Engineering Physics
Sample Curriculum for Electrical and Computer 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 *(C++ Programming)* ..... 3 hr ___ GenEd 1201[3] ..... 1 hr
2	___ Physics 2300 *(Mechanics I)* ..... 4 hr ___ **Physics 2095** *(Physics Seminar)* ..... 1 hr ___ Math 2173 *(Eng Mathematics B)* ..... 3 hr ___ ECE 2020 *(Intro to Analog Systms & Circuits)* ..... 3 hr ___ ECE 2060 *(Intro to Digital Logic)* ..... 3 hr ___ Literary, Visual and Performing Arts GE ..... 3 hr	___ Physics 2301 *(Mechanics II)* ..... 4 hr ___ Math 2415 *(Differential Equations)* ..... 3 hr ___ Math 2568 *(Linear Algebra)* ..... 3 hr ___ ECE 2050 *(Intro to Discrete Time Signals/Sysm)* ..... 3 hr ___ Social and Behavioral Sciences GE ..... 3 hr
3	___ **Physics 5500** *(Quantum Mechanics)* ..... 4 hr ___ ECE Elective ..... 3 hr ___ ECE Elective ..... 3 hr ___ Physics 3700 *(Data Analysis Lab)* ..... 3 hr ___ Thematic Pathways #1[7] ..... 3 hr	___ **Physics 5400** *(Electromagnetism)* ..... 4 hr ___ Physics 4700 *(Electronics Lab)* ..... 3 hr ___ ECE 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 ___ ECE Elective ..... 3 hr ___ ECE 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 ___ ECE Elective ..... 3 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

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

[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. Note: since students pursuing the ECE specialization take Math 2415+2568 instead of 2174, the additional math course is counting as 3 hours toward the Targeted Elective requirement, leaving 6 hours remaining.

[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 **Electrical and Computer Engineering** (ECE) 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

Electrical and Computer Engineering Specialization

Required courses (9 hours)

Course	Course title	Credits	Term	Prerequisites
ECE 2020	Intro to Analog Systems and Circuits	3	Au, Sp	(Math 1152 or 1172 or 1181H); and (Physics 1250, 1260, or 1270)
ECE 2050	Intro to Discrete Time Signals & Systems	3	Au, Sp	ECE 2060; and CSE 1222. Prereq or concur: Math 2568
ECE 2060	Intro to Digital Logic	3	Au, Sp	None

Electives courses (choose 18 hours)
See the end of this document for guidance on choosing electives based on your interests.

Course	Course title	Credits	Term	Prerequisites
ECE 2300	Electrical Circuits and Electronic Devices	3	Au, Sp	(Physics 1251 or 1261 or 1271) and (Math 1172, 2153, 2182H, or 4182H)
ECE 2560	Intro to Microcontroller-Based Systems	2	Au, Sp	ECE 2060; pre-req or concurrent: CSE 1222 or ENGR 1281H
ECE 3010	Intro to Radio Frequency & Optical Engineering	3	Au, Sp	ECE 2020; and (Physics 1251, 1261, or 1271); and (Math 2415 or 2174)
ECE 3020	Introduction to Electronics	3	Au, Sp	ECE 2020
ECE 3027	Electronics Laboratory	1	Au, Sp	ECE 3020
ECE 3030	Semiconductor Electronic Devices	3	Au, Sp	(Physics 1251, 1261, or 1271); and (Chemistry 1210 or 1250); pre-req or concur: Math 2415 or 2174
ECE 3040	Sustainable Energy and Power Systems I	3	Au, Sp	ECE 2020
ECE 3047	Sustainable Energy and Energy Conversion Lab	1	Au, Sp	ECE 3040
ECE 3050	Signals and Systems	3	Au, Sp	ECE 2020, 2050, and 2060; and Math 2568

