

MAJOR IN MECHANICAL ENGINEERING, ROBOTICS AND AUTOMATION CONCENTRATION

The Robotics and Automation concentration offers mechanical engineering students an opportunity to specialize in the design, modeling, and implementation of intelligent electromechanical systems. This concentration integrates mechanical engineering fundamentals with cutting-edge technologies, including sensors, actuators, embedded systems, and control systems. Students gain hands-on experience through laboratory courses, simulation-based analysis, and design projects focused on robotic platforms and automated systems.

Graduates of this concentration will develop a specialized focus in robotics, mechatronics, and automation, preparing them for careers in high-demand industries such as manufacturing automation, aerospace systems, autonomous vehicles, and industrial robotics. This concentration equips students with the skills needed to thrive in emerging fields driven by advancements in intelligent system design and integration.

Learning Objectives

Upon successful completion, students will be able to:

1. Identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.
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. Communicate effectively with a range of audiences.
4. 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.
5. Function effectively on a team whose members together provide leadership, create a collaborative environment, establish goals, plan tasks, and meet objectives.
6. Develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.
7. Acquire and apply new knowledge as needed, using appropriate learning strategies.

Requirements Effective Fall 2026

Freshman

		AUCC	Credits
CO 150	College Composition (GT-CO2)	1A	3
ENGR 111	Fundamentals of Engineering		3
ENGR 114	Engineering for Grand Challenges		3
MATH 160	Calculus for Physical Scientists I (GT-MA1)	1B	4
MATH 161	Calculus for Physical Scientists II (GT-MA1)	1B	4
PH 141	Physics for Scientists and Engineers I (GT-SC1)	3A	5
Select one group from the following:			5
Group A:			
CHEM 111	General Chemistry I (GT-SC2)	3A	
CHEM 112	General Chemistry Lab I (GT-SC1)	3A	
Group B:			
CHEM 120	Foundations of Modern Chemistry (GT-SC2)	3A	
CHEM 121	Foundations of Modern Chemistry Laboratory (GT-SC1)	3A	
Historical Perspectives (https://catalog.colostate.edu/general-catalog/all-university-core-curriculum/aucc/#historical-perspectives)			3

Total Credits

30

Sophomore

CIVE 260	Engineering Mechanics-Statics	3
MATH 261	Calculus for Physical Scientists III	4
MATH 340	Intro to Ordinary Differential Equations	4
MECH 200A	Introduction to Manufacturing Processes: Lecture	3
MECH 200B	Introduction to Manufacturing Processes : Laboratory	1
MECH 207	Mechatronics I	3
MECH 210	Engineering Design--3D Modeling and Printing	2
MECH 231	Engineering Experimentation	2
MECH 261	Dynamics for Mechanical Engineers	3

PH 142	Physics for Scientists and Engineers II (GT-SC1)	3A	5
Social and Behavioral Sciences (https://catalog.colostate.edu/general-catalog/all-university-core-curriculum/aucc/#social-behavioral-sciences)		3C	3
Total Credits			33
Junior			
CIVE 360	Mechanics of Solids		3
MECH 305	Mechanical Engineering Computational Methods		3
MECH 307	Mechatronics II		3
MECH 324	Dynamics of Machines		4
MECH 325	Machine Design with Finite Element Analysis		4
MECH 331A	Introduction to Engineering Materials: Lecture		3
MECH 331B	Introduction to Engineering Materials : Lab		1
MECH 339	Thermodynamics I for Mechanical Engineers		3
MECH 342	Fluid Mechanics for Mechanical Engineers		3
MECH 344	Heat and Mass Transfer	4B	3
Advanced Writing (https://catalog.colostate.edu/general-catalog/all-university-core-curriculum/aucc/#advanced-writing)		2	3
Total Credits			33
Senior			
MECH 338	Thermal/Fluid Sciences Laboratory		1
MECH 417	Control Systems		3
MECH 439	Thermodynamics II for Mechanical Engineers		3
Select one group from the following:			6
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	
Robotics and Automation Electives – select a minimum of 9 credits from the following:			9
ECE 253	Microcontrollers and C for Internet-of-Things		
ECE 412	Digital Control and Digital Filters		
ECE 450	Digital System Design Laboratory		
& ECE 451			
ECE 528/CS 528	Embedded Systems and Machine Learning		
ECE 561/CS 561	Hardware/Software Design of Embedded Systems		
MECH 414	Machine Learning-Mechanical Engr Automation		
MECH 415	Rotorcraft Modeling and Control		
MECH 416	Introduction to Robotic Manipulators		
MECH 564	Fundamentals of Robot Mechanics and Controls		
Select up to one course from the following:			
MECH 424	Advanced Dynamics		
MECH 425	Mechanical Engineering Vibrations		
MECH 529	Advanced Mechanical Systems		
1C (https://catalog.colostate.edu/general-catalog/all-university-core-curriculum/aucc/#aucc)		1C	3
Arts and Humanities (https://catalog.colostate.edu/general-catalog/all-university-core-curriculum/aucc/#arts-humanities)		3B	6
Total Credits			31
Program Total Credits:			127

