General Science with Teaching, B.S.

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

The B.S. with Teaching in General Science is part of Temple's innovative "TUteach" secondary education teacher-training program. The B.S. with Teaching provides broad training in general science and prepares students for a career in secondary school teaching or an entry level laboratory position. 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 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.

Undergraduate Contact Information:

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Summary of Requirements for the Degree

1. University Requirements (124 total s.h.)
   • Students must complete all University requirements including those listed below.
   • All Temple students must take a minimum of two writing-intensive courses at Temple as part of their major. The specific writing-intensive course options for this major are:

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>SCTC 2396</td>
<td>Writing for Science and Technology</td>
<td>3</td>
</tr>
<tr>
<td>MGSE 3796</td>
<td>Differentiated Literacy Instruction in the Disciplines (grades 7-12)</td>
<td>3</td>
</tr>
</tbody>
</table>

Alternative disciplinary writing-intensive course substitutions for SCTC 2396 may be approved by both the TUteach Program Director and CST faculty advisors in Biology, Chemistry, Earth and Environmental Science, or Physics. Following is a list of these alternative writing-intensive courses:
### General Science with Teaching, B.S.

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</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>4</td>
</tr>
<tr>
<td>BIOL 3396</td>
<td>Scientific Writing for Biology: The Art of Communicating</td>
<td>3</td>
</tr>
<tr>
<td>CHEM 4196</td>
<td>Techniques of Chemical Measurement II</td>
<td>5</td>
</tr>
<tr>
<td>CHEM 3397</td>
<td>Physical Chemistry Laboratory I</td>
<td>2</td>
</tr>
<tr>
<td>&amp; CHEM 3398</td>
<td>and Physical Chemistry Laboratory II</td>
<td></td>
</tr>
<tr>
<td>PHYS 2796</td>
<td>Introduction to Modern Physics (S)</td>
<td>4</td>
</tr>
<tr>
<td>PHYS 4796</td>
<td>Experimental Physics (S)</td>
<td>3</td>
</tr>
</tbody>
</table>

- Students must complete the General Education (GenEd) requirements.
  - Students who complete TUteach majors receive a waiver for 1 Human Behavior (GB), 2 Science & Technology (GS) and 1 Quantitative Literacy (GQ) GenEd courses.

2. **College Requirements**

- 45 Upper Level (2000+) credits within the College of Science & Technology (CST), the College of Liberal Arts (CLA) or the College of Engineering (ENG).
- 90 credits within the College of Science & Technology (CST), the College of Liberal Arts (CLA) or the College of Engineering (ENG).
- All students in the College of Science and Technology are required to take a one credit first year seminar. SCTC 1001 CST First Year Seminar is the appropriate course option for every entering first year CST major. Transfer students should use SCTC 2001 CST Transfer Seminar to fulfill this requirement. Other courses that fulfill this requirement may be found on the CST College Requirements page.

3. **Major Requirements for Bachelor of Science (84-92 s.h.)**

At least 9 courses required for the major must be completed at Temple. At least 6 courses in CST and 3 courses in Education 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.

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOL 1011</td>
<td>General Biology I (F)</td>
<td>4</td>
</tr>
<tr>
<td>BIOL 1012</td>
<td>General Biology II (S)</td>
<td>4</td>
</tr>
</tbody>
</table>

**Chemistry**

Select one of the following:

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
</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></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:

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<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></td>
</tr>
<tr>
<td>&amp; CHEM 1954</td>
<td>and Honors Chemical Science Laboratory II (S)</td>
<td></td>
</tr>
</tbody>
</table>

**Earth & Environmental Science**

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>EES 1001</td>
<td>Introductory Geology</td>
<td>4</td>
</tr>
<tr>
<td>or EES 2001</td>
<td>Physical Geology</td>
<td></td>
</tr>
</tbody>
</table>

**Mathematics**

Select one of the following:

