ELECTRICAL ENGINEERING, B.S. (CAPITAL)

Begin Campus: Any Penn State Campus
End Campus: Harrisburg

Program Description
The Bachelor of Science degree in Electrical Engineering provides a solid background in electrical engineering sciences. It also provides an opportunity for students to pursue interests in electrical and electronic circuits, including digital circuits and VLSI and its fabrication, microprocessors and their applications, electromagnetics, communications, control systems, and digital image processing and computer vision. Through participation in a senior capstone design, the curriculum emphasizes written as well as verbal communication and teamwork approach among the students to attain a common goal.

This program helps its graduates develop capabilities to analyze and design a variety of electrical and electronic systems found in many industrial and government settings as well as provide a foundation for further graduate studies. A strong background in the fundamentals is built through a broad base core in basic sciences (physics and chemistry) and mathematics as well as engineering sciences.

What is Electrical Engineering?
Electrical engineering is a broad discipline of study that includes circuit design, analog and digital electronics, electromagnetics, electro-optics, control systems, power systems, communications, and signal/image processing. Electrical engineers study and apply physics and mathematics to design electrical and electronic systems and their components for a wide range of applications such as mobile phones, wireless communications, consumer electronics, computers, computer networks, power generation, machine learning, robotics, nanoelectronics, nanophotonics, bioelectronics, autonomous transportation, wearable electronics, and metamaterials.

You Might Like This Program If...
- You enjoy problem-solving and math.
- You prefer to use analysis and the scientific method to understand things.
- You enjoy working on multidisciplinary teams on complex problems.
- You want to pursue a career in electrical engineering or its sub-branches.

Entrance to Major
Entry to the Electrical Engineering major requires that the student has completed: MATH 140, MATH 141, PHYS 211, CHEM 110, and CHEM 111. A 2.00 or higher cumulative grade-point average is required.

Degree Requirements
For the Bachelor of Science degree in Electrical Engineering a minimum of 135 credits is required:

### University Degree Requirements

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>General Education</td>
<td>45</td>
</tr>
<tr>
<td>Requirements for the Major</td>
<td>114</td>
</tr>
</tbody>
</table>

24 of the 45 credits for General Education are included in the Requirements for the Major. This includes: 3 credits of GWS courses; 6 credits of GS courses; 9 credits of GN courses; 6 credits of GQ courses.

### General Education

Connecting career and curiosity, the General Education curriculum provides the opportunity for students to acquire transferable skills necessary to be successful in the future and to thrive while living in interconnected contexts. General Education aids students in developing intellectual curiosity, a strengthened ability to think, and a deeper sense of aesthetic appreciation. These are requirements for all baccalaureate students and are often partially incorporated into the requirements of a program. For additional information, see the General Education Requirements (https://bulletins.psu.edu/undergraduate/general-education/baccalaureate-degree-general-education-program/) section of the Bulletin and consult your academic adviser.

The keystone symbol appears next to the title of any course that is designated as a General Education course. Program requirements may also satisfy General Education requirements and vary for each program.

#### Foundations (grade of C or better is required.)
- Quantification (GQ): 6 credits
- Writing and Speaking (GWS): 9 credits

#### Knowledge Domains
- Arts (GA): 6 credits
- Health and Wellness (GHW): 3 credits
- Humanities (GH): 6 credits
- Social and Behavioral Sciences (GS): 6 credits
- Natural Sciences (GN): 9 credits

#### Integrative Studies (may also complete a Knowledge Domain requirement)
- Inter-Domain or Approved Linked Courses: 6 credits

### University Degree Requirements

#### First Year Engagement

All students enrolled in a college or the Division of Undergraduate Studies at University Park, and the World Campus are required to take 1 to 3 credits of the First-Year Seminar, as specified by their college First-Year Engagement Plan.

Other Penn State colleges and campuses may require the First-Year Seminar; colleges and campuses that do not require a First-Year Seminar provide students with a first-year engagement experience.

First-year baccalaureate students entering Penn State should consult their academic adviser for these requirements.

#### Cultures Requirement
6 credits are required and may satisfy other requirements
- United States Cultures: 3 credits
- International Cultures: 3 credits
Writing Across the Curriculum
3 credits required from the college of graduation and likely prescribed as part of major requirements.

Total Minimum Credits
A minimum of 120 degree credits must be earned for a baccalaureate degree. The requirements for some programs may exceed 120 credits. Students should consult with their college or department adviser for information on specific credit requirements.

Quality of Work
Candidates must complete the degree requirements for their major and earn at least a 2.00 grade-point average for all courses completed within their degree program.