Major Completion Map

Distinctive Requirements for Degree Program:

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
CO 150	College Composition (GT-CO2)		X	1A	3
ENGR 111	Fundamentals of Engineering	X			3
MATH 160	Calculus for Physical Scientists I (GT-MA1)	X		1B	4
Select one group from the following:					5
Group A:					
CHEM 111	General Chemistry I (GT-SC2)	X		3A	
CHEM 112	General Chemistry Lab I (GT-SC1)	X		3A	
Group B:					
CHEM 120	Foundations of Modern Chemistry (GT-SC2)		X	3A	
CHEM 121	Foundations of Modern Chemistry Laboratory (GT-SC1)		X	3A	

Total Credits **15**

Semester 2		Critical	Recommended	AUCC	Credits
ENGR 114	Engineering for Grand Challenges	X			3
MATH 161	Calculus for Physical Scientists II (GT-MA1)	X		1B	4
PH 141	Physics for Scientists and Engineers I (GT-SC1)	X		3A	5
Historical Perspectives (https://catalog.colostate.edu/general-catalog/all-university-core-curriculum/aucc/#historical-perspectives)					3
CO 150 must be completed by the end of Semester 2.					

Total Credits **15**

Sophomore

Semester 3		Critical	Recommended	AUCC	Credits
CIVE 260	Engineering Mechanics-Statics	X			3
MATH 261	Calculus for Physical Scientists III	X			4
MECH 210	Engineering Design-3D Modeling and Printing	X			2
PH 142	Physics for Scientists and Engineers II (GT-SC1)	X		3A	5
Social and Behavioral Sciences (https://catalog.colostate.edu/general-catalog/all-university-core-curriculum/aucc/#social-behavioral-sciences)					3

Total Credits **17**

Semester 4		Critical	Recommended	AUCC	Credits
MATH 340	Intro to Ordinary Differential Equations	X			4
MECH 200A	Introduction to Manufacturing Processes: Lecture	X			3
MECH 200B	Introduction to Manufacturing Processes : Laboratory	X			1
MECH 207	Mechatronics I	X			3
MECH 231	Engineering Experimentation	X			2
MECH 261	Dynamics for Mechanical Engineers	X			3

Total Credits **16**

Junior

Semester 5		Critical	Recommended	AUCC	Credits
CIVE 360	Mechanics of Solids	X			3
MECH 305	Mechanical Engineering Computational Methods	X			3
MECH 307	Mechatronics II	X			3
MECH 331A	Introduction to Engineering Materials: Lecture	X			3
MECH 331B	Introduction to Engineering Materials : Lab	X			1
MECH 339	Thermodynamics I for Mechanical Engineers	X			3

Total Credits **16**

Semester 6		Critical	Recommended	AUCC	Credits
MECH 324	Dynamics of Machines	X			4

MECH 325	Machine Design with Finite Element Analysis	X			4
MECH 342	Fluid Mechanics for Mechanical Engineers	X			3
MECH 344	Heat and Mass Transfer	X		4B	3
Advanced Writing (https://catalog.colostate.edu/general-catalog/all-university-core-curriculum/aucc/#advanced-writing)			X	2	3
Total Credits					17
Senior					
Semester 7		Critical	Recommended	AUCC	Credits
MECH 338	Thermal/Fluid Sciences Laboratory	X			1
MECH 439	Thermodynamics II for Mechanical Engineers	X			3
Select one course from the following:					3
MECH 486A	Engineering Design Practicum: I	X		4A,4C	
MECH 498A	Engineering Research Practicum: I	X		4A,4C	
Robotics and Automation Electives (See List on Requirements Tab)		X			6
Arts and Humanities (https://catalog.colostate.edu/general-catalog/all-university-core-curriculum/aucc/#arts-humanities)			X	3B	3
Total Credits					16
Semester 8		Critical	Recommended	AUCC	Credits
MECH 417	Control Systems	X			3
select one course from the following:					3
MECH 486B	Engineering Design Practicum: II	X		4C	
MECH 498B	Engineering Research Practicum: II	X		4C	
Robotics and Automation Elective (See List on Requirements Tab)		X			3
1C (https://catalog.colostate.edu/general-catalog/all-university-core-curriculum/aucc/#aucc)			X	1C	3
Arts and Humanities (https://catalog.colostate.edu/general-catalog/all-university-core-curriculum/aucc/#arts-humanities)			X	3B	3
The benchmark courses for the 8th semester are the remaining courses in the entire program of study.		X			
Total Credits					15
Program Total Credits:					127