# Electrical and Computer Engineering BSECE with Electrical Engineering Concentration

## Overview

The **Bachelor of Science in Electrical and Computer Engineering** is offered by the Department of Electrical and Computer Engineering. The program prepares students for careers as practicing engineers in areas such as digital systems, embedded processor applications, digital communications, control systems, sensor networks, biomedical signal processing, microelectronics, computer security and power networks. These careers are in applications, development, research, and design of electric and electronic systems and devices. Electrical and Computer Engineers are involved in the design and development of telecommunications networks, cellular telephones, computer and other microprocessor-based devices, consumer electronics, control systems for space vehicles and robots, and in many aspects of the power and automotive industries.

Electrical Engineering students must complete one of the following **concentrations**:

- Bioelectrical Engineering
- Computer Engineering
- Electrical Engineering

## Electrical Engineering Concentration

The **concentration in Electrical Engineering** prepares students for careers where they design, develop, test, and supervise the manufacture of electrical equipment, such as electric motors, radar and navigation systems, communications systems, and power generation equipment. Electrical engineers are responsible for designing new ways to use electrical power to develop or improve products, conducting detailed calculations for manufacturing, construction, and installation standards, and overseeing the manufacture, installation, and testing of electrical equipment to meet specifications and codes.

**Campus Location:** Main

**Program Code:** EN-ELCE-BSECE

## Accreditation

The Electrical and Computer Engineering (BS) program is accredited by the Engineering Accreditation Commission of ABET, https://www.abet.org, under the General Criteria and Program Criteria for Electrical, Computer, Communications, Telecommunication(s) and Similarly Named Engineering Programs. ABET is a non-profit and non-governmental accrediting agency for academic programs in the disciplines of applied science, computing, engineering, and engineering technology recognized by the Council for Higher Education Accreditation (CHEA).

## +1 Bachelor to Master's Accelerated Degree Program

High-achieving undergraduates can earn both a bachelor's degree and a master's degree within five years. Students apply for this program in sophomore year, and four graduate-level courses are taken in place of undergraduate requirements during junior and senior years. After the bachelor's degree is earned, one graduate-level course is taken in the summer followed by full-time study in the subsequent Fall and Spring semesters to complete the master's degree study. The following accelerated program is available:

- Bachelor of Science in Electrical and Computer Engineering with Electrical Engineering Concentration and Master of Science in Electrical Engineering

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*These requirements are for students who matriculated in academic year 2024-2025. Students who matriculated prior to fall 2024 should refer to the* Archives *to view the requirements for their Bulletin year.*

# Summary of Degree Requirements

## University Requirements

All new students are required to complete the university's General Education (GenEd) curriculum.

All Temple students must take a minimum of two writing-intensive courses for a total of at least six credits. The writing-intensive course credits are counted as part of the major; they are not General Education (GenEd) or elective credits. The writing-intensive courses must be completed at Temple University and students may not transfer in credits to satisfy this requirement. The specific writing-intensive courses required for this major are:

| Code | Title | Credit Hours |
|---|---|---|
| ENGR 2196 | Technical Communication | 3 |
| or ENGR 2996 | Honors Technical Communication | |
| ENGR 4296 | Capstone Senior Design Project | 3 |
| or ENGR 4996 | Honors Capstone Senior Design Project | |

## College Requirements

The degree of Bachelor of Science in Electrical and Computer Engineering with a concentration in Electrical Engineering may be conferred upon satisfactory completion of a minimum of 128 semester hours of credit with a minimum GPA of 2.0 overall and in the major. Students must also score a minimum grade of C- in each of the following courses before they can take other junior and senior level courses:

| Code | Title | Credit Hours |
|---|---|---|
| ECE 2342 | Circuits and Electronics I | 5 |
| ECE 2612 | Digital Circuit Design | 3 |
| ECE 3516 | Signals and Systems | 5 |
| or ECE 3916 | Honors Signals and Systems | |

## Program Requirements

| Code | Title | Credit Hours |
|---|---|---|
| **Required Math & Basic Science Courses** | | |
| MATH 1041 | Calculus I | 4 |
| or MATH 1941 | Honors Calculus I | |
| MATH 1042 | Calculus II | 4 |
| or MATH 1942 | Honors Calculus II | |
| MATH 2041 | Differential Equations I | 3 |
| or MATH 2941 | Honors Differential Equations I | |
| ECE 3522 | Stochastic Processes in Signals and Systems | 3 |
| ENGR 2011 | Engineering Analysis and Applications | 3 |
| ENGR 2013 | Engineering Analysis and Applications Lab | 1 |
| PHYS 1061 | Elementary Classical Physics I | 4 |
| or PHYS 1961 | Honors Elementary Classical Physics I | |
| PHYS 1062 | Elementary Classical Physics II | 4 |
| or PHYS 1962 | Honors Elementary Classical Physics II | |
| CHEM 1035 | Chemistry for Engineers | 3 |
| Select one of the following: | | 1 |
| CHEM 1033 | General Chemistry Laboratory I | |
| or CHEM 1953 | Honors Chemical Science Laboratory I | |
| CHEM 1036 | Chemistry Laboratory for Engineers | |
| **Required General Education Courses** | | |
| Select one of the following: | | 4 |
| ENG 0802 | Analytical Reading and Writing | |
| ENG 0812 | Analytical Reading and Writing: ESL | |
| ENG 0902 | Honors Analytical Reading and Writing | |

