

# 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 <sup>1</sup> ( <i>Intro Physics I</i> ) ..... 5 hr ___ Math 1151 ( <i>Calculus I</i> ) ..... 5 hr ___ Engineering 1181 ( <i>Intro Engineering I</i> ) ..... 2 hr ___ Engineering 1100 ( <i>Engineering Survey</i> ) ..... 1 hr ___ Writing & Info Literacy GE ..... 3 hr	___ Physics 1271 <sup>1</sup> ( <i>Intro Physics II</i> ) ..... 5 hr ___ Math 1172 ( <i>Eng Mathematics A</i> ) ..... 5 hr ___ Engineering 1182 ( <i>Intro Engineering II</i> ) ..... 2 hr ___ CSE 1222 <sup>2</sup> ( <i>C++ Programming</i> ) ..... 3 hr ___ GenEd 1201 <sup>3</sup> ..... 1 hr
2	___ Physics 2300 ( <i>Mechanics I</i> ) ..... 4 hr ___ <b>Physics 2095</b> ( <i>Physics Seminar</i> ) ..... 1 hr ___ Physics 3700 ( <i>Data Analysis Lab</i> ) ..... 3 hr ___ Math 2173 ( <i>Eng Mathematics B</i> ) ..... 3 hr ___ ISE 2500 ( <i>Intro to Manufacturing Engr</i> ) ..... 3 hr ___ Literary, Visual and Performing Arts GE ..... 3 hr	___ Physics 2301 ( <i>Mechanics II</i> ) ..... 4 hr ___ Math 2174 <sup>4</sup> ( <i>Differential Eq/Linear Algebra</i> ) ..... 3 hr ___ ISE 2400 ( <i>Design of Work</i> ) ..... 2 hr ___ ISE 3200 ( <i>Linear and Integer Programming</i> ) ..... 3 hr ___ Social and Behavioral Sciences GE ..... 3 hr ___ Targeted Elective <sup>6</sup> ..... 3 hr
3	___ <b>Physics 5500</b> ( <i>Quantum Mechanics</i> ) ..... 4 hr ___ ISE Elective ..... 3 hr ___ ISE Elective ..... 3 hr ___ Targeted Elective <sup>6</sup> ..... 3 hr ___ Citizenship Theme GE <sup>7</sup> ..... 3 hr	___ <b>Physics 5400</b> ( <i>Electromagnetism</i> ) ..... 4 hr ___ Physics 4700 ( <i>Electronics Lab</i> ) ..... 3 hr ___ ISE Elective ..... 3 hr ___ Historical and Cultural Studies GE ..... 3 hr ___ Race, Ethnicity, Gender Diversity GE ..... 3 hr
4	___ <b>Physics 5800</b> <sup>8</sup> ( <i>Eng Phy Capstone I</i> ) ..... 3 hr ___ ISE Elective ..... 3 hr ___ ISE Elective ..... 3 hr ___ Citizenship Theme GE ..... 3 hr ___ Student Choice Theme GE <sup>7</sup> ..... 3 hr	___ <b>Physics 5801</b> <sup>8</sup> ( <i>Eng Phy Capstone II</i> ) ..... 3 hr ___ ISE Elective ..... 4 hr ___ Targeted Elective <sup>6</sup> ..... 3 hr ___ Physics Elective <sup>5</sup> ..... 4 hr ___ Student Choice Theme GE <sup>7</sup> ..... 3 hr

**Total Hours to complete the degree program = 131;** Courses printed in **bold** are taught only during the term shown.

<sup>1</sup> Students can take Physics 1250-1251, 1250H-1251H, 1260-1261, or 1270-1271

<sup>2</sup> Students can take CSE 1222, CSE 1223, CSE 1224, or Engr 1281H as their programming course

<sup>3</sup> GenEd 1201 must be taken within the first three semesters

<sup>4</sup> Or (Math 2415 and Math 2568) or (Math 2255 and Math 2568) or Math 5520H can be completed in pace of Math 2174.

<sup>5</sup> Physics Elective options are Physics 3470, 5300, 5401H, 5501, 5600, 5680, and 5810

<sup>6</sup> A list of Targeted Electives options is available at [go.osu.edu/targeted-electives](http://go.osu.edu/targeted-electives).

<sup>7</sup> Take either two 3-credit hour classes or one 4-credit hour class for each of the two GE Thematic Pathways requirements. If two 3-hour courses are taken, they must be from different subjects.

<sup>8</sup> Students can take the College of Engineering Multidisciplinary Capstone Design sequence, Engineering 5901.01-5902.01 in place of Physics 5800-5801. Enrollment in ENGR 5901.01 requires approval. More information about ENGR 5901.01, including the enrollment request details, can be found on the [Department of Engineering Education website](http://Department of Engineering Education website).

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## 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 below and at [physics.osu.edu/engineering-physics-program/engineering-physics-degree-requirements](https://physics.osu.edu/engineering-physics-program/engineering-physics-degree-requirements)

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## 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)

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## General Education Requirement

A list of approved general education courses can be found at [advising.engineering.osu.edu/current-students/curriculum/general-education](https://advising.engineering.osu.edu/current-students/curriculum/general-education)