

## Bachelor of Science in Engineering Science

2024-25 Catalog Year

*subject to change and catalog regulations.*

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### Program Overview

An engineering program must prepare students for not only today's technological and societal challenges but also those of the future. These challenges are becoming more and more complex as well as multidisciplinary in nature. The Engineering Science program provides students with a strong, broad foundation in engineering fundamentals rather than in a specific engineering discipline to prepare students to be dynamic, agile, and flexible engineers.

**What is Engineering Science?** The Engineering Science curriculum has a common core built from select courses across several engineering disciplines (industrial, electrical, mechanical, and computer science) as well as science and mathematics foundations. Technical electives in different disciplines allow students to either gain exposure to several different fields by taking an assortment of those courses or to specialize in a particular area by taking technical electives focused in one of the concentration areas.

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### Engineering Science: Degree Requirements

Students will complete the following requirements to complete the Bachelor of Science in Engineering Science. This guide will help students work with their advisor to plan their pathway to graduation.

- University Graduation Requirements
  - College of Engineering Requirements
  - Baccalaureate Core ("Bacc Core")
  - Engineering Science Major Requirements
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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](https://catalog.oregonstate.edu/regulations/#text)

- 180 minimum = total number of credits required to graduate
- 60 minimum = number of upper division credits required
- 45 of the 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:** ESC 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/](http://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](https://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
Fitness		
Fitness Physical Activity		
Mathematics	MTH 251 in major	
Writing I^	WR 121Z in major	
Writing II	WR 227Z in major	
Speech^	COMM 114 in major	
<b>Perspective Requirements: no more than 2 from 1 department</b>		
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 212-213 in major	
Difference, Power & Discrimination		
<b>Synthesis Requirements: cannot be from the same department</b>		
Contemporary Global Issues		
Science, Technology & Society		

# Engineering Science Major Requirements - All courses must be completed with a C grade or better

## First & Second Year Courses

x	Course	Title	Pre-requisites	Credits	Term Offered*	Grade
	CH 201	Chemistry for Engineering Majors	MTH 111Z	3	F	
	CH 202	Chemistry for Engineering Majors	CH 201	3	W	
	CH 205	Chemistry Lab for CH 202	CH 202	1	SP	
	COMM 114	Arg. & Critical Discord		3	SP	
	ECON 201	Intro to Microeconomics	MTH 111Z recommended	4	F, W	
	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	
	ME 217 (ENGR 212)	Mechanical Engineering Dynamics	ENGR 103, ENGR 211 & PH 211	4	W	
	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 264	Intro to Matrix Algebra	MTH 252	2	W	
	PH 211	General Physics with Calculus	Rec: MTH 251 & co-req MTH 252	4	F	
	PH 212	General Physics with Calculus	PH 211	4	W	
	PH 213	General Physics with Calculus	Rec: PH 212 & MTH 254	4	SP	
	ST 314	Introduction to Statistics for Engineers	MTH 252	3	SP	
	WR 227Z	Technical Writing	WR 121Z	4	F, W, SP	

## Third- & Fourth-Year Courses

x	Course	Title	Pre-requisites	Credits	Term Offered*	Grade
	CS 162	Intro to Computer Science II	ENGR 103 or CS 161	4	F	
	ECE 271/272	Digital Logic Design + Lab	MTH 251	4	W	
	ECE 322	Electronics I	ENGR 203 or ESE 330	3	SP	
	ESC 322	Electronics I Laboratory	ENGR 203 or ESE 330	1	SP	
	ENGR 390	Engineering Economy		3	F	
	ESC 331 (ME 331)	Intro to Fluid Mechanics	ME 310	4	SP	
	ESC 340	Intro to Experimentation	CS 162, ENGR 202, PH 213, & ST 314	4	W	
	MATS 321 (ESC 350)	Introduction to Materials Science	CH 202	4	W	
	ESC 440	Computational Methods for Engineers	MTH 256, & MTH 264	4	F	
	ENGR 415	Engineering Capstone Design I	**ENGR 390, IE 425, ME 312, ESE 355, WR 227Z, ST 314, ENGR 390	4	F	
	ENGR 416	Engineering Capstone Design II	ENGR 415	4	W	
	ESE 330	Modeling & Analysis of Dynamic Systems	ENGR 202, ENGR 212 or ME 217, MTH 256, & MTH 341 or MTH 264	4	F	
	ESC 395 (IE 471)	Engineering Project Management	ENGR 390	3	SP	
	ME 310 (ME 311)	Introduction to Thermodynamics	MTH 256 & ME 217 or ENGR 212	4	F	

### Restricted Electives or Option

Students who select an Engineering Science degree option must complete 28 unique credits to meet the option requirement. Refer to each option for a list of its unique courses.

