

Bachelor of Science in Energy Systems Engineering

2023-24 Catalog Year

subject to change and catalog regulations.

Program Overview

What is Energy Systems Engineering? The [ABET-accredited](#) energy systems engineering program at OSU-Cascades is part of the OSU College of Engineering's School of Mechanical, Industrial and Manufacturing Engineering. It combines engineering fundamentals with energy-focused technical courses and business management classes. This multidisciplinary curriculum provides students with a strong foundation in the core principles of mechanical, electrical, and industrial engineering. Additional courses in energy consumption, distribution, storage, conversion, policy, and business management help prepare energy systems engineering students for rewarding technical careers in the broad energy field.

What do Energy Systems Engineers do? Energy systems engineers design devices, processes and systems used to convert, distribute and store energy. It is a broad field with many opportunities.

Student Outcomes: School of MIME Energy Systems Engineering (ESE) Program

The below lists the skills, knowledge, and behaviors characteristic of every student who graduates from Oregon State School of Mechanical, Industrial & Manufacturing Engineering with a bachelor's degree in energy systems engineering. These **Energy Systems Engineering Student Outcomes** are grouped by the MIME Program Educational Objective (PEO) with which they are most closely associated:

- **PEO 1.)** Created value to organizations through the analysis, evaluation, and improvement of engineered systems and processes using appropriate systems engineering methods and tools.
 - Ability to apply mathematics, science, and engineering.
 - Ability to design and conduct experiments, as well as to analyze and interpret data.
 - Ability to identify, formulate, and solve engineering problems.
 - Ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.
- **PEO 2.)** Communicated effectively across disciplines and cultures to manage and/or lead activities in support of organizational goals and objectives.
 - Ability to function on multi-disciplinary teams.
 - Understanding of professional and ethical responsibility
 - Ability to communicate effectively.
 - Knowledge of contemporary issues
- **PEO 3.)** Innovated systems and processes, in response to organizational challenges, through the application of structured and unstructured systems engineering methodologies, including engineering design and problem-solving.
 - Ability to design a system, component, or process to meet desired needs within realistic constraints.
 - Broad education is necessary to understand the impact of engineering solutions in a global and societal context.
 - Recognition of the need for, and an ability to engage in, life-long learning.

Degree Requirements

Students completing the ESE major complete the following requirements.

- University Graduation Requirements
 - College of Engineering Requirements
 - Baccalaureate Core (“Bacc Core”)
 - Energy Systems Engineering major courses
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Program Requirements

OSU Graduation Requirement:

Students are required to meet the University Graduation requirements as well as complete course work required for their major to graduate with a Bachelor of Science in Energy Systems Engineering. **All catalog and course selection information is subject to change pending catalog declaration year.* catalog.oregonstate.edu/regulations/#text

- 180 minimum = total number of credits required to graduate
- 60 minimum = number of upper division credits required
- 45 of last 75 credits must be OSU credits
- Max 135 credits transferred to OSU
- Max 18 W grades (withdraw)
- Max 11 credits PAC

College of Engineering Academic Standing

Progression Model

- **Grades of C or better** and a minimum of 2.50 cumulative OSU GPA
- Maintain 2.50 term and/or cumulative OSU GPA and 65% of courses completed
 - Warning: OSU term GPA is below a 2.50 and/or completion is under 65%
 - Probation: After 24 OSU credits attempted, if both term and cumulative standards are not met
 - Suspension: If on probation and have a subsequent term OSU GPA under 2.50 and/or pace under 65%
- **S/U Grading:** ESE students may not take for S/U grading (Satisfactory/Unsatisfactory) any course listed as a requirement for the major.

Academic Progression Model Information: <https://engineering.oregonstate.edu/current-students/advising/progression>

Important Notes:

- **It is the student’s responsibility to double check that all requirements are met.** The advisor can suggest courses and assist the student in constructing a plan of study, but the student in the end is responsible for assuring all requirements for graduation are met.
- Degree requirements are subject to change and dependent on catalog year of admission and major declaration.
- MECOP Internship information: www.mecopinc.org/

Students will work with their Academic Advisor and use the Bacc Core approved list for OSU-Cascades to choose courses for the Bacc Core requirements. To find information about Bacc Core or for the approved list, visit: <https://admissions.oregonstate.edu/course-articulations>

Student Name: _____ ID#: _____

Baccalaureate Core:

Use the OSU-Cascades Bacc Core course guide to plan courses osucascades.edu/advising/baccalaureate-core

An ASOT-Business or an AAOT has completed all Skills & Perspectives requirements in the Bacc Core.

