Engineering Physics
Sample Curriculum for Materials Science and Engineering Specialization

Student Information

Name:_____ OSU Email: _____

Suggested Curriculum

This should be used as a **guide** only. Semester offerings are subject to change.

Year	Autumn	Spring
1	___ Physics 1270[1] *(Into Physics I)* ..... 5 hr ___ Math 1151 *(Calculus I)* ..... 5 hr ___ Engineering 1181 *(Intro Engineering I)* ..... 2 hr ___ Engineering 1100 *(Engineering Survey)* ..... 1 hr ___ Writing & Info Literacy GE ..... 3 hr	___ Physics 1271[1] *(Intro Physics II)* ..... 5 hr ___ Math 1172 (*Eng Mathematics A)* ..... 5 hr ___ Engineering 1182 *(Intro Engineering II)* ..... 2 hr ___ Chemistry 1210 *(General Chemistry I)* ..... 5 hr ___ GenEd 1201[3] ..... 1 hr
2	___ Physics 2300 *(Mechanics I)* ..... 4 hr ___ **Physics 2095** *(Physics Seminar)* ..... 1 hr ___ CSE 1222[2] *(C++ Programming)* ..... 3 hr ___ Math 2173 *(Eng Mathematics B)* ..... 3 hr ___ MSE 2010 *(Intro to Engineering Materials)* ..... 3 hr ___ Literary, Visual and Performing Arts GE ..... 3 hr	___ Physics 2301 *(Mechanics II)* ..... 4 hr ___ Math 2174[4] *(Differential Eq/Linear Algebra)* ..... 3 hr ___ **MSE 2241** *(Structure, Characterization of Mtrls)* ..... 3 hr ___ **MSE 2251** *(Thermodynamics of Materials)* ..... 3 hr ___ **MSE 2331** *(Structure and Characterization Lab)* ..... 2 hr ___ Physics 3700 *(Data Analysis Lab)* ..... 3 hr
3	___ **Physics 5500** *(Quantum Mechanics)* ..... 4 hr ___ MSE Elective ..... 3 hr ___ MSE Elective ..... 3 hr ___ Targeted Elective[6] ..... 3 hr ___ Thematic Pathways #1[7] ..... 3 hr	___ **Physics 5400** *(Electromagnetism)* ..... 4 hr ___ Physics 4700 *(Electronics Lab)* ..... 3 hr ___ MSE Elective ..... 2 hr ___ Historical and Cultural Studies GE ..... 3 hr ___ Race, Ethnicity, Gender Diversity GE ..... 3 hr
4	___ **Physics 5800** *(Eng Phy Capstone I)* ..... 3 hr ___ MSE Elective ..... 3 hr ___ MSE Elective ..... 3 hr ___ Targeted Elective[6] ..... 3 hr ___ Thematic Pathways[7] #2 ..... 3 hr ___ Thematic Pathways[7] #3 ..... 3 hr	___ **Physics 5801** *(Eng Phy Capstone II)* ..... 3 hr ___ MSE Elective ..... 2 hr ___ Targeted Elective[6] ..... 3 hr ___ Physics Elective[5] ..... 4 hr ___ Thematic Pathways[7] #4 ..... 3 hr ___ Social and Behavioral Sciences GE ..... 3 hr

Total Hours to complete the degree program = 131

[1] Students can take Physics 1250-1251, 1250H-1251H, 1260-1261, or 1270-1271

[2] Students can take CSE 1222, CSE 1223, CSE 1224, Astronomy 1221, or Engr 1281H as their programming course

[3] GenEd 1201 must be taken within the first three semesters

[4] Or (Math 2415 and Math 2568) or (Math 2255 and Math 2568) or Math 5520H can be completed in pace of Math 2174.

[5] Physics Elective options are Physics 3470, 5300, 5401H, 5501, 5600, 5680, and 5810

[6] A list of Targeted Electives options is available at go.osu.edu/targeted-electives.

[7] The requirement is to take either two 3-credit hour classes or one 4-credit hour class for each of the two GE Theme categories

Courses printed in **bold** are taught only during the term shown.

