Oregon State University Cascades

# Bachelor of Science in Energy Systems Engineering

2021-22 Catalog Year

*subject to change and catalog regulations.*

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## 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, though 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 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
ESE major courses

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## OSU Graduation requirements:

- 180 total college credits
- 60 upper division credits
- 45 out of last 75 credits must be OSU credits

## 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%
- No major courses may be taken with S/U grading.

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

Degree requirements are subject to change and dependent on catalog year of admission and major declaration.
Find the list of Bacc Core course chooses at the following website: osucascades.edu/advising/baccalaureate-core

**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.

Student Name: _____ ID#:_____

## Baccalaureate Core:

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

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

| x | Skills Requirements | Course | Grade |
|---|---|---|---|
| | Health/Fitness | | |
| | Mathematics | MTH 251 in major | |
| | Writing I^ | WR 121 in major | |
| | Writing II | WR 327 in major | |
| | Speech^ | COMM 111 or 114 in major | |
| x | **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 | | |
| x | **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 |
|---|---|---|---|---|---|---|
| | ENGR 102 | Design Engineering & Problem Solving | | 3 | W | |
| | ENGR 103 | Engineering Computation & Algorithmic Thinking | | 3 | SP | |
| | ENGR 201 | Electrical Fundamentals I | MTH 251 & MTH 252 | 3 | F | |
| | ENGR 212 | Dynamics | ENGR 211 & PH 211 | 3 | W | |
| | MTH 251 | Differential Calculus | MTH 112 or placement | 4 | F, SU | |
| | MTH 252 | Integral Calculus | MTH 251 | 4 | W | |
| | MTH 254 | Vector Calculus I | MTH 252 | 4 | SP | |
| | MTH 256 | Applied Differential Equations | MTH 254 | 4 | F | |
| | MTH 341 | Linear Algebra I | MTH 254 | 3 | W | |
| | CH 201 | Chemistry for Engineering Majors | MTH 111 | 3 | F | |
| | 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 | |
| | COMM 111 or COMM 114 | Public Speaking or Argument & Critical Discourse | | 3 | F, W SP | |
| | WR 121 | English Composition | | 4 | F, W, SP | |
| | ENGR 211 | Statics | MTH 252 | 3 | F | |
| | IE 212 | Computational Methods for IE | ENGR 112 | 4 | SP | |
| | ENGR 100 | The OSU Engineering Student | | 3 | F | |
| | ENGR 202 | Electrical Fundamentals II | ENGR 201 | 3 | W | |
| | ST 314 | Introduction to Statistics for Engineers | MTH 252 | 3 | SP | |
| | CH 202/CH 205 | Chem. for Engineering Majors + Lab | CH 201 | 4 | W + SP | |
| | WR 327 | Technical Writing | WR 121 | 3 | SP | |

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

| x | Course | Title | Pre-requisites | Credits | Term Offered* | Grade |
|---|---|---|---|---|---|---|
| | ME 311 | Introduction to Thermal-Fluid Sciences | ENGR 212 & MTH 256 | 4 | F | |
| | ME 312 | Thermodynamics | ME 311 & MTH 256 | 4 | W | |
| | ME 331 | Introductory to Fluid Mechanics | MTH 254, MTH 256, ENGR 212, & ME 311 | 4 | F | |
| | ME 332 | Heat Transfer | MTH 256, ENGR 212, ME 311, & ME 331 | 4 | W | |
| | ESE 450 | Energy Generation Systems | ME 312 | 4 | SP | |
| | ESE 470 | Energy Distribution Systems | ENGR 202 & ME 311 | 4 | SP | |
| | ESE 471 | Energy Storage Systems | ENGR 202 & ME 312 | 4 | SP | |
| | ESE 355 | Energy Regulation | ENGR 390 or BA 360 | 4 | SP | |
| | ESE 360 | Energy Consumption Analysis | ENGR 390 or BA 360 & ME 311 | 4 | W | |
| | ESE 330 | Modeling & Analysis of Dynamic Systems | ENGR 202, 212, MTH 256, & MTH 306 or MTH 341 | 4 | F | |
| | ESE 430 | Feedback Control Systems | ESE 330 | 4 | W | |
| | IE 415 | Simulation and Decision Support Systems | ST 314 | 4 | W | |
| | IE 425 | Industrial Systems Optimization | ST 314 & MTH 306 or MTH 341 | 4 | F | |
| | IE 471 | Project Management in Engineering | ENGR 390 | 3 | SP | |
| | ESE 497 | MIME Capstone Design | ME 312, ME 331 (co-requisite), ESE 355, ESE 360, IE 425, & WR 327 | 4 | F | |
| | ESE 498 | MIME Capstone Design | ESE 497 | 4 | W | |
| | Choose one: ME 444 or ESE 499 | Upper Division Restricted Elective | See course restrictions *See Academic Advisor for Restricted Elective information* | 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 | |
| | ENGR 390 | Engineering Economy | | 3 | F | |
| | ECON 201 | Introduction to Microeconomics | MTH 111 or equivalent is recommended | 4 | F, W | |
| | 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.