General Science with Teaching, B.S.

Learn more about the Bachelor of Science in General Science with Teaching (https://www.temple.edu/academics/degree-programs/general-science-with-teaching-major-st-gstc-bs).

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 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. 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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Assistant Professor
College of Science and Technology
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george.mehler@temple.edu

Kenneth Ruff, TUteach Faculty Advisor, Academic Programs Director
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kruff@temple.edu

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. The courses that can be used to satisfy the writing-intensive requirement for this major are: SCTC 2396 and SECE 3796. 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:

<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></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 (S)</td>
<td></td>
</tr>
<tr>
<td>CHEM 4196</td>
<td>Techniques of Chemical Measurement II</td>
<td></td>
</tr>
</tbody>
</table>
CHEM 3397 & CHEM 3398
Physical Chemistry Laboratory I and Physical Chemistry Laboratory II

PHIL 2196
Perspectives on Science and Mathematics

PHIL 2596
Philosophical Perspectives on the Environment

PHYS 2796
Introduction to Modern Physics (S)

PHYS 4796
Experimental Physics (S)

- 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).
- 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.

3. Major Requirements for Bachelor of Science (81-89 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. In addition, 2 of the 4 concentration area 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.

<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:

- 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:

- 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)

Earth & Environmental Science

- EES 1001
  Introductory Geology

or
- EES 2001
  Physical Geology

Mathematics

Select one of the following:

- MATH 1031
  Differential and Integral Calculus

- MATH 1041 & MATH 1042
  Calculus I and Calculus II

- MATH 1041 & MATH 1044
  Calculus I and Introduction to Probability and Statistics for the Life Sciences

- MATH 1941 & MATH 1942
  Honors Calculus I and Honors Calculus II

Physics
General Science with Teaching, B.S.

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>PHYS 1004</td>
<td>Introduction to Astronomy (F)</td>
<td>3</td>
</tr>
<tr>
<td>PHYS 1021</td>
<td>Introduction to General Physics I</td>
<td>4</td>
</tr>
<tr>
<td>PHYS 1022</td>
<td>Introduction to General Physics II</td>
<td>4</td>
</tr>
</tbody>
</table>

**Upper-Level Electives**

Four Upper-Level (2000+) elective science courses\(^2\) 12-16

**College of Science and Technology**

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>SCTC 1389</td>
<td>Step 1 and 2: Inquiry-Based Lesson Design in Science and Mathematics Modified for English Learners</td>
<td>2</td>
</tr>
<tr>
<td>SCTC 2396</td>
<td>Writing for Science and Technology</td>
<td>3</td>
</tr>
<tr>
<td>SCTC 3312</td>
<td>Coding STEM Lessons(^3)</td>
<td>1</td>
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**Education**

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
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</thead>
<tbody>
<tr>
<td>EDUC 2179</td>
<td>Knowing and Learning in Mathematics and Science</td>
<td>3</td>
</tr>
<tr>
<td>EDUC 4388</td>
<td>TUtEach Apprentice Teaching</td>
<td>6</td>
</tr>
<tr>
<td>EDUC 4802</td>
<td>TUtEach Apprentice Teaching Seminar</td>
<td>1</td>
</tr>
<tr>
<td>SCES 2189</td>
<td>Classroom Interactions (S)</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 (F)</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>SECE 3796</td>
<td>Differentiated Literacy Instruction in the Disciplines, 7-12</td>
<td>3</td>
</tr>
<tr>
<td>SPED 2231</td>
<td>Introduction to Inclusive Education</td>
<td>3</td>
</tr>
</tbody>
</table>

**Philosophy/History**

Select one of the following: 3

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>PHIL 2196</td>
<td>Perspectives on Science and Mathematics (WI)</td>
<td></td>
</tr>
<tr>
<td>SCTC 3001</td>
<td>History of Science</td>
<td></td>
</tr>
</tbody>
</table>

**Research Methods**

Select one of the following: 4 3

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOL/CHEM/EES/PHYS 3091</td>
<td>Research Methods (S)</td>
<td></td>
</tr>
</tbody>
</table>

Total Credit Hours 81-89

(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 (https://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 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 or SCTC 3485</td>
<td>Classroom Interactions or Science and Mathematics in the Classroom</td>
<td>3</td>
</tr>
<tr>
<td>SCES 4189 or SCTC 4485</td>
<td>Project-Based Instruction or Integrating STEM Practice in Diverse Teaching Environments</td>
<td>3</td>
</tr>
<tr>
<td>EDUC 4802</td>
<td>TUrach Apprentice Teaching Seminar</td>
<td>1</td>
</tr>
<tr>
<td>EDUC 4388</td>
<td>TUrach 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 2019-2020 Academic Year**

#### Year 1

**Fall**

Select one of the following: 4.

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

Select one of the following: 4.

- MATH 1031 Differential and Integral Calculus
- MATH 1041 Calculus I
- MATH 1941 Honors Calculus I
- SCTC 1001 CST First Year Seminar 1
- SCTC 1389 Step 1 and 2: Inquiry-Based Lesson Design in Science and Mathematics Modified for English Learners 2

General Education/Elective Credits 5

**Spring**

Select one of the following: 4.

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

Select one of the following: 1.

- MATH 1044 Introduction to Probability and Statistics for the Life Sciences
- MATH 1042 Calculus II
- MATH 1942 Honors Calculus II

General Education/Elective Credits 11-7

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**Year 2**

**Fall**

- BIOL 1011 General Biology I (F) 4
- SPED 2231 Introduction to Inclusive Education 3
- EDUC 2179 Knowing and Learning in Mathematics and Science 3

Select one of the following: 4.

- EES 1001 Introductory Geology
### Year 2
#### Spring
- **EES 2001** Physical Geology
- **General Education/Elective Credits** 3

<table>
<thead>
<tr>
<th>Term Credit Hours</th>
<th>17</th>
</tr>
</thead>
</table>

#### Fall
- **BIOL 1012** General Biology II (S) 4
- **Science 2000+ Elective** 3-4
- **SECE 3796** Differentiated Literacy Instruction in the Disciplines, 7-12 [WI] 3

<table>
<thead>
<tr>
<th>Term Credit Hours</th>
<th>17</th>
</tr>
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</table>

### Year 3
#### Fall
- **PHYS 1021** Introduction to General Physics I 4
- **Science 2000+ Elective** 3-4
- **Select one of the following:**
  - **PHIL 2196** Perspectives on Science and Mathematics [WI] 3
  - **SCTC 3001** History of Science 3

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

#### Spring
- **PHYS 1022** Introduction to General Physics II 4
- **Select one of the following (S):** 3
  - **BIOL 3091** Research Methods (S)
  - **CHEM 3091** Research Methods (S)
  - **PHYS 3091** Research Methods (S)
  - **EES 3091** Research Methods (S)

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

### Year 4
#### Fall
- **PHYS 1004** Introduction to Astronomy (F) 3
- **Science 2000+ Elective** 3-4
- **Select one of the following:** 3
  - **SCES 4189** Project-Based Instruction (F)
  - **SCTC 4485** Integrating STEM Practice in Diverse Teaching Environments

<table>
<thead>
<tr>
<th>Term Credit Hours</th>
<th>17</th>
</tr>
</thead>
</table>

#### Spring
- **EDUC 4388** TUteach Apprentice Teaching 6
- **EDUC 4802** TUteach Apprentice Teaching Seminar 1

<table>
<thead>
<tr>
<th>Term Credit Hours</th>
<th>10</th>
</tr>
</thead>
</table>

### Total Credit Hours: 124
General Science with Teaching, B.S.

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.

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