

TO: The Engineering Faculty
FROM: The Faculty of the School of Materials Engineering
DATE: October 21, 2025
RE: MSE laboratory course updates and changes in credit hours

The faculty of the School of Materials Engineering has approved the following changes to MSE 33500. This action is now submitted to the Engineering Faculty with a recommendation for approval.

Overview:

The School of Materials Engineering is updating the undergraduate laboratory courses to reflect changes in the field and to accommodate the increasing undergraduate enrollment in the School. The 2nd-year laboratory was updated last year. This document details the updates to the third-year laboratories by combining MSE 33500 and MSE 36700 to one unified course. By merging these laboratories, three credit hours are freed and made available to students as elective options.

Reasons:

1) Have two distinct lab courses targeting the 2nd-year and 3rd-year students allows for growth in undergraduate program, simplifies scheduling and advising for the students while maintaining an active “hands-on” learning experience. The new 3rd-year laboratory will have a similar number of student hours in the lab (twice a week) as the combined, previous versions of MSE 33500 and MSE 36700 courses, but with fewer lecture hours. This new format allows student teams additional time to address open-ended materials problems through practical, hands-on investigation.

2) The extra 3-credit hours from combining MSE 33500 and MSE 36700 will be added to the technical electives requirements targeting statistics, computer science, data science, AI, or related fields



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FROM - taking two 30000 level lab courses:

MSE 33500 - Materials Characterization Laboratory

Prerequisite: MSE 23500

Credit Hours: 3.00. The principles of analytical methods for characterization of materials for structure and composition; optical microscopy, scanning electron microscopy, X-ray spectroscopy and diffraction, atomic absorption, emission spectroscopy, and mass spectrometry. Laboratory experiments in X-ray spectroscopy, X-ray diffraction, optical microscopy, and scanning electron microscopy.

Credits: 3.00

MSE 36700 - Materials Processing Laboratory

Prerequisite: MSE 23500

Credit Hours: 3.00. This laboratory is intended as an intensive experience in processing techniques used for ceramics, metals, and polymers. Sintering of a ceramic, casting and post-processing (work hardening, heat treatment, etc.) of a metal, and preparation and extrusion of a polymer are the suggested processes. The measurements (e.g., powder size, compaction force, temperature, grain size, molecular weight) applicable to the successful processing of the material and the final properties (e.g., hardness, ductility, strength, stiffness) will be emphasized.

Learning Outcomes

1. Demonstrate the use of a variety of processing techniques for metals, ceramics, and polymers and to identify the changes in microstructure and properties they cause.
 2. Demonstrate effective written communication in lab reports.
 3. Demonstrate effective oral communication in final project presentation.
 4. Characterize the physical mechanisms that underlie the basic interactions between macroscopic shaping processes and microstructure development for the core bulk processing routes of each of the main classes of materials and how they relate to properties.
 5. Assess validity of experimental data and recognize experimental factors affecting data.
 6. Identify specific processing capabilities and limitations for the main classes of materials.
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Credits: 3.00

To - taking one 30000 level lab course:

MSE 33500 Third Year Materials Engineering Laboratory

Credit Hours: 3.00. This laboratory provides hands-on experience across a range of material classes, including structural and functional materials such as semiconductors. Students perform experiments using standard characterization and processing equipment to measure properties, analyze structure and composition. The course emphasizes developing experimental skills, interpreting data, and linking results to materials performance.

Credits: 3.00

Learning Outcomes

1. Demonstrate the use of a variety of processing and characterization techniques for different classes of materials to identify changes in properties and performance.
 2. Assess validity of experimental data and recognize experimental factors affecting data.
 3. Demonstrate effective written communication in technical reports, and effective oral communication in a final project presentation.
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The 3 credit hours obtained by combining the two required laboratory courses will be applied as an additional technical elective in statistics, computer science, data science, AI, or related fields. For example, students will be encouraged to select a course offered through one of the associated Minor or Certificate programs:

Math

https://catalog.purdue.edu/preview_program.php?catoid=10&poid=12826&returnto=13413

Statistics

https://catalog.purdue.edu/preview_program.php?catoid=16&poid=25252

Computer Science

https://catalog.purdue.edu/preview_program.php?catoid=16&poid=25257

Data Science

https://catalog.purdue.edu/preview_program.php?catoid=18&poid=32907&returnto=23643

Changes in the MSE Degree Requirements

Minimum Degree Requirements For Materials Engineering

Credit Hours Required for Graduation: 125

<i>Courses</i>	<i>Credit Hours</i>
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Mathematics and Physical Sciences

Calculus: MA 16500, 16600, 26100, 26500, and 26600	18
Chemistry: CHM 11500, 11600	8
Physics: PHYS 17200, 24100, 25200	8

General Education Program

Foundational Learning Outcomes:

(Courses approved by the Undergraduate Curriculum Council)

Written Communication/Information Literacy	3
Oral Communication	3
Humanities	3
Behavior/Social Science	3
Science, Technology, & Society	3
General Education Electives:	9

Electives are selected from approved lists with MSE faculty guidance subject to the programmatic requirements of the College of Engineering General Education Program.

Seminars

MSE 39000 (semesters 3-8)	0
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Core Engineering Courses

ENGR 13100, 13200 or ENGR 14100 and 14200	4
MSE Core: 23000, 23500, 25000, 26000, 27000, 33000, 33500, 34000, 36700, 37000, 38200, 42000, 43000, 44000 and 44500.	45
Integrated MSE courses, including year-long, industry-sponsored senior design projects, on the structure, properties, processing, and performance of engineering materials.	

Technical Electives

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A plan of study is designed with the help of a faculty advisor to meet each individual student's professional goals. At least 12 of the **18-21** credits must be approved materials-specific courses; the remaining **6-9** credits may be selected from an approved list of courses, including other academic disciplines, **3 of which** should target statistics, computer science, data science, AI, or related fields.