

MAJOR IN MECHANICAL ENGINEERING

Is making a difference important to you? Do you like putting ideas and designs to work? Are you interested in collaborating and working in teams with others? Would you enjoy the challenge of inventing sustainable energy devices, leading computer-aided product design, or biomedical research? Does creating new designs for the hybrid electric vehicle industry, or new airplanes in the fields of aeronautics and aerospace sound interesting? Would designing or doing research and development in a wide range of industrial and governmental enterprises appeal to you? Does studying thermal sciences and the integration of electronic and mechanical devices interest you? If your answer to any of these questions is "yes," then a major in Mechanical Engineering may be for you.

Mechanical engineers are creative problem solvers who design, develop, and manufacture the machines and instrumentation that run energy, building, environmental, and transportation systems. Examples include biomedical devices, ground/air/space vehicles, robots, environmental control equipment, and power plants.

In Mechanical Engineering, students take basic science and mathematics courses while beginning their engineering studies in design and computing. A broad spectrum of classes is designed to sharpen problem-solving skills. The senior year focuses on a year-long capstone design course to help students in the transition from college to an engineering career. Students also choose technical electives from the energy, automotive, material science, manufacturing, dynamic systems, robotics and controls, simulation and modeling, and biomedical engineering areas. Participation in labs provides an active learning environment and further develops design, modeling, and analytical skills.

Mechanical Engineering at CSU is dedicated to graduating ethical mechanical engineers who:

- Make an impact on society's global, grand engineering challenges.
- Act as innovative and creative engineering designers who identify, analyze, and solve complex problems.
- Function as accomplished thinkers with hands-on practical skills.
- Serve as local, regional, and global collaborators and communicators.
- Commit to life-long learning.
- Uphold the CSU Principles of Community which encompass inclusion, integrity, respect, service, and social justice.

Learning Objectives

Mechanical Engineering Bachelor of Science graduates will be able to accomplish the following within the first few years after graduation:

Freshman

		AUCC	Credits
CHEM 111	General Chemistry I (GT-SC2)	3A	4
CHEM 112	General Chemistry Lab I (GT-SC1)	3A	1
CO 150	College Composition (GT-CO2)	1A	3
MATH 160	Calculus for Physical Scientists I (GT-MA1)	1B	4
MATH 161	Calculus for Physical Scientists II (GT-MA1)	1B	4
MECH 103	Introduction to Mechanical Engineering		3

1. Identify, analyze, formulate, and solve complex engineering problems associated with their professional position, both independently and in a team environment.
2. 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. Develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.
4. Manage multi-faceted and multi-disciplinary projects with significant legal, ethical, regulatory, social, environmental, and economic considerations using a broad systems perspective.
5. 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.
6. Function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives.
7. Communicate effectively with colleagues, professional clients, and the public.
8. Demonstrate commitment and progress in lifelong learning, professional development, and leadership.

Potential Occupations

Graduates from the Department of Mechanical Engineering are expected to have the fundamental knowledge required for the successful practice of mechanical engineering. CSU engineering graduates are well prepared for a professional career. The Department boasts a 100% pass rate on the Fundamentals of Engineering professional examination. Participating in internships, co-curricular and volunteer activities, and cooperative education opportunities is highly recommended to enhance practical training and development. Students who continue on to pursue a graduate education can attain more responsible positions with the possibility of rising to top professional levels.

Concentrations

- Advanced Manufacturing Concentration (<http://catalog.colostate.edu/general-catalog/colleges/engineering/mechanical/mechanical-engineering-major-advanced-manufacturing-concentration/>)
- Aerospace Engineering Concentration (<http://catalog.colostate.edu/general-catalog/colleges/engineering/mechanical/mechanical-engineering-major-aerospace-engineering-concentration/>)

Requirements Effective Fall 2023

2 Major in Mechanical Engineering

MECH 105	Mechanical Engineering Problem Solving		3
PH 141	Physics for Scientists and Engineers I (GT-SC1)	3A	5
Arts and Humanities (http://catalog.colostate.edu/general-catalog/all-university-core-curriculum/aucc/#arts-humanities)			3B
Diversity, Equity, and Inclusion (http://catalog.colostate.edu/general-catalog/all-university-core-curriculum/aucc/#diversity-equity-inclusion)			1C

Total Credits **33**

Sophomore

CIVE 260	Engineering Mechanics-Statics		3
CIVE 261	Engineering Mechanics-Dynamics		3
ECE 204	Introduction to Electrical Engineering		3
MATH 261	Calculus for Physical Scientists III		4
MATH 340	Intro to Ordinary Differential Equations		4

