DUAL DEGREE PROGRAM: BIOMEDICAL ENGINEERING COMBINED WITH COMPUTER ENGINEERING

requires a cumulative grade point average of at least 2.000 in Electrical Engineering 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 C (2.000).

Requirements
Effective Fall 2025

In order to maintain professional standards required of practicing engineers, the Department of Electrical and Computer Engineering

Freshman

		AUCC	Credits
CHEM 111	General Chemistry I (GT-SC2)	3A	4
CHEM 112	General Chemistry Lab I (GT-SC1)	3A	1
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
Select one group from the following:[1]			7
Group A:			
CS 150B	Culture and Coding: Python (GT-AH3)	3B	
CS 164	CS1--Computational Thinking with Java		
Group B:			
CS 152	Python for STEM		
CS 162	CS1--Introduction to Java Programming		
Arts and Humanities (http://catalog.colostate.edu/general-catalog/all-university-core-curriculum/aucc/#arts-humanities)		3B	
Group C:			
CS 163	CS1---No Prior Programming Experience		
Arts and Humanities (http://catalog.colostate.edu/general-catalog/all-university-core-curriculum/aucc/#arts-humanities)		3B	
	Total Credits		**29**

Sophomore

BIOM 200	Fundamentals of Biomedical Engineering		2
CS 165	CS2--Data Structures		4
ECE 205	Analog Circuits I		2
ECE 206	Analog Circuits II		3
ECE 232	Introduction to Project Practices		1
ECE 252	Introduction to Digital Circuits		3
ECE 303/STAT 303	Introduction to Communications Principles		3
LIFE 102	Attributes of Living Systems (GT-SC1)	3A	4
MATH 261	Calculus for Physical Scientists III		4
MATH 340	Intro to Ordinary Differential Equations		4
	Total Credits		**30**

Junior

BIOM 300	Problem-Based Learning Biomedical Engr Lab		4

BMS 300	Principles of Human Physiology		4
CS 214	Software Development		3
ECE 253	Microcontrollers and C for Internet-of-Things		3
ECE 311	Linear System Analysis I		3
PH 141	Physics for Scientists and Engineers I (GT-SC1)	3A	5
PH 142	Physics for Scientists and Engineers II (GT-SC1)	3A	5
Computer Engineering (CpE) Electives/Technical Electives (see lists below)[2]			4
	Total Credits		**31**

Senior

BIOM 431/ECE 431	Biomedical Signal and Image Processing		3
CHEM 113	General Chemistry II		3
CHEM 245	Fundamentals of Organic Chemistry		4
CS 220	Discrete Structures and the Applications		4
CT 301	C++ Fundamentals		2
MECH 262	Engineering Mechanics		4
MECH 337	Thermodynamics		4
Select one course from the following:			3-4
DSCI 369	Linear Algebra for Data Science		
MATH 369	Linear Algebra I		
Select one course from the following:			3
CO 301B	Writing in the Disciplines: Sciences (GT-CO3)	2	
JTC 300	Strategic Writing and Communication (GT-CO3)	2	
Computer Engineering (CpE) Electives/Technical Electives (see lists below)[2]			4
	Total Credits		**34-35**

Fifth Year

BIOM 486A	Biomedical Design Practicum: Capstone Design I	4A,4B,4C	4
BIOM 486B	Biomedical Design Practicum: Capstone Design II	4A,4B,4C	4
ECON 202	Principles of Microeconomics (GT-SS1)	3C	3
BME Technical Electives (see list below)[2]			3
Computer Engineering (CpE) Electives/Technical Electives (see lists below)[2]			10
1C (http://catalog.colostate.edu/general-catalog/all-university-core-curriculum/aucc/#aucc)		1C	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
	Total Credits		**33**
	Program Total Credits:		**157-158**

Computer Engineering (CpE) Electives (11-17 credits)

