

Materials Science and Engineering B.S.

Materials Science and Engineering Major

The B.S. Materials Science and Engineering major requires a minimum of 120 total hours to graduate. This total includes UNIFI/General Education requirements and the following specified major requirements, plus electives to complete the minimum of 120 hours.

The Materials Science and Engineering (MSE) major provides students with instruction and practical experience in the science and engineering of materials, with a focus on metals. In addition to gaining skills in engineering design and materials properties, students will learn to design materials using computation.

Admission Requirements:

To be admitted to the B.S. in Materials Science and Engineering program, students must satisfy UNI's admission requirements and be prepared to take Calculus I. Preparation for Calculus I can be demonstrated with a satisfactory ALEKS score or MATH 1140 Precalculus or equivalent. ALEKS score of 61 is required for the math, chemistry and physics classes in the program.

Math and Science:

CHEM 1110 & CHEM 1120 or CHEM 1130	General Chemistry I and General Chemistry II General Chemistry I-II	5-8
MATH 1420	Calculus I	4
MATH 1421	Calculus II	4
MATH 2422	Calculus III	4
PHYSICS 1701	Physics I for Science and Engineering	4
PHYSICS 1702	Physics II for Science and Engineering	4
PHYSICS 2700 or MATH 3425/5425	Mathematical Methods of Physics & Engineering Differential Equations	3
PHYSICS 4750/5750	Physics of Modern Materials	3
PHYSICS 4760/5760	Computational Materials Science	3
PHYSICS 4900/5900	Thermodynamics and Statistical Mechanics	4
CHEM/PHYSICS 4200	Nanoscience	3
STAT 3751	Probability and Statistics	3
Technology and Engineering:		
ENGR 1000	Introduction to Engineering & Professional Practice	3
ENGR 2080	Statics	2
ENGR 2089	Engineering Seminar: (Topic)	1
ENGR 2180	Strength of Materials	2
ENGLISH 1005	College Writing and Research	3
ENGLISH 3772/5772	Technical Writing for Engineering Technologists	3

PHIL 1560	Science, Technology, and Ethics (STE)	3
TECH 1024	Engineering Design with CAD	3
TECH 2072	Engineering Materials	3
TECH 3127	Applied Thermodynamics	3
TECH 3132/5132	Metallurgy and Phase Transformation	3
TECH 3136	Principles of Metal Casting	3
TECH 3192/5192	Non-Destructive Evaluation of Materials/Scanning Electron Microscopy	3
ENGR 4235/5235	Material Transformations & Modeling	3
ENGR 4500	Senior Design @	3
Technical Electives - 12 credits of course work approved by your academic advisor.		12
Total Hours		97-100

@ENGR 4500 meets the Bachelor of Science degree undergraduate research course requirement.

Four-Year Plan

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This is a sample plan of study with a suggested sequencing of classes for the major. University electives may be applied to earn additional academic majors, minors, or certificates. Students should regularly meet with their academic advisor to plan their specific semester schedule to include UNIFI/General Education program and/or university elective hours required.

Course	Title	Hour
Freshman		
Fall		
CHEM 1110	General Chemistry I	4
MATH 1420	Calculus I	4
PHYSICS 1701	Physics I for Science and Engineering	4
ENGR 1000	Introduction to Engineering & Professional Practice	3
Hours		15
Spring		
UNIFI/General Education or University Electives		
		2
CHEM 1120	General Chemistry II	4
MATH 1421	Calculus II	4
PHYSICS 1702	Physics II for Science and Engineering	4
Hours		14
Sophomore		
Fall		
UNIFI/General Education or University Electives		
		3
MATH 2422	Calculus III	4
TECH 1024	Engineering Design with CAD	3
ENGR 2080	Statics	2

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ENGR 2089	Engineering Seminar: (Topic)	1
ENGLISH 3772/5772	Technical Writing for Engineering Technologists	3
Hours		16
Spring		
UNIFI/General Education or University Electives		3
TECH 2072	Engineering Materials	3
ENGR 2180	Strength of Materials	2
PHYSICS 2700	Mathematical Methods of Physics & Engineering	3
STAT 3751	Probability and Statistics	3
Technical Elective Course		3
Hours		17
Junior		
Fall		
UNIFI/General Education or University Electives		6
TECH 3132/5132	Metallurgy and Phase Transformation	3
CHEM 4200/5200	Nanoscience	3
Technical Elective Course		3
Hours		15
Spring		
UNIFI/General Education or University Electives		3
TECH 3127	Applied Thermodynamics	3
TECH 3192/5192	Non-Destructive Evaluation of Materials/Scanning Electron Microscopy	3
PHYSICS 4760/5760	Computational Materials Science	3
PHYSICS 4900/5900	Thermodynamics and Statistical Mechanics	4
Hours		16
Senior		
Fall		
PHIL 1560	Science, Technology, and Ethics (STE)	3
TECH 3136	Principles of Metal Casting	3
ENGR 4235/5235	Material Transformations & Modeling	3
PHYSICS 4750/5750	Physics of Modern Materials	3
Technical Elective Course		3
Hours		15
Spring		
UNIFI/General Education or University Electives		6
ENGR 4500	Senior Design	3
Technical Elective Course		3
Hours		12
Total Hours		120

principles, as well as applications relevant to current and future industries.

- Engage students in laboratory activities and project work to ensure that they obtain practical and direct experience with engineering design and practice.
- Enhance technical writing skills through detailed reports adhering to professional styles and standards.

Related Programs

- Applied Engineering M.S.
- Industrial Management B.A.

Learning Outcomes

Materials Science and Engineering, B.S.

Program goals:

- Provide an education in materials science & engineering consistent with the highest ABET (formerly Accreditation Board for Engineering and Technology) EAC (Engineering Accreditation Commission) accreditation standards.
- Prepare students to understand fundamental engineering principles with high-quality courses in mathematics, chemistry and physics.
- Provide rigorous courses in materials science and engineering that incorporate discussion of underlying physical and chemical