Engineering Physics
Sample Curriculum for Industrial and Systems 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 ___ CSE 1222[2] *(C++ Programming)* ..... 3 hr ___ GenEd 1201[3] ..... 1 hr
2	___ Physics 2300 *(Mechanics I)* ..... 4 hr ___ **Physics 2095** *(Physics Seminar)* ..... 1 hr ___ Physics 3700 *(Data Analysis Lab)* ..... 3 hr ___ Math 2173 *(Eng Mathematics B)* ..... 3 hr ___ ISE 2500 *(Intro to Manufacturing Engr)* ..... 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 ___ ISE 2400 *(Design of Work)* ..... 2 hr ___ ISE 3200 *(Linear and Integer Programming)* ..... 3 hr ___ Social and Behavioral Sciences GE ..... 3 hr
3	___ **Physics 5500** *(Quantum Mechanics)* ..... 4 hr ___ ISE Elective ..... 3 hr ___ ISE 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 ___ ISE Elective ..... 3 hr ___ Historical and Cultural Studies GE ..... 3 hr ___ Race, Ethnicity, Gender Diversity GE ..... 3 hr
4	___ **Physics 5800** *(Eng Phy Capstone I)* ..... 3 hr ___ ISE Elective ..... 3 hr ___ ISE 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 ___ ISE Elective ..... 4 hr ___ Targeted Elective[6] ..... 3 hr ___ Physics Elective[5] ..... 4 hr ___ Thematic Pathways[7] #4 ..... 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, 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 **Industrial and Systems Engineering** (ISE) 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

Industrial and Systems Engineering Specialization

Required courses (8 hours)

Course	Course title	Credits	Term	Prerequisites
ISE 2400	Design of Work: Methods and Measurements	2	Au, Sp	Sophomore standing (rank 2)
ISE 2500	Introduction to Manufacturing Engineering	3	Au, Sp	None
ISE 3200	Linear and Integer Programming	3	Au, Sp	Math 2568 or 2174; and CSE 1222, CSE 1223, CSE 1224, or Engineering 1281H

Electives courses (choose 19 hours)

Course	Course title	Credits	Term	Prerequisites
ISE 2040.01 or 2040.02	Engineering Economics In-Person (.01) or Online (.02)	2	Au, Sp	Sophomore standing (rank 2) or above
ISE 3210	Nonlinear and Dynamic Optimization	3	Au, Sp	ISE 3200
ISE 3400	Production Planning and Facilities Design	4	Au, Sp	ISE 3200 and Statistics 3470
ISE 3500	Process Engineering for Machining Operations	3	Au, Sp	ISE 2400
ISE 3600	Workplace Ergonomics	3	Au, Sp	ISE 2040 and Statistics 3470
ISE 3700	Cognitive Engineering Systems	3	Au, Sp	ISE 2400
ISE 3800	Engineering Project Management	3	Au, Sp	ISE 2400
ISE 4100	Stochastic Modeling and Simulation	4	Au, Sp	ISE 2400 and Statistics 3470

ISE 4120	Quality and Reliability Engineering	3	Au, Sp	Junior standing (rank 3) and Statistics 3470
ISE 4500	Manufacturing Process Engineering	3	Au, Sp	(ME 2020 or 2020) and (Welding Engineering 4201 or ME 3500 or MSE 3151)
ISE 4510	Manufacturing Engineering	3	Au, Sp	ISE 2500
ISE 5110	Design of Engineering Experiments	3	Au, Sp	ISE 4210
ISE 5200	Linear Optimization	3	Au	Math 2174, 2415, or 2568
ISE 5220	Complementarity Theory & Applications	3	Sp	ISE 3200
ISE 5230	Decomposition Techniques in Mathematical Programming	3	Au	ISE 3200 and 3210
ISE 5350	Probabilistic Models and Methods in Operations Research	3	Sp	ISE 3200 and Statistics 3470
ISE 5410	Quantitative Models in Production and Distribution Logistics	3	Au	ISE 3210 and 3400
ISE 5520	Industrial Automation	1.5	Au, Sp	ISE 2500
ISE 5525	Industrial Robotics	1.5	Au, Sp	Engineering 1182, 1282H, or 1188; and Junior standing (Rank 3) or above
ISE 5540	Polymer Processing Fundamentals	3	Sp	(ME 2020 or ME 2040) and prereq or concur: (MSE 2251 or ME 4510)
ISE 5555	Manufacturing Processes and Machine Tools	3	Sp	Junior or Senior (Rank 3 or 4) in Engineering
ISE 5570	Manufacturing Data Processing and Analysis	3	Au	CSE 1222, 1223, 1224, or 2021; and Statistics 3470, 3450, or 3460
ISE 5610	Ergonomics in the Product Design Process	3	Au	ISE 3600 and 3700
ISE 5620	Risk Assessment Tools for Occupational Musculoskeletal Disorders	3	Sp	ISE 3600
ISE 5740	Cognitive Engineering Systems: Human-Centered Automation	3	Au	Senior standing (Rank 4)
ISE 5745	Human-Centered Machine Learning	3	Sp	Senior standing (Rank 4)
ISE 5760	Visual Analytics and Sensemaking	3	Au, Sp	Junior or Senior standing (Rank 3 or 4)
ISE 5800	Advanced Project Management	3	Au, Sp	ISE 3800
ISE 5830	Decision Analysis	3	Au	ISE 2040 and Statistics 3470
ISE 5870	Resilience Engineering	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