

BACHELOR OF ENGINEERING IN ELECTRICAL ENGINEERING

Through the Electrical Engineering program at Youngstown State University, you'll develop competency in all aspects of electrical engineering and its related fields. You'll take coursework anchored in engineering, math and physics that will allow you to solve complex problems and design intricate systems. Along the way, you'll also refine your communication skills and learn how to ethically and responsibly deploy your engineering skills.

Electrical engineers have homes in a large assortment of industries, from power generation and automotive manufacturing to biomedical development and consumer product design. You may even find yourself using your engineering expertise to serve your country in the military.

With your bachelor's degree in hand, you'll be the person advancing the products and systems that advance society.

MAJOR

Design projects, computer simulations, and hands-on laboratory sessions are the pillars of the Electrical Engineering major at YSU. Students enrolled in the program may choose from three concentrations that prepare graduates for a large variety of professional positions or advanced studies:

- Traditional Concentration
- Computer Digital Concentration
- Biomedical Concentration

This program offers coursework leading to the Bachelor of Engineering with a major in electrical engineering. Traditional, computer/digital, and biomedical options are available. The first courses in the electrical and computer engineering are ECEN 1521 Digital Circuits and ECEN 1521L Digital Circuits Laboratory, and are available to all University students without prerequisites. Visit the office or website for details.

Mission

The Electrical and Computer Engineering program is committed to academic excellence, and it provides educational opportunities in electrical and computer engineering. We provide students at baccalaureate and master levels with diverse and comprehensive educational experiences which meet the highly demanding standards required by industry and preparation for further education.

We utilize the resources of the university and interact with industry to evaluate, optimize, and upgrade our teaching, research, scholarship, service and facilities to continue offering a high-standard educational environment. We promote students' intellectual growth to become fully developed, informed, and productive in order to serve themselves and their local and global communities effectively.

Program Educational Objectives

The Electrical and Computer Engineering program at Youngstown State University offers students a high standard of engineering education. In fulfillment of its mission, as well as the missions of the College of Science, Technology, Engineering, and Mathematics, and the University, the following Program Educational Objectives are established for the Electrical Engineering Program.

Within a few years of graduation, our graduates should:

- Competently design, analyze, test, and implement systems, devices, and processes in the field of electrical engineering within the constraints set by the client and by society, and disseminate the results. (SO-1,2,3,6)

- Commit to practicing engineering ethically and responsibly, both individually and within diverse teams, while holding paramount the impact of engineering decisions on society and ecology. (SO-1,2,4,5)
- Pursue career-long growth through continued learning in their engineering profession and/or pursuit of post graduate education, and to demonstrate leadership and influence within their profession. (SO-3,5,7)

Student Outcomes

The following (1 through 7) Student Outcomes support the program educational objectives. Attainment of these outcomes by students by the time of their graduation prepares graduating students to enter the professional practice of engineering.

1. An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.
2. An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.
3. An ability to communicate effectively with a range of audiences.
4. An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts.
5. An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives.
6. An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.
7. An ability to acquire and apply new knowledge as needed, using appropriate learning strategies.

Accreditation

The YSU undergraduate program in Electrical Engineering has been accredited by the Engineering Accreditation Commission of ABET (<https://www.abet.org/>), under the commission's General Criteria and Program Criteria for Electrical, Electronic(s), Computer, Communication(s), Telecommunication(s) or Similarly Named Engineering Programs.

Laboratory Facilities

The Electrical and Computer Engineering program maintains well-equipped laboratory facilities for circuits, electronics, communications, electromagnetics, energy conversion, power systems, control systems, and digital systems. PC computing and wireless networking are available, as well as various licensed software packages.

Professional Practice

The Electrical and Computer Engineering program participates in the College of STEM Professional Practice Program.

Students who complete course and internship requirements related to the field may receive up to 2 s.h. of credit toward ECEN elective courses. Contact the department for details.

