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 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

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](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](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/](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](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](http://osucascades.edu/advising/baccalaureate-core). An ASOT-Business or an AAOT has completed all Skills & Perspectives requirements in the Bacc Core.

### Skills Requirements

<table>
<thead>
<tr>
<th>Course</th>
<th>Grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fitness</td>
<td></td>
</tr>
<tr>
<td>Fitness Physical Activity</td>
<td></td>
</tr>
<tr>
<td>Mathematics</td>
<td>MTH 251 in major</td>
</tr>
<tr>
<td>Writing I^</td>
<td>WR 121Z in major</td>
</tr>
<tr>
<td>Writing II</td>
<td>WR 227Z in major</td>
</tr>
<tr>
<td>Speech^</td>
<td>COMM 114 in major</td>
</tr>
</tbody>
</table>

### Perspective Requirements: no more than 2 from 1 department

<table>
<thead>
<tr>
<th>Perspective</th>
<th>Course</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cultural Diversity</td>
<td>ECON 201 in major</td>
</tr>
<tr>
<td>Literature &amp; the Arts</td>
<td></td>
</tr>
<tr>
<td>Social Processes &amp; Institutions</td>
<td></td>
</tr>
<tr>
<td>Western Culture</td>
<td></td>
</tr>
<tr>
<td>Physical Science</td>
<td>PH 211 in major</td>
</tr>
<tr>
<td>Biological Science</td>
<td></td>
</tr>
<tr>
<td>Additional Science (Physical or Biological)</td>
<td>PH 212 in major</td>
</tr>
<tr>
<td>Difference, Power &amp; Discrimination</td>
<td></td>
</tr>
</tbody>
</table>

### Synthesis Requirements: cannot be from the same department

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Course</th>
</tr>
</thead>
<tbody>
<tr>
<td>Contemporary Global Issues</td>
<td>SUS 350 in major</td>
</tr>
<tr>
<td>Science, Technology &amp; Society</td>
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</tr>
</tbody>
</table>

### Major Requirements

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

<table>
<thead>
<tr>
<th>x</th>
<th>Course</th>
<th>Title</th>
<th>Pre-requisites</th>
<th>Credits</th>
<th>Term Offered*</th>
<th>Grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>CH 201</td>
<td>Chemistry for Engineering Majors</td>
<td></td>
<td>MTH 111Z</td>
<td>3</td>
<td>F</td>
<td></td>
</tr>
<tr>
<td>CH 202</td>
<td>Chemistry for Engineering Majors</td>
<td></td>
<td>CH 201</td>
<td>3</td>
<td>W</td>
<td></td>
</tr>
<tr>
<td>CH 205</td>
<td>Chemistry Lab for CH 202</td>
<td></td>
<td>CH 202</td>
<td>1</td>
<td>SP</td>
<td></td>
</tr>
<tr>
<td>COMM 114</td>
<td>Argument &amp; Critical Discourse</td>
<td></td>
<td></td>
<td>3</td>
<td>SP</td>
<td></td>
</tr>
<tr>
<td>ENGR 100</td>
<td>The OSU Engineering Student</td>
<td></td>
<td></td>
<td>3</td>
<td>F</td>
<td></td>
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<tr>
<td>ENGR 102</td>
<td>Design Engineering &amp; Problem Solving</td>
<td></td>
<td></td>
<td>3</td>
<td>W</td>
<td></td>
</tr>
<tr>
<td>ENGR 103</td>
<td>Engineering Computation &amp; Algorithmic Thinking</td>
<td></td>
<td>ENGR 102 &amp; MTH 112Z</td>
<td>3</td>
<td>SP</td>
<td></td>
</tr>
<tr>
<td>ENGR 201</td>
<td>Electrical Fundamentals I</td>
<td></td>
<td>MTH 251 &amp; MTH 252</td>
<td>3</td>
<td>F</td>
<td></td>
</tr>
<tr>
<td>ENGR 202</td>
<td>Electrical Fundamentals II</td>
<td></td>
<td>ENGR 201</td>
<td>3</td>
<td>W</td>
<td></td>
</tr>
<tr>
<td>ENGR 211</td>
<td>Statics</td>
<td></td>
<td>MTH 252</td>
<td>3</td>
<td>F</td>
<td></td>
</tr>
<tr>
<td>ME 217 (ENGR 212)</td>
<td>Mechanical Engineering Dynamics</td>
<td></td>
<td>ENGR 103, ENGR 211 &amp; PH 211</td>
<td>4</td>
<td>W</td>
<td></td>
</tr>
<tr>
<td>IE 212</td>
<td>Computational Methods for IE</td>
<td></td>
<td>ENGR 103</td>
<td>4</td>
<td>SP</td>
<td></td>
</tr>
<tr>
<td>MTH 251</td>
<td>Differential Calculus</td>
<td></td>
<td>MTH 112Z or placement</td>
<td>4</td>
<td>F, W, SU</td>
<td></td>
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<tr>
<td>MTH 252</td>
<td>Integral Calculus</td>
<td></td>
<td>MTH 251</td>
<td>4</td>
<td>W, SP, SU</td>
<td></td>
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<tr>
<td>MTH 254</td>
<td>Vector Calculus I</td>
<td></td>
<td>MTH 252</td>
<td>4</td>
<td>SP, SU, F</td>
<td></td>
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<tr>
<td>MTH 256</td>
<td>Applied Differential Equations</td>
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<td>MTH 254</td>
<td>4</td>
<td>F</td>
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<tr>
<td>MTH 264</td>
<td>Introduction to Matrix Algebra</td>
<td></td>
<td>MTH 252</td>
<td>2</td>
<td>W</td>
<td></td>
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<tr>
<td>PH 211</td>
<td>General Physics with Calculus</td>
<td></td>
<td>Rec: MTH 251 &amp; co-req MTH 252</td>
<td>4</td>
<td>F</td>
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</tr>
<tr>
<td>PH 212</td>
<td>General Physics with Calculus</td>
<td></td>
<td>PH 211</td>
<td>4</td>
<td>W</td>
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<tr>
<td>PH 213</td>
<td>General Physics with Calculus</td>
<td></td>
<td>Rec: PH 212 &amp; MTH 254</td>
<td>4</td>
<td>SP</td>
<td></td>
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<tr>
<td>ST 314</td>
<td>Introduction to Statistics for Engineers</td>
<td></td>
<td>MTH 252</td>
<td>3</td>
<td>SP</td>
<td></td>
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<tr>
<td>WR 227Z</td>
<td>Technical Writing</td>
<td></td>
<td>WR 121Z</td>
<td>4</td>
<td>W, SP, SU</td>
<td></td>
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</tbody>
</table>
### Third & Fourth year courses: All courses must be completed with a C grade or better

