MAJOR IN MECHANICAL ENGINEERING, ADVANCED MANUFACTURING CONCENTRATION

Advanced Manufacturing explores manufacturing techniques, automation, simulation, and processing of materials. This concentration is available to all mechanical engineering students who wish to delve deeper into manufacturing topics. Students will have a solid foundation in manufacturing topics through their mechanical engineering major. With the addition of the concentration in advanced manufacturing, students will earn a specialized focus in advanced manufacturing, providing additional depth in this topic area.

Learning Objectives

Students will:

1. Apply knowledge of mathematics, science, and engineering;
2. Design and conduct experiments, as well as analyze and interpret data;
3. Design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability arenas;
4. Function on multidisciplinary teams;
5. Identify, formulate, and solve engineering problems;
6. Model professional and ethical responsibility;
7. Communicate effectively;
8. Understand the impact of engineering solutions in a global, economic, environmental, and societal context;
9. Recognize the need for and engage in life-long learning;
10. Utilize the techniques, skills, and modern engineering tools necessary for engineering practice.

Requirements Effective Fall 2025

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)		3D	3
	Total Credits		**30**

Sophomore

CIVE 260	Engineering Mechanics-Statics		3
CIVE 261	Engineering Mechanics-Dynamics		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
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 439	Thermodynamics II for Mechanical Engineers		3
Select one course from the following:			3
MECH 411	Manufacturing Engineering		
MECH 502	Advanced/Additive Manufacturing Engineering		
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	
Advanced Manufacturing Electives – select a minimum of 9 credits from the following:			9
ENGR 510	Engineering Optimization: Method/Application		
MECH 407	Laser Applications in Mechanical Engineering		
MECH 411[1]	Manufacturing Engineering		
MECH 417	Control Systems		
MECH 428	Probabilistic Design		
MECH 432	Engineering of Nanomaterials		
MECH 434	Materials Selection for Mechanical Design		
MECH 464	Injection Molding		
MECH 502[1]	Advanced/Additive Manufacturing Engineering		
MECH 513	Simulation Modeling and Experimentation		
MECH 529	Advanced Mechanical Systems		
MECH 530	Advanced Composite Materials		
MECH 531/BIOM 531	Materials Engineering		
MECH 533	Composites Product Development		
MECH 537	Processing of Polymer Composites		
MECH 564	Fundamentals of Robot Mechanics and Controls		
MSE 502A	Materials Science and Engineering Methods: Materials Structure and Scattering		
MSE 502C	Materials Science and Engineering Methods: Materials Microscopy		
MSE 502E	Materials Science and Engineering Methods: Bulk Properties and Performance		
MSE 502F	Materials Science and Engineering Methods: Experimental Methods for Materials Research		

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**

[1] This course may only count toward the electives if the course was not selected as a required course.

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)			X	3D	3
CO 150 must be completed by the end of Semester 2.		X			
	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)			X	3C	3
	Total Credits				**17**

Semester 4		**Critical**	**Recommended**	**AUCC**	**Credits**
CIVE 261	Engineering Mechanics-Dynamics	X			3
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
	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	
Advanced Manufacturing 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 411 or 502	Manufacturing Engineering Advanced/Additive Manufacturing Engineering	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	
Advanced Manufacturing 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**