Code	Title	Credits
Group 1 - Select 11 credits from the following: [2]		11
ECE 450	Digital System Design Laboratory	
ECE 451	Digital System Design	
ECE 452	Computer Organization and Architecture	
ECE 456	Computer Networks	
ECE 528/CS 528	Embedded Systems and Machine Learning	
Group 2 - Select 0-6 credits from the following: [2]		0-6
DSCI 320/ MATH 320	Optimization Methods in Data Science	
ECE 312	Linear System Analysis II	
Group 3 - Select 0-6 credits from the following: [2,3]		0-6
ECE 101	Foundations in ECE	
ECE 395A	Independent Study [3]	
ECE 395B	Independent Study: Open Option Project [3]	
ECE 395C	Independent Study : Vertically Integrated Project [3]	

Technical Electives (1-7 credits)

Code	Title	Credits
Select 1-7 credits from the following: [2,3]		
CS 310H/IDEA 310H	Design Thinking Toolbox: Mixed Reality Design	3
CS 314	Software Engineering	3
CS 320	Algorithms--Theory and Practice	3

CS 345	Machine Learning Foundations and Practice	3
CS 356	Systems Security	3
CS 370	Operating Systems	3
CS 4XX Any CS course at the 400-level, excluding CS 457 and CS 470		
CS 5XX Any CS course at the 500-level		
DSCI 475	Topological Data Analysis	2
ECE 340	Electromagnetics for Computer Engineering	3
ECE 495A	Independent Study [3]	1-3
ECE 495B	Independent Study: Open Option Project [3]	1
ECE 495C	Independent Study: Vertically Integrated Projects [3]	1
ECE 4XX Any ECE course at the 400-level		
ECE 5XX Any ECE course at the 500-level, excluding ECE 532/ SYSE 532		
MATH 360	Mathematics of Information Security	3
MATH 450	Introduction to Numerical Analysis I	3
MATH 451	Introduction to Numerical Analysis II	3
MATH 460	Information and Coding Theory	3
MECH 564	Fundamentals of Robot Mechanics and Controls	3
STAT 421	Introduction to Stochastic Processes	3

Biomedical Engineering (BME) Technical Electives (3 credits)

