

# 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
CHEM 111	General Chemistry I (GT-SC2)	X		3A	4
CHEM 112	General Chemistry Lab I (GT-SC1)		X	3A	1
ENGR 111	Fundamentals of Engineering	X			3
MATH 160	Calculus for Physical Scientists I (GT-MA1)	X		1B	4
Select one course from the following:		X			3
CS 150B	Culture and Coding: Python (GT-AH3)			3B	
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>15</b>

Semester 2		Critical	Recommended	AUCC	Credits
CO 150	College Composition (GT-CO2)	X		1A	3
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
<b>Total Credits</b>					<b>15</b>

### Sophomore

Semester 3		Critical	Recommended	AUCC	Credits
BIOM 200	Fundamentals of Biomedical Engineering	X			2
ECE 205	Analog Circuits I	X			2
ECE 252	Introduction to Digital Circuits	X			3
LIFE 102	Attributes of Living Systems (GT-SC1)	X		3A	4
MATH 261	Calculus for Physical Scientists III	X			4
<b>Total Credits</b>					<b>15</b>

Semester 4		Critical	Recommended	AUCC	Credits
ECE 206	Analog Circuits II	X			3
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 142	Physics for Scientists and Engineers II (GT-SC1)	X		3A	5
<b>Total Credits</b>					<b>16</b>

**Junior**

<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
Course(s) from Group A, B, or C (See Options in Program Requirements Tab)		X			4
Select one course from the following:			X		3
CO 301B	Writing in the Disciplines: Sciences (GT-CO3)		X	2	
JTC 300	Strategic Writing and Communication (GT-CO3)		X	2	
<b>Total Credits</b>					<b>17</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
ECE 332	Electronics Principles II	X			4
ECE 342	Electromagnetic Fields and Devices II	X			3
PH 314	Introduction to Modern Physics	X			4
<b>Total Credits</b>					<b>15</b>

**Senior**

<b>Semester 7</b>		<b>Critical</b>	<b>Recommended</b>	<b>AUCC</b>	<b>Credits</b>
BMS 300	Principles of Human Physiology		X		4
CHEM 113	General Chemistry II		X		3
ECE 404	Experiments in Optical Electronics	X			2
ECE 441	Optical Electronics	X			3
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>
BIOM 431/ ECE 431	Biomedical Signal and Image Processing	X			3
CHEM 245	Fundamentals of Organic Chemistry		X		4
ECE 457	Fourier Optics	X			3
MECH 262	Engineering Mechanics	X			4
ECE Lasers & Optical Engineering Technical Electives (See list below)			X		3
<b>Total Credits</b>					<b>17</b>

**Fifth Year**

<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
ECON 202	Principles of Microeconomics (GT-SS1)		X	3C	3
MECH 337	Thermodynamics		X		4
PH 451	Introductory Quantum Mechanics I	X			3
1C ( <a href="http://catalog.colostate.edu/general-catalog/all-university-core-curriculum/aucc/#aucc">http://catalog.colostate.edu/general-catalog/all-university-core-curriculum/aucc/#aucc</a> )			X	1C	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			3
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

Total Credits	16
Program Total Credits:	159