COURSE	TITLE	S.H.
FIRST YEAR REQUIREMENT -STUDENT SUCCESS		
YSU 1500	Success Seminar	1-2
or YSU 1500S	Youngstown State University Success Seminar	
or HONR 1500	Intro to Honors	
General Education Requirements		
ENGL 1550	Writing 1	3-4
or ENGL 1549	Writing 1 with Support	
ENGL 1551	Writing 2	3

Gen Ed Math met in major		
Natural Science (7 s.h.)		
CHEM 1515	General Chemistry 1	3
CHEM 1515L	General Chemistry 1 Laboratory	1
PHYS 2610	General Physics 1	4
PHYS 2610L	General Physics Laboratory 1	1
Arts and Humanities (6 s.h. select one course)		
PHIL 2625	Introduction to Professional Ethics	3
Social Science (6 s.h. select one course)		
ECON 2610	Principles 1: Microeconomics	3
General Education Electives (9 s.h.)		
CMST 1545	Communication Foundations	3
General Education Elective (select any 2 courses)		
6		
Major Core Requirements		
ECEN 1521	Digital Circuits	3
ECEN 1521L	Digital Circuits Laboratory	1
ECEN 2611	Instrumentation and Computation Lab 1	1
ECEN 2612	Instrumentation and Computation Lab 2	1
ECEN 2632	Basic Circuit Theory 1	3
ECEN 2633	Basic Circuit Theory 2	3
ECEN 3711	Intermediate Laboratory 1	1
ECEN 3712	Intermediate Laboratory 2	1
ECEN 3733	Digital Circuit Design	3
ECEN 3741	Electromagnetic Fields 1	3
ECEN 3742	Electromagnetic Fields 2	3
ECEN 3771	Digital and Analog Circuits 1	3
ECEN 4803	Linear Control Systems	3
ECEN 4803L	Linear Control Systems Laboratory	1
ECEN 4811	Senior Laboratory	1
ECEN 4844	Electromagnetic Energy Conversion	3
ENGR 1500	Engineering Orientation	1
ECEN 4899	Senior Design Project	3
ECEN 4899L	Senior Design Project Lab	1
ENGR 1550	Engineering Concepts	2
ENGR 1560	Engineering Computing	2
MECH 2620	Statics and Dynamics	3
ISEN 2610	Engineering Statistics	3
PHYS 3705	Thermodynamics and Classical Statistical Dynamics	3
CSIS 2610	Programming and Problem-Solving	3
CSIS 2610L	Programming and Problem-Solving Lab	1
Electrical Engineering Concentration		15-20
Mathematics Minor -one course counts toward Gen Ed		
MATH 1571	Calculus 1	4
MATH 1572	Calculus 2	4
MATH 2673	Calculus 3	4
MATH 3705	Differential Equations	3
MATH 3718	Linear Algebra and Discrete Mathematics for Engineers	3
Total Semester Hours		126-133

TRADITIONAL CONCENTRATION

COURSE	TITLE	S.H.
Traditional Concentration		
ECEN 3710	Signals and Systems	3

ECEN 3772	Digital and Analog Circuits 2	3
9 s.h. of ECEN Electives or (6) ECEN elective hours + (3) STEM internship credits or (3)		9
Total Semester Hours		15

COMPUTER DIGITAL CONCENTRATION

COURSE	TITLE	S.H.
Computer Digital Concentration		
ECEN 3710	Signals and Systems	3
ECEN 3734	Computer Design	3
CSIS 3700	Data Structures and Objects	3
CSIS 3700L	Data Structures and Objects Lab	1
8 s.h. of CSCI or ECEN Electives		8
Total Semester Hours		18

BIOMEDICAL CONCENTRATION

COURSE	TITLE	S.H.
Biomedical Concentration		
ECEN 3710	Signals and Systems	3
or ECEN 3734	Computer Design	
or ECEN 3772	Digital and Analog Circuits 2	
CHEM 3719	Organic Chemistry 1	3
CHEM 3719L	Organic Chemistry 1 Laboratory	1
CHEM 3720	Organic Chemistry 2	3
CHEM 3720L	Organic Chemistry 2 Laboratory	1
BIOL 2601	General Biology 1: Molecules and Cells	3
BIOL 2601L	General Biology I: Molecules and Cells Laboratory	1
PHYS 2610	General Physics 1	4
PHYS 2610L	General Physics Laboratory 1	1
Total Semester Hours		20

Traditional Concentration

Year 1

Fall		S.H.
YSU 1500	Success Seminar	1-2
or YSU 1500S	or Youngstown State University Success Seminar	
or HONR 1500	or Intro to Honors	
MATH 1571	Calculus 1	4
ENGR 1500	Engineering Orientation	1
ENGR 1550	Engineering Concepts	2
CHEM 1515 & 1515L	General Chemistry 1 and General Chemistry 1 Laboratory	4
ENGL 1550	Writing 1	3-4
or ENGL 1549	or Writing 1 with Support	

