AEROSPACE ENGINEERING, B.S.

Begin Campus: Any Penn State Campus
End Campus: University Park

Degree Requirements

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

<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>113-117</td>
</tr>
</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.

The first two years of study are similar to those in other engineering majors and provide students with a basic education for the engineering profession. Students need to complete EMCH 212, CMPSC 121 or CMPSC 131 or CMPSC 200 or CMPSC 201, MATH 220, MATH 230, and MATH 250 or MATH 251 prior to the start of the junior year in order to meet graduation requirements in the following two years. Six of the nine technical-elective credits taken in the senior year must be aerospace engineering courses.

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 (https://senate.psu.edu/policies-and-rules-for-undergraduate-students/82-00-and-83-00-degree-requirements/#82-44).

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>AERSP 304</td>
<td>Dynamics and Control of Aerospace Systems</td>
<td>3</td>
</tr>
<tr>
<td>AERSP 305W</td>
<td>Aerospace Technology Laboratory</td>
<td>3</td>
</tr>
<tr>
<td>AERSP 312</td>
<td>Aerodynamics II</td>
<td>3</td>
</tr>
<tr>
<td>AERSP 410</td>
<td>Aerospace Propulsion</td>
<td>3</td>
</tr>
<tr>
<td>EMCH 315</td>
<td>Mechanical Response of Engineering Materials</td>
<td>2</td>
</tr>
<tr>
<td>EMCH 316</td>
<td>Experimental Determination of Mechanical Response of Materials</td>
<td>1</td>
</tr>
<tr>
<td>MATH 220</td>
<td>Matrices</td>
<td>2-3</td>
</tr>
<tr>
<td>MATH 230</td>
<td>Calculus and Vector Analysis</td>
<td>4</td>
</tr>
<tr>
<td>ME 201</td>
<td>Introduction to Thermal Science</td>
<td>3</td>
</tr>
<tr>
<td>PHYS 214</td>
<td>General Physics: Wave Motion and Quantum Physics</td>
<td>2</td>
</tr>
</tbody>
</table>

Prescribed Courses: Require a grade of C or better

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>AERSP 301</td>
<td>Aerospace Structures</td>
<td>3</td>
</tr>
<tr>
<td>AERSP 306</td>
<td>Aeronautics</td>
<td>3</td>
</tr>
<tr>
<td>AERSP 309</td>
<td>Astronautics</td>
<td>3</td>
</tr>
<tr>
<td>AERSP 311</td>
<td>Aerodynamics I</td>
<td>3</td>
</tr>
<tr>
<td>AERSP 313</td>
<td>Aerospace Analysis</td>
<td>3</td>
</tr>
<tr>
<td>CHEM 110</td>
<td>Chemical Principles I</td>
<td>3</td>
</tr>
</tbody>
</table>

EDSGN 100 Cornerstone Engineering Design 3
EMCH 212 Dynamics 3
ENGL 202C Effective Writing: Technical Writing 3
MATH 140 Calculus With Analytic Geometry I 4
MATH 141 Calculus with Analytic Geometry II 4
PHYS 211 General Physics: Mechanics 4
PHYS 212 General Physics: Electricity and Magnetism 4

Additional Courses

Select 1 credit of First-Year Seminar 1
AERSP 413 Stability and Control of Aircraft 3
or AERSP 450 Orbit and Attitude Control of Spacecraft 3
Select 3 credits from the following: 3
CMPSC 121 Introduction to Programming Techniques
CMPSC 131 Programming and Computation I: Fundamentals
CMPSC 200 Programming for Engineers with MATLAB
CMPSC 201 Programming for Engineers with C++
Select 3 credits from the following: 3
ECON 102 Introductory Microeconomic Analysis and Policy
ECON 104 Introductory Macroeconomic Analysis and Policy
ECON 14 Principles of Economics
Select 5-6 credits of the following: 5-6
EMCH 210 Statics and Strength of Materials
EMCH 211 Statics
& EMCH 213 and Strength of Materials
Select one of the following sequences: 5
AERSP 401A Spacecraft Design--Preliminary
&AERSP 401B and Spacecraft Design--Detailed
AERSP 402A Aircraft Design--Preliminary
&AERSP 402B and Aircraft Design--Detailed
Select 3-4 credits from the following: 3-4
AERSP 424 Advanced Computer Programming
EE 210 Circuits and Devices
EE 212 Introduction to Electronic Measuring Systems

Additional Courses: Require a grade of C or better

CAS 100A Effective Speech 3
or CAS 100B Effective Speech 3
ENGL 15 Rhetoric and Composition 3
or ENGL 30H Honors Rhetoric and Composition 3
MATH 250 Ordinary Differential Equations 3-4
or MATH 251 Ordinary and Partial Differential Equations 3-4

Supporting Courses and Related Areas

Select 6 credits of Aerospace Technical Elective (ATE) courses from department list 6
Select 3 credits of General Technical Elective (GTE) courses from department list 3
Select 3 credits of Limited Elective (LE) courses from department list 3

1 Students who complete Basic ROTC may substitute 6 of the ROTC credits for 3 credits of LE and 3 credits of GHW.

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 and Inter-Domain courses do not meet this requirement.)
- Quantification (GQ): 6 credits
- Writing and Speaking (GWS): 9 credits

Breadth in the Knowledge Domains (Inter-Domain courses do not meet this requirement.)
- Arts (GA): 3 credits
- Health and Wellness (GHW): 3 credits
- Humanities (GH): 3 credits
- Social and Behavioral Sciences (GS): 3 credits
- Natural Sciences (GN): 3 credits

Integrative Studies
- Inter-Domain Courses (Inter-Domain): 6 credits

Exploration
- GN, may be completed with Inter-Domain courses: 3 credits
- GA, GH, GN, GS, Inter-Domain courses. This may include 3 credits of World Language course work beyond the 12th credit level or the requirements for the student's degree program, whichever is higher: 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 (https://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.