHS course beyond the Carolina Core GHS requirement.

- If the Carolina Core GHS requirement is fulfilled by a **U.S. history** course, the College of Arts and Sciences history requirement must be fulfilled by a **non-U.S. history** course.

- If the Carolina Core GHS requirement is fulfilled by a **non-U.S. history** course, the College of Arts and Sciences history requirement must be fulfilled by a **U.S. history** course.

Please select the College of Arts and Sciences history requirement from the approved list of U.S. and non-U.S. history courses (<https://academicbulletins.sc.edu/undergraduate/arts-sciences/history-requirement/>).

## Social Science and Fine Arts or Humanities (6 hours)

### • Social Science (3 hours)

- The College of Arts and Science requires one 3- hour Social Science Course (<https://academicbulletins.sc.edu/undergraduate/arts-sciences/courses-acceptable-social-science/>)

- SOCY 101\* (recommended for Pre-Med)

### • Fine Arts/Humanities (3 Hours)

- A Bachelor of Science from the College of Arts and Sciences requires one 3-hour Fine Arts/Humanities Course (<https://academicbulletins.sc.edu/undergraduate/arts-sciences/courses-acceptable-fine-arts-humanities/>)

- CLAS 230\* (recommended for Pre-Med)

## Program Requirements (20-37 hours)

### Supporting Courses (19 hours)

*Must be passed with a grade of C or higher*

Course	Title	Credits
PSYC 405	Cognitive Psychology	3
CHEM 111 & 111L	General Chemistry I and General Chemistry I Lab	4
CHEM 112 & 112L	General Chemistry II and General Chemistry II Lab	4
CHEM 333 & 331L	Organic Chemistry I and Essentials of Organic Chemistry Laboratory I	4
BIOL 302 & 302L	Cell and Molecular Biology and Cell and Molecular Biology Laboratory	4

Note: Supporting courses are prerequisites for Major Requirements. Eight hours may also be used to fulfill the requirements for a Minor, Cognate or second Major.

### Cognate or Minor (0-18 hours)

This major does not require a cognate or minor.

An optional cognate or minor may be added to a student's program of study. A minor is intended to develop a coherent basic preparation in a second area of study. Courses applied toward general education requirements cannot be counted toward the minor. No course may satisfy both major and minor requirements. All minor courses must be passed with a grade of C or higher. At least half of the courses in the minor must be completed in residence at the University. A list of minor programs of study can be found at Programs A-Z. An optional additional major may also be added to a student's program of study. **Additional majors must include all major courses as well as any prescribed courses noted (\*) in the bulletin.** Prescribed courses noted in the bulletin may be shared with Carolina Core, College requirements, and Program requirements in the primary program.

A list of minor programs of study can be found at **Programs A-Z**.

### Cognate (12 hours)

The cognate must consist of twelve (12) hours of courses at the advanced level, outside of but related to the major. The cognate may be taken in one or more departments or programs.

Courses offered by departments and programs that are acceptable for cognate credit are outlined in the section titled Courses Acceptable for Cognate Credit in Degree Programs in the College of Arts and Sciences (<https://academicbulletins.sc.edu/undergraduate/arts-sciences/courses-acceptable-cognate/>). Some major programs have specific cognate requirements. It should be emphasized that the cognate is not a second set of elective courses to be chosen at random by the student. Students are urged to consult their major advisors for specific requirements in their major.

Unless otherwise noted, for Bachelor of Science degrees, cognate courses passed with a grade of D or higher are acceptable.

### Minor (18 hours)

In place of the cognate a student in the College of Arts and Sciences may choose a minor consisting of at least 18 credit hours of prescribed courses.

The minor is intended to develop a coherent basic preparation in a second area of study. It differs from the cognate inasmuch as the courses must follow a structured sequence.

Courses applied toward general education requirements cannot be counted toward the minor. No course may satisfy both major and minor requirements. **All minor courses must be passed with a grade of C or higher.** At least half of the courses in the minor must be completed in residence at the University.

A list of minor programs of study can be found at Programs A-Z (<https://academicbulletins.sc.edu/undergraduate/programs-az/>).

### Electives (0-18 hours)

120 (or 128) degree applicable credits are required to complete any degree at UofSC. After the cognate, minor or second major is complete, any additional credits needed to reach 120 (or 128) total credits can be fulfilled by electives. No courses of a remedial, developmental, skill-acquiring, or vocational nature may apply as credit toward degrees in the College of Arts and Sciences. The College of Arts and Sciences allows the use of the Pass-Fail option on elective courses. Further clarification on inapplicable courses can be obtained from the College of Arts and Sciences.