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Pre-requisites</th>
<th>Credits</th>
<th>Term Offered*</th>
<th>Grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>ESE 330</td>
<td>Modeling &amp; Analysis of Dynamic Systems</td>
<td>ENGR 202, ENGR 212 or ME 217, MTH 256, &amp; MTH 341 or MTH 264</td>
<td>4</td>
<td>F</td>
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<tr>
<td>ESE 355</td>
<td>Energy Regulation</td>
<td>ENGR 390</td>
<td>4</td>
<td>SP</td>
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<tr>
<td>ESE 360</td>
<td>Energy Consumption Analysis</td>
<td>ENGR 390 &amp; ME 311 or ME 310</td>
<td>4</td>
<td>W</td>
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<tr>
<td>ESE 430</td>
<td>Feedback Control Systems</td>
<td>ESE 330</td>
<td>4</td>
<td>W</td>
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<tr>
<td>ESE 450</td>
<td>Energy Generation Systems</td>
<td>**ME 312 or ME 333</td>
<td>4</td>
<td>SP</td>
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<tr>
<td>ESE 470</td>
<td>Electrical Energy Distribution Systems</td>
<td>**ENGR 202 &amp; ME 311 or ME 310</td>
<td>4</td>
<td>SP</td>
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<tr>
<td>ESE 471</td>
<td>Energy Storage Systems</td>
<td>**ENGR 202 &amp; ME 312 or ME 333</td>
<td>4</td>
<td>SP</td>
<td></td>
</tr>
<tr>
<td>ENGR 415</td>
<td>Engineering Capstone Design I</td>
<td>**ME 312, ME 331 (co-requisite), ESE 355, ESE 360, IE 425, &amp; WR 227Z</td>
<td>4</td>
<td>F</td>
<td></td>
</tr>
<tr>
<td>ENGR 416</td>
<td>Engineering Capstone Design II</td>
<td>ENGR 415</td>
<td>4</td>
<td>W</td>
<td></td>
</tr>
<tr>
<td>IE 415</td>
<td>Simulation and Decision Support Systems</td>
<td>**IE 212 &amp; ST 314</td>
<td>4</td>
<td>W</td>
<td></td>
</tr>
<tr>
<td>IE 425</td>
<td>Industrial Systems Optimization</td>
<td>ST 314 &amp; MTH 341 or MTH 264</td>
<td>4</td>
<td>F</td>
<td></td>
</tr>
<tr>
<td>ESC 395 (IE 471)</td>
<td>Engineering Project Management</td>
<td>ENGR 390</td>
<td>3</td>
<td>SP</td>
<td></td>
</tr>
<tr>
<td>ME 310 (ME 311)</td>
<td>Introduction to Thermodynamics</td>
<td>MTH 256 &amp; ME 217 or ENGR 212</td>
<td>4</td>
<td>F</td>
<td></td>
</tr>
<tr>
<td>ME 333 (ME 312)</td>
<td>Thermodynamics II</td>
<td>ME 311 or ME 310</td>
<td>4</td>
<td>W</td>
<td></td>
</tr>
<tr>
<td>ESC 331 (ME 331)</td>
<td>Introductory Fluid Mechanics</td>
<td>ME 311 or ME 310</td>
<td>4</td>
<td>SP</td>
<td></td>
</tr>
<tr>
<td>ESC 332 (ME 332)</td>
<td>Introductory Heat Transfer</td>
<td>ESC 331 or ME 331</td>
<td>4</td>
<td>W</td>
<td></td>
</tr>
<tr>
<td>Choose one: ESE 499</td>
<td>Upper Division Restricted Elective</td>
<td>See course restrictions See Academic Advisor for Restricted Elective information</td>
<td>3-4</td>
<td>F</td>
<td></td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Pre-requisites</th>
<th>Credits</th>
<th>Term Offered*</th>
<th>Grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>BA 357</td>
<td>Operations &amp; Supply Chain Mgmt.</td>
<td>ST 314 &amp; Junior standing</td>
<td>4</td>
<td>W, SP</td>
<td></td>
</tr>
<tr>
<td>ECON 201</td>
<td>Introduction to Microeconomics</td>
<td>Rec: MTH 111Z or equivalent</td>
<td>4</td>
<td>F, W</td>
<td></td>
</tr>
<tr>
<td>ENGR 390</td>
<td>Engineering Economy</td>
<td></td>
<td>3</td>
<td>F</td>
<td></td>
</tr>
<tr>
<td>SUS 350</td>
<td>Sustainable Communities</td>
<td></td>
<td>4</td>
<td>F</td>
<td></td>
</tr>
</tbody>
</table>

**IMPORTANT NOTES**

* All projected course term offering is subject to change.
**Pre-requisites pending review
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.