

MATERIALS SCIENCE AND ENGINEERING, MINOR

Requirements for a minor may be completed at any campus location offering the specified courses for the minor. Students may not change from a campus that offers their major to a campus that does not offer their major for the purpose of completing a minor.

Program Requirements

Requirement	Credits
Requirements for the Minor	18

The minor in Materials Science and Engineering requires the completion of a total of 18 credits in materials related and other supporting courses. With the approval of the student's program chair, some of these courses may also be used to satisfy the requirements for the student's major bachelor's degree.

Requirements for the Minor

A grade of C or better is required for all courses in the minor, as specified by Senate Policy 59-10 (<https://senate.psu.edu/students/policies-and-rules-for-undergraduate-students/59-00-minors-and-certificates/>). In addition, at least six credits of the minor must be unique from the prescribed courses required by a student's major(s).

Code	Title	Credits
Additional Courses		
<i>Additional Courses: Require a grade of C or better</i>		
Select one of the following:		3
ESC 414M	Elements of Material Engineering	
MATSE 201	Introduction to Materials Science	
MATSE 259	Properties and Processing of Engineering Materials	
Select 3-9 credits from the following MATSE Core Courses:		3-9
MATSE 400	Crystal Chemistry	
MATSE 401	Thermodynamics of Materials	
MATSE 402	Materials Process Kinetics	
MATSE 413	Solid-State Materials	
MATSE 419	Computational Materials Science and Engineering	
MATSE 430	Materials Characterization	
MATSE 436	Mechanical Properties of Materials	
Select 6-12 credits from the following MATSE Supporting Courses:		6-12
MATSE 403	Biomedical Materials	
MATSE 404	Surfaces and the Biological Response to Materials	
MATSE 409	Nuclear Materials	
MATSE 410	Phase Relations in Materials Systems	
MATSE 411	Processing of Ceramics	
MATSE 412	Thermal Properties of Materials	
MATSE 415	Introduction to Glass Science	
MATSE 417	Electrical and Magnetic Properties	
MATSE 421	Corrosion Engineering	
MATSE 425	Processing of Metals	
MATSE 426	Aqueous Processing	
MATSE 427	Microstructure Design of Structural Materials	

MATSE 429	Non-Ferrous Structural Metals
MATSE 435	Optical Properties of Materials
MATSE 440	Nondestructive Evaluation of Flaws
MATSE 441	Polymeric Materials I
MATSE 445	Thermodynamics, Microstructure, and Characterization of Polymers
MATSE 446	Mechanical and Electrical Properties of Polymers and Composites
MATSE 447	Rheology and Processing of Polymers
MATSE 449	Fundamentals of Composite Materials Science and Engineering
MATSE 450	Synthesis and Processing of Electronic and Photonic Materials
MATSE 455	Properties and Characterization of Electronic and Photonic Materials
MATSE 497	Special Topics

Supporting Courses and Related Areas

<i>Supporting Courses and Related Areas: Require a grade of C or better</i>	
Select 0-6 credits from the following:	
0-6	
BME 408	Solid Mechanics of Biological Materials
BME 443	Biomedical Materials
BME 444	Surfaces and the Biological Response to Materials
BME 446	Polymers in Biomedical Engineering
CHE 320	Phase and Chemical Equilibria
CHE 430	Chemical Reaction Engineering
CHE 443	Introduction to Polymer Science
CHEM 410	Inorganic Chemistry
CHEM 480	Chemistry and Properties of Polymers
ESC 417	Electrical and Magnetic Properties
ESC 419	Electronic Properties and Applications of Materials
ESC 450	Synthesis and Processing of Electronic and Photonic Materials
ESC 475	Particulate Materials Processing
EE 340	Introduction to Nanoelectronics
EE 441	Semiconductor Integrated Circuit Technology
EE 442	Solid State Devices
EGEE 304	Heat and Mass Transfer
EGEE 420	Hydrogen and Fuel Cells
EGEE 441	Electrochemical Engineering Fundamentals
EGEE 442	Electrochemical Methods
EGEE 455	Materials for Energy Applications
EME 301	Thermodynamics in Energy and Mineral Engineering
EME 303	Fluid Mechanics in Energy and Mineral Engineering
EME 407	Electrochemical Energy Storage
IE 311	Principles of Solidification Processing
IE 312	Product Design and Manufacturing Processes
IE 428	Metal Casting
ME 403	Polymer Electrolyte Fuel Cell Engines
ME 404	Gas Turbines
PHYS 412	Solid State Physics I

Additional 300- or 400-level courses within a science or engineering major and with a materials focus may be approved at the discretion of the Materials Science and Engineering department.