| IH 0851 | Intellectual Heritage I: The Good Life | 3 |
|---|---|---|
| or IH 0951 | Honors Intellectual Heritage I: The Good Life | |
| IH 0852 | Intellectual Heritage II: The Common Good | 3 |
| or IH 0952 | Honors Intellectual Heritage II: The Common Good | |
| GenEd 08xx or 09xx (U.S. Society) | | 3 |
| GenEd 08xx or 09xx (Global/World Society) | | 3 |
| GenEd 08xx or 09xx (Human Behavior) | | 3 |
| GenEd 08xx or 09xx (The Arts) | | 3 |
| GenEd 08xx or 09xx (Race and Diversity) | | 3 |
| **Required Electrical Engineering Courses** | | |
| ECE 1111 | Engineering Computation I | 4 |
| ECE 2342 | Circuits and Electronics I | 5 |
| ECE 2352 | Circuits and Electronics II | 5 |
| ECE 2612 | Digital Circuit Design | 3 |
| ECE 2613 | Digital Circuit Design Laboratory | 1 |
| ECE 3516 | Signals and Systems | 5 |
| or ECE 3916 | Honors Signals and Systems | |
| ECE 3612 | Processor Systems | 3 |
| or ECE 3914 | Honors Microprocessor Systems | |
| ECE 3613 | Processor Systems Laboratory | 1 |
| or ECE 3915 | Honors Microprocessor Systems Lab | |
| ECE 3712 | Introduction to Electromagnetic Fields and Waves | 3 |
| ECE 3822 | Engineering Computation II | 3 |
| **Required Engineering Courses** | | |
| ENGR 1001 | College of Engineering First Year Seminar | 1 |
| ENGR 1101 | Introduction to Engineering and Engineering Technology | 3 |
| or ENGR 1901 | Honors Introduction to Engineering | |
| ENGR 1102 | Introduction to Engineering Problem Solving | 3 |
| ENGR 2196 | Technical Communication (WI) | 3 |
| or ENGR 2996 | Honors Technical Communication | |
| ECE 4176 | Senior Design Project I: ECE | 3 |
| ENGR 4296 | Capstone Senior Design Project (WI) | 3 |
| or ENGR 4996 | Honors Capstone Senior Design Project | |
| **Required Elective Courses** | | |
| ECE Technical Electives - may use a combination of 3 credit and/or 4 credit courses | | 16 |
| Math, Science, or Engineering Electives | | 6 |
| Free Elective | | 2 |
| **Total Credit Hours** | | **128** |

## Suggested Academic Plan

Please note that this is a **suggested** academic plan. Depending on your situation, your academic plan may look different.

## Bachelor of Science in Electrical and Computer Engineering with Concentration in Electrical Engineering

### Suggested Plan for New Students Starting in the 2024-2025 Academic Year

| Year 1 | | |
|---|---|---|
| **Fall** | | **Credit Hours** |
| MATH 1041 | Calculus I | 4 |
| or MATH 1941 | or Honors Calculus I | |
| PHYS 1061 | Elementary Classical Physics I | 4 |
| or PHYS 1961 | or Honors Elementary Classical Physics I | |