Skills Requirements	Course	Grade
Health/Fitness		
Mathematics	MTH 251 in major	
Writing I^	WR 121Z in major	
Writing II	WR 227Z in major	
Speech^	COMM 111Z or 114 in major	
Perspective Requirements: no more than 2 from 1 department		
Cultural Diversity		
Literature & the Arts		
Social Processes & Institutions	ECON 201 in major	
Western Culture		
Physical Science	PH 211 in major	
Biological Science		
Additional Science (Physical or Biological)	PH 212 in major	
Difference, Power & Discrimination		
Synthesis Requirements: cannot be from the same department		
Contemporary Global Issues	SUS 350 in major	
Science, Technology & Society		

Major Requirements

First & Second year courses: All courses must be completed with a C grade or better

x	Course	Title	Pre-requisites	Credits	Term Offered*	Grade
	CH 201	Chemistry for Engineering Majors	MTH 111Z	3	F	
	CH 202/CH 205	Chem. for Engineering Majors + Lab	CH 201/CH 202	3 + 1	W + SP	
	COMM 111Z or COMM 114	Public Speaking or Argument & Critical Discourse		4 or 3	F, W SP	
	ENGR 100	The OSU Engineering Student		3	F	
	ENGR 102	Design Engineering & Problem Solving		3	W	
	ENGR 103	Engineering Computation & Algorithmic Thinking	ENGR 102 & MTH 112Z	3	SP	
	ENGR 201	Electrical Fundamentals I	MTH 251 & MTH 252	3	F	
	ENGR 202	Electrical Fundamentals II	ENGR 201	3	W	
	ENGR 211	Statics	MTH 252	3	F	
	ENGR 212 or ME 217*	Dynamics	ENGR 211 & PH 211	3 or 4	W	
	IE 212 or ME 203*	Computational Methods for IE	ENGR 103	4 or 3	SP	
	MTH 251	Differential Calculus	MTH 112Z or placement	4	F, W, SU	
	MTH 252	Integral Calculus	MTH 251	4	W, SP, SU	
	MTH 254	Vector Calculus I	MTH 252	4	SP, SU, F	
	MTH 256	Applied Differential Equations	MTH 254	4	F	
	MTH 341	Linear Algebra I	MTH 254	3	W	
	PH 211	General Physics with Calculus	MTH 251 & co-req MTH 252	4	F	
	PH 212	General Physics with Calculus	PH 211	4	W	
	PH 213	General Physics with Calculus	PH 212 & MTH 254	4	SP	
	ST 314	Introduction to Statistics for Engineers	MTH 252	3	SP	
	WR 121Z	English Composition		4	F, W, SP	
	WR 227Z	Technical Writing	WR 121Z	4	W, SP, SU	

Third & Fourth year courses: All courses must be completed with a C grade or better

x	Course	Title	Pre-requisites	Credits	Term Offered*	Grade
	ESE 330	Modeling & Analysis of Dynamic Systems	ENGR 202, 212, MTH 256, & MTH 341 or MTH 264	4	F	
	ESE 355	Energy Regulation	ENGR 390	4	SP	
	ESE 360	Energy Consumption Analysis	ENGR 390 & ME 311 or ME 310*	4	W	
	ESE 430	Feedback Control Systems	ESE 330	4	W	
	ESE 450	Energy Generation Systems	ME 312	4	SP	
	ESE 470	Energy Distribution Systems	ENGR 202 & ME 311 or ME 310*	4	SP	
	ESE 471	Energy Storage Systems	ENGR 202 & ME 312	4	SP	
	ENGR 415	Engineering Capstone Design I	ME 312, ME 331 (co-requisite), ESE 355, ESE 360, IE 425, & WR 227Z	4	F	
	ENGR 416	Engineering Capstone Design II	ENGR 415	4	W	
	IE 415	Simulation and Decision Support Systems	ST 314	4	W	
	IE 425	Industrial Systems Optimization	ST 314 & MTH 341	4	F	
	IE 471	Project Management in Engineering	ENGR 390	3	SP	
	ME 311 or ME 310*	Introduction to Thermal-Fluid Sciences	ENGR 212 & MTH 256	4	F	
	ME 312	Thermodynamics	ME 311 or ME 310*	4	W	
	ME 331	Introductory to Fluid Mechanics	ME 311 or ME 330* (content differs)	4	SP	
	ME 332	Heat Transfer	ME 331	4	W	
	Choose one: ME 444 or ESE 499	Upper Division Restricted Elective	See course restrictions <i>See Academic Advisor for Restricted Elective information</i>	3-4	F	

Business & Sustainability Courses: All courses must be completed with a C grade or better

x	Course	Title	Pre-requisites	Credits	Term Offered*	Grade
	BA 357	Operations Management	ST 314 & Junior standing	4	W, SP	
	ECON 201	Introduction to Microeconomics	MTH 111Z or equivalent is recommended	4	F, W	
	ENGR 390	Engineering Economy		3	F	
	SUS 350	Sustainable Communities		4	F	

IMPORTANT NOTES

* All projected course term offering is subject to change.

All info is subject to change at catalog policy.

See Academic Advisor for Restricted Elective information.

All PH courses need to be taken at the same institution.