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH 1031</td>
<td>Differential and Integral Calculus</td>
<td>4-8</td>
</tr>
<tr>
<td>MATH 1041</td>
<td>Calculus I</td>
<td></td>
</tr>
<tr>
<td>&amp; MATH 1042</td>
<td>and Calculus II</td>
<td></td>
</tr>
<tr>
<td>MATH 1041</td>
<td>Calculus I</td>
<td></td>
</tr>
<tr>
<td>&amp; MATH 1044</td>
<td>and Introduction to Probability and Statistics for the Life Sciences</td>
<td></td>
</tr>
</tbody>
</table>
MATH 1941 & MATH 1942  
Honors Calculus I and Honors Calculus II

Physics

PHYS 1004  
Introduction to Astronomy (F)  
3

PHYS 1021  
Introduction to General Physics I  
4

PHYS 1022  
Introduction to General Physics II  
4

Upper-Level Electives

Four Upper-Level (2000+) elective science courses  
12-16

College of Science and Technology

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 2396  
Writing for Science and Technology  
3

SCTC 3001  
History of Science  
3

SCTC 3312  
Coding STEM Lessons  
1

Education

EDUC 2179  
Knowing and Learning in Mathematics and Science  
3

EDUC 4388  
TUteach Apprentice Teaching  
6

EDUC 4802  
TUteach Apprentice Teaching Seminar  
1

MGSE 2189  
Classroom Interactions (S)  
3

or SCTC 3485  
Science and Mathematics in the Classroom  

MGSE 3796  
Differentiated Literacy Instruction in the Disciplines (grades 7-12)  
3

MGSE 4189  
Project-Based Instruction (F)  
3

or SCTC 4485  
Integrating STEM Practice in Diverse Teaching Environments  

SPED 2231  
Introduction to Special Education  
3

Research Methods

Select one of the following:  
3

BIOL/CHEM/EES/PHYS 3091  
Research Methods (S)  

Total Credit Hours  
84-92

(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. 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  The four science electives chosen to satisfy the science concentration must be taken from the same department. The departments from which you can choose electives are: Biology, Chemistry, Earth & Environmental Science or Physics. In the circumstance where a laboratory course is the complement of a lecture course, both must be completed to fulfill the requirement for ONE science elective.

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

4  The course must be selected from the same department as the four science electives.

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 CHEM 1027, for example.

Distinction in Major

To graduate with a Distinction in General Science with Teaching, students must:
1. Achieve a 3.50 GPA or better for the aggregate of courses required for the B.S. in General Science with Teaching.

2. Achieve a 3.33 GPA or better in all the content area courses in the major.

3. Complete at least one internship or laboratory project based course.

4. Achieve a 3.90 GPA in the following courses:

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>SCES 2189</td>
<td>Classroom Interactions</td>
<td>3</td>
</tr>
<tr>
<td>or SCTC 3485</td>
<td>Science and Mathematics in the Classroom</td>
<td></td>
</tr>
<tr>
<td>SCES 4189</td>
<td>Project-Based Instruction</td>
<td>3</td>
</tr>
<tr>
<td>or SCTC 4485</td>
<td>Integrating STEM Practice in Diverse Teaching Environments</td>
<td></td>
</tr>
<tr>
<td>EDUC 4802</td>
<td>TUtach Apprentice Teaching Seminar</td>
<td>1</td>
</tr>
<tr>
<td>EDUC 4388</td>
<td>TUtach Apprentice Teaching</td>
<td>6</td>
</tr>
</tbody>
</table>

Suggested Academic Plan

Bachelor of Science in General Science with Teaching

Requirements for New Students starting in the 2021-2022 Academic Year

Year 1

Fall

<table>
<thead>
<tr>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Term Credit Hours</td>
</tr>
<tr>
<td>16</td>
</tr>
</tbody>
</table>

Select one of the following:

- CHEM 1031 General Chemistry I
- CHEM 1033
- CHEM 1951 Honors General Chemical Science I (F)
- CHEM 1953

Select one of the following:

