BACHELOR OF SCIENCE (BS) DEGREE WITH A MAJOR IN NEUROSCIENCE AND A MAJOR CONCENTRATION IN COMPUTATIONAL NEUROSCIENCE

Program Learning Outcomes for the BS Degree with a Major in Neuroscience and a Major Concentration in Computational Neuroscience

Upon completing the BS degree with a major in Neuroscience, students will be able to:

1. Demonstrate knowledge of the biological basis for brain and neuron function and the experimental strategies that led to our current understanding.
2. Understand proper experimental design in neuroscience, including how to apply the modern scientific methods, statistics and the most common experimental methods to measure and manipulate brain activity.
3. Demonstrate the ability to communicate effectively to both a scientific and lay audience.
4. Search through, review and evaluate the scientific literature on neuroscience and related fields.

Additionally, upon completing the BS degree with a major in Neuroscience and a major concentration in Computational Neuroscience, students will be able to:

1. Demonstrate an advanced ability to analyze quantitatively, model, and interpret neuro-scientific data.

Requirements for the BS Degree with a Major in Neuroscience and a Major Concentration in Computational Neuroscience

For general university requirements, see Graduation Requirements (https://ga.rice.edu/undergraduate-students/academic-policies-procedures/graduation-requirements/). Students pursuing the BS degree with a major in Neuroscience and a major concentration in Computational Neuroscience must complete:

- A minimum of 27-30 courses (73-77 credit hours), depending on course selection, to satisfy major requirements.
- A minimum of 120 credit hours to satisfy degree requirements.
- A minimum of 29 credit hours taken at the 300-level or above.
- A maximum of 2 courses (6 credit hours) from study abroad or transfer credit after matriculation at Rice may be applied towards specific major requirements. For additional program guidelines regarding transfer credit, see the Policies (p. 3) tab.

- The requirements of a major concentration. When students declare the major (https://ga.rice.edu/undergraduate-students/academic-opportunities/majors-minors-certificates/#text) in Neuroscience, students must additionally identify and declare one of two major concentrations, either in:
  - Computational Neuroscience (p. 1), or

Because of the common core requirements, it is possible for students to change their major concentration at any time, even after initially declaring the major. To do so, please contact the Office of the Registrar (%20registrar@rice.edu).

The Bachelor of Science (BS) Core Requirements emphasize a broad foundational knowledge of neuroscience. The major concentrations provide an in-depth exposure to various subfields.

The courses listed below satisfy the requirements for this major. In certain instances, courses not on this official list may be substituted upon approval of the major’s academic advisor, or where applicable, the department’s Director of Undergraduate Studies. (Course substitutions must be formally applied and entered into Degree Works by the major’s Official Certifier (https://registrar.rice.edu/facstaff/degreeworks/officialcertifier/)) Students and their academic advisors should identify and clearly document the courses to be taken.

Summary

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<th>Credit Hours</th>
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<td>Total Credit Hours Required for the Major in Neuroscience and a Major Concentration in Computational Neuroscience</td>
<td>120</td>
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Degree Requirements

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Core Requirements

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Non-Neuroscience Courses

- BIOS 201 INTRODUCTORY BIOLOGY I 3
- CHEM 121 GENERAL CHEMISTRY I 3
- CHEM 123 GENERAL CHEMISTRY LABORATORY I 1
- MATH 101 SINGLE VARIABLE CALCULUS I 3
- MATH 102 SINGLE VARIABLE CALCULUS II 3
- PHYS 125 GENERAL PHYSICS (WITH LAB) 4
- PHYS 126 GENERAL PHYSICS II (WITH LAB) 3
- PSYC 203 INTRODUCTION TO COGNITIVE PSYCHOLOGY 3

Core Programming Experience Course

- CMOR 220 INTRODUCTION TO ENGINEERING COMPUTATION 3
Bachelor of Science (BS) Degree with a Major in Neuroscience and a Major Concentration in Computational Neuroscience

or COMP 140   COMPUTATIONAL THINKING

Core Statistics Course

Select 1 course from the following:  3-4

STAT 305   INTRODUCTION TO STATISTICS FOR BIOSCIENCES
STAT 310 / ECON 307   PROBABILITY AND STATISTICS
STAT 315   PROBABILITY AND STATISTICS FOR DATA SCIENCE

Core Neuroscience Lecture Courses

BIOS 385   CELLULAR AND MOLECULAR MECHANISMS OF THE NEURON  3
NEUR 362 / PSYC 362   COGNITIVE NEUROSCIENCE: EXPLORING THE LIVING BRAIN  3
NEUR 380   FUNDAMENTAL NEUROSCIENCE SYSTEMS  3
NEUR 383 / BIO 380 / ELEC 380   MEASURING AND MANIPULATING NEURAL ACTIVITY  3

BIOS 212   INTERMEDIATE EXPERIMENTAL CELLULAR AND MOLECULAR NEUROSCIENCE  2
NEUR 310   INDEPENDENT RESEARCH FOR NEUROSCIENCE UNDERGRADUATES  1-4

Core Neuroscience Laboratory Courses

BIOS 315   EXPERIMENTAL PHYSIOLOGY  1-3
BIOS 417   EXPERIMENTAL CELL AND MOLECULAR NEUROSCIENCE
PSYC 366   METHODS IN SOCIAL COGNITIVE AND AFFECTIVE NEUROSCIENCE
PSYC 487   FUNCTIONAL HUMAN NEUROANATOMY

Code    Title                                         Credit Hours

BIOS 442   MOLECULES, MEMORY AND MODEL ANIMALS: METHODS IN BEHAVIORAL NEUROSCIENCE  7
BIOS 443   DEVELOPMENTAL NEUROBIOLOGY  7
BIOS 449   ADVANCED CELL AND MOLECULAR NEUROSCIENCE  7
CMOR 404   GRAPH THEORY
CMOR 420   COMPUTATIONAL SCIENCE
COMP 440 / ELEC 440   ARTIFICIAL INTELLIGENCE
ELEC 242   SIGNALS, SYSTEMS, AND TRANSFORMS
ELEC 301   SIGNALS, SYSTEMS, AND LEARNING
ELEC 303   RANDOM SIGNALS IN ELECTRICAL ENGINEERING SYSTEMS
ELEC 378   MACHINE LEARNING: CONCEPTS AND TECHNIQUES
ELEC 475   LEARNING FROM SENSOR DATA
NEUR 310   INDEPENDENT RESEARCH FOR NEUROSCIENCE UNDERGRADUATES  4
PHIL 130   THE SCIENCES OF THE MIND
PHIL 231   ANIMAL MINDS
PHIL 431   ADVANCED TOPICS IN THE SCIENCES OF THE MIND
PSYC 308   MEMORY
PSYC 310   PSYCHOLOGY OF AGING
PSYC 354   INTRODUCTION TO SOCIAL AND AFFECTIVE NEUROSCIENCE
PSYC 430   COMPUTATIONAL MODELING OF COGNITIVE PROCESSES

Capstone Requirement  7

Select one course from the following:  3

BIOS 442   MOLECULES, MEMORY AND MODEL ANIMALS: METHODS IN BEHAVIORAL NEUROSCIENCE
BIOS 443   DEVELOPMENTAL NEUROBIOLOGY
BIOS 449   ADVANCED CELL AND MOLECULAR NEUROSCIENCE

Total Credit Hours Required for the Major in Neuroscience and Major Concentration in Computational Neuroscience  73-77

Additional Credit Hours to Complete Degree Requirements *  12-16

University Graduation Requirements (https://ga.rice.edu/undergraduate-students/academic-policies-procedures/graduation-requirements/)

Total Credit Hours  120

Footnotes and Additional Information

* Note: University Graduation Requirements include 31 credit hours, comprised of Distribution Requirements (Groups I, II, and III), FWIS, and LPAP coursework. In some instances, courses satisfying FWIS or distribution requirements may additionally meet other requirements, such as the Analyzing Diversity (AD) requirement, or some of the student’s declared major, minor, or certificate requirements. Additional Credit Hours to Complete Degree Requirements include general electives, coursework completed as upper-level, residency (hours taken at Rice), and/or any other additional academic program requirements.
Policies for the BS Degree with a Major in Neuroscience and a Major Concentration in Computational Neuroscience

Program Restrictions and Exclusions

Students pursuing the BS Degree with a Major in Neuroscience should be aware of the following program restrictions:

- As noted in Majors, Minors, and Certificates (https://ga.rice.edu/undergraduate-students/academic-opportunities/majors-minors-certificates/), under Declaring Majors, Minors and Certificates, students may not obtain both a BA and a BS in the same major. Students pursuing the BS Degree with a Major in Neuroscience may not additionally pursue the BA Degree with a Major in Neuroscience.
- Students pursuing the major in Neuroscience may pursue only one major concentration within the major.
- As noted in Majors, Minors, and Certificates (https://ga.rice.edu/undergraduate-students/academic-opportunities/majors-minors-certificates/), students may not major and minor in the same subject.

Transfer Credit

For Rice University's policy regarding transfer credit, see Transfer Credit (https://ga.rice.edu/undergraduate-students/academic-policies-procedures/transfer-credit/). Some departments and programs have additional restrictions on transfer credit. The Office of Academic Advising maintains the university’s official list of transfer credit advisors (https://oaa.rice.edu/advising-network/transfer-credit-advisors/) on their website: https://oaa.rice.edu. Students are encouraged to meet with their academic program’s transfer credit advisor when considering transfer credit possibilities.

Program Transfer Credit Guidelines

Students pursuing the major in Neuroscience should be aware of the following program transfer credit guidelines:

- No more than 2 courses (6 credit hours) of transfer credit from U.S. or international universities of similar standing as Rice may apply towards specific major requirements after matriculation at Rice.
- Requests for transfer credit will be considered by the program director (and/or the program’s official transfer credit advisor) on an individual case-by-case basis.

Additional Information

For additional information, please see the Neuroscience website: https://neuroscience.rice.edu/.

Opportunities for the BS Degree with a Major in Neuroscience and a Major Concentration in Computational Neuroscience

Academic Honors

The university recognizes academic excellence achieved over an undergraduate's academic history at Rice. For information on university honors, please see Latin Honors (https://ga.rice.edu/undergraduate-students/honors-distinctions/university/) (summa cum laude, magna cum laude, and cum laude) and Distinction in Research and Creative Work (https://ga.rice.edu/undergraduate-students/honors-distinctions/university/). Some departments have department-specific Honors awards or designations.

Research in Neuroscience

Research is highly encouraged for all neuroscience programs, and many opportunities are available for independent research at Rice and other institutions of the Texas Medical Center. Students can receive course credit for independent research through the course NEUR 310.

Please Note: Students pursuing the major in Neuroscience may repeat NEUR 310 for credit once as an elective for the major. The first instance of the course may fulfill the Core Neuroscience Laboratory requirement. The second instance of the course may fulfill the Elective Requirement.

Additional Information

For additional information, please see the Neuroscience website: https://neuroscience.rice.edu/.