

# Biology with Teaching BS

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## Overview

Biology spans a continuum of organization from molecules and cells to individuals and ecosystems. The Department of Biology offers programs designed to give students a broad base, while allowing a measure of sub-field specialization. All Biology majors are required to take a two-semester series of "Introduction to Biology" classes, plus a course in Genetics. In addition, students have the choice of Cell Biology, Biochemistry, or Molecular Biology, and Ecology or Evolution as part of their core program requirements, followed by upper-level electives.

The **Bachelor of Science in Biology with Teaching** is part of Temple's innovative "TUteach" secondary education teacher-training program. The BS in Biology with Teaching provides broad training in Biology and prepares students for a career in secondary school teaching, further graduate study or an entry level position as a biologist. The education courses in this major include supervised teaching in school district classrooms and emphasize inquiry-based approaches to learning. Students in the BS in Biology with Teaching degree program become *eligible* for a Pennsylvania teacher certification when they complete all the requirements for the degree that include theoretical and practical courses in education specifically designed for science and mathematics majors. In order to be *recommended* for Pennsylvania teacher certification, students must graduate with:

1. a BS with Teaching degree and
2. meet GPA and testing requirements of the state of Pennsylvania.

Students will be scheduled once each semester to meet with the TUteach advisor to ensure that students have knowledge of academic programming, internships opportunities and testing options that include test preparation. The state of Pennsylvania has specific candidacy requirements. The TUteach advisor will also help the students complete and submit the candidacy documents. All students joining the program in their freshman year must complete the PAPA examination or acquire the PAPA waiver within their first 72 credits. Transfer students, from within Temple and those from other institutions, will build a tailored program with the academic and testing benchmarks structured for efficient degree completion with the TUteach advisor. Students are encouraged to complete the appropriate PRAXIS II examination prior to student teaching. Students are encouraged to take internship courses to expand their teaching portfolio or select elective courses that will extend their knowledge of science and teaching practice.

**Campus Location:** Main

**Program Code:** ST-BITC-BS

## Distinction in Major

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

- achieve a minimum 3.5 major GPA;
- achieve a minimum 3.2 GPA in all Biology courses;
- achieve a minimum 3.9 GPA in the following courses:
  - SCES 2189 or SCTC 3485
  - SCES 4189 or SCTC 4485
  - EDUC 4802
  - EDUC 4388
- write a final research paper either in a topic combining both major content and pedagogy or a topic focused on research in Biology; and
- present at a departmental research poster session.

## Undergraduate Contact Information

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Learn more about the Bachelor of Science in Biology with Teaching.

*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 (124 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
MGSE 3796	Differentiated Literacy Instruction in the Disciplines (grades 7-12)	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 TUteach majors receive a waiver for 1 Human Behavior (GB), 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 (95-99 s.h.)<sup>1</sup>

At least 9 courses required for the major must be completed at Temple. At least 5 Biology courses and 3 Education courses must be completed at Temple. Though not required, students are strongly encouraged to increase training and field work experience by enrolling in SCTC 1385,

SCTC 2385, or SCTC 2389. Students will also benefit from directed laboratory projects offered through SCTC 3185. These courses are offered every semester.

Code	Title	Credit Hours
<b>Biology</b>		
BIOL 1111 or BIOL 1911	Introduction to Organismal Biology Honors Introduction to Organismal Biology	4
Select one of the following:		4
BIOL 1112 or BIOL 1912	Introduction to Biomolecules, Cells and Genomes Honors Introduction to Biomolecules, Cells and Genomes	
BIOL 2112 or BIOL 2912	Introduction to Cellular and Molecular Biology Honors Introduction to Cellular and Molecular Biology	
BIOL 2207	Genetics (S)	3
BIOL 2297	Research Techniques in Genetics (WI, S) <sup>2</sup>	3
Select one of the following:		3
BIOL 2227	Principles of Ecology	
BIOL 3101	Evolution (F)	
BIOL 3091	Research Methods (S)	3
Select one of the following:		3-4
BIOL 3324	Molecular Biology	
BIOL 3204	Cell Structure and Function (F)	
BIOL 4375	General Biochemistry I	
Three upper level Biology electives at the 2200 level or above <sup>3</sup>		9-12
<b>Chemistry</b>		
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)	
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
CHEM 2201 & CHEM 2203	Organic Chemistry I and Organic Chemistry Laboratory I	
CHEM 2921 & CHEM 2923	Organic Chemistry for Honors I and Organic Honors Laboratory I (F)	
Select one of the following:		4
CHEM 2202 & CHEM 2204	Organic Chemistry II and Organic Chemistry Laboratory II	
CHEM 2922 & CHEM 2924	Organic Chemistry for Honors II and Organic Honors Laboratory II (S)	
<b>Mathematics</b>		
MATH 1041 or MATH 1941	Calculus I Honors Calculus I	4
Select one of the following:		4
MATH 1042 or MATH 1942	Calculus II Honors Calculus II	
MATH 1044	Introduction to Probability and Statistics for the Life Sciences	
<b>Physics</b>		
Select one of the following:		4
PHYS 1021	Introduction to General Physics I	

