

INTERDISCIPLINARY MINOR IN BIOMEDICAL ENGINEERING

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engr.colostate.edu/sbme/undergraduate-programs/bme-minor/ (<https://www.engr.colostate.edu/sbme/undergraduate-programs/bme-minor/>)

The Biomedical Engineering Interdisciplinary Minor offers students an interdisciplinary approach to biomedical engineering education and research. This unique program combines courses in biomedical engineering and life sciences to improve human and animal health and well-being. This 21-credit minimum minor is open to all majors, thus complementing students' major area of study, and BME minor courses may count as electives in a student's major. The program provides a solid foundation in biomedical engineering and strengthens skills in engineering and life sciences.

Learning Objectives

Students successfully completing this interdisciplinary minor will be able to:

1. Describe the scope of biomedical engineering and be able to work on and present examples of specific biomedical engineering applications.
2. Discuss primary mammalian physiological systems and relate them to engineering concepts.
3. Identify basic principles and fundamentals in biomedical engineering.
4. Apply broad knowledge, practical experiences, and creativity to solving problems at the interface of engineering and the life sciences.
5. Apply mathematics, science, and engineering to solve technical problems that impact human or animal health.
6. Discuss contemporary issues in biomedical engineering.

Requirements Effective Fall 2024

Students must satisfactorily complete the total credits required for the minor. Minors and interdisciplinary minors require 12 or more upper-division (300- to 400-level) credits.

Additional coursework may be required due to prerequisites.

Courses may only be used to fulfill requirements in one core or elective area; courses may not be double-counted in multiple sections.

Code	Title	Credits
Core Courses		
BIOM 100	Overview of Biomedical Engineering	1
Choose one course from the following:		2-3
BIOM 200	Fundamentals of Biomedical Engineering	
CBE 205	Fundamentals of Biological Engineering	
Choose one course from the following:		4-5
BMS 300	Principles of Human Physiology	
BMS 301	Human Gross Anatomy	
BMS 360	Fundamentals of Physiology	
Choose one course from the following:		3-4

BIOM 300	Problem-Based Learning Biomedical Engr Lab	
BIOM 421	Transport Phenomena in Biomedical Engineering	
BIOM 422	Quantitative Systems and Synthetic Biology	
BIOM 431/ ECE 431	Biomedical Signal and Image Processing	
BIOM 441	Biomechanics and Biomaterials	
Electives		11

Engineering and Related Courses Elective List – Select a minimum of 5 credits

Science, Engineering, Animal Research, Bioethics, and Entrepreneurship Elective List – Select a minimum of 6 credits

Program Total Credits: 21-24

Engineering and Related Courses Elective List (Select a minimum of 5 credits from this list.)

Code	Title	Credits
BIOM 300	Problem-Based Learning Biomedical Engr Lab	4
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 431/ECE 431	Biomedical Signal and Image Processing	3
BIOM 441	Biomechanics and Biomaterials	3
BIOM 525/MECH 525	Cell and Tissue Engineering	3
BIOM 533/CIVE 533	Biomolecular Tools for Engineers	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
CBE 201	Material and Energy Balances	3
CBE 210	Thermodynamic Process Analysis	3
CBE 320	Chemical and Biological Reactor Design	3
CBE 331	Momentum Transfer and Mechanical Separations	3
CBE 332	Heat and Mass Transfer Fundamentals	3
CBE 406	Introduction to Transport Phenomena	3
CBE 430	Process Control and Instrumentation	3
CIVE 260	Engineering Mechanics-Statics	3
CIVE 261	Engineering Mechanics-Dynamics	3
ECE 202	Circuit Theory Applications	4
ECE 204	Introduction to Electrical Engineering	3
ECE 331	Electronics Principles I	4
ECE 341	Electromagnetic Fields and Devices I	3
MECH 237	Introduