MAJOR IN CHEMICAL AND BIOLOGICAL ENGINEERING, MOLECULAR MEDICINE CONCENTRATION

Requirements
Effective Fall 2024

Students may enroll in either the standalone major or (at most) one of the concentrations under the Major in Chemical and Biological Engineering.

Freshman			
		AUCC	**Credits**
CBE 160	MATLAB for Chemical and Biological Eng		1
CHEM 111	General Chemistry I (GT-SC2)	3A	4
CHEM 112	General Chemistry Lab I (GT-SC1)	3A	1
CHEM 113	General Chemistry II		3
CHEM 114	General Chemistry Lab II		1
CO 150	College Composition (GT-CO2)	1A	3
LIFE 102	Attributes of Living Systems (GT-SC1)	3A	4
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:			3
Group A:			
CBE 101	Introduction to Chemical and Biological Engr		
Group B:			
CBE 101A	Introduction to Chemical and Biological Engr: Lecture		
CBE 101B	Introduction to Chemical and Biological Engr: Laboratory		
Group C:			
CBE 104A	Study Abroad--Denmark: Intro to Chemical and Biological Engineering		
	Total Credits		**33**
Sophomore			
CBE 201	Material and Energy Balances		3
CBE 205	Fundamentals of Biological Engineering		3
CBE 210	Thermodynamic Process Analysis		3
CHEM 341	Modern Organic Chemistry I		3
CHEM 343	Modern Organic Chemistry II		3
CHEM 344	Modern Organic Chemistry Laboratory		2
MATH 261	Calculus for Physical Scientists III		4
MATH 340	Intro to Ordinary Differential Equations		4
PH 142	Physics for Scientists and Engineers II (GT-SC1)	3A	5
Diversity, Equity, and Inclusion (http://catalog.colostate.edu/general-catalog/all-university-core-curriculum/aucc/#diversity-equity-inclusion)		1C	3
	Total Credits		**33**
Junior			
BC 351	Principles of Biochemistry		4

CBE 310	Molecular Concepts and Applications		3
CBE 320	Chemical and Biological Reactor Design		3
CBE 330	Process Simulation		3
CBE 331	Momentum Transfer and Mechanical Separations		3
CBE 332	Heat and Mass Transfer Fundamentals		3
CBE 393	Professional Development Seminar		1
Bioscience Elective (see list below)			3
Technical Elective (see list below)			3
Advanced Writing (http://catalog.colostate.edu/general-catalog/all-university-core-curriculum/aucc/#advanced-writing)		2	3
Arts and Humanities (http://catalog.colostate.edu/general-catalog/all-university-core-curriculum/aucc/#arts-humanities)		3B	3
	Total Credits		**32**

Senior

CBE 333	Chemical and Biological Engineering Lab I		2
CBE 430	Process Control and Instrumentation		3
CBE 442	Separation Processes		4
CBE 443	Chemical and Biological Engineering Lab II		2
CBE 451	Chemical and Biological Engineering Design I	4A,4B,4C	3
CBE 452	Chemical and Biological Engineering Design II	4A,4B,4C	3
Engineering Elective (see list below)			3
Technical Elective (see list below)			3
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-sceinces)		3C	3
	Total Credits		**32**
	Program Total Credits:		**130**

Bioscience Electives

Select a minimum of 3 credits from the following.

Code	Title	Credits
BMS 300	Principles of Human Physiology	4
BMS 450	Pharmacology	3
BZ 240	Synthetic Biology-Principles and Applications	3
BZ 350	Molecular and General Genetics	4
or LIFE 201B	Introductory Genetics: Molecular/Immunological/Developmental (GT-SC2)	
BZ 360	Bioinformatics and Genomics	4
MIP 300	General Microbiology	3
MIP 315	Pathology of Human and Animal Disease	3
or MIP 555	Principles and Mechanisms of Disease	

Technical Electives

Select a minimum of 6 credits from the following, or select additional credits from the Bioscience Electives or Engineering Electives lists.

Code	Title	Credits
BC 467	Biochemistry of Disease	3
CHEM 448	Medicinal Chemistry	3
MATH 455	Mathematics in Biology and Medicine	3
MIP 410	Foundations of Modern Biotechnology	2
STAT 307	Introduction to Biostatistics	3

Engineering Electives

Select a minimum of 3 credits from the following.

Code	Title	Credits
BIOM 350B	Study Abroad--Portugal: Biomedical Engineering and Healthcare	1
BIOM 421	Transport Phenomena in Biomedical Engineering	3
BIOM 525/MECH 525	Cell and Tissue Engineering	3
BIOM 533/CIVE 533	Biomolecular Tools for Engineers	3
CBE 560	Engineering of Protein Expression Systems	3
CBE 570	Biomolecular Engineering/Synthetic Biology	3
ECE 527D/ BIOM 527D	Biosensing: Electrochemical Sensors	1
ECE 527E/ BIOM 527E	Biosensing: Affinity Sensors	1