

# MATERIALS SCIENCE AND ENGINEERING, B.S.

**Begin Campus:** Any Penn State Campus

**End Campus:** University Park

## Degree Requirements

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

Requirement	Credits
General Education	45
Requirements for the Major	110

**24 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; 9 credits of GWS courses.**

Note: The Accreditation Board for Engineering and Technology (ABET) does not permit the use of skills courses to satisfy the Arts category of General Education.

## 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>).

Code	Title	Credits
<b>Prescribed Courses</b>		
CHEM 110	Chemical Principles I	3
CHEM 111	Experimental Chemistry I	1
CHEM 113	Experimental Chemistry II	1
CHEM 202	Fundamentals of Organic Chemistry I	3
CMPSC 200	Programming for Engineers with MATLAB	3
EMSC 100S	Earth and Mineral Sciences First-Year Seminar <sup>1</sup>	3
ENGL 202C	Effective Writing: Technical Writing	3
IE 424	Process Quality Engineering	3
MATH 140G	Calculus with Earth and Mineral Sciences Applications I	4
MATH 141G	Calculus with Earth and Mineral Sciences Applications II	4
MATH 220	Matrices	2
MATH 231	Calculus of Several Variables	2
MATH 251	Ordinary and Partial Differential Equations	4
MATSE 112	Applied Materials Chemistry for Engineers	3
MATSE 413	Solid-State Materials	3
MATSE 419	Computational Materials Science and Engineering	3
MATSE 436	Mechanical Properties of Materials	3
MATSE 460	Introductory Laboratory in Materials	1
MATSE 462	General Properties Laboratory in Materials	1
PHYS 211	General Physics: Mechanics	4
PHYS 212	General Physics: Electricity and Magnetism	4

*Prescribed Courses: Require a grade of C or better*

MATSE 201	Introduction to Materials Science	3
MATSE 202	Introduction to Polymer Materials	3
MATSE 400	Crystal Chemistry	3
MATSE 401	Thermodynamics of Materials	3
MATSE 402	Materials Process Kinetics	3
MATSE 430	Materials Characterization	3
MATSE 492W	Materials Engineering Methodology and Design	3

### Additional Courses

ENGL 15	Rhetoric and Composition	3
or ENGL 30H	Honors Rhetoric and Composition	

### Synthesis and Processing

Select 3-6 credits of the following: 3-6

MATSE 411	Processing of Ceramics
MATSE 422	Thermochemical Processing
MATSE 425	Processing of Metals
MATSE 441	Polymeric Materials I
MATSE 448	
MATSE 450	Synthesis and Processing of Electronic and Photonic Materials

### Structure and Characterization

Select 3-6 credits of the following: 3-6

MATSE 410	Phase Relations in Materials Systems
MATSE 415	Introduction to Glass Science
MATSE 421	Corrosion Engineering
MATSE 444	
MATSE 445	Thermodynamics, Microstructure, and Characterization of Polymers
MATSE 455	Properties and Characterization of Electronic and Photonic Materials

### Properties

Select 3-6 credits of the following: 3-6

MATSE 412	Thermal Properties of Materials
MATSE 417	Electrical and Magnetic Properties
MATSE 435	Optical Properties of Materials
MATSE 446	Mechanical and Electrical Properties of Polymers and Composites
MATSE 447	Rheology and Processing of Polymers

### Processing Laboratory

Select one of the following: 1

MATSE 463	Characterization and Processing of Electronic and Photonic Materials Laboratory
MATSE 468	Ceramics Laboratory III
MATSE 472	
MATSE 474	

### Senior Capstone Experience

MATSE 493W	Materials Science and Engineering Multidisciplinary Capstone Design Project	3
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or MATSE 494W Research and Design Senior Project

### Supporting Courses and Related Areas

Select 12 credits of approved Science or Engineering Elective courses in consultation with adviser 12

<sup>1</sup> The following substitutions are allowed for students attending campuses where the indicated course is not offered: CAS 100 or ENGL 202C can be substituted for EMSC 100S.

## 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.