| ENGR 1101<br>    or ENGR 1901 | Introduction to Engineering and Engineering Technology<br>    or Honors Introduction to Engineering | 3 |
|---|---|---|
| ENGR 1001 | College of Engineering First Year Seminar | 1 |
| ENG 0802<br>    or ENG 0812<br>    or ENG 0902 | Analytical Reading and Writing [GW]<br>    or Analytical Reading and Writing: ESL [GW]<br>    or Honors Analytical Reading and Writing [GW] | 4 |
| | **Credit Hours** | **16** |
| **Spring** | | |
| MATH 1042<br>    or MATH 1942 | Calculus II<br>    or Honors Calculus II | 4 |
| PHYS 1062<br>    or PHYS 1962 | Elementary Classical Physics II<br>    or Honors Elementary Classical Physics II | 4 |
| CHEM 1035 | Chemistry for Engineers | 3 |
| Select one of the following: | | 1 |
|     CHEM 1033<br>        or CHEM 1953 | General Chemistry Laboratory I<br>        or Honors Chemical Science Laboratory I | |
|     CHEM 1036 | Chemistry Laboratory for Engineers | |
| ENGR 1102 | Introduction to Engineering Problem Solving | 3 |
| | **Credit Hours** | **15** |
| **Year 2** | | |
| **Fall** | | |
| ENGR 2011 | Engineering Analysis and Applications | 3 |
| ENGR 2013 | Engineering Analysis and Applications Lab | 1 |
| ECE 1111 | Engineering Computation I | 4 |
| ECE 2342 | Circuits and Electronics I | 5 |
| IH 0851<br>    or IH 0951 | Intellectual Heritage I: The Good Life [GY]<br>    or Honors Intellectual Heritage I: The Good Life [GY] | 3 |
| | **Credit Hours** | **16** |
| **Spring** | | |
| MATH 2041<br>    or MATH 2941 | Differential Equations I<br>    or Honors Differential Equations I | 3 |
| ECE 2352 | Circuits and Electronics II | 5 |
| ECE 2612 | Digital Circuit Design | 3 |
| ECE 2613 | Digital Circuit Design Laboratory | 1 |
| IH 0852<br>    or IH 0952 | Intellectual Heritage II: The Common Good [GZ]<br>    or Honors Intellectual Heritage II: The Common Good [GZ] | 3 |
| | **Credit Hours** | **15** |
| **Year 3** | | |
| **Fall** | | |
| ECE 3516<br>    or ECE 3916 | Signals and Systems<br>    or Honors Signals and Systems | 5 |
| ECE 3612<br>    or ECE 3914 | Processor Systems<br>    or Honors Microprocessor Systems | 3 |
| ECE 3613<br>    or ECE 3915 | Processor Systems Laboratory<br>    or Honors Microprocessor Systems Lab | 1 |
| ENGR 2196<br>    or ENGR 2996 | Technical Communication [WI]<br>    or Honors Technical Communication [WI] | 3 |
| GenEd Breadth Course | | 3 |
| GenEd Breadth Course | | 3 |
| | **Credit Hours** | **18** |
| **Spring** | | |
| ECE 3522 | Stochastic Processes in Signals and Systems | 3 |
| ECE 3822 | Engineering Computation II | 3 |
| ECE Technical Elective #1 | | 3 |

| | | |
|---|---|---:|
| ECE Technical Elective #2 | | 4 |
| GenEd Breadth Course | | 3 |
| | **Credit Hours** | **16** |
| **Year 4** | | |
| **Fall** | | |
| ECE 3712 | Introduction to Electromagnetic Fields and Waves | 3 |
| ECE 4176 | Senior Design Project I: ECE | 3 |
| ECE Technical Elective #3 | | 3 |
| Math, Science, or Engineering Elective #1 | | 3 |
| GenEd Breadth Course | | 3 |
| Free Elective | | 2 |
| | **Credit Hours** | **17** |
| **Spring** | | |
| ENGR 4296<br>    or ENGR 4996 | Capstone Senior Design Project [WI]<br>    or Honors Capstone Senior Design Project [WI] | 3 |
| ECE Technical Elective #4 | | 3 |
| ECE Technical Elective #5 | | 3 |
| Math, Science, or Engineering Elective #2 | | 3 |
| GenEd Breadth Course | | 3 |
| | **Credit Hours** | **15** |
| | **Total Credit Hours** | **128** |

## ECE Technical Electives

| Code | Title | Credit Hours |
|---|---|---:|
| ECE 3412 | Classical Control Systems | 3 |
| ECE 3413 | Classical Control Laboratory | 1 |
| ECE 3432 | Robotic Control using Robotic Operating System (ROS) | 3 |
| ECE 3614 | Printed Circuit Board Design | 3 |
| ECE 3622 | Embedded System Design | 3 |
| ECE 3623 | Embedded System Design Laboratory | 1 |
| ECE 3732 | Electromechanical Energy Systems | 3 |
| ECE 3733 | Electromechanical Energy Systems Laboratory | 1 |
| ECE 3824 | Engineering Computation III | 3 |
| ECE 4110 | Special Topics | 1 to 4 |
| ECE 4312 | Microelectronics II | 3 |
| ECE 4322 | VLSI Systems Design | 3 |
| ECE 4412 | Modern Control Theory | 3 |
| ECE 4422 | Digital Control Systems | 3 |
| ECE 4512 | Digital Communication Systems | 3 |
| ECE 4513 | Digital Communication Systems Laboratory | 1 |
| ECE 4522 | Digital Signal Processing | 3 |
| ECE 4527 | Introduction to Machine Learning and Pattern Recognition | 3 |
| ECE 4532 | Data and Computer Communication | 3 |
| ECE 4542 | Telecommunications Engineering | 3 |
| ECE 4612 | Advanced Processor Systems | 3 |
| ECE 4712 | Power System Analysis | 3 |
| ECE 4722 | Power Electronics | 3 |
| ECE 4822 | Engineering Computation IV | 3 |

## Math, Science, or Engineering Electives

| Code | Title | Credit Hours |
|---|---|---|
| Any course 2000-level or above from the College of Science and Technology (CST), excluding MATH 2101, MATH 2103, CIS 3715, CIS 4526. | | 3 |
| Any course 2000-level or above from the College of Engineering. | | 3 |

# Accelerated Programs

Students may opt to pursue an accelerated +1 program, enabling them to complete both a bachelor's degree and master's degree in less time than the traditional route.

The following accelerated program may be of interest to students in the Electrical and Computer Engineering BSECE with Electrical Engineering concentration:

**College of Engineering**

- Electrical Engineering MSEE