DUAL DEGREE PROGRAM: BIOMEDICAL ENGINEERING COMBINED WITH CHEMICAL AND BIOLOGICAL ENGINEERING

TO DECLARE MAJOR: Engineering is a controlled major: students are admitted into the major only if they meet established academic standards. Please see competitive major requirements or the advisor in the Department for more information.

TO PREPARE FOR FIRST SEMESTER: The curriculum for this major assumes students enter college prepared to take calculus and chemistry. To qualify for graduation, students in the biomedical engineering combined with chemical and biological engineering program must achieve a minimum 2.000 grade point average at CSU in all courses in engineering, mathematics, computer science, statistics, physics, and chemistry as well as courses taken as technical electives.

Major Completion Map

Distinctive Requirements for Degree Program:

Freshman

Semester 1		Critical	Recommended	AUCC	Credits
CHEM 120	Foundations of Modern Chemistry (GT-SC2)	X		3A	4
CHEM 121	Foundations of Modern Chemistry Laboratory (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
Select one Group from the Following:					3
Group A:					
ENGR 111	Fundamentals of Engineering	X			
Group B:					
CBE 101	Introduction to Chemical and Biological Engr	X			
Group C:					
CBE 101A	Introduction to Chemical and Biological Engr: Lecture	X			
CBE 101B	Introduction to Chemical and Biological Engr: Laboratory	X			
CBE 160	MATLAB for Chemical and Biological Eng	X			
Group D:					
CBE 104A	Study Abroad--Denmark: Intro to Chemical and Biological Engineering	X			
	Total Credits				**15**

Semester 2		Critical	Recommended	AUCC	Credits
ENGR 114	Engineering for Grand Challenges	X			3
LIFE 102	Attributes of Living Systems (GT-SC1)	X		3A	4
MATH 161	Calculus for Physical Scientists II (GT-MA1)	X		1B	4
Social and Behavioral Sciences (http://catalog.colostate.edu/general-catalog/all-university-core-curriculum/aucc/#social-behavioral-sciences)			X	3C	3
	Total Credits				**14**

Sophomore

Semester 3		Critical	Recommended	AUCC	Credits
CBE 201	Material and Energy Balances	X			3
CBE 205	Fundamentals of Biological Engineering	X			3
MATH 261	Calculus for Physical Scientists III	X			4
PH 141	Physics for Scientists and Engineers I (GT-SC1)	X		3A	5
	Total Credits				**15**

Semester 4		Critical	Recommended	AUCC	Credits
CBE 210	Thermodynamic Process Analysis	X			3
CBE 223	CBE Design and Experimentation I	X			2
CHEM 241	Foundations of Organic Chemistry	X			4
CHEM 242	Foundations of Organic Chemistry Laboratory	X			1
CBE 393	Professional Development Seminar	X			1

MATH 340	Intro to Ordinary Differential Equations	X			4
	Total Credits				**15**
Junior					
Semester 5		**Critical**	**Recommended**	**AUCC**	**Credits**
CBE 320	Chemical and Biological Reactor Design	X			3
CBE 330	Process Simulation	X			3
CBE 331	Momentum Transfer and Mechanical Separations	X			3
CBE 334	CBE Design and Experimentation II	X			1
Select one of the following courses:					4
BC 351	Principles of Biochemistry		X		
BMS 300	Principles of Human Physiology		X		
Arts and Humanities (http://catalog.colostate.edu/general-catalog/all-university-core-curriculum/aucc/#arts-humanities)			X	3B	3
	Total Credits				**17**
Semester 6		**Critical**	**Recommended**	**AUCC**	**Credits**
BIOM 300	Problem-Based Learning Biomedical Engr Lab	X			4
CBE 332	Heat and Mass Transfer Fundamentals	X			3
CBE 335	CBE Design and Experimentation III	X			1
CBE 340	Statistics for CBE Applications	X			3
MECH 262	Engineering Mechanics	X			4
	Total Credits				**15**
Senior					
Semester 7		**Critical**	**Recommended**	**AUCC**	**Credits**
BIOM 422	Quantitative Systems and Synthetic Biology	X			3
CBE 442	Separation Processes	X			4
CBE 443	Chemical and Biological Engineering Lab II	X			2
CBE 451	Chemical and Biological Engineering Design I	X			3
BME Broad Elective (See List on Requirements Tab)			X		3
Historical Perspectives (http://catalog.colostate.edu/general-catalog/all-university-core-curriculum/aucc/#historical-perspectives)			X	3D	3
	Total Credits				**18**
Semester 8		**Critical**	**Recommended**	**AUCC**	**Credits**
BIOM 421	Transport Phenomena in Biomedical Engineering				3
CBE 430	Process Control and Instrumentation	X			3
PH 142	Physics for Scientists and Engineers II (GT-SC1)		X	3A	5
Chemistry Elective (See List on Requirements Tab)			X		3
Advanced Writing (http://catalog.colostate.edu/general-catalog/all-university-core-curriculum/aucc/#advanced-writing)			X	2	3
	Total Credits				**17**
Fifth Year					
Semester 9		**Critical**	**Recommended**	**AUCC**	**Credits**
BIOM 486A	Biomedical Design Practicum: Capstone Design I	X		4A,4B,4C	4
Select one of the following courses (one that you have not taken previously):		X			4
BC 351	Principles of Biochemistry	X			
BMS 300	Principles of Human Physiology	X			
BME Technical Elective (See List on Requirements Tab)			X		3
CBE Technical Elective (See List on Requirements Tab)			X		2
1C (http://catalog.colostate.edu/general-catalog/all-university-core-curriculum/aucc/#aucc)			X	1C	3
	Total Credits				**16**
Semester 10		**Critical**	**Recommended**	**AUCC**	**Credits**
BIOM 486B	Biomedical Design Practicum: Capstone Design II	X		4A,4B,4C	4
BME Technical Elective (See List on Requirements Tab)		X			2

CBE Technical Elective (See List on Requirements Tab)	X			3
Chemistry Elective (See List on Requirements Tab)		X		3
Arts and Humanities (http://catalog.colostate.edu/general-catalog/all-university-core-curriculum/aucc/#arts-humanities)		X	3B	3
The benchmark courses for the 10th semester are the remaining courses in the entire program of study	X			
Total Credits				**15**
Program Total Credits:				**157**