ENGINEERING SCIENCE, B.S.

Begin Campus: Any Penn State Campus

End Campus: University Park

Degree Requirements

For the Bachelor of Science degree in Engineering Science, a minimum of 131 credits is required:

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Credits</th>
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</thead>
<tbody>
<tr>
<td>General Education</td>
<td>45</td>
</tr>
<tr>
<td>Requirements for the Major</td>
<td>113</td>
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</tbody>
</table>

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

For the non-Honors B.S. degree in Engineering Science, 131 credits and a 2.50 grade-point average are required. The Honors degree requires the same number of total credits but a minimum of 16 honors Jr./Sr. year credits and a higher grade-point average as determined by the faculty.

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).

Code | Title                                    | Credits |
---   | ---------------------------------------- |---------|
CHEM 111 | Experimental Chemistry I                 | 1       |
EE 210  | Circuits and Devices                    | 4       |
EMCH 302H | Thermodynamics, Heat Conduction, and Principles of Modeling, Honors | 4       |
ESC 312 | Engineering Applications of Wave, Particle, and Ensemble Concepts | 3       |
ESC 409 | Senior Research and Design Project Preparation, Honors | 1       |
ESC 410 |                                              | 3       |
ESC 411 | Senior Research and Design Project II, Honors | 2       |
ESC 433 | Engineering Science Research Laboratory Experience | 1       |
MATH 220 | Matrices                                | 2       |
MATH 230 | Calculus and Vector Analysis            | 4       |
PHYS 214 | General Physics: Wave Motion and Quantum Physics | 2       |

Prescribed Courses: Require a grade of C or better

<table>
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<tr>
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</table>
CHEM 110 | Chemical Principles I                    | 3       |
EDSON 100 | Cornerstone Engineering Design          | 3       |
ENGL 202C | Effective Writing: Technical Writing     | 3       |
ESC 404 | Analysis in Engineering Science         | 3       |
ESC 407 | Computer Methods in Engineering Science, Honors | 3       |
ESC 414M | Elements of Material Engineering         | 3       |
MATH 140 | Calculus With Analytic Geometry I        | 4       |
MATH 141 | Calculus With Analytic Geometry II       | 4       |

MATH 251 | Ordinary and Partial Differential Equations | 4       |
PHYS 211 | General Physics: Mechanics               | 4       |
PHYS 212 | General Physics: Electricity and Magnetism | 4       |

Additional Courses

Select 1 credit of First-Year Seminar

CMPSC 201 | Programming for Engineers with C++       | 3       |
or ESC 261M | Computational Methods in Engineering     |         |

Select one of the following:

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<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
</table>
ECON 14 | Principles of Economics                  | 3       |
ECON 102 | Introductory Microeconomic Analysis and Policy |         |
ECON 104 | Introductory Macroeconomic Analysis and Policy |         |

Supporting Courses and Related Areas

Select 15 credits from the department Foundational Elective List

Select 12 credits from the department Technical Elective List

1 Students may apply 3 credits of ROTC or 3 credits of co-op experience.

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.