

# DUAL DEGREE PROGRAM: BIOMEDICAL ENGINEERING COMBINED WITH ELECTRICAL ENGINEERING, LASERS AND OPTICAL ENGINEERING CONCENTRATION

## Major Completion Map

### Distinctive Requirements for Degree Program:

**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.

In order to maintain professional standards required of practicing engineers, the Department of Electrical and Computer Engineering requires a cumulative grade point average of at least 2.000 in ECE courses as a graduation requirement. It is the responsibility of any student who fails to maintain a 2.000 average to work with their advisor to correct grade point deficiencies. In addition, it is required that students retake any Electrical Engineering course at the 300-level or below in which they receive a grade below a C (2.000).

### Freshman

Semester 1		Critical	Recommended	AUCC	Credits
BIOM 100	Overview of Biomedical Engineering	X			1
CHEM 111	General Chemistry I (GT-SC2)	X		3A	4
CO 150	College Composition (GT-CO2)		X	1A	3
ECE 102	Digital Circuit Logic	X			4
MATH 160	Calculus for Physical Scientists I (GT-MA1)	X		1B	4
<b>Total Credits</b>					<b>16</b>

Semester 2		Critical	Recommended	AUCC	Credits
ECE 103	DC Circuit Analysis	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
PH 141	Physics for Scientists and Engineers I (GT-SC1)	X		3A	5
<b>Total Credits</b>					<b>16</b>

### Sophomore

Semester 3		Critical	Recommended	AUCC	Credits
BIOM 200	Fundamentals of Biomedical Engineering	X			2
CHEM 112	General Chemistry Lab I (GT-SC1)		X	3A	1
Select from one of the following groups:					3-4
Group A					
CS 150B	Culture and Coding: Python (GT-AH3)	X		3B,3B	
Group B					
CS 152	Python for STEM	X			
CS 162	CS1—Introduction to Java Programming	X			
Group C					
CS 163	CS1—No Prior Programming Experience	X			
MATH 261	Calculus for Physical Scientists III	X			4
PH 142	Physics for Scientists and Engineers II (GT-SC1)	X		3A	5
<b>Total Credits</b>					<b>15-16</b>

Semester 4		Critical	Recommended	AUCC	Credits
ECE 202	Circuit Theory Applications	X			4
ECE 232	Introduction to Project Practices	X			1
ECE 303/ STAT 303	Introduction to Communications Principles	X			3
MATH 340	Intro to Ordinary Differential Equations	X			4

PH 314	Introduction to Modern Physics	X			4
<b>Total Credits</b>					<b>16</b>
<b>Junior</b>					
<b>Semester 5</b>		<b>Critical</b>	<b>Recommended</b>	<b>AUCC</b>	<b>Credits</b>
ECE 311	Linear System Analysis I	X			3
ECE 331	Electronics Principles I	X			4
ECE 341	Electromagnetic Fields and Devices I	X			3
Select from the following to complete group sequence:					3-4
Group A					
CS 164	CS1–Computational Thinking with Java	X			
Group B					
Arts and Humanities ( <a href="http://catalog.colostate.edu/general-catalog/all-university-core-curriculum/aucc/#arts-humanities">http://catalog.colostate.edu/general-catalog/all-university-core-curriculum/aucc/#arts-humanities</a> )		X		3B	
Group C					
Arts and Humanities ( <a href="http://catalog.colostate.edu/general-catalog/all-university-core-curriculum/aucc/#arts-humanities">http://catalog.colostate.edu/general-catalog/all-university-core-curriculum/aucc/#arts-humanities</a> )		X		3B	
<b>Total Credits</b>					<b>13-14</b>
<b>Semester 6</b>		<b>Critical</b>	<b>Recommended</b>	<b>AUCC</b>	<b>Credits</b>
BIOM 300	Problem-Based Learning Biomedical Engr Lab	X			4
BMS 300	Principles of Human Physiology		X		4
ECE 332	Electronics Principles II	X			4
ECE 342	Electromagnetic Fields and Devices II	X			3
<b>Total Credits</b>					<b>15</b>
<b>Senior</b>					
<b>Semester 7</b>		<b>Critical</b>	<b>Recommended</b>	<b>AUCC</b>	<b>Credits</b>
CHEM 113	General Chemistry II		X		3
ECE 404	Experiments in Optical Electronics	X			2
ECE 441	Optical Electronics	X			3
MECH 337	Thermodynamics		X		4
PH 353	Optics and Waves	X			4
<b>Total Credits</b>					<b>16</b>
<b>Semester 8</b>		<b>Critical</b>	<b>Recommended</b>	<b>AUCC</b>	<b>Credits</b>
<b>BIOM 431/ ECE 431</b>	<b>Biomedical Signal and Image Processing</b>	<b>X</b>			<b>3</b>
CHEM 245	Fundamentals of Organic Chemistry		X		4
ECE 457	Fourier Optics	X			3
ECON 202	Principles of Microeconomics (GT-SS1)		X	3C	3
MECH 262	Engineering Mechanics	X			4
<b>Total Credits</b>					<b>17</b>
<b>Fifth Year</b>					
<b>Semester 9</b>		<b>Critical</b>	<b>Recommended</b>	<b>AUCC</b>	<b>Credits</b>
BIOM 486A	Biomedical Design Practicum: Capstone Design I	X		4A,4B,4C	4
PH 451	Introductory Quantum Mechanics I	X			3
Select one course from the following:					3
CO 301B	Writing in the Disciplines: Sciences (GT-C03)		X	2	
JTC 300	Strategic Writing and Communication (GT-C03)		X	2	
ECE Lasers & Optical Engineering Technical Electives (See List on Requirements tab)					4
Diversity, Equity, and Inclusion ( <a href="http://catalog.colostate.edu/general-catalog/all-university-core-curriculum/aucc/#diversity-equity-inclusion">http://catalog.colostate.edu/general-catalog/all-university-core-curriculum/aucc/#diversity-equity-inclusion</a> )					3
<b>Total Credits</b>					<b>17</b>
<b>Semester 10</b>		<b>Critical</b>	<b>Recommended</b>	<b>AUCC</b>	<b>Credits</b>
BIOM 486B	Biomedical Design Practicum: Capstone Design II	X		4A,4B,4C	4

BME Broad Elective (See List on Requirements Tab)	X		3
ECE Lasers & Optical Engineering Technical Electives (See List on Requirements tab)	X		4
Arts and Humanities ( <a href="http://catalog.colostate.edu/general-catalog/all-university-core-curriculum/aucc/#arts-humanities">http://catalog.colostate.edu/general-catalog/all-university-core-curriculum/aucc/#arts-humanities</a> )	X	3B	3
Historical Perspectives ( <a href="http://catalog.colostate.edu/general-catalog/all-university-core-curriculum/aucc/#historical-perspectives">http://catalog.colostate.edu/general-catalog/all-university-core-curriculum/aucc/#historical-perspectives</a> )	X	3D	3
The benchmark courses for the 10th semester are the remaining courses in the entire program of study.	X		
<b>Total Credits</b>			<b>17</b>
<b>Program Total Credits:</b>			<b>158-160</b>