

MATERIALS SCIENCE AND ENGINEERING, BSE

The Materials Science and Engineering (MSE) program reflects the explosive growth of interest in the nano and bio sectors of engineering science and technology. MSE prepares students to use fundamental scientific principles to synthesize, manipulate, design and characterize the structural and functional properties of advanced engineering materials. The program offers students advantages seldom found in other MSE programs: the opportunity to tailor the curriculum to their own interests, guaranteed research experience and an excellent student-faculty ratio.

For more information: <https://www.seas.upenn.edu/prospective-students/undergrad/majors/materials-science-and-engineering/>

Materials Science and Engineering (MSE) Major Requirements

37 course units are required.

Code	Title	Course Units
Engineering		
Engineering Elective (ENGR 1010 recommended)		1
MSE 2010	Materials Lab I	0.5
MSE 2020	Materials Lab II	0.5
MSE 2150	Introduction to Functional Materials: From Macro to Nanoscale	1
MSE 2200	Introduction to Materials Science and Engineering	1
MSE 2600	Energetics of Macro and Nano-scale Materials	1
MSE 3010	Materials Lab III	0.5
MSE 3300	Self-Assembly of Soft Materials	1
MSE 3600	Structure at the Nanoscale	1
MSE 3930	Materials Selection	1
MSE 4050	Mechanical Properties of Macro/Nanoscale Materials	1
MSE 4400	Phase Transformations	1
MSE 4600	Computational Materials Science	1
MSE 4950	Senior Design	1
MSE 4960	Senior Design	1
Math and Natural Science		
MATH 1400	Calculus, Part I	1
MATH 1410	Calculus, Part II	1
MATH 2400	Calculus, Part III	1
MATH 2410	Calculus, Part IV	1
or ENM 2510	Analytical Methods for Engineering	
Mathematics Elective		1
PHYS 0140	Principles of Physics I (without laboratory)	1
or MEAM 1100	Introduction to Mechanics	
PHYS 0141	Principles of Physics II (without laboratory)	1
CHEM 1012	General Chemistry I	1
CHEM 1101	General Chemistry Laboratory I	.5

CHEM 1022	General Chemistry II	1
MSE 2210	Quantum Physics of Materials	1
Technical Electives		
ENGR 1050	Introduction to Scientific Computing	1
MSE Elective		2
Tech Elective ¹		2
General Electives ²		
EAS 2030	Engineering Ethics	1
Select 4 Social Science or Humanities courses		4
Select 2 Social Science or Humanities or Technology in Business & Society courses		2
Free Elective		
Select 1 course unit of free electives		1
Total Course Units		37

1

Includes any Engineering, Math or Natural Science

2

Must include a Writing Seminar (a list of approved Writing Seminars can be found in the SEAS Undergraduate Handbook (<https://ugrad.seas.upenn.edu/student-handbook/courses-requirements/writing-courses/>))

Concentrations

Students may select one of three concentrations:

- Electronic & Optical Devices and Sensors
- Energy and Sustainability
- Nanotechnology

The degree and major requirements displayed are intended as a guide for students entering in the Fall of 2022 and later. Students should consult with their academic program regarding final certifications and requirements for graduation.