Select one group from the following: 3

Group A:

MECH 200 Introduction to Manufacturing Processes

Group B:

MECH 200A Introduction to Manufacturing Processes: Lecture

MECH 200B Introduction to Manufacturing Processes : Laboratory

MECH 201	Engineering Design I		2
MECH 202	Engineering Design II		3
MECH 231	Engineering Experimentation		3
PH 142	Physics for Scientists and Engineers II (GT-SC1)	3A	5

Total Credits **33**

Junior

CIVE 360	Mechanics of Solids		3
MECH 301A	Engineering Design III: Finite Element Analysis		1
MECH 301B	Engineering Design III: Computational Fluid Dynamics		1
MECH 307	Mechatronics and Measurement Systems		4
MECH 324	Dynamics of Machines		4
MECH 325	Machine Design		3

Select one group from the following: 4

Group A:

MECH 331 Introduction to Engineering Materials

Group B:

MECH 331A Introduction to Engineering Materials: Lecture

MECH 331B Introduction to Engineering Materials : Lab

MECH 337	Thermodynamics		4
MECH 338	Thermal/Fluid Sciences Laboratory		1
MECH 342	Fluid Mechanics for Mechanical Engineers		3
MECH 344	Heat and Mass Transfer	4B	3

Advanced Writing (<http://catalog.colostate.edu/general-catalog/all-university-core-curriculum/aucc/#advanced-writing>) 2 3

Total Credits **34**

Senior

Select one group from the following: 8

Group A:

MECH 486A Engineering Design Practicum: I 4A,4C

MECH 486B Engineering Design Practicum: II 4C

Group B:			
MECH 498A	Engineering Research Practicum: I		4A,4C
MECH 498B	Engineering Research Practicum: II		4C
Arts and Humanities (http://catalog.colostate.edu/general-catalog/all-university-core-curriculum/aucc/#arts-humanities)		3B	3
Historical Perspectives (http://catalog.colostate.edu/general-catalog/all-university-core-curriculum/aucc/#historical-perspectives)		3D	3
Social and Behavioral Sciences (http://catalog.colostate.edu/general-catalog/all-university-core-curriculum/aucc/#social-behavioral-sciences)		3C	3
Technical Electives (See List below)			12
Total Credits			29
Program Total Credits:			129

Mechanical Engineering Technical Electives

Select 12 credits of any 400-level or 500-level MECH course except MECH 495, MECH 486A, MECH 486B, MECH 498A, and MECH 498B, or select 9 credits and an additional 3 credits from the **Alternate Technical Electives** list.

Alternate Technical Electives

Code	Title	Credits
BMS 300	Principles of Human Physiology	4
CIVE 367	Structural Analysis	3
CIVE 438	Fundamentals of Environmental Engr	3
CIVE 560	Advanced Mechanics of Materials	3
CIVE 562	Fundamentals of Vibrations	3
CS 150A	Culture and Coding: Java (GT-AH3)	3
CS 150B	Culture and Coding: Python (GT-AH3)	3
CS 155	Introduction to Unix	1
CS 156	Introduction to C Programming I	1
CS 157	Introduction to C Programming II	1
CS 163	CS1--No Prior Programming Experience	4
CS 164	CS1--Computational Thinking with Java	4
ECE 411	Control Systems	3
ECE 465	Electrical Energy Generation Technologies	3

ENGR 422	Technology Entrepreneurship	3
HES 207	Anatomical Kinesiology	4
MATH 331	Introduction to Mathematical Modeling	3
MATH 332	Partial Differential Equations	3
MATH 369	Linear Algebra I	3
MGT 305	Fundamentals of Management	3
MGT 340	Fundamentals of Entrepreneurship	3
MKT 305	Fundamentals of Marketing	3
PH 314	Introduction to Modern Physics	4
PH 341	Mechanics	4
PH 353	Optics and Waves	4
PH 451	Introductory Quantum Mechanics I	3
STAT 315	Intro to Theory and Practice of Statistics	3
SYSE 501	Foundations of Systems Engineering	3

Major Completion Map

Distinctive Requirements for Degree Program:

TO DECLARE MAJOR: Competitive entry controls required and capped enrollment in place. Incoming students please see the Office of Admissions to declare. Current CSU students please see your assigned advisor for information about the waitlist.

TO PREPARE FOR FIRST SEMESTER: The curriculum for this major assumes students enter college prepared to take calculus.