Limitations on Source and Time for Credit Acquisition
The college dean or campus chancellor and program faculty may require up to 24 credits of course work in the major to be taken at the location or in the college or program where the degree is earned. Credit used toward degree programs may need to be earned from a particular source or within time constraints (see Senate Policy 83-80 (http://senate.psu.edu/policies-and-rules-for-undergraduate-students/82-00-and-83-00-degree-requirements/#83-80)). For more information, check the Suggested Academic Plan for your intended program.

Requirements for the Major
To graduate, a student enrolled in the major must earn a grade of C or better in each course designated by the major as a C-required course, as specified by Senate Policy 82-44 (http://senate.psu.edu/policies-and-rules-for-undergraduate-students/82-00-and-83-00-degree-requirements/#82-44).

Integrated B.S. in Electrical Engineering and M.S. in Electrical Engineering
Requirements for the Integrated B.S. in Electrical Engineering and M.S. in Electrical Engineering can be found in the Graduate Bulletin (https://bulletins.psu.edu/graduate/programs/majors/electrical-engineering-capital/#integratedundergradgradprogramstext).

Academic Advising
The objectives of the university's academic advising program are to help advisees identify and achieve their academic goals, to promote their intellectual discovery, and to encourage students to take advantage of both in-and out-of-class educational opportunities in order that they become self-directed learners and decision makers.

Both advisers and advisees share responsibility for making the advising relationship succeed. By encouraging their advisees to become engaged in their education, to meet their educational goals, and to develop the habit of learning, advisers assume a significant educational role. The advisee's unit of enrollment will provide each advisee with a primary academic adviser, the information needed to plan the chosen program of study, and referrals to other specialized resources.

READ SENATE POLICY 32-00: ADVISING POLICY (https://senate.psu.edu/policies-and-rules-for-undergraduate-students/32-00-advising-policy/)
### Harrisburg

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## Suggested Academic Plan

The suggested academic plan(s) listed on this page are the plan(s) that are in effect during the 2021-22 academic year. To access previous years’ suggested academic plans, please visit the archive (https://bulletins.psu.edu/undergraduate/archive/) to view the appropriate Undergraduate Bulletin edition (Note: the archive only contain suggested academic plans beginning with the 2018-19 edition of the Undergraduate Bulletin).

### Electrical Engineering, B.S.: Ending at Harrisburg Campus

The course series listed below provides only one of the many possible ways to move through this curriculum. The University may make changes in policies, procedures, educational offerings, and requirements at any time. This plan should be used in conjunction with your degree audit (accessible in LionPATH as either an What If report). Please consult with a Penn State academic adviser on a regular time. This plan should be used in conjunction with your degree audit (accessible in LionPATH as either an Academic Requirements or What If report). Please consult with a Penn State academic adviser on a regular basis to develop and refine an academic plan that is appropriate for you.

### First Year

<table>
<thead>
<tr>
<th>Fall</th>
<th>Credits</th>
<th>Spring</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHEM 110†</td>
<td>3</td>
<td>CAS 100‡</td>
<td>3</td>
</tr>
<tr>
<td>CHEM 111†</td>
<td>3</td>
<td>EDSGN 100S</td>
<td>3</td>
</tr>
<tr>
<td>ENGL 15 or 30H†</td>
<td>4</td>
<td>MATH 141*#†</td>
<td>4</td>
</tr>
<tr>
<td>MATH 140*#‡</td>
<td>4</td>
<td>PHYS 211*¶†</td>
<td>4</td>
</tr>
<tr>
<td>General Education Course</td>
<td>3</td>
<td>General Education Course</td>
<td>3</td>
</tr>
</tbody>
</table>

- † General Education Course (GHW)
- † General Education Course (GHS)

**Total Credits 17 - 17**

### Second Year

<table>
<thead>
<tr>
<th>Fall</th>
<th>Credits</th>
<th>Spring</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CMPEN 271*</td>
<td>3</td>
<td>CMPSC 121, 201, or 202‡</td>
<td>3</td>
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<tr>
<td>CMPEN 275‡</td>
<td>1</td>
<td>ECON 102, 104, or 14†</td>
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<tr>
<td>EMCH 211</td>
<td>3</td>
<td>ENGL 202C†</td>
<td>3</td>
</tr>
<tr>
<td>MATH 220†</td>
<td>2</td>
<td>MATH 250</td>
<td>3</td>
</tr>
<tr>
<td>MATH 230</td>
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<td>PHYS 213†</td>
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</tr>
<tr>
<td>PHYS 212†</td>
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<td>SSET 295</td>
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**Total Credits 17 - 17**

