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 oral 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, electrodynamics, 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:

- General Education: 45 credits
- Requirements for the Major: 114 credits

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). 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/#83-80). For more information, check the Suggested Academic Plan for your intended program.

Code | Title | Credits
--- | --- | ---
CHEM 110 | Chemical Principles I | 3
CHEM 111 | Experimental Chemistry I | 1
CMPEH 472 | Microprocessors | 4
EDSGN 100S | Introduction to Engineering Design | 3
EE 210 | Circuits and Devices | 4
EE 311 | Electronic Circuit Design II | 3
EE 317 | Circuits II and Data Acquisition | 2
EE 330 | Engineering Electromagnetics | 4
EE 341 | Semiconductor Device Principles | 3
EE 405 | Capstone Proposal Preparation | 1
EE 461 | Communications I | 4
EE 481 | Control Systems | 4
EE 485 | Energy Systems and Conversion | 3
EMCH 211 | Statics | 3
ENGL 202C | Effective Writing: Technical Writing | 3
ENGR 320Y | Design for Global Society | 3
MATH 220 | Matrices | 2
MATH 230 | Calculus and Vector Analysis | 4
MATH 250 | Ordinary Differential Equations | 3
PHYS 213 | General Physics: Fluids and Thermal Physics | 2
PHYS 214 | General Physics: Wave Motion and Quantum Physics | 2
SSET 295 | Internship | 1

Prescribed Courses: Require a grade of C or better

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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717-948-6349
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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 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

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<th>Fall</th>
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<tr>
<td>CHEM 110 ††</td>
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<td>CAS 100 ‡</td>
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<td>CHEM 111 ††</td>
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<td>MATH 141 ††</td>
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<td>PHYS 21 ††</td>
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### Second Year

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<td>ECON 102, 104, or 14 †</td>
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<td>ENGL 202C †</td>
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<td>MATH 250</td>
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<td>MATH 230</td>
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<td>PHYS 213 †</td>
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<td>PHYS 212 ††</td>
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<td>PHYS 214 †</td>
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<td>SSET 295</td>
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### Third Year

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<tbody>
<tr>
<td>EE 210 †</td>
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<td>EE 310 ‡</td>
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<tr>
<td>EE 341</td>
<td>3</td>
<td>EE 317 ‡</td>
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<td>CMPEH 472</td>
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<td>EE 330</td>
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<td>STAT 200, 401, 414, or 418 ‡</td>
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<td>EE 352 ‡</td>
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<td>EE 461</td>
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<td>EE 481</td>
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<tr>
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<td>ENGR 320Y †</td>
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**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 VSLI 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.

**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.

**Accreditation**

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

**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.