Freshman

Semester 1		Critical	Recommended	AUCC	Credits
CHEM 111	General Chemistry I (GT-SC2)	X		3A	4
CHEM 112	General Chemistry Lab I (GT-SC1)	X		3A	1
CO 150	College Composition (GT-CO2)		X	1A	3
MATH 160	Calculus for Physical Scientists I (GT-MA1)	X		1B	4
MECH 103	Introduction to Mechanical Engineering	X			3
Total Credits					15

Semester 2		Critical	Recommended	AUCC	Credits
MATH 161	Calculus for Physical Scientists II (GT-MA1)	X		1B	4
MECH 105	Mechanical Engineering Problem Solving	X			3
PH 141	Physics for Scientists and Engineers I (GT-SC1)	X		3A	5
Arts and Humanities (http://catalog.colostate.edu/general-catalog/all-university-core-curriculum/aucc/#arts-humanities)			X	3B	3
Diversity, Equity, and Inclusion (http://catalog.colostate.edu/general-catalog/all-university-core-curriculum/aucc/#diversity-equity-inclusion)				1C	3

CO 150 must be completed by the end of Semester 2.		X			
Total Credits					18
Sophomore					
Semester 3		Critical	Recommended	AUCC	Credits
CIVE 260	Engineering Mechanics-Statics	X			3
MATH 261	Calculus for Physical Scientists III	X			4
Select one group from the following:					3
Group A:					
MECH 200	Introduction to Manufacturing Processes	X			
Group B:					
MECH 200A	Introduction to Manufacturing Processes: Lecture	X			
MECH 200B	Introduction to Manufacturing Processes : Laboratory	X			
MECH 201	Engineering Design I	X			2
PH 142	Physics for Scientists and Engineers II (GT-SC1)	X		3A	5
Total Credits					17
Semester 4		Critical	Recommended	AUCC	Credits
CIVE 261	Engineering Mechanics-Dynamics	X			3
ECE 204	Introduction to Electrical Engineering	X			3
MATH 340	Intro to Ordinary Differential Equations	X			4
MECH 202	Engineering Design II	X			3
MECH 231	Engineering Experimentation	X			3
Total Credits					16
Junior					
Semester 5		Critical	Recommended	AUCC	Credits
CIVE 360	Mechanics of Solids	X			3
MECH 307	Mechatronics and Measurement Systems	X			4
MECH 324	Dynamics of Machines	X			4
MECH 337	Thermodynamics	X			4
MECH 342	Fluid Mechanics for Mechanical Engineers	X			3
Total Credits					18
Semester 6		Critical	Recommended	AUCC	Credits
MECH 301A	Engineering Design III: Finite Element Analysis				1
MECH 301B	Engineering Design III: Computational Fluid Dynamics				1
MECH 325	Machine Design	X			3
Select one group from the following:					4
Group A:					
MECH 331	Introduction to Engineering Materials	X			
Group B:					
MECH 331A	Introduction to Engineering Materials: Lecture	X			
MECH 331B	Introduction to Engineering Materials : Lab	X			
MECH 338	Thermal/Fluid Sciences Laboratory	X			1
MECH 344	Heat and Mass Transfer	X		4B	3
Advanced Writing (http://catalog.colostate.edu/general-catalog/all-university-core-curriculum/aucc/#advanced-writing)			X	2	3
Total Credits					16
Senior					
Semester 7		Critical	Recommended	AUCC	Credits
Select one course from the following:					4
MECH 486A	Engineering Design Practicum: I	X		4A,4C	
MECH 498A	Engineering Research Practicum: I	X		4A,4C	
Arts and Humanities (http://catalog.colostate.edu/general-catalog/all-university-core-curriculum/aucc/#arts-humanities)			X	3B	3

Social and Behavioral Sciences (http://catalog.colostate.edu/general-catalog/all-university-core-curriculum/aucc/#social-behavioral-sciences)	X	3C	3
Technical Elective (See List on Requirements Tab)			6

Total Credits			16
Semester 8	Critical	Recommended	AUCC
Select one course from the following:			
MECH 486B Engineering Design Practicum: II	X		4C
MECH 498B Engineering Research Practicum: II	X		4C
Historical Perspectives (http://catalog.colostate.edu/general-catalog/all-university-core-curriculum/aucc/#historical-perspectives)	X		3D
Technical Electives (See List on Requirements Tab)	X		6
The benchmark courses for the 8th semester are the remaining courses in the entire program of study.	X		
Total Credits			13
Program Total Credits:			129