Engineering Specializations

Engineering Physics students are required to take at least 27 hours from one of the following engineering specializations. Note: this document outlines the requirements for the **Materials Science and Engineering** (MSE) specialization.

Aerospace Engineering
Chemical & Biomolecular Engineering
Computer Science & Engineering
Electrical and Computer Engineering
Industrial & Systems Engineering
Materials Science & Engineering
Mechanical Engineering
Nuclear Engineering

Requirements for each specialization can be found at https://physics.osu.edu/engineering-physics-program/concentration-requirements

Materials Science and Engineering Specialization

Required courses (11 hours)

Course	Course title	Credits	Term	Prerequisites
MSE 2010	Introduction to Engineering Materials	3	Au, Sp	Physics 1250, 1260, or 1270; and Math 1151; and Chemistry 1210, 1250, or 1910H
MSE 2241	Structure and Characterization of Materials	3	Sp	MSE 2010
MSE 2251	Thermodynamics of Materials	3	Sp	MSE 2010
MSE 2331	Structure and Characterization Lab	2	Sp	MSE 2010

Electives courses (choose 16 hours)

Course	Course title	Credits	Term	Prerequisites
MSE 2321	Modeling and Simulation Lab I	3	Sp	MSE 2010
MSE 3141	Transformation and Processing of Materials	3	Au	MSE 2251
MSE 3151	Transport Phenomena and Kinetics	3	Au	MSE 2010, 2241, and (Math 2174 or 2415)
MSE 3261	Introduction to the Mechanical Behavior of Materials	3	Sp	MSE 2010 and (ME 2020 or 2040)
MSE 3271	Electronic Properties	3	Sp	MSE 2010, Math 1151, and (Physics 1251, 1261, or 1271)
MSE 3321	Modeling and Simulation Lab II	2	Sp	MSE 3231, 3141, and 3151
MSE 3331	Materials Science and Engineering Lab I	2	Au	MSE 2331

MSE 3332	Materials Science and Engineering Lab II	2	Sp	MSE 2241, 2331, and 2251
MSE 3611	Biological Response to Biomaterials	3	Sp	MSE 2010
MSE 4181	Materials Selection	2	Au	MSE 2241, 2331, 2251, and 2321
MSE 4321	Modeling and Simulation-Based Design	3	Au	MSE 2321 and 3321
MSE 5431	Advanced Metals Laboratory	1	Au	MSE 2241, 2331, 3141, 3261, and 3332; Prereq or concur: MSE 5441 or 5451
MSE 5441	Physical Metallurgy	3	Au	MSE 3141 and 3261
MSE 5451	Molten Metal Processing	3	Sp	MSE 2251 or 3151
MSE 5531	Ceramics Processing Laboratory	1	Sp	MSE 3141, 3261, 3271, and 3332
MSE 5551	Ceramic Processing	3	Au	MSE 3141 and 3151
MSE 5571.71	Electroceramics I: Electronic and Ionic Conductors	1.5	Sp	MSE 3271
MSE 5571.72	Electroceramics II: Dielectric, Magnetic, and Optical Ceramics	1.5	Au	MSE 3271
MSE 5572	Ultrafast Laser Materials Processing	3	Au	MSE 2241 and MSE 3271
MSE 5575	Polymer Processing Fundamentals	3	Sp	Math 1172; and prereq or concur: Physics 1251, 1261, or 1271
MSE 5631	Biomaterials Laboratory	1	Au	prereq or concur: MSE 5641
MSE 5641	Structure-Property Relationships of Polymers	3	Au	MSE 2010
MSE 5651	Biomaterials Processing	3	Sp	MSE 5641
MSE 5711.70	Introduction to Composites	1.5	Sp	MSE 3261
MSE 5761.71	Mechanical Behavior of Crystalline Solids at Lower Temperatures	1.5	Au	MSE 3261 or 3332
MSE 5763.70	Fracture and Fatigue of Engineering Materials	1.5	Au	MSE 3261
MSE 5951	Corrosion	3	Au, Sp	Senior standing (Rank 4)
MSE 5952	Failure Analysis of Materials	3	Sp	Senior standing (Rank 4)

General Education Requirement

A list of approved general education courses can be found at advising.engineering.osu.edu/current-students/curriculum/general-education