Biology with Teaching, B.S.

The B.S. with Teaching in Biology is part of Temple's innovative "TUteach" secondary education teacher-training program. The B.S. with Teaching provides broad training in Biology, and prepares students for a career in secondary school teaching. The education courses in the B.S. with Teaching include supervised teaching in school district classrooms and emphasize inquiry-based approaches to learning. Students in the B.S. 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 B.S. with Teaching degree
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 insure 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. Finally, students are encouraged to complete the appropriate PRAXIS II examination prior to student teaching.

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215-204-8851

Dr. Joel Sheffield, Content Advisor
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First Year Students/Sophomore Year Students
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Summary of Requirements for the Degree

1. University Requirements (124 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:
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOL 2296</td>
<td>Genetics (S)</td>
<td>4</td>
</tr>
<tr>
<td>BIOL 3096</td>
<td>Cell Structure and Function (F)</td>
<td></td>
</tr>
<tr>
<td>BIOL 3396</td>
<td>Scientific Writing for Biology: The Art of Communicating</td>
<td></td>
</tr>
<tr>
<td>PHIL 2196</td>
<td>Perspectives on Science and Mathematics</td>
<td></td>
</tr>
<tr>
<td>SECE 3796</td>
<td>Differentiated Literacy Instruction in the Disciplines, 7-12</td>
<td></td>
</tr>
</tbody>
</table>

- Students must complete the General Education (GenEd) requirements.
  - See the General Education (http://bulletin.temple.edu/undergraduate/general-education) section of the Undergraduate Bulletin for the GenEd curriculum.
  - Students who complete TUteach majors typically 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 (http://bulletin.temple.edu/undergraduate/academic-policies/academic-residency-requirements).

2. College Requirements
   - 90 credits within the College of Science & Technology (CST) or the College of Liberal Arts (CLA).
   - 45 Upper Level (2000+) credits within the College of Science & Technology (CST) or the College of Liberal Arts (CLA).

3. Major Requirements for Bachelor of Science (91-94 s.h.)
   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.

**Biology**

<table>
<thead>
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<tbody>
<tr>
<td>BIOL 1111</td>
<td>Introduction to Biology I</td>
<td>4</td>
</tr>
<tr>
<td>or BIOL 1911</td>
<td>Honors Introduction to Biology I</td>
<td></td>
</tr>
<tr>
<td>BIOL 2112</td>
<td>Introduction to Biology II</td>
<td>4</td>
</tr>
<tr>
<td>or BIOL 2912</td>
<td>Honors Introduction to Biology II</td>
<td></td>
</tr>
<tr>
<td>BIOL 2296</td>
<td>Genetics (S)</td>
<td>4</td>
</tr>
<tr>
<td>BIOL 2227</td>
<td>Principles of Ecology (S)</td>
<td>3</td>
</tr>
<tr>
<td>BIOL 3091</td>
<td>Research Methods (S)</td>
<td>3</td>
</tr>
<tr>
<td>BIOL 3096</td>
<td>Cell Structure and Function (F)</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>Three upper level Biology electives at the 2200 level or above</td>
<td>9-12</td>
</tr>
</tbody>
</table>

**Chemistry**

Select one of the following:

<table>
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<tr>
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</tr>
</thead>
<tbody>
<tr>
<td>CHEM 1031</td>
<td>General Chemistry I</td>
<td>4</td>
</tr>
<tr>
<td>&amp; CHEM 1033</td>
<td>and General Chemistry Laboratory I</td>
<td></td>
</tr>
<tr>
<td>CHEM 1951</td>
<td>Honors General Chemical Science I</td>
<td>3</td>
</tr>
<tr>
<td>&amp; CHEM 1953</td>
<td>and Honors Chemical Science Laboratory I (F)</td>
<td></td>
</tr>
</tbody>
</table>

Select one of the following:

