

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 Description

The Minor in Materials Science and Engineering prepares students to understand the materials properties, materials processing techniques, characterization methods, and selection criteria in implementing engineering solutions. The materials selection for cutting edge mechanical design requires precise and definite knowledge of choice of materials, processing route, and mechanical response in service conditions. The materials engineer must have a sound expertise on modeling and experimental tools validating microstructural, mechanical, and electrical properties requirements for a specific design application. Hence, a wide variety of industries such as aerospace, automotive, energy, biomedical, and electronics to name a few, have a demand for engineers with a strong background in materials engineering. The MMSE covers introductory courses and laboratories on materials science in general, properties and processing of materials, materials thermodynamics and kinetics, and characterization of mechanical, microstructural and electrical properties of materials. The introductory courses and labs provide the basic foundation on materials science and engineering; the rest of the courses provide advanced knowledge on properties and selection, processing techniques, and characterization methods. Moreover, thermodynamics and kinetics of materials systems and process are also introduced. The above mentioned topics are covered by offering courses from sophomore through senior level.

What is Materials Science and Engineering?

Materials are ubiquitous. Materials play a role in every industry and facet of life. Materials science and engineering is an interdisciplinary study of the properties of matter and the exploration for new and creative uses of ceramics, metals, polymers and composites. Materials scientists and engineers study the entire life cycle of materials (production, synthesis and processing, manufacturing, use, recycling and reclamation) by employing science to solve engineering problems. This engineering discipline is unique in that our studies begin with understanding materials at the atomic scale, allowing for prediction and measurement of material properties, and creation of materials by design. What do you want to do with your career? Make alternative energy more economical? Improve human health, cure cancer? Provide clean drinking water to the world? Make transportation more efficient and environmentally friendly? Make everyday materials more sustainable? All these outcomes and more are possible by studying materials.

You Might Like This Program If...

- You enjoy problem-solving, math, and the physical sciences.
- You like understanding why materials react the way they do to various stimuli.
- You are interested in creating tools and materials for the aerospace, automotive, energy, biomedical, or electronics industries.

Entrance to Minor

The Minor is open to any undergraduate who has: A minimum cumulative GPA of 3.0 or better and a minimum grade of "C" or better in the prerequisite courses for the 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. At least 9 unique credits counted toward the requirements for a student's minor must not be used to fulfill the requirements for that student's major.

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/policies-and-rules-for-undergraduate-students/59-00-minors-and-certificates/#59-10>). 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
Prescribed Courses		
<i>Prescribed Courses: Require a grade of C or better</i>		
MATSE 201	Introduction to Materials Science	3
MATSE 259	Properties and Processing of Engineering Materials	3
MATSE 460	Introductory Laboratory in Materials	1
MATSE 462	General Properties Laboratory in Materials	1
Additional Courses		
<i>Additional Courses: Require a grade of C or better</i>		
Select 10 credits of the following: ¹		10
ESC 314		
MATSE 202	Introduction to Polymer Materials	
MATSE 400	Crystal Chemistry	
MATSE 401	Thermodynamics of Materials	
MATSE 402	Materials Process Kinetics	
MATSE 410	Phase Relations in Materials Systems	
MATSE 413	Solid-State Materials	
MATSE/ESC 417	Electrical and Magnetic Properties	
MATSE 419	Computational Materials Science and Engineering	
MATSE 430	Materials Characterization	
MATSE 436	Mechanical Properties of Materials	
MATSE 471	Metallurgy Laboratory I	
MATSE 496	Independent Studies	
MATSE 497	Special Topics	
PHYS 414	Solid State Physics	

¹ Elective courses may be drawn from a wide variety of courses in Materials Science, Engineering, and Physics.

Completion of the minor may extend graduation date.

Transfer of credits from other institutions may be eligible to satisfy the minor requirements based on adviser review and program approval.

Graduation Requirements

To be given credit for the minor, undergraduate must:

- Maintain a GPA of 3.0 in the minor courses
- Complete 18 credits from the minor

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/>)

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