

# Mathematics and Technology with Teaching BS

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## Overview

The Department of Mathematics prepares students for careers, graduate study and professional programs requiring solid mathematical, quantitative or analytical skills.

The **Bachelor of Science in Mathematics and Technology with Teaching** is part of Temple's innovative "TUteach" secondary education teacher-training program. The BS in Mathematics and Technology with Teaching provides broad training in mathematics and prepares students for a career in secondary school teaching or an entry level position as a mathematics specialist. 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 Mathematics and Technology 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-MTTC-BS

## Distinction in Major

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

- achieve a minimum 3.25 cumulative GPA;
- achieve a minimum 3.50 major GPA;
- achieve a minimum 3.50 in the Mathematics courses required for the major;
- achieve a minimum 3.50 in the Engineering courses required for the major;
- successfully complete MATH 3141, MATH 3142 and MATH 4051 instead of MATH 3137 and MATH 3138;
- successfully complete MATH 3098 instead of MATH 3096;
- achieve a minimum 3.50 GPA in the following courses:
  - MATH 3098
  - MATH 3141
  - MATH 3142
  - MATH 4051
  - Any additional course from the following:
    - MATH 3043
    - MATH 3044
    - MATH 3101
    - Any 4000-level course other than Individual Study; and
- achieve a minimum 3.90 GPA in the following courses:
  - MAES 2189 or SCTC 4385
  - MAES 4189 or SCTC 4485
  - EDUC 4388
  - EDUC 4802.

## Undergraduate Contact Information

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Learn more about the Bachelor of Science in Mathematics and Technology 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
MATH 3096	Introduction to Modern Algebra	
MATH 4096	Senior Problem Solving	
MGSE 3796	Differentiated Literacy Instruction in the Disciplines (grades 7-12)	

- Students must complete the General Education (GenEd) requirements.
  - See the General Education section of the *Undergraduate Bulletin* for the GenEd curriculum.
  - Students who complete TUtach 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 (98-101 s.h.)<sup>1</sup>

At least 10 courses required for the major must be completed at Temple. At least 7 Math, 2 Engineering, 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>Mathematics</b>		
MATH 1041 or MATH 1941	Calculus I Honors Calculus I	4
MATH 1042 or MATH 1942	Calculus II Honors Calculus II	4
MATH 2021	Functions and Modeling (S)	3
MATH 2043 or MATH 2943	Calculus III Honors Calculus III	4
MATH 2061	Euclidean Geometry (S)	3
MATH 2101 or MATH 2103	Linear Algebra Linear Algebra with Computer Lab	3-4
MATH 2111	Basic Concepts of Math	3
MATH 3003	Theory of Numbers	3
MATH 3031	Probability Theory I	3
MATH 3096	Introduction to Modern Algebra	3
MATH 3137	Real & Complex Analysis I (F)	3
MATH 3138	Real & Complex Analysis II (S)	3
MATH 4096	Senior Problem Solving	3
One Mathematics 3000+ elective <sup>2</sup>		3
<b>Chemistry or Physics</b>		
Select one of the following sets: <sup>3</sup>		8
CHEM 1031 & CHEM 1033 & CHEM 1032 & CHEM 1034	General Chemistry I and General Chemistry Laboratory I and General Chemistry II and General Chemistry Laboratory II	
CHEM 1951 & CHEM 1953 & CHEM 1952 & CHEM 1954	Honors General Chemical Science I and Honors Chemical Science Laboratory I and Honors General Chemical Science II and Honors Chemical Science Laboratory II	
PHYS 1061 or PHYS 1961 or PHYS 2021 or PHYS 2921	Elementary Classical Physics I Honors Elementary Classical Physics I General Physics I Honors General Physics I	
and		
PHYS 1062 or PHYS 1962 or PHYS 2022 or PHYS 2922	Elementary Classical Physics II Honors Elementary Classical Physics II General Physics II Honors General Physics II	
<b>Engineering Foundation courses</b>		
Select one of the following:		3
ENGR 1101	Introduction to Engineering & Engineering Technology	

ENGR 1102	Introduction to Engineering Problem Solving	
ENGR 1901	Honors Introduction to Engineering	
ENGR 1117	Engineering Graphics	2

**Engineering Concentration Courses**

Select two courses within the same track: <sup>3</sup> 6-8

**Track 1 - Environment**

EES 2001	Physical Geology	
CEE 2711	Environmental Chemistry & Microbiology	
or CEE 3711	Environmental Engineering	

**Track 2 - Robotics**

ECE 2312	Electrical Engineering Science I	
& ECE 2313	and Electrical Engineering Science I Lab	
ECE 2612	Digital Circuit Design	
& ECE 2613	and Digital Circuit Design Laboratory	

**Track 3 - Energy**

ENGR 3571	Classical and Statistical Thermodynamics	
MEE 4575	Renewable and Alternative Energy	

**Track 4 - Bioengineering**

BIOE 2001	Frontiers in Bioengineering	
BIOE 3725	Cell Biology for Engineers	
or BIOL 3334	Mammalian Physiology	

**College of Science & 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 3001	History of Science	3
SCTC 3312	Coding STEM Lessons <sup>4</sup>	1

**Education**

EDUC 2179	Knowing and Learning in Mathematics and Science	3
EDUC 4388	TUteach Apprentice Teaching	4
EDUC 4802	TUteach Apprentice Teaching Seminar	3
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**

BIOL/CHEM/EES/PHYS 3091	Research Methods (S)	3
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**Total Credit Hours** **98-101**

Code	Title	Credit Hours
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(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

MATH 2041, MATH 2941, MATH 2045, or MATH 2121 may be used to fulfill the Mathematics elective at the 3000 level or above.