PHYS 1061 or PHYS 1961	Elementary Classical Physics I Honors Elementary Classical Physics I	
PHYS 2021 or PHYS 2921	General Physics I Honors General Physics I	
Select one of the following:		4
PHYS 1022	Introduction to General Physics II	
PHYS 1062 or PHYS 1962	Elementary Classical Physics II Honors Elementary Classical Physics II	
PHYS 2022 or PHYS 2922	General Physics II Honors General Physics II	
<b>College of Science and Technology</b>		
SCTC 1013	Elements of Data Science for the Physical and Life Sciences	3
SCTC 1389	Step 1 and 2: Inquiry-Based Lesson Design in Science and Mathematics Modified for English Learners	2
SCTC 3001	History of Science	3
SCTC 3312	Coding STEM Lessons <sup>4</sup>	1
<b>Education</b>		
EDUC 2179	Knowing and Learning in Mathematics and Science	3
EDUC 4388	TUteach Apprentice Teaching	4
EDUC 4802	TUteach Apprentice Teaching Seminar	3
MGSE 3796	Differentiated Literacy Instruction in the Disciplines (grades 7-12)	3
MGSE 2189 or SCTC 3485	Classroom Interactions (S) Science and Mathematics in the Classroom	3
MGSE 4189 or SCTC 4485	Project-Based Instruction (F) Integrating STEM Practice in Diverse Teaching Environments	3
SPED 2231	Introduction to Special Education	3
<b>Total Credit Hours</b>		<b>95-99</b>

Code	Title	Credit Hours
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(F) - Fall only course

(S) - Spring only course

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The certification requirements need to meet Pennsylvania Department of Education standards and are subject to change. All students are strongly recommended to check with the TUteach Advisor in the College of Science and Technology to affirm the requirements that pertain to their specific major. In addition, students should check the *Undergraduate Bulletin* web site for the most current information about these programs or the TUteach web site. It is also recommended that all students meet with an advisor before enrolling in classes specific to these majors and leading to certification as a teacher. This is to assure that a candidate's intended program of study will be compatible with the new requirements.

2

This course has a co-requisite of BIOL 2207.

3

See course descriptions for exceptions.

4

All students are required to take a minimum of one credit.