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<tr>
<td>CHEM 1032</td>
<td>General Chemistry II</td>
<td>4</td>
</tr>
<tr>
<td>&amp; CHEM 1034</td>
<td>and General Chemistry Laboratory II</td>
<td></td>
</tr>
<tr>
<td>CHEM 1952</td>
<td>Honors General Chemical Science II</td>
<td>3</td>
</tr>
<tr>
<td>&amp; CHEM 1954</td>
<td>and Honors Chemical Science Laboratory II (S)</td>
<td></td>
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</tbody>
</table>

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<tbody>
<tr>
<td>CHEM 2201</td>
<td>Organic Chemistry I</td>
<td>4</td>
</tr>
<tr>
<td>&amp; CHEM 2203</td>
<td>and Organic Chemistry Laboratory I</td>
<td></td>
</tr>
<tr>
<td>CHEM 2211</td>
<td>Organic Chemistry for Majors I</td>
<td>4</td>
</tr>
<tr>
<td>&amp; CHEM 2213</td>
<td>and Organic Majors Laboratory I</td>
<td></td>
</tr>
<tr>
<td>CHEM 2921</td>
<td>Organic Chemistry for Honors I</td>
<td>4</td>
</tr>
<tr>
<td>&amp; CHEM 2923</td>
<td>and Organic Honors Laboratory I (F)</td>
<td></td>
</tr>
</tbody>
</table>

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<tr>
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<tbody>
<tr>
<td>CHEM 2202</td>
<td>Organic Chemistry II</td>
<td>4</td>
</tr>
<tr>
<td>&amp; CHEM 2204</td>
<td>and Organic Chemistry Laboratory II</td>
<td></td>
</tr>
<tr>
<td>CHEM 2212</td>
<td>Organic Chemistry for Majors II</td>
<td>4</td>
</tr>
<tr>
<td>&amp; CHEM 2214</td>
<td>and Organic Majors Laboratory II</td>
<td></td>
</tr>
</tbody>
</table>
CHEM 2922 & CHEM 2924
Organic Chemistry for Honors II and Organic Honors Laboratory II (S)

Mathematics
MATH 1041
Calculus I
or MATH 1941
Honors Calculus I

Select one of the following:
MATH 1044
Introduction to Probability and Statistics for the Life Sciences
MATH 1042
Calculus II
MATH 1942
Honors Calculus II

Physics
PHYS 2021
General Physics I
or PHYS 2921
Honors General Physics I
PHYS 2022
General Physics II
or PHYS 2922
Honors General Physics II

College of Science and Technology
SCTC 1389
Step 1 and 2: Inquiry-Based Lesson Design in Science and Mathematics Modified for English Learners
SCTC 3312
Coding STEM Lessons

Education
EDUC 2179
Knowing and Learning in Mathematics and Science
EDUC 4388
TUteach Apprentice Teaching
EDUC 4802
TUteach Apprentice Teaching Seminar
SCES 2189
Classroom Interactions (S)
or SCTC 3485
Science and Mathematics in the Classroom
SCES 4189
Project-Based Instruction (F)
or SCTC 4485
Integrating STEM Practice in Diverse Teaching Environments
SECE 3796
Differentiated Literacy Instruction in the Disciplines, 7-12
SPED 2231
Introduction to Inclusive Education

Philosophy/History
Select one of the following:
PHIL 2196
Perspectives on Science and Mathematics
SCTC 3001
History of Science

Total Credit Hours
91-94

(F) - Fall only course
(S) - Spring only course

1 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 (http://cst.temple.edu/academics/accelerated-programs/tuteach). 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 See course descriptions for exceptions.

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

Note: A grade of C or higher in CHEM 1031 and CHEM 1032 is required to take BIOL 1111 and 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. BIOL 3091 is not available for major credit.