Code	Title	Credits
BC 351	Principles of Biochemistry	4
BC 401	Comprehensive Biochemistry I	3
BC 403	Comprehensive Biochemistry II	3
BC 404	Comprehensive Biochemistry Laboratory	2
BC 411	Physical Biochemistry	4
BC 463	Molecular Genetics	3
BC 465	Molecular Regulation of Cell Function	3
BC 565	Molecular Regulation of Cell Function	4
BIOM 304	Global Challenges and Collaborations in BME	3
BIOM 350A	Study Abroad--Ecuador: Prosthetics	1-3
BIOM 421	Transport Phenomena in Biomedical Engineering	3
BIOM 422	Quantitative Systems and Synthetic Biology	3
BIOM 441	Biomechanics and Biomaterials	3
BIOM 476	Biomedical Engineering Clinical Practicum [3]	1-3
BIOM 495	Independent Study [3]	1-6
BIOM 504/CBE 504	Fundamentals of Biochemical Engineering	3
BIOM 518/ECE 518	Biophotonics	3
BIOM 522/CBE 522	Bioseparation Processes	3
BIOM 525/MECH 525	Cell and Tissue Engineering	3
BIOM 526/ECE 526	Biological Physics	3
BIOM 531/MECH 531	Materials Engineering	3
BIOM 533/CIVE 533	Biomolecular Tools for Engineers	3
BIOM 537/ECE 537	Biomedical Signal Processing	3
BIOM 570/MECH 570	Bioengineering	3
BIOM 572/MECH 572	Regenerative Bioengineering with Stem Cells	3
BIOM 573/MECH 573	Structure and Function of Biomaterials	3
BIOM 574/MECH 574	Bio-Inspired Surfaces	3
BIOM 576/MECH 576	Quantitative Systems Physiology	4
BIOM 578/MECH 578	Musculoskeletal Biosolid Mechanics	3
BMS 301	Human Gross Anatomy	5
BMS 302	Laboratory in Principles of Physiology	2
BMS 310	Anatomy for the Health Professions	4
BMS 320	Virtual Laboratory in Physiology	2
BMS 325	Cellular Neurobiology	3
BMS 345	Functional Neuroanatomy	4
BMS 405	Nerve and Muscle-Toxins, Trauma and Disease	3
BMS 409	Human and Animal Reproductive Biology	3
BMS 420	Cardiopulmonary Physiology	3
BMS 430	Endocrinology	3
BMS 450	Pharmacology	3
BMS 500	Mammalian Physiology I	4
BMS 501	Mammalian Physiology II	4
BMS 503/NB 503	Developmental Neurobiology	3
BZ 311	Developmental Biology	4
BZ 350	Molecular and General Genetics	4
BZ 476/BZ 576	Genetics of Model Organisms	3
CBE 330	Process Simulation	3
CBE 543	Membranes for Biotechnology and Biomedicine	3
CHEM 334	Quantitative Analysis Laboratory	1
CHEM 335	Introduction to Analytical Chemistry	3
CHEM 343	Modern Organic Chemistry II	3
CHEM 344	Modern Organic Chemistry Laboratory	2
CHEM 346	Organic Chemistry II	4
CHEM 433	Clinical Chemistry	3
CHEM 539A	Principles of NMR and MRI: Basic NMR Principles	1
CHEM 539B	Principles of NMR and MRI: NMR Diffusion Measurements-2D NMR and MRI	1
CHEM 539C	Principles of NMR and MRI: Advanced NMR and MRI Techniques	1
ECE 569/MECH 569	Micro-Electro-Mechanical Devices	3
ENGR 533	Spaceflight and Biological Systems	3
ERHS 332	Principles of Epidemiology	3
ERHS 450	Introduction to Radiation Biology	3
ERHS 502	Fundamentals of Toxicology	3
ERHS 510/VS 510	Cancer Biology	3
ERHS 540	Principles of Ergonomics	3
FSHN 470	Integrative Nutrition and Metabolism	3
HES 307	Biomechanical Principles of Human Movement	3
HES 319	Neuromuscular Aspects of Human Movement	4

HES 403	Physiology of Exercise	3
HES 420	Electrocardiography and Exercise Management	3
HES 476	Exercise and Chronic Disease	3
MATH 455	Mathematics in Biology and Medicine	3
MECH 432	Engineering of Nanomaterials	3
MECH 543	Biofluid Mechanics	3
MIP 300	General Microbiology	3
MIP 302	General Microbiology Laboratory	2
MIP 342	Immunology	4
MIP 343	Immunology Laboratory	2
MIP 351	Medical Bacteriology	3
MIP 352	Medical Bacteriology Laboratory	3
MIP 420	Medical and Molecular Virology	4
MIP 443	Microbial Physiology	3
MIP 450	Microbial Genetics	3
NB 500/BMS 502	Readings in Cellular Neurobiology	1
NB 501	Cellular and Molecular Neurophysiology	2
NB 505/BMS 505	Neuronal Circuits, Systems and Behavior	3

[1] Students must take a total of 7 credits from either of these groups: Group A: CS 150B + CS 164 - OR - Group B: AUCC 3B + CS 163 - OR - Group C: AUCC 3B + CS 152 + CS 162. Recommended sequence for most incoming students is Group A: **CS 150B** to **CS 164**.

[2] Students are required to complete 18 credits of CpE electives (11 - 17 credits of CpE Electives and 1 - 7 credits of Technical Electives), in addition to 3 credits of BME Technical Electives to reach the required 157 total program credits.

[3] A maximum total 6 credits of ECE Independent Study may apply toward total degree requirements, including ECE 395A, ECE 395B, ECE 395C and ECE 495A, ECE 495B, ECE 495C combined. A maximum total 3 credits of BIOM Independent Study may apply toward total degree requirements, including BIOM 476 and BIOM 495.