Note: CHEM 334/CHEM 332L, PHYS 201, and PHYS 202 are recommended electives for Pre-Med.

### Major Requirements (36 hours)

*A minimum grade of C is required in all major courses*

### Major Courses (12 hours)

Course	Title	Credits
NSCI 300	Introduction to Neuroscience	3
BIOL 405	Cellular and Molecular Neurobiology	3
PSYC 507	Cognitive Neuroscience	3
Required Neuroscience Research <sup>1</sup>		3
NSCI 498	Individual Research in Neuroscience (or other equivalent independent study course)	

### Lab Courses:

NSCI 570 Neuroscience Laboratory

Other lab-based courses may be approved by the Neuroscience Program Director if they have a significant neuroscience component.

**Total Credit Hours 12**

<sup>1</sup> Training in the methods of scientific inquiry and the dissemination of research in neuroscience. Can be fulfilled with independent research undertaken with a faculty mentor or lab-based coursework. Must be approved by the Neuroscience Program Director.

### Major Electives (12 hours)

*Students must complete a minimum of 12 hours of elective coursework. Electives should be selected in conjunction with the neuroscience advisor to target each student's interests and career goals and complement their concentration coursework.*

Course	Title	Credits
BIOL 303	Fundamental Genetics	3
BIOL 460	Advanced Human Physiology	3
BIOL 461	Advanced Human Anatomy	3
BIOL 505	Developmental Biology	3
BIOL 530	Histology	4
BIOL 534	Animal Behavior	3
BIOL 541	Biochemistry	3
BIOL 541L	Biochemistry Laboratory <sup>1</sup>	1
BIOL 543	Comparative Physiology	3
BIOL 553	Genomics	3
BIOL 612	Virology - Classical and Emerging Concepts	3
BIOL 614	Stem Cell Biology	3
BIOL 620	Immunobiology	3
BIOL 634	Biology of Neurological Diseases	3
BIOL 635	Neurophysiology	4
BIOL 665	Human Molecular Genetics	3
BIOL 667	Molecular and Genetic Mechanisms of Disease Pathogenesis	3
BMEN 321	Biomonitoring and Electrophysiology	3
COMD 501	Anatomy and Physiology of Speech and Hearing Mechanisms	3
EXSC 303	Perceptual-Motor Development	3
EXSC 351	Acquisition of Motor Skills	3
NSCI 560	Advanced Topics in Neuroscience	3
NSCI 570	Neuroscience Laboratory <sup>2</sup>	3
PHIL 351	Mind and Nature	3
PSYC 400	Survey of Learning and Memory	3
PSYC 405	Cognitive Psychology	3
PSYC 450	Sensation and Perception	3
PSYC 503	Psychology of Drug Use and Effects	3
PSYC 550	Advanced Sensation and Perception	3
PSYC 571	Cognitive Neuroscience Laboratory	3
PSYC 572	Cognitive Psychology Laboratory	3
Individual Research <sup>3</sup>		

Depending on the topic, special topics courses/seminars and internships may be applied as core courses towards concentrations or as major electives with permission of the Neuroscience program director.

BIOL 599	Topics in Biology
NSCI 560	Advanced Topics in Neuroscience
PSYC 589	Selected Topics in Psychology
COLA 390	Internship: Community Engagement
	or COLA 391 Internship: Global Community Engagement

<sup>1</sup> Students intending to take BIOL 541 as part of their major requirements should also take CHEM 334/CHEM 332L as part of their program requirements, either as an elective or as part of their cognate/minor

<sup>2</sup> Students who complete Individual Research to complete the Required Neuroscience Research may take NSCI 570 as an elective

<sup>3</sup> A maximum of 6 hours of Independent Study / Individual Research can be applied as major credit. Students admitted to the BS with Distinction in Neuroscience may apply an additional 3 hours of independent research toward their major requirements, up to a maximum of 9 hours.

## Concentrations (12 hours)

Students must choose one of the following three concentrations. Concentrations consist of a minimum of 12 hours of core courses in a targeted area of study. Core courses should be selected in conjunction with the neuroscience advisor to target each student's interests and career goals.