Semester Hours

15-17

Spring

MATH 1572	Calculus 2	4
ENGR 1560	Engineering Computing	2
ECEN 1521 & 1521L	Digital Circuits and Digital Circuits Laboratory	4

ENGL 1551	Writing 2	3
CMST 1545	Communication Foundations	3
Any Gen Ed Elective Course		3

Semester Hours 19

Year 2

Fall

MATH 2673	Calculus 3	4
ECEN 2632	Basic Circuit Theory 1	3
ECEN 2611	Instrumentation and Computation Lab 1	1
PHYS 2610 & 2610L	General Physics 1 and General Physics Laboratory 1	5

Semester Hours 13

Spring

MATH 3705	Differential Equations	3
MATH 3718	Linear Algebra and Discrete Mathematics for Engineers	3
ECEN 2633	Basic Circuit Theory 2	3
ECEN 2612	Instrumentation and Computation Lab 2	1
MECH 2620	Statics and Dynamics	3
CSIS 2610	Programming and Problem-Solving	3
CSIS 2610L	Programming and Problem-Solving Lab	1

Semester Hours 17

Year 3

Fall

ECEN 3711	Intermediate Laboratory 1	1
ECEN 3733	Digital Circuit Design	3
ECEN 3741	Electromagnetic Fields 1	3
ECEN 3771	Digital and Analog Circuits 1	3
PHIL 2626	Engineering Ethics	3
ISEN 2610	Engineering Statistics	3

Semester Hours 16

Spring

ECEN 3712	Intermediate Laboratory 2	1
ECEN 3710	Signals and Systems	3
ECEN 3742	Electromagnetic Fields 2	3
ECEN 3772	Digital and Analog Circuits 2	3
ECEN 4844	Electromagnetic Energy Conversion	3
ECON 2610	Principles 1: Microeconomics	3

Semester Hours 16

Year 4

Fall

ECEN 4803 & 4803L	Linear Control Systems and Linear Control Systems Laboratory	4
ECEN 4811	Senior Laboratory	1
ECEN elective		3
ECEN elective		3
PHYS 3705	Thermodynamics and Classical Statistical Dynamics	3

Semester Hours 14

Spring

ECEN Elective		3
ECEN 4899	Senior Design Project	3
ECEN 4899L	Senior Design Project Lab	1
General Education Requirement		3

General Education Requirement 3

Semester Hours 13

Total Semester Hours 123-125

Computer Digital Concentration

Year 1

Fall

YSU 1500	Success Seminar	1-2
or YSU 1500S or HONR 1500	or Youngstown State University Success Seminar or Intro to Honors	

S.H.

MATH 1571	Calculus 1	4
ENGR 1500	Engineering Orientation	1
ENGR 1550	Engineering Concepts	2
CHEM 1515 & 1515L	General Chemistry 1 and General Chemistry 1 Laboratory	4
ENGL 1550 or ENGL 1549	Writing 1 or Writing 1 with Support	3-4

Semester Hours 15-17

Spring

MATH 1572	Calculus 2	4
ENGR 1560	Engineering Computing	2
ECEN 1521 & 1521L	Digital Circuits and Digital Circuits Laboratory	4
ENGL 1551	Writing 2	3
CMST 1545	Communication Foundations	3
Any Gen Ed Elective Course		3

Semester Hours 19

Year 2

Fall

MATH 2673	Calculus 3	4
ECEN 2632	Basic Circuit Theory 1	3
ECEN 2611	Instrumentation and Computation Lab 1	1
PHYS 2610 & 2610L	General Physics 1 and General Physics Laboratory 1	5

Semester Hours 13

Spring

MATH 3705	Differential Equations	3
MATH 3718	Linear Algebra and Discrete Mathematics for Engineers	3
ECEN 2633	Basic Circuit Theory 2	3
ECEN 2612	Instrumentation and Computation Lab 2	1
MECH 2620	Statics and Dynamics	3
CSIS 2610	Programming and Problem-Solving	3
CSIS 2610L	Programming and Problem-Solving Lab	1

