

# Neuroscience: Cellular & Molecular, B.S.

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

The Bachelor of Science degree in Neuroscience: Cellular & 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.

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## Bachelor of Science

### Summary of Requirements for the Degree

- University Requirements (123 total s.h.)
  - MATH 0701 (4 s.h.) and/or ENG 0701 (4 s.h.), if required by placement testing.
  - All Temple students must take a minimum of two writing-intensive courses at Temple as part of their major. Following is a list of courses that can be used to satisfy the writing-intensive requirement: BIOL 2296 and BIOL 3096.
  - 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 typically receive a waiver for 2 Science & Technology (GS) and 1 Quantitative Literacy (GQ) GenEd courses.
  - Students must satisfy general Temple University residency requirements.
- College Requirements
  - 45 Upper Level (2000+) credits within the College of Science & Technology (CST) or the College of Liberal Arts (CLA).
  - 90 credits within the College of Science & Technology (CST) or the College of Liberal Arts (CLA).
  - First Year Seminar Requirement: All students in the College of Science & Technology (CST) are required to take a 1 credit first year seminar course, SCTC 1001 CST First Year Seminar. Other courses that fulfill this requirement may be found on the CST College Requirements page. Only one course in this category may count towards graduation.
- Major Requirements for Bachelor of Science (75-82 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
<b>Biology</b>		
BIOL 1111 or BIOL 1911	Introduction to Organismal Biology Honors Introduction to Organismal Biology	4
BIOL 2112 or BIOL 2912	Introduction to Cellular and Molecular Biology Honors Introduction to Cellular and Molecular Biology	4
BIOL 2296	Genetics (S)	4
BIOL 3096	Cell Structure and Function (F)	4
BIOL 3352	Systems Neuroscience	3
BIOL 3358	Cellular and Molecular Neuroscience (S)	3

**Chemistry**

CHEM 1031 & CHEM 1033 or CHEM 1951 & CHEM 1953	General Chemistry I and General Chemistry Laboratory I Honors General Chemical Science I and Honors Chemical Science Laboratory I	4
CHEM 1032 & CHEM 1034 or CHEM 1952 & CHEM 1954	General Chemistry II and General Chemistry Laboratory II Honors General Chemical Science II and Honors Chemical Science Laboratory II	4
CHEM 2201 & CHEM 2203 or CHEM 2211 & CHEM 2213 or CHEM 2921 & CHEM 2923	Organic Chemistry I and Organic Chemistry Laboratory I Organic Chemistry for Majors I and Organic Majors Laboratory I Organic Chemistry for Honors I and Organic Honors Laboratory I	4
CHEM 2202 & CHEM 2204 or CHEM 2212 & CHEM 2214 or CHEM 2922 & CHEM 2924	Organic Chemistry II and Organic Chemistry Laboratory II Organic Chemistry for Majors II and Organic Majors Laboratory II Organic Chemistry for Honors II and Organic Honors Laboratory II	4

**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: <sup>1</sup> 15-20

BIOL 3232	Behavioral Genetics (F)
BIOL 3312	Biostatistics (F)
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 - odd years)
BIOL 3356	Organization and Development of the Nervous System (F - even years)
BIOL 3361	Molecular Neuropharmacology
BIOL 3365	The New Neuroimmunology
BIOL 4375	General Biochemistry I
CIS 1166 or CIS 1966	Mathematical Concepts in Computing I <sup>2</sup> Honors Mathematical Concepts in Computing I
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 <sup>3</sup>**

Take the following for a total of 6-8 credits: 6-8

BIOL 4591	Research in Neuroscience (or Neuroscience Independent Study)
BIOL 4591	Research in Neuroscience (or Neuroscience Independent Study)

**Physics**

PHYS 2021	General Physics I	4
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or PHYS 2921	Honors General Physics I	
PHYS 2022	General Physics II	4
or PHYS 2922	Honors General Physics II	
Total Credit Hours		75-82

- 1 Three of the five electives must be within the College of Science & Technology.
- 2 CIS 1166 or CIS 1966 may be replaced with CIS 1053.
- 3 Neuroscience Research/Independent Study courses 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 Neuroscience Research, BIOL 4591. Students are required to have BOTH a B- or above in BIOL 3352 AND a Science GPA of 3.0 to take Independent Study in Neuroscience. 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		

**Note:** A grade of C or higher in CHEM 1031 and CHEM 1032 is required to take BIOL 2112. A grade of C or higher in BIOL 1111 and BIOL 2112 is required to take upper-level Biology courses, and a C- or higher is required unless otherwise specified in all other courses for the major, including course prerequisites.