### I. Cellular and Molecular Neuroscience Concentration (12 hours)

Course	Title	Credits
Students must take a minimum of 12 hours selected from the following:		
BIOL 303	Fundamental Genetics	3
BIOL 530	Histology	4
BIOL 541	Biochemistry	3
BIOL 541L	Biochemistry Laboratory <sup>1</sup>	1
BIOL 553	Genomics	3
BIOL 614	Stem Cell Biology	3
BIOL 620	Immunobiology	3
BIOL 634	Biology of Neurological Diseases	3
BIOL 635	Neurophysiology	4
BIOL 665	Human Molecular Genetics	3
BIOL 667	Molecular and Genetic Mechanisms of Disease Pathogenesis	3
BMEN 321	Biomonitoring and Electrophysiology	3

<sup>1</sup> Students intending to take BIOL 541 as part of their major requirements should also take CHEM 334/CHEM 332L as part of their program requirements, either as an elective or as part of a cognate/minor.

Note: Students may take additional courses from the Cellular and Molecular Neuroscience core courses to fulfill the major electives.

### II. Cognitive and Behavioral Neuroscience Concentration (12 hours)

Students must take a minimum of 3 hours from List A and 3 hours from List B, with additional courses selected from either list to meet the minimum of 12 hours.

List A (minimum 3 hours)		
BIOL 460	Advanced Human Physiology	3
BIOL 534	Animal Behavior	3
BIOL 543	Comparative Physiology	3
COMD 501	Anatomy and Physiology of Speech and Hearing Mechanisms	3
EXSC 351	Acquisition of Motor Skills	3
List B (minimum 3 hours)		
PSYC 400	Survey of Learning and Memory	3
PSYC 450	Sensation and Perception	3
PSYC 503	Psychology of Drug Use and Effects	3
PSYC 550	Advanced Sensation and Perception	3
PSYC 571	Cognitive Neuroscience Laboratory	3
PSYC 572	Cognitive Psychology Laboratory	3

Note: Students may take additional courses from the Cognitive and Behavioral Neuroscience core courses List A or B to fulfill the major electives.

### III. Neurodevelopment and Neurodevelopmental Disorders Concentration (12 hours)

Course	Title	Credits
Required:		
BIOL 505	Developmental Biology	3
PSYC 420	Survey of Developmental Psychology	3
Select 6 hours from the following:		
BIOL 614	Stem Cell Biology	3
BIOL 634	Biology of Neurological Diseases	3
PSYC 510	Child Behavioral and Mental Disorders	3
PSYC 520	Psychology of Child Development	3
PSYC 521	Psychology of Adolescence	3
<b>Total Credit Hours</b>		<b>12</b>

### BS WITH DISTINCTION IN NEUROSCIENCE (45 HOURS)

Available to students majoring in Neuroscience who wish to participate in significant research activities in their major field under the supervision of a faculty mentor.

#### Prerequisite

A minimum GPA of 3.50 in the major, and 3.50 cumulative, is required to apply for a BS with Distinction in Neuroscience.

#### Requirements

- Students must submit a written application for the BS with Distinction in Neuroscience at least eight months before completion of the degree.
- Written sponsorship agreement from a faculty mentor affiliated with the Neuroscience program.
- An established thesis committee consisting of a tenure-track faculty member affiliated with the Neuroscience Program and at least one other tenure-track or research faculty member at the University of South Carolina.

- A written thesis demonstrating significant original work and approved by the thesis committee. The student may use their senior thesis to simultaneously fulfill other requirements as well (e.g., Honors College Thesis), at the discretion of the thesis advisor.
- A public presentation of the Senior Thesis research.
- Successful fulfillment of all requirements below with a minimum GPA of 3.50 in the major and 3.50 cumulative.
- Completion of all major requirements, plus 9 additional credit hours including:
  - A minimum of three credit hours of independent research (in addition to any hours taken as part of the major requirements)
  - A minimum of three upper-level credits from the list of approved neuroscience electives (can include additional credits of independent research)
  - NSCI 499 (3 hours) or SCHC 499 (3 hours)

Note: South Carolina Honors College students satisfying the above requirements will graduate with “Honors from the South Carolina Honors College” and with “Distinction in Neuroscience.”

## Major Map

A major map is a layout of required courses in a given program of study, including critical courses and suggested course sequences to ensure a clear path to graduation.

Major maps are only a suggested or recommended sequence of courses required in a program of study. Please contact your academic advisor for assistance in the application of specific coursework to a program of study and course selection and planning for upcoming semesters.

**Neuroscience, B.S.**