Bachelor of Science in Electrical Engineering with Co-op

Learn more about the Bachelor of Science in Electrical Engineering (https://www.temple.edu/academics/degree-programs/electrical-engineering-major-en-ece-bsee).

Cooperative Education Program

A Cooperative Education (Co-Op) is an optional program available at the College of Engineering where you have the opportunity to gain professional work experience before graduation. It is designed to give you the chance to apply the knowledge learned in the classroom to real life problems. You will be exposed to the latest technology and new ideas at a worksite helping you understand your field of work more extensively. During the Co-Op, you will make valuable connections with professionals in your field. A cooperative education can enhance and strengthen you academically, professionally and personally.

Summary of Degree Requirements

University Requirements

All new students are required to complete the university's General Education (GenEd (http://bulletin.temple.edu/undergraduate/general-education)) 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:

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENGR 2196</td>
<td>Technical Communication</td>
<td>3</td>
</tr>
<tr>
<td>or ENGR 2996</td>
<td>Honors Technical Communication by Design</td>
<td></td>
</tr>
<tr>
<td>ENGR 4296</td>
<td>Senior Design Project II</td>
<td>3</td>
</tr>
<tr>
<td>or ENGR 4996</td>
<td>Honors Senior Design Project II</td>
<td></td>
</tr>
</tbody>
</table>

College Requirements

The degree of Bachelor of Science in Electrical Engineering with the optional Cooperative Education Program may be conferred upon satisfactory completion of a minimum of 134 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:

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>ECE 2332</td>
<td>Principles of Electric Circuits</td>
<td>4</td>
</tr>
<tr>
<td>ECE 2612</td>
<td>Digital Circuit Design</td>
<td>3</td>
</tr>
<tr>
<td>ECE 3512</td>
<td>Signals: Continuous and Discrete</td>
<td>4</td>
</tr>
</tbody>
</table>

Program Requirements

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH 1041</td>
<td>Calculus I</td>
<td>4</td>
</tr>
<tr>
<td>or MATH 1941</td>
<td>Honors Calculus I</td>
<td></td>
</tr>
<tr>
<td>MATH 1042</td>
<td>Calculus II</td>
<td>4</td>
</tr>
<tr>
<td>or MATH 1942</td>
<td>Honors Calculus II</td>
<td></td>
</tr>
<tr>
<td>MATH 2043</td>
<td>Calculus III</td>
<td>4</td>
</tr>
<tr>
<td>or MATH 2943</td>
<td>Honors Calculus III</td>
<td></td>
</tr>
<tr>
<td>MATH 3041</td>
<td>Differential Equations I</td>
<td>3</td>
</tr>
<tr>
<td>or MATH 3941</td>
<td>Honors Differential Equations I</td>
<td></td>
</tr>
<tr>
<td>ECE 3522</td>
<td>Stochastic Processes in Signals and Systems</td>
<td>3</td>
</tr>
<tr>
<td>ENGR 2011</td>
<td>Engineering Analysis &amp; Applications</td>
<td>3</td>
</tr>
</tbody>
</table>
Bachelor of Science in Electrical Engineering with Co-op

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>PHYS 1061</td>
<td>Elementary Classical Physics I</td>
<td>4</td>
</tr>
<tr>
<td>or PHYS 1961</td>
<td>Honors Elementary Classical Physics I</td>
<td></td>
</tr>
<tr>
<td>PHYS 1062</td>
<td>Elementary Classical Physics II</td>
<td>4</td>
</tr>
<tr>
<td>or PHYS 1962</td>
<td>Honors Elementary Classical Physics II</td>
<td></td>
</tr>
<tr>
<td>CHEM 1035</td>
<td>Chemistry for Engineers</td>
<td>3</td>
</tr>
<tr>
<td>CHEM 1033</td>
<td>General Chemistry Laboratory I</td>
<td>1</td>
</tr>
<tr>
<td>or CHEM 1953</td>
<td>Honors Chemical Science Laboratory I</td>
<td></td>
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</table>

**Required General Education Courses**

Select one of the following:

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
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</thead>
<tbody>
<tr>
<td>ENG 0802</td>
<td>Analytical Reading and Writing</td>
<td>4</td>
</tr>
<tr>
<td>ENG 0812</td>
<td>Analytical Reading and Writing: ESL</td>
<td></td>
</tr>
<tr>
<td>ENG 0902</td>
<td>Honors Literature/Reading/Writing</td>
<td></td>
</tr>
<tr>
<td>IH 0851</td>
<td>Intellectual Heritage I: The Good Life</td>
<td>3</td>
</tr>
<tr>
<td>or IH 0951</td>
<td>Honors Intellectual Heritage I: The Good Life</td>
<td></td>
</tr>
<tr>
<td>IH 0852</td>
<td>Intellectual Heritage II: The Common Good</td>
<td>3</td>
</tr>
<tr>
<td>or IH 0952</td>
<td>Honors Intellectual Heritage II: The Common Good</td>
<td></td>
</tr>
<tr>
<td>GenEd 08xx or 09xx (U.S. Society)</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>GenEd 08xx or 09xx (Global/World Society)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>GenEd 08xx or 09xx (Human Behavior)</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>GenEd 08xx or 09xx (The Arts)</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>GenEd 08xx or 09xx (Race and Diversity)</td>
<td>3</td>
<td></td>
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</tbody>
</table>

**Required Electrical Engineering Courses**

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ECE 2612</td>
<td>Digital Circuit Design</td>
<td>3</td>
</tr>
<tr>
<td>ECE 2332</td>
<td>Principles of Electric Circuits</td>
<td>4</td>
</tr>
<tr>
<td>ECE 2333</td>
<td>Principles of Electric Circuits Lab</td>
<td>1</td>
</tr>
<tr>
<td>ECE 2613</td>
<td>Digital Circuit Design Laboratory</td>
<td>1</td>
</tr>
<tr>
<td>ECE 3512</td>
<td>Signals: Continuous and Discrete</td>
<td>4</td>
</tr>
<tr>
<td>or ECE 3912</td>
<td>Honors Signals: Continuous and Discrete</td>
<td></td>
</tr>
<tr>
<td>ECE 3712</td>
<td>Introduction to Electromagnetic Fields and Waves</td>
<td>3</td>
</tr>
<tr>
<td>ECE 3612</td>
<td>Processor Systems</td>
<td>3</td>
</tr>
<tr>
<td>or ECE 3914</td>
<td>Honors Microprocessor Systems</td>
<td></td>
</tr>
<tr>
<td>ECE 3613</td>
<td>Processor Systems Laboratory</td>
<td>1</td>
</tr>
<tr>
<td>or ECE 3915</td>
<td>Honors Microprocessor Systems Lab</td>
<td></td>
</tr>
<tr>
<td>ECE 3312</td>
<td>Microelectronics I</td>
<td>3</td>
</tr>
<tr>
<td>ECE 3313</td>
<td>Microelectronics I Laboratory</td>
<td>1</td>
</tr>
<tr>
<td>ECE 3412</td>
<td>Classical Control Systems</td>
<td>3</td>
</tr>
<tr>
<td>ECE 3413</td>
<td>Classical Control Laboratory</td>
<td>1</td>
</tr>
<tr>
<td>ECE 4512</td>
<td>Digital Communication Systems</td>
<td>3</td>
</tr>
<tr>
<td>ECE 4513</td>
<td>Digital Communication Systems Laboratory</td>
<td>1</td>
</tr>
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**Required Engineering Courses**

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENGR 1101</td>
<td>Introduction to Engineering &amp; Engineering Technology</td>
<td>3</td>
</tr>
<tr>
<td>or ENGR 1901</td>
<td>Honors Introduction to Engineering</td>
<td></td>
</tr>
<tr>
<td>ENGR 1102</td>
<td>Introduction to Engineering Problem Solving</td>
<td>3</td>
</tr>
<tr>
<td>ENGR 2196</td>
<td>Technical Communication (WI)</td>
<td>3</td>
</tr>
<tr>
<td>or ENGR 2996</td>
<td>Honors Technical Communication by Design</td>
<td></td>
</tr>
<tr>
<td>ENGR 3334</td>
<td>Mechanical Systems</td>
<td>3</td>
</tr>
<tr>
<td>ENGR 4169</td>
<td>Engineering Seminar</td>
<td>1</td>
</tr>
<tr>
<td>ENGR 4176</td>
<td>Senior Design Project I for Electrical Engineering</td>
<td>2</td>
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<tr>
<td>ENGR 4296</td>
<td>Senior Design Project II (WI)</td>
<td>3</td>
</tr>
<tr>
<td>or ENGR 4996</td>
<td>Honors Senior Design Project II</td>
<td></td>
</tr>
<tr>
<td>CIS 1057</td>
<td>Computer Programming in C</td>
<td>4</td>
</tr>
</tbody>
</table>

**Required Elective Courses**
Suggested Academic Plan

Below is a suggested five-year plan for the Co-Op program leading to the Bachelor of Science in Electrical Engineering. The minimum requirement for graduation is 134 semester hours.

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

### Bachelor of Science in Electrical Engineering with Cooperative Experience

#### Requirements for New Students starting in the 2018-2019 Academic Year

**Year 1**

<table>
<thead>
<tr>
<th>Fall</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH 1041 or 1941</td>
<td>Calculus I</td>
</tr>
<tr>
<td>CHEM 1035</td>
<td>Chemistry for Engineers</td>
</tr>
<tr>
<td>CHEM 1033 or 1953</td>
<td>General Chemistry Laboratory I</td>
</tr>
<tr>
<td>ENGR 1101 or 1901</td>
<td>Introduction to Engineering Engineering Technology (prerequisite: Engineering admission)</td>
</tr>
<tr>
<td>ENG 0802, 0812, or 0902</td>
<td>Analytical Reading and Writing [GW]</td>
</tr>
<tr>
<td><strong>Term Credit Hours</strong></td>
<td></td>
</tr>
</tbody>
</table>

**Spring**

| MATH 1042 or 1942 | Calculus II | 4 |
| PHYS 1061 or 1961 | Elementary Classical Physics I | 4 |
| CIS 1057 | Computer Programming in C\(^1\) | 4 |
| ENGR 1102 | Introduction to Engineering Problem Solving | 3 |
| **Term Credit Hours** | | 15 |

**Year 2**

<table>
<thead>
<tr>
<th>Fall</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH 2043 or 2943</td>
<td>Calculus III</td>
</tr>
<tr>
<td>PHYS 1062 or 1962</td>
<td>Elementary Classical Physics II</td>
</tr>
<tr>
<td>ECE 2332</td>
<td>Principles of Electric Circuits</td>
</tr>
<tr>
<td>GenEd Breadth Course</td>
<td></td>
</tr>
<tr>
<td>IH 0851 or 0951</td>
<td>Intellectual Heritage I: The Good Life [GY]</td>
</tr>
<tr>
<td><strong>Term Credit Hours</strong></td>
<td></td>
</tr>
</tbody>
</table>

**Spring**

| MATH 3041 or 3941 | Differential Equations I | 3 |
| ECE 2333 | Principles of Electric Circuits Lab | 1 |
| ECE 2612 | Digital Circuit Design | 3 |
| ECE 2613 | Digital Circuit Design Laboratory | 1 |
| ENGR 2011 | Engineering Analysis Applications | 3 |
| GenEd Breadth Course | | 3 |
| IH 0852 or 0952 | Intellectual Heritage II: The Common Good [GZ] | 3 |
| **Term Credit Hours** | | 17 |

**Year 3**

<table>
<thead>
<tr>
<th>Fall</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>ECE 3512 or 3912</td>
<td>Signals: Continuous and Discrete</td>
</tr>
<tr>
<td>ECE 3612 or 3914</td>
<td>Processor Systems</td>
</tr>
<tr>
<td>ECE 3613 or 3915</td>
<td>Processor Systems Laboratory</td>
</tr>
<tr>
<td>ECE 3712</td>
<td>Introduction to Electromagnetic Fields and Waves</td>
</tr>
</tbody>
</table>
ENGR 3334  Mechanical Systems  3
ENGR 2196 or 2996  Technical Communication [WI]  3