3

Most engineering concentration courses require either Chemistry or Physics as a prerequisite, so students should choose the course that best prepares them for their intended track. The Environment and Bioengineering tracks cannot be completed without the chemistry sequence, and the Robotics and Energy tracks cannot be completed without the physics sequence.

4

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

## Suggested Academic Plan

### Bachelor of Science in Mathematics and Technology with Teaching

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

Year 1		
Fall		Credit Hours
MATH 1041 or MATH 1941	Calculus I or Honors Calculus I	4
Select one of the following: <sup>1</sup>		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	
PHYS 1061	Elementary Classical Physics I	
PHYS 1961	Honors Elementary Classical Physics I (F)	
PHYS 2021	General Physics I	
PHYS 2921	Honors General Physics 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>
Spring		
MATH 1042 or MATH 1942	Calculus II or Honors Calculus II	4
Select one of the following: <sup>1</sup>		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	
PHYS 1062	Elementary Classical Physics II	
PHYS 1962	Honors Elementary Classical Physics II (S)	
PHYS 2022	General Physics II	
PHYS 2922	Honors General Physics II (S)	
Select one of the following:		3
ENGR 1101	Introduction to Engineering & Engineering Technology	
ENGR 1102	Introduction to Engineering Problem Solving	
ENGR 1901	Honors Introduction to Engineering	
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>15</b>
Year 2		
Fall		
MATH 2043 or MATH 2943	Calculus III or Honors Calculus III	4

MATH 2101 or MATH 2103	Linear Algebra or Linear Algebra with Computer Lab	3-4
ENGR 1117	Engineering Graphics	2
EDUC 2179	Knowing and Learning in Mathematics and Science	3
IH 0851 or IH 0951	Intellectual Heritage I: The Good Life or Honors Intellectual Heritage I: The Good Life	3
Elective		1-0
<b>Credit Hours</b>		<b>16</b>
<b>Spring</b>		
MATH 2021	Functions and Modeling (S)	3
MATH 2061	Euclidean Geometry (S)	3
MATH 2111	Basic Concepts of Math	3
SPED 2231	Introduction to Special Education	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
<b>Credit Hours</b>		<b>18</b>
<b>Year 3</b>		
<b>Fall</b>		
MATH 3003	Theory of Numbers	3
MATH 3137	Real & Complex Analysis I (F)	3
Engineering Concentration Elective <sup>1</sup>		3-4
SCTC 3001	History of Science	3
MGSE 3796	Differentiated Literacy Instruction in the Disciplines (grades 7-12)	3
Elective		1-0
<b>Credit Hours</b>		<b>16</b>
<b>Spring</b>		
MATH 3096	Introduction to Modern Algebra	3
MATH 3138	Real & Complex Analysis II (S)	3
Select one of the following:		3
MGSE 2189	Classroom Interactions (S)	
SCTC 3485	Science and Mathematics in the Classroom	
Select one of the following:		3
BIOL 3091	Research Methods (S)	
CHEM 3091	Research Methods (S)	
EES 3091	Research Methods (S)	
PHYS 3091	Research Methods (S)	
Engineering Concentration Elective <sup>1</sup>		3-4
Elective		1-0
<b>Credit Hours</b>		<b>16</b>
<b>Year 4</b>		
<b>Fall</b>		
Mathematics Elective (3000+) <sup>2</sup>		3
MATH 3031	Probability Theory I	3
MATH 4096	Senior Problem Solving	3
SCTC 3312	Coding STEM Lessons <sup>3</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
<b>Credit Hours</b>		<b>16</b>

Spring		
EDUC 4388	TUteach Apprentice Teaching	4
EDUC 4802	TUteach Apprentice Teaching Seminar	3
GenEd Breadth Course		3
Credit Hours		10
Total Credit Hours		124

1

The two (2) Engineering concentration electives must be chosen from the same track. See major requirements for details. Most engineering concentration courses require either Chemistry or Physics as a prerequisite, so students should choose the course that best prepares them for their intended track. The Environment and Bioengineering tracks cannot be completed without the chemistry sequence, and the Robotics and Energy tracks cannot be completed without the physics sequence.

2

MATH 2041, MATH 2941, MATH 2045, or MATH 2121 may be used to fulfill the Mathematics elective at the 3000 level or above.

3

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

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