**Energy Systems Engineering Option:** The Energy Systems Engineering option provides Engineering Science students with the opportunity to focus on the design, processes, and systems used to convert, distribute, and store energy with the 28 CH of required electives listed below.

x	Course	Title	Pre-requisites	Credits	Term Offered*	Grade
	ESE 355	Energy Regulation	ENGR 390	4	SP	
	ESE 430	Feedback Control Systems	ESE 330	4	W	
	ESE 450	Energy Generation Systems	**ME 311 or ME 310	4	SP	
	ESE 470	Energy Distribution Systems	**ENGR 202 & ME 311 or ME 310*	4	SP	
	ESE 471	Energy Storage Systems	**ENGR 202 & ME 311 or ME 310	4	SP	
	IE 415	Simulation and Decision Support Systems	**ST 314 & CS 162	4	W	
	IE 425	Industrial Systems Optimization	ST 314 & MTH 341 or MTH 264	4	F	

**The Engineering Computing Option:** The Engineering Computing Option provides students the opportunity to apply computer science techniques for processing, analyzing, and extracting meaning from collections of data with the 28 CH of required electives listed below.

x	Course	Title	Pre-requisites	Credits	Term Offered*	Grade
	CS 261	Data Structures	CS 162 & MTH 231	4	W	
	CS 290	Web Development	CS 162	4	W	
	CS 325	Analysis of Algorithms	CS 261 & MTH 231	4	SP	
	CS 340	Introduction to Databases	CS 290	4	SP	
	CS 434	Machine Learning and Data Mining	CS 325 & ST 314	4	F	
	CS 450	Introduction to Computer Graphics	CS 261	4	Online only	
	MTH 231	Elements of Discrete Mathematics	MTH 111Z	4	SP	

**Choose Your Own Path:** Engineering Science students who do not select a degree option must choose 28 credits from the following list of approved courses.

x	Course	Title	Pre-requisites	Credits	Term Offered*	Grade
	CS 261	Data Structures	CS 162 & MTH 231	4	W	
	CS 290	Web Development	CS 162	4	W	
	CS 325	Analysis of Algorithms	CS 261 & MTH 231	4	SP	
	CS 340	Introduction to Databases	CS 290	4	SP	
	CS 434	Machine Learning & Data Mining	CS 325 & ST 314	4	F	
	CS 450	Introduction to Computer Graphics	CS 261	4	Online only	
	ENGR 213	Strength of Materials	ENGR 211	3	SP	
	ENGR 248	Engineering Graphics & 3-D Modeling		3	W	
	ESE 355	Energy Regulation	ENGR 390	4	SP	
	ESE 430	Feedback Control Systems	ESE 330	4	W	
	ESE 450	Energy Generation Systems	**ME 311 or ME 310	4	SP	
	ESE 470	Energy Distribution Systems	ENGR 202, ME 311 or ME 310	4	SP	
	ESE 471	Energy Storage Systems	**ENGR 202 & ME 311 or ME 310	4	SP	

ESE 499	Special Topics: Finite Element Analysis	Sr. Standing	4	F	
IE 415	Simulation and Decision Support Systems	**ST 314 & CS 162	4	W	
IE 425	Industrial Systems Optimization	**ST 314 & MTH 341 or MTH 264	4	F	
ME 316	Mechanics of Materials	ENGR 213 & MTH 256	3	TBD	
ESC 332 (ME 332)	Introductory Heat Transfer	ESC 331 or ME 331	4	W	
ME 333 (ME 312)	Thermodynamics II	ME 311 or ME 310	4	W	
ME 382	Intro. To Design	ME 217, ENGR 213, & ENGR 248	4	Hybrid TBD	
ME 383	Mechanical Component Design	ME 316, ME 217 & ENGR 213	4	Hybrid TBD	
MTH 231	Elements of Discrete Mathematics	MTH 111Z	4	SP	

**IMPORTANT NOTES:**

\* All projected course term offerings are subject to change.

\*\*Pre-requisites pending review

All info is subject to change at catalog policy.

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