**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 Biology with Teaching

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

Year 1		Credit Hours
<b>Fall</b>		
BIOL 1111 or BIOL 1911	Introduction to Organismal Biology or Honors Introduction to Organismal Biology	4
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)	
SCTC 1001	CST First Year Seminar	1
SCTC 1013	Elements of Data Science for the Physical and Life Sciences	3
SCTC 1389	Step 1 and 2: Inquiry-Based Lesson Design in Science and Mathematics Modified for English Learners	2
GenEd Breadth Course		3
<b>Credit Hours</b>		<b>17</b>
<b>Spring</b>		
Select one of the following:		4
BIOL 1112 or BIOL 1912	Introduction to Biomolecules, Cells and Genomes or Honors Introduction to Biomolecules, Cells and Genomes	
BIOL 2112 or BIOL 2912	Introduction to Cellular and Molecular Biology or Honors Introduction to Cellular and Molecular Biology	
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)	
MATH 1041 or MATH 1941	Calculus I or Honors Calculus I	4
ENG 0802 or ENG 0812 or ENG 0902	Analytical Reading and Writing or Analytical Reading and Writing: ESL or Honors Writing About Literature	4
<b>Credit Hours</b>		<b>16</b>
<b>Year 2</b>		
<b>Fall</b>		
Select one of the following:		3
BIOL 2227	Principles of Ecology	
BIOL 3101	Evolution (F)	
Select one of the following:		4
CHEM 2201 & CHEM 2203	Organic Chemistry I and Organic Chemistry Laboratory I	
CHEM 2921 & CHEM 2923	Organic Chemistry for Honors I and Organic Honors Laboratory I (F)	
EDUC 2179	Knowing and Learning in Mathematics and Science	3
SPED 2231	Introduction to Special Education	3
IH 0851 or IH 0951	Intellectual Heritage I: The Good Life or Honors Intellectual Heritage I: The Good Life	3
<b>Credit Hours</b>		<b>16</b>
<b>Spring</b>		
Select one of the following:		4
MATH 1042 or MATH 1942	Calculus II or Honors Calculus II	

MATH 1044	Introduction to Probability and Statistics for the Life Sciences	
BIOL 2207	Genetics (S)	3
BIOL 2297	Research Techniques in Genetics (S)	3
Select one of the following:		4
CHEM 2202 & CHEM 2204	Organic Chemistry II and Organic Chemistry Laboratory II	
CHEM 2922 & CHEM 2924	Organic Chemistry for Honors II and Organic Honors Laboratory II (S)	
MGSE 3796	Differentiated Literacy Instruction in the Disciplines (grades 7-12)	3
<b>Credit Hours</b>		<b>17</b>

**Year 3****Fall**

Select one of the following:		3-4
BIOL 3204	Cell Structure and Function (F)	
BIOL 3324	Molecular Biology	
BIOL 4375	General Biochemistry I	
Select one of the following:		4
PHYS 1021	Introduction to General Physics I	
PHYS 1061 or PHYS 1961	Elementary Classical Physics I or Honors Elementary Classical Physics I	
PHYS 2021 or PHYS 2921	General Physics I or Honors General Physics I	
SCTC 3001	History of Science	3
IH 0852 or IH 0952	Intellectual Heritage II: The Common Good or Honors Intellectual Heritage II: The Common Good	3
GenEd Breadth Course		3
Elective		1-0
<b>Credit Hours</b>		<b>17</b>

**Spring**

BIOL 3091	Research Methods (S)	3
Select one of the following:		4
PHYS 1022	Introduction to General Physics II	
PHYS 1062 or PHYS 1962	Elementary Classical Physics II or Honors Elementary Classical Physics II	
PHYS 2022 or PHYS 2922	General Physics II or Honors General Physics II	
Select one of the following:		3
MGSE 2189	Classroom Interactions (S)	
SCTC 3485	Science and Mathematics in the Classroom	
GenEd Breadth Course		3
Elective		2
<b>Credit Hours</b>		<b>15</b>

**Year 4****Fall**

Upper-Level 2200+ Biology Elective <sup>1</sup>		3
Upper-Level 2200+ Biology Elective <sup>1</sup>		3-4
SCTC 3312	Coding STEM Lessons <sup>2</sup>	1
Select one of the following:		3
MGSE 4189	Project-Based Instruction (F)	
SCTC 4485	Integrating STEM Practice in Diverse Teaching Environments	
GenEd Breadth Course		3-4
Elective		2-0
<b>Credit Hours</b>		<b>15</b>

**Spring**

Upper-Level 2200+ Biology Elective <sup>1</sup>		3
EDUC 4388	TUteach Apprentice Teaching	4
EDUC 4802	TUteach Apprentice Teaching Seminar	3
Elective		1
<b>Credit Hours</b>		<b>11</b>
<b>Total Credit Hours</b>		<b>124</b>

<b>Code</b>	<b>Title</b>	<b>Credit Hours</b>
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- (F) - Fall only course
- (S) - Spring only course

**1**  
See course descriptions for exceptions. If the student has taken the necessary prerequisite courses, some of the Biology elective courses may be taken before the Fall semester of Year 4.

**2**  
All students are required to take a minimum of one credit.