### Third Year

<table>
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<th>Fall</th>
<th>Credits</th>
<th>Spring</th>
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<tbody>
<tr>
<td>EE 210*</td>
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<td>EE 310*</td>
<td>4</td>
</tr>
<tr>
<td>EE 341</td>
<td>3</td>
<td>EE 317‡</td>
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<tr>
<td>CMPEH 472</td>
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<td>EE 330</td>
<td>4</td>
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<tr>
<td>STAT 200, 401, 414, or 418‡</td>
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<td>EE 352‡</td>
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<table>
<thead>
<tr>
<th>Fourth Year</th>
<th>Fall</th>
<th>Credits</th>
<th>Spring</th>
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<tbody>
<tr>
<td>EE 311</td>
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<td>EE 406W</td>
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<tr>
<td>EE 405</td>
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<td>Technical Elective II</td>
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<tr>
<td>EE 461</td>
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<td>Technical Elective III</td>
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<td>Technical Elective</td>
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<td>ENGR 320Y‡</td>
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<tr>
<td>General Education Course</td>
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</tbody>
</table>

**Total Credits 134-137**

* Course requires a grade of C or better for the major  
† Course requires a grade of C or better for General Education  
# Course is an Entrance to Major requirement  
‡ Course satisfies General Education and degree requirement  
1 CMPSC 121 Introduction to Programming Techniques, recommended.  
2 STAT 200 Elementary Statistics requires a grade of C or better and satisfies both major and General Education requirements.

### University Requirements and General Education Notes:

US and IL are abbreviations used to designate courses that satisfy University Requirements (United States and International Cultures).

W, M, X, and Y are the suffixes at the end of a course number used to designate courses that satisfy University Writing Across the Curriculum requirement.

GWS, GQ, GHW, GN, GA, GH, and GS are abbreviations used to identify General Education program courses. General Education includes Foundations (GWS and GQ) and Knowledge Domains (GHW, GN, GA, GH, GS, and Integrative Studies). Foundations courses (GWS and GQ) require a grade of ‘C’ or better.

Integrative Studies courses are required for the General Education program. N is the suffix at the end of a course number used to designate an Inter-Domain course and Z is the suffix at the end of a course number used to designate a Linked course.

###program Notes:

Following courses are offered only in semesters as listed below:  
Fall: EE 341, EE 311, EE 461  
Spring: EE 330, EE 485

Students must complete a 3-credit course in "United State Culture (US)" and a 3-credit course in "International Cultures (IL)."

### Career Paths

According to the U.S. Bureau of Labor Statistics, employment of electrical engineers is projected to grow 7 percent from 2016 to 2026, about as fast as the average for all occupations. The rapid pace of technological innovation will likely drive demand for electrical and electronics engineers in research and development, an area in which engineering expertise will
be needed to design distribution systems related to new technologies.
These engineers will play key roles in new developments with solar
arrays, semiconductors, and communications technologies.

**Careers**

Graduates of the program have gained positions in a number
of specialty areas including digital circuits and VLSI and its
fabrication, microprocessors and their applications, electromagnetics,
communications, control systems, digital image processing, and
computer engineering. Career opportunities for these specialties are
available in a multitude of industries including computers, automobile,
power, communications, manufacturing, pure and applied research, and
biomedical and environmental fields.

MORE INFORMATION ABOUT POTENTIAL CAREER OPTIONS FOR
GRADUATES OF THE ELECTRICAL ENGINEERING PROGRAM
(https://harrisburg.psu.edu/science-engineering-technology/ee-eet/bachelor-
science-electrical-engineering/career-opportunities/)

**Opportunities for Graduate Studies**

The Bachelor of Science degree in Electrical Engineering is designed to
provide a solid background for students who plan to pursue graduate
studies, including Penn State's Master of Engineering and Master of
Science in Electrical Engineering programs.

MORE INFORMATION ABOUT OPPORTUNITIES FOR GRADUATE STUDIES
(http://harrisburg.psu.edu/science-engineering-technology/ee-eet/)

**Accreditation**

This program is accredited by the Engineering Accreditation Commission
of ABET.

MORE INFORMATION ABOUT ABET ACCREDITATION
(http://www.abet.org)

**Professional Licensure/Certification**

Many U.S. states and territories require professional licensure/
certification to be employed. If you plan to pursue employment in a
licensed profession after completing this program, please visit the
Professional Licensure/Certification Disclosures by State
(https://psu.edu/state-licensure-disclosures/) interactive map.

**Contact**

Harrisburg

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(http://harrisburg.psu.edu/science-engineering-technology/ee-eet/bachelor-science-electrical-engineering/)