ECE 3551	Intro to Feedback Control Systms	3	Au, Sp	ECE 3050
ECE 3561	Advanced Digital Design	3	Au, Sp	ECE 2060; pre-req or concur: ECE 3020
ECE 3567	Microcontroller Lab	2	Au, Sp	ECE 2560
ECE 4021	Analog Integrated Circuits I	3	Au	ECE 3020
ECE 5010	Wireless Propagation and Remote Sensing	3	Au	ECE 3010
ECE 5012	Integrated Optics	3	Sp	ECE 3010
ECE 5013	Intro to Radar Systems	3	Sp	ECE 3050; and ECE 3010; and Statistics 3470
ECE 5020	Mixed Signal VLSI	3	Au	ECE 3020
ECE 5021	Analog Integrated Circuits II	3	Sp	ECE 4021
ECE 5022	Intro to RF Systems	3	Au	ECE 4021
ECE 5025	Power Electronics: Devices, Circuits, and Applications	3	Au	ECE 3020
ECE 5027	Microwave Electronics	4	Sp	ECE 3020
ECE 5031	Semiconductor Process Tech.	3	Sp	ECE 3030
ECE 5033	Surfaces and Interfaces of Electronics Materials	3	Au	ECE 3030
ECE 5037	Solid State Electronics and Photonics Laboratory	4	Au	Prereq or concur: ECE 3030
ECE 5041	Electric Machines	3	Sp	ECE 3020 and 3040
ECE 5042	Power Systems	3	Au	ECE 3040
ECE 5050	Humanitarian Engineering	4	Sp	Engineering 1182 or 1282H
ECE 5078	Empowering the Entrepreneurial Electrical and Computer Engineer	3	Sp	Prereq or concurrent: ECE 3010, 3020, 3030, 3040, or 3050
ECE 5101	Intro to Wireless Networking	3	Sp	ECE 3561 and (Statistics 2450 or 3470)
ECE 5131	Lasers	3	Au	ECE 3010 or 3030
ECE 5227	Fundamentals of Power Mngmt Integrated Circuits for VLSI Sysm	4	Sp	ECE 4021
ECE 5244	Si and Wade Band Gap Power Devices	3	Au	ECE 3030
ECE 5326	Computer Architecture & Design	3	Au, Sp	ECE 2560 and 3561
ECE 5400	Instrumentation, Signals, and Control in Transport. Applications	3	Varies	ECE 2020 and 2050; and Math 2415
ECE 5460	Image Processing	3	Au	Statistics 3470 and Math 2568
ECE 5463	Introduction to Real Time Robotics Systems	3	Au, Sp	Math 2174 or (Math 2415 and 2568); and (Physics 1250, 1260, or 1270); and (CSE 1222, ENGR 1181, ENGR 1281H, or ENGR 1222)

ECE 5466	Embedded Computer Systems	3	Sp	ECE 5362
ECE 5510	Intro to Computational Electromagnetics	3		ECE 3010
ECE 5530	Fund. of Semiconductors for Microelectronics and Photonics	3	Au	ECE 3030
ECE 5537	Semiconductor Device Characterization and Modelling Lab	4	Sp	ECE 3030
ECE 5551	State-Space Control Systems	3	Au	ECE 3050 and Statistics 3470
ECE 5553	Autonomy in Vehicles	3	Sp	ECE 3551
ECE 5554	Powertrain Control Systems	3	Sp	ECE 3551
ECE 5561	Intro to Cybersecurity	3	Au, Sp	Junior (rank 3) standing or above
ECE 5832	Photovoltaics & Energy Convers.	3	Au	ECE 3030
ECE 5833	Organic and Printed Flexible Electronics	3	Sp	ECE 3030

ECE Course Topic Information

In ECE, the third digit of the course number indicates the subtopic:

xx0x: Communication and Signal processing
xx1x: Electromagnetics
xx2x: Circuits/electronics
xx3x: Semiconductors and optoelectronics
xx4x: Power and energy
xx5x: Control systems
xx6x: Computers/networks
xx7x: Other topics not listed above (e.g. entrepreneurism)

Any course ending in a “7” is a lab, e.g. 3027 is the electronics lab.

Additionally, Electrical Engineering has a “math-based” side and a physics-based” side.

- Math based: Communication and Controls
- Physics based: Circuits, Semiconductors, and Electromagnetics. The physics-based courses use advanced math, but they are more focused on hardware.

General Education Requirement

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