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.
**Distinction in Major**

To graduate with a Distinction in Biology with Teaching, students must meet the following requirements:

1. Achieve a 3.50 GPA or better for the aggregate of courses required for the B.S. in Biology with Teaching.

2. Achieve a 3.20 GPA or better in the Biology coursework.

3. Achieve a 3.90 GPA in the following courses:

   - SCES 2189  
     Classroom Interactions  
     or SCTC 3485  
     Science and Mathematics in the Classroom

   - SCES 4189  
     Project-Based Instruction  
     or SCTC 4485  
     Integrating STEM Practice in Diverse Teaching Environments

   - EDUC 4802  
     TUtach Apprentice Teaching Seminar

   - EDUC 4388  
     TUtach Apprentice Teaching

4. Write a final research paper either in a topic combining both major content and pedagogy or a topic focused on research in Biology. They must present their research for evaluation and present at a departmental research poster session before graduation. Consult the undergraduate TUtach advisor for more details.

**Suggested Academic Plan**

**Bachelor of Science in Biology with Teaching**

**Requirements for New Students starting in the 2017-2018 Academic Year**

| Year 1 |  
|---|---|
| **Fall** |  
| Select one of the following: | Credit Hours |
| CHEM 1031 & CHEM 1033 | 4 |
| CHEM 1951 & CHEM 1953 | 4 |
| MATH 1041 or 1941 | 4 |
| SCTC 1389 | 2 |
| General Education/Elective Credits | 6 |
| **Term Credit Hours** | 16 |

| Spring |  
|---|---|
| BIOL 1111 or 1911 | Introduction to Biology I | 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 | 4 |
| **Term Credit Hours** | 16 |

<p>| Year 2 |<br />
|---|---|
| <strong>Fall</strong> |<br />
| BIOL 2112 or 2912 | Introduction to Biology II | 4 |
| Select one of the following: | 4 |
| CHEM 2201 &amp; CHEM 2203 | Organic Chemistry I |</p>
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<td>Organic Chemistry for Honors I (F)</td>
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<td>EDUC 2179</td>
<td>Knowing and Learning in Mathematics and Science</td>
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<tr>
<td>SPED 2231</td>
<td>Introduction to Inclusive Education</td>
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</tr>
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</table>

**Spring**

Select one of the following: 3-4

- BIOL 2227 Principles of Ecology (S)
- BIOL 2296 Genetics [WI] (S)

Select one of the following: 4

- CHEM 2202 Organic Chemistry II
- CHEM 2204
- CHEM 2212 Organic Chemistry for Majors II
- CHEM 2214
- CHEM 2922 Organic Chemistry for Honors II (S)
- CHEM 2924

SECE 3796 Differentiated Literacy Instruction in the Disciplines, 7-12 [WI] | 3 |

General Education/Elective Credits | 7-6 |

**Year 3**

**Fall**

BIOL 3096 Cell Structure and Function [WI] (F) | 4 |

PHYS 2021 or 2921 General Physics I | 4 |

Select one of the following: 3 |

- PHIL 2196 Perspectives on Science and Mathematics [WI]
- SCTC 3001 History of Science

General Education/Elective Credits | 6 |

**Spring**

BIOL 3091 Research Methods (S) | 3 |

PHYS 2022 or 2922 General Physics II | 4 |

Select one of the following: 3-4 |

- BIOL 2227 Principles of Ecology (S)
- BIOL 2296 Genetics [WI] (S)

Select one of the following: 3 |

- SCES 2189 Classroom Interactions (S)
- SCTC 3485 Science and Mathematics in the Classroom

General Education/Elective Credits | 4-3 |

**Year 4**

**Fall**

Upper-Level 2200+ Biology Elective¹ | 3-4 |

Upper-Level 2200+ Biology Elective¹ | 3-4 |

SCTC 3312 Coding STEM Lessons² | 1 |

Select one of the following: 3 |

- SCES 4189 Project-Based Instruction (F)
- SCTC 4485 Integrating STEM Practice in Diverse Teaching Environments

General Education/Elective Credits | 6-4 |

**Spring**

Upper-Level 2200+ Biology Elective¹ | 3-4 |
EDUC 4388  TUteach Apprentice Teaching  6
EDUC 4802  TUteach Apprentice Teaching Seminar  1

General Education/Elective Credits  1-0

Term Credit Hours  11

Total Credit Hours:  124

(F) - Fall only course
(S) - Spring only course

1 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. While not required, BIOL 3101 Evolution is highly recommended as one of three Biology electives.

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