Term Credit Hours  17

Spring
ECE 3412  Classical Control Systems  3
ECE 3413  Classical Control Laboratory  1
ECE 3522  Stochastic Processes in Signals and Systems  3
ECE 3312  Microelectronics I  3
ECE 3313  Microelectronics I Laboratory  1
ENGR 4169  Engineering Seminar  1
GenEd Breadth Course  3

Term Credit Hours  15

Year 4
Fall
ENGR 2181  Co-Op Work Experience I  3

Term Credit Hours  3

Spring
ENGR 3181  Co-Op Work Experience II  3

Term Credit Hours  3

Year 5
Fall
ENGR 4176  Senior Design Project I for Electrical Engineering  2
ECE 4512  Digital Communication Systems  3
ECE 4513  Digital Communication Systems Laboratory  1
Electrical Engineering Technical Elective\(^2\)  3
Electrical Engineering Technical Elective\(^2\)  3
GenEd Breadth Course  3

Term Credit Hours  15

Spring
ENGR 4296 or 4996  Senior Design Project II [WI]  3
Electrical Engineering Technical Elective\(^2\)  4
Electrical Engineering Technical Elective\(^2\)  3
GenEd Breadth Course  3
Free Elective  3

Term Credit Hours  16

Total Credit Hours:  134

\(^1\) CIS 1057 is a required course for all ECE students. If you completed ENGR 1117 before declaring an ECE major, you must take CIS 1057 in your third semester. ENGR 1117 will be counted as a free elective. See your advisor for more information.

\(^2\) Students may satisfy no more than one Electrical Engineering Technical Elective with 3 credits of Independent Study or Independent Research coursework. Students must be granted prior approval from the department.

### Technical Electives

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>ECE 3622</td>
<td>Embedded System Design</td>
<td>3</td>
</tr>
<tr>
<td>ECE 3623</td>
<td>Embedded System Design Laboratory</td>
<td>1</td>
</tr>
<tr>
<td>ECE 3722</td>
<td>Electromagnetic Wave Propagation</td>
<td>3</td>
</tr>
<tr>
<td>ECE 3723</td>
<td>Electromagnetic Wave Propagation Laboratory</td>
<td>1</td>
</tr>
<tr>
<td>ECE 3732</td>
<td>Electromechanical Energy Systems</td>
<td>3</td>
</tr>
<tr>
<td>ECE 3733</td>
<td>Electromechanical Energy Systems Laboratory</td>
<td>1</td>
</tr>
<tr>
<td>ECE 3822</td>
<td>Engineering Computation II</td>
<td>3</td>
</tr>
<tr>
<td>ECE 4312</td>
<td>Microelectronics II</td>
<td>3</td>
</tr>
<tr>
<td>Course Code</td>
<td>Course Title</td>
<td>Credits</td>
</tr>
<tr>
<td>-------------</td>
<td>----------------------------------------------</td>
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<tr>
<td>ECE 4322</td>
<td>VLSI Systems Design</td>
<td>3</td>
</tr>
<tr>
<td>ECE 4412</td>
<td>Modern Control Theory</td>
<td>3</td>
</tr>
<tr>
<td>ECE 4422</td>
<td>Digital Control Systems</td>
<td>3</td>
</tr>
<tr>
<td>ECE 4522</td>
<td>Digital Signal Processing</td>
<td>3</td>
</tr>
<tr>
<td>ECE 4532</td>
<td>Data and Computer Communication</td>
<td>3</td>
</tr>
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<td>ECE 4542</td>
<td>Telecommunications Engineering</td>
<td>3</td>
</tr>
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<td>ECE 4612</td>
<td>Advanced Processor Systems</td>
<td>3</td>
</tr>
<tr>
<td>ECE 4712</td>
<td>Power System Analysis</td>
<td>3</td>
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<tr>
<td>ENGR 3033</td>
<td>Entrepreneurial Engineering</td>
<td>3</td>
</tr>
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<td>ENGR 4116</td>
<td>Spacecraft Systems Engineering</td>
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<tr>
<td>ECE 3082</td>
<td>Independent Study in Electrical Engineering</td>
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</tr>
<tr>
<td>ECE 3091</td>
<td>Independent Research in Electrical Engineering</td>
<td>3</td>
</tr>
</tbody>
</table>