Semester Hours 17

Year 3

Fall

ECEN 3711	Intermediate Laboratory 1	1
ECEN 3733	Digital Circuit Design	3
ECEN 3741	Electromagnetic Fields 1	3
ECEN 3771	Digital and Analog Circuits 1	3
PHIL 2626	Engineering Ethics	3
ISEN 2610	Engineering Statistics	3

Semester Hours 16

Spring		
ECEN 3712	Intermediate Laboratory 2	1
ECEN 3710	Signals and Systems	3
ECEN 3742	Electromagnetic Fields 2	3
ECEN 3772	Digital and Analog Circuits 2	3
ECEN 4844	Electromagnetic Energy Conversion	3
ECON 2610	Principles 1: Microeconomics	3
Semester Hours		16
Year 4		
Fall		
ECEN 4803 & 4803L	Linear Control Systems and Linear Control Systems Laboratory	4
ECEN 4811	Senior Laboratory	1
ECEN elective		3
ECEN elective		3
PHYS 3705	Thermodynamics and Classical Statistical Dynamics	3
Semester Hours		14
Spring		
ECEN Elective		3
ECEN 4899	Senior Design Project	3
ECEN 4899L	Senior Design Project Lab	1
General Education Requirement		3
General Education Requirement		3
Semester Hours		13
Total Semester Hours		123-125

Biomedical Concentration

Year 1		
Fall		
YSU 1500	Success Seminar	1-2
or YSU 1500S	or Youngstown State University Success Seminar	
or HONR 1500	or Intro to Honors	
MATH 1571	Calculus 1	4
ENGR 1500	Engineering Orientation	1
ENGR 1550	Engineering Concepts	2
CHEM 1515 & 1515L	General Chemistry 1 and General Chemistry 1 Laboratory	4
ENGL 1550	Writing 1	3-4
or ENGL 1549	or Writing 1 with Support	
Semester Hours		15-17
Spring		
MATH 1572	Calculus 2	4
ENGR 1560	Engineering Computing	2
ECEN 1521 & 1521L	Digital Circuits and Digital Circuits Laboratory	4
ENGL 1551	Writing 2	3
CMST 1545	Communication Foundations	3
Any Gen Ed Elective Course		3
Semester Hours		19
Year 2		
Fall		
MATH 2673	Calculus 3	4
ECEN 2632	Basic Circuit Theory 1	3
ECEN 2611	Instrumentation and Computation Lab 1	1

PHYS 2610 & 2610L	General Physics 1 and General Physics Laboratory 1	5
Semester Hours		13

Spring		
MATH 3705	Differential Equations	3
MATH 3718	Linear Algebra and Discrete Mathematics for Engineers	3
ECEN 2633	Basic Circuit Theory 2	3
ECEN 2612	Instrumentation and Computation Lab 2	1
MECH 2620	Statics and Dynamics	3
CSIS 2610	Programming and Problem-Solving	3
CSIS 2610L	Programming and Problem-Solving Lab	1
Semester Hours		17

Year 3		
Fall		
ECEN 3711	Intermediate Laboratory 1	1
ECEN 3733	Digital Circuit Design	3
ECEN 3741	Electromagnetic Fields 1	3
ECEN 3771	Digital and Analog Circuits 1	3
PHIL 2626	Engineering Ethics	3
ISEN 2610	Engineering Statistics	3
Semester Hours		16

Spring		
ECEN 3712	Intermediate Laboratory 2	1
ECEN 3710	Signals and Systems	3
ECEN 3742	Electromagnetic Fields 2	3
ECEN 3772	Digital and Analog Circuits 2	3
ECEN 4844	Electromagnetic Energy Conversion	3
ECON 2610	Principles 1: Microeconomics	3
Semester Hours		16

Year 4		
Fall		
ECEN 4803 & 4803L	Linear Control Systems and Linear Control Systems Laboratory	4
ECEN 4811	Senior Laboratory	1
ECEN elective		3
ECEN elective		3
PHYS 3705	Thermodynamics and Classical Statistical Dynamics	3
Semester Hours		14

Spring		
ECEN Elective		3
ECEN 4899	Senior Design Project	3
ECEN 4899L	Senior Design Project Lab	1
General Education Requirement		3
General Education Requirement		3
Semester Hours		13
Total Semester Hours		123-125

Student Outcomes

The following (1 through 7) Student Outcomes support the program educational objectives. Attainment of these outcomes by students by the time of their graduation prepares graduating students to enter the professional practice of engineering.

1. An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.

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5. An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives.
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