- MATH 1031 Differential and Integral Calculus
- MATH 1041 Calculus I
- MATH 1941 Honors Calculus I
- SCTC 1001 CST First Year Seminar
- SCTC 1013 Elements of Data Science for the Physical and Life Sciences
- SCTC 1389 Step 1 and 2: Inquiry-Based Lesson Design in Science and Mathematics Modified for English Learners
- Elective

Spring

Select one of the following:

- CHEM 1032 General Chemistry II
- CHEM 1034
- CHEM 1952 Honors General Chemical Science II (S)
- & CHEM 1954

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
- ENG 0802, 0812, or 0902 Analytical Reading and Writing [GW]
- GenEd Breadth Course
- Elective

Term Credit Hours

15

Year 2

Fall

<table>
<thead>
<tr>
<th>Credit Hours</th>
</tr>
</thead>
</table>

| Term Credit Hours |
| 15           |

BIOL 1011 General Biology I (F)

SPED 2231 Introduction to Special Education
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>EDUC 2179</td>
<td>Knowing and Learning in Mathematics and Science</td>
<td>3</td>
</tr>
<tr>
<td>EES 1001</td>
<td>Introductory Geology</td>
<td>4</td>
</tr>
<tr>
<td>EES 2001</td>
<td>Physical Geology</td>
<td>3</td>
</tr>
<tr>
<td>IH 0851 or 0951</td>
<td>Intellectual Heritage I: The Good Life [GY]</td>
<td>3</td>
</tr>
</tbody>
</table>

**Term Credit Hours**: 17

**Spring**

- BIOL 1012 | General Biology II (S) | 4
- Science 2000+ Elective² | 3-4
- MGSE 3796 | Differentiated Literacy Instruction in the Disciplines (grades 7-12) [WI] | 3
- IH 0852 or 0952 | Intellectual Heritage II: The Common Good [GZ] | 3
- GenEd Breadth Course | 4-3

**Year 3**

**Fall**

- PHYS 1021 | Introduction to General Physics I | 4
- Science 2000+ Elective² | 3-4
- SCTC 3001 | History of Science | 3
- SCTC 3312 | Coding STEM Lessons³ | 1
- GenEd Breadth Course | 3
- Elective | 2-1

**Term Credit Hours**: 17

**Spring**

- PHYS 1022 | Introduction to General Physics II | 4
- Select one of the following (S):² | 3
  - BIOL 3091 | Research Methods (S) |
  - CHEM 3091 | Research Methods (S) |
  - PHYS 3091 | Research Methods (S) |
  - EES 3091 | Research Methods (S) |
- Select one of the following: | 3
  - MGSE 2189 | Classroom Interactions (S) |
  - SCTC 3485 | Science and Mathematics in the Classroom |
  - SCTC 2396 | Writing for Science and Technology [WI] |
- Elective | 3

**Year 4**

**Fall**

- PHYS 1004 | Introduction to Astronomy (F) | 3
- Science 2000+ Elective² | 3-4
- Science 2000+ Elective² | 3-4
- 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
- Elective | 2-0

**Term Credit Hours**: 16

**Spring**

- EDUC 4388 | TUtach Apprentice Teaching | 6
- EDUC 4802 | TUtach Apprentice Teaching Seminar | 1
General Science with Teaching, B.S.

<table>
<thead>
<tr>
<th>Elective</th>
<th>Term Credit Hours</th>
<th>Total Credit Hours:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>3</td>
<td>124</td>
</tr>
</tbody>
</table>

1. Not required if MATH 1031 is completed.
2. The four science electives chosen to satisfy the science concentration must be taken from the same department. The departments from which you can choose electives are: Biology, Chemistry, Earth & Environmental Science or Physics. The Research Methods course must also be selected from the same department as the four electives. In the circumstance where a laboratory course is the complement of a lecture course, both must be completed to fulfill the requirement for ONE science elective.
3. All students are required to take a minimum of one credit.

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>(F)</td>
<td>(S)</td>
<td></td>
</tr>
<tr>
<td>Fall</td>
<td>Spring</td>
<td></td>
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<tr>
<td>only</td>
<td>only</td>
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<tr>
<td>course</td>
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