## Calculation of Major GPA

Courses listed under the major requirements for the degree will be included in the calculation of the major GPA. Courses that could not apply toward the major as an elective or required course would not be counted in the calculation of the major GPA. This would include BIOL 1011, for example.

A total of up to 3 s.h. of Biology research courses numbered lower than 4000 from the list below may be taken for a letter grade. Any additional credits in research courses in this category can be taken only on a Credit/No Credit (CR/NC) basis. No research courses numbered lower than 4000 may be used for Biology elective credit.

Code	Title	Credit Hours
BIOL 2082	Independent Research I (not repeatable)	1 to 4
BIOL 3082	Independent Research II	1 to 4
BIOL 3181	Cooperative Research in Biochemistry	3
BIOL 3281	Cooperative Research in Biochemistry	3
BIOL 3681	Cooperative Studies	2 to 4

## Distinction in the Major

Distinction in Neuroscience is awarded based upon the completion of two semesters of BIOL 4591, submission of a paper, a poster presentation, AND maintaining a GPA of 3.2.

## Suggested Academic Plan

### Bachelor of Science in Neuroscience: Cellular & Molecular

#### Requirements for New Students starting in the 2020-2021 Academic Year

Year 1		Credit Hours
<b>Fall</b>		
Select one of the following:		4
CHEM 1031 & CHEM 1033	General Chemistry I	
CHEM 1951 & CHEM 1953	Honors General Chemical Science I (F)	
MATH 1041 or 1941	Calculus I	4
SCTC 1001	CST First Year Seminar	1
General Education/Elective Credits		6
Term Credit Hours		15

**Spring**

BIOL 1111 or 1911	Introduction to Organismal Biology	4
Select one of the following:		4
CHEM 1032 & CHEM 1034	General Chemistry II	
CHEM 1952 & CHEM 1954	Honors General Chemical Science 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	
General Education/Elective Credits		3
	Term Credit Hours	15

**Year 2****Fall**

BIOL 2112 or 2912	Introduction to Cellular and Molecular Biology	4
Select one of the following:		4
CHEM 2201 & CHEM 2203	Organic Chemistry I	
CHEM 2211 & CHEM 2213	Organic Chemistry for Majors I	
CHEM 2921 & CHEM 2923	Organic Chemistry for Honors I (F)	
General Education/Elective Credits		8
	Term Credit Hours	16

**Spring**

BIOL 2296	Genetics [WI] (S)	4
BIOL 3352	Systems Neuroscience	3
Select one of the following:		4
CHEM 2202 & CHEM 2204	Organic Chemistry II	
CHEM 2212 & CHEM 2214	Organic Chemistry for Majors II	
CHEM 2922 & CHEM 2924	Organic Chemistry for Honors II (S)	
General Education/Elective Credits		4
	Term Credit Hours	15

**Year 3****Fall**

BIOL 3096	Cell Structure and Function [WI] (F)	4
Neuroscience Elective <sup>1</sup>		3-4
PHYS 2021 or 2921	General Physics I	4
General Education/Elective Credits		4-3
	Term Credit Hours	15

**Spring**

BIOL 3358	Cellular and Molecular Neuroscience (S)	3
Neuroscience Elective <sup>1</sup>		3-4
PHYS 2022 or 2922	General Physics II	4
General Education/Elective Credits		5-4
	Term Credit Hours	15

**Year 4****Fall**

BIOL 4591	Research in Neuroscience (or Neuroscience Independent Study) <sup>2</sup>	3-4
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Neuroscience Elective <sup>1</sup>		3-4
Neuroscience Elective <sup>1</sup>		3-4
General Education/Elective Credits		7-4
Term Credit Hours		16
<b>Spring</b>		
BIOL 4591	Research in Neuroscience (or Neuroscience Independent Study) <sup>2</sup>	3-4
Neuroscience Elective <sup>1</sup>		3-4
General Education/Elective Credits		10-8
Term Credit Hours		16
Total Credit Hours:		123

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

<sup>1</sup> Select from the Neuroscience Electives list under Requirements.

<sup>2</sup> Neuroscience Research/Independent Study courses 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 Neuroscience Research, BIOL 4591. Students are required to have BOTH a B- or above in BIOL 3352 AND a Science GPA of 3.0 to take Independent Study in Neuroscience. The Science GPA consists of all required courses in Biology, Calculus, Chemistry, and Physics.