Neuroscience: Cellular and Molecular BS

Overview

Offered by the Department of Biology, the **Bachelor of Science in Neuroscience: Cellular and Molecular** is designed to provide rigorous preparation in scientific knowledge at the molecular and cellular level to those students interested in pursuing advanced studies and professional development in neuroscience, medicine or a related field in life sciences. In addition to neuroscience, graduates in the major will be well prepared for graduate or professional studies in cell or molecular biology, biochemistry, biophysics, biomedical sciences, medicine, pharmacy, dentistry, and many allied health fields. Neuroscience graduates who do not pursue graduate studies will be prepared to accept technical positions in industry (pharmaceutical, biotech) or government and university laboratories. Graduates will be ready to conduct research on a range of neuroscience and related topics at the level of cells or molecules, including nervous system function, development, disease or injury.

Campus Location: Main

Program Code: ST-NSCM-BS

Distinction in the Major

To graduate with distinction in this major, a student must satisfy the following criteria:

- achieve a minimum 3.2 cumulative GPA;
- successfully complete two semesters of BIOL 4591;
- submit final research paper; and
- present their research at a departmental research poster session.

Accelerated Programs

Accelerated programs provide a pathway for students to pursue both an undergraduate degree and an advanced degree in a shorter amount of time. Below is a list of available accelerated programs for students in the BS in Neuroscience: Cellular and Molecular.

- BS in Neuroscience: Cellular and Molecular / PSM in Biotechnology
- BS in Neuroscience: Cellular and Molecular / PSM in Bioinformatics and Biological Data Science
- BS in Neuroscience: Cellular and Molecular / PSM in Bioinnovation

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Learn more about the Bachelor of Science in Neuroscience: Cellular and Molecular.

These requirements are for students who matriculated in academic year 2023-2024. Students who matriculated prior to fall 2023 should refer to the Archives *to view the requirements for their Bulletin year.*

Bachelor of Science Requirements

Summary of Requirements for the Degree

1. University Requirements (123 total s.h.)
    - Students must complete all University requirements including those listed below.
    - All undergraduate students must complete at least two writing-intensive courses for a total of at least six credits at Temple as part of their major. The specific writing-intensive course options for this major are:

Code	Title	Credit Hours
BIOL 2297	Research Techniques in Genetics (S)	3
BIOL 3396	Scientific Writing for Biology: The Art of Communicating	3
BIOL 4396	Advanced Study in Biology	3

- Students must complete the General Education (GenEd) requirements.
  - See the General Education section of the *Undergraduate Bulletin* for the GenEd curriculum.
  - Students who complete CST majors receive a waiver for 2 Science & Technology (GS) and 1 Quantitative Literacy (GQ) GenEd courses.
- Students must satisfy general Temple University residency requirements.

2. College Requirements
   - A minimum of 90 total credits within the College of Science & Technology (CST), the College of Liberal Arts (CLA), and/or the College of Engineering (ENG).
     - A minimum of 45 of these credits must be upper-level (courses numbered 2000 and above).
   - Complete a one-credit first-year or transfer seminar.
     - SCTC 1001 CST First Year Seminar for every entering first-year CST student.
     - SCTC 2001 CST Transfer Seminar for every entering transfer CST student.
3. Major Requirements for Bachelor of Science (77-84 s.h.)

At least 9 courses required for the major must be completed at Temple. At least 4 Biology courses must be completed at Temple.

Code	Title	Credit Hours
Biology		
BIOL 1111	Introduction to Organismal Biology	4
or BIOL 1911	Honors Introduction to Organismal Biology	
BIOL 2112	Introduction to Cellular and Molecular Biology	4
or BIOL 2912	Honors Introduction to Cellular and Molecular Biology	
BIOL 2207	Genetics (S)	3
BIOL 2297	Research Techniques in Genetics (WI, S) [1]	3
BIOL 3204	Cell Structure and Function (F)	4
BIOL 3352	Systems Neuroscience	3
BIOL 3358	Cellular and Molecular Neuroscience (S)	3
Chemistry		
CHEM 1031 & CHEM 1033	General Chemistry I and General Chemistry Laboratory I	4
or CHEM 1951 & CHEM 1953	Honors General Chemical Science I and Honors Chemical Science Laboratory I	
CHEM 1032 & CHEM 1034	General Chemistry II and General Chemistry Laboratory II	4
or CHEM 1952 & CHEM 1954	Honors General Chemical Science II and Honors Chemical Science Laboratory II	
CHEM 2201 & CHEM 2203	Organic Chemistry I and Organic Chemistry Laboratory I	4
or CHEM 2211 & CHEM 2213	Organic Chemistry for Majors I and Organic Majors Laboratory I	
or CHEM 2921 & CHEM 2923	Organic Chemistry for Honors I and Organic Honors Laboratory I	
CHEM 2202 & CHEM 2204	Organic Chemistry II and Organic Chemistry Laboratory II	4
or CHEM 2212 & CHEM 2214	Organic Chemistry for Majors II and Organic Majors Laboratory II	
or CHEM 2922 & CHEM 2924	Organic Chemistry for Honors II and Organic Honors Laboratory II	
Mathematics		
Select one of the following:		4
MATH 1041	Calculus I	

MATH 1941	Honors Calculus I	
Select one of the following:		4
MATH 1044	Introduction to Probability and Statistics for the Life Sciences	
MATH 1042	Calculus II	
MATH 1942	Honors Calculus II	
Neuroscience		
Neuroscience electives - select five of the following: [2]		15-20
BIOL 3265	Developmental Biology	
BIOL 3312	Biostatistics	
BIOL 3324	Molecular Biology	
BIOL 3325	Research Techniques in Molecular Biology (S)	
BIOL 3333	Advanced Techniques in Microscopy (S)	
BIOL 3334	Mammalian Physiology (S)	
BIOL 3337	Comparative Biomechanics	
BIOL 3354	Neural Basis of Animal Behavior (F)	
BIOL 3356	Organization and Development of the Nervous System (S)	
BIOL 3361	Molecular Neuropharmacology (F)	
BIOL 3365	The New Neuroimmunology (S)	
BIOL 4364	Biochemistry of Embryogenesis	
BIOL 4375	General Biochemistry I	
BIOL 4396	Advanced Study in Biology (WI)	
NSCI 3087	Techniques in Neuroscience (non-CST course)	
PSY 2501	Foundations of Behavioral Neuroscience (non-CST course)	
PSY 2502	Foundations of Cognitive Neuroscience (non-CST course)	
Neuroscience Research/Independent Study courses [3]		
Take the following for a total of 6-8 credits:		6-8
BIOL 4591	Research in Neuroscience	
BIOL 3082	Independent Research II	
Physics		
PHYS 2021	General Physics I	4
or PHYS 2921	Honors General Physics I	
PHYS 2022	General Physics II	4
or PHYS 2922	Honors General Physics II	
Total Credit Hours		**77-84**

1

This course has a co-requisite of BIOL 2207.

2

Three of the five electives must be within the College of Science & Technology.

3

Research in Neuroscience (BIOL 4591)/Independent Research II (BIOL 3082) course choice should be determined in consultation with the Neuroscience faculty advisor. Students are required to have BOTH a B- or above in BIOL 3352 AND a Science GPA of 3.2 to take BIOL 4591 Research in Neuroscience. Students are required to have BOTH a B- or above in BIOL 3352 AND a Science GPA of 3.0 to take BIOL 3082 Independent Research II. The Science GPA consists of all required courses in Biology, Calculus, Chemistry, and Physics.

Code	Title	Credit Hours
(F) - Fall course only		
(S) - Spring only course		

With the exception in footnote 3 above, the research and independent study courses shown below do not count as Neuroscience electives, but may count as free elective credits toward graduation. Most research courses can only be taken ONCE for a letter grade. Check individual course descriptions for details and/or exceptions.

Code	Title	Credit Hours
BIOL 2082	Independent Research I	1 to 4
BIOL 3082	Independent Research II	1 to 4
BIOL 3181	Cooperative Research in Biochemistry	3
BIOL 3681	Cooperative Studies	2 to 4
BIOL 3685	Externship Studies	3
BIOL 4291	Extradepartmental Research	1 to 4
BIOL 4391	Accelerated Research in Biology	1 to 4
BIOL 4483	Accelerated Research in Biochemistry	3
BIOL 4491	Research in Biochemistry	3
BIOL 4591	Research in Neuroscience	1 to 4

Note: Grades of C- or higher are required unless otherwise specified in all courses for the major, including course prerequisites. The College of Science and Technology requires that students have a GPA of at least 2.00 overall and at least 2.00 in the courses applicable to their major and/or minor GPA to graduate.

Suggested Academic Plan

Bachelor of Science in Neuroscience: Cellular and Molecular

Suggested Plan for New Students Starting in the 2023-2024 Academic Year

Year 1		
Fall		**Credit Hours**
Select one of the following:		4
CHEM 1031 & CHEM 1033	General Chemistry I and General Chemistry Laboratory I	
CHEM 1951 & CHEM 1953	Honors General Chemical Science I and Honors Chemical Science Laboratory I (F)	
MATH 1041 or MATH 1941	Calculus I or Honors Calculus I	4
SCTC 1001	CST First Year Seminar	1
ENG 0802 or ENG 0812 or ENG 0902	Analytical Reading and Writing or Analytical Reading and Writing: ESL or Honors Writing About Literature	4
Elective		2
	Credit Hours	**15**
Spring		
BIOL 1111 or BIOL 1911	Introduction to Organismal Biology or Honors Introduction to Organismal Biology	4
Select one of the following:		4
CHEM 1032 & CHEM 1034	General Chemistry II and General Chemistry Laboratory II	
CHEM 1952 & CHEM 1954	Honors General Chemical Science II and Honors Chemical Science Laboratory II (S)	
Select one of the following:		4
MATH 1044	Introduction to Probability and Statistics for the Life Sciences	
MATH 1042	Calculus II	
MATH 1942	Honors Calculus II	
IH 0851 or IH 0951	Intellectual Heritage I: The Good Life or Honors Intellectual Heritage I: The Good Life	3
	Credit Hours	**15**
Year 2		
Fall		
BIOL 2112 or BIOL 2912	Introduction to Cellular and Molecular Biology or Honors Introduction to Cellular and Molecular Biology	4

Select one of the following:		4
CHEM 2201 & CHEM 2203	Organic Chemistry I and Organic Chemistry Laboratory I	
CHEM 2211 & CHEM 2213	Organic Chemistry for Majors I and Organic Majors Laboratory I	
CHEM 2921 & CHEM 2923	Organic Chemistry for Honors I and Organic Honors Laboratory I (F)	
IH 0852 or IH 0952	Intellectual Heritage II: The Common Good or Honors Intellectual Heritage II: The Common Good	3
Elective		5
	Credit Hours	**16**
Spring		
BIOL 2207	Genetics (S)	3
BIOL 2297	Research Techniques in Genetics (S)	3
BIOL 3352	Systems Neuroscience	3
Select one of the following:		4
CHEM 2202 & CHEM 2204	Organic Chemistry II and Organic Chemistry Laboratory II	
CHEM 2212 & CHEM 2214	Organic Chemistry for Majors II and Organic Majors Laboratory II	
CHEM 2922 & CHEM 2924	Organic Chemistry for Honors II and Organic Honors Laboratory II (S)	
GenEd Breadth Course		3
	Credit Hours	**16**
Year 3		
Fall		
BIOL 3204	Cell Structure and Function (F)	4
Neuroscience Elective [1]		3-4
PHYS 2021 or PHYS 2921	General Physics I or Honors General Physics I	4
GenEd Breadth Course		3
Elective		1-0
	Credit Hours	**15**
Spring		
BIOL 3358	Cellular and Molecular Neuroscience (S)	3
Neuroscience Elective [1]		3-4
PHYS 2022 or PHYS 2922	General Physics II or Honors General Physics II	4
GenEd Breadth Course		3-4
Elective		2-0
	Credit Hours	**15**
Year 4		
Fall		
Select one of the following: [2]		3-4
BIOL 4591	Research in Neuroscience	
BIOL 3082	Independent Research II	
Neuroscience Elective [1]		3-4
Choose one of the following: [3]		3-4
BIOL 4396	Advanced Study in Biology	
Neuroscience Elective [1]		
GenEd Breadth Course		3
Elective		3-0
	Credit Hours	**15**

Spring		
Select one of the following: [2]		3-4
BIOL 4591	Research in Neuroscience	
BIOL 3082	Independent Research II	
Choose one of the following: [3]		3-4
BIOL 4396	Advanced Study in Biology	
Neuroscience Elective [1]		
GenEd Breadth Course		3
Elective		7-5
	Credit Hours	**16**
	Total Credit Hours	**123**

Code	Title	Credit Hours
(F) - Fall only course		
(S) - Spring only course		

1

Select from the Neuroscience Electives list under Requirements.

2

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3

Either BIOL 4396 or a Neuroscience elective can be chosen in the fall term. The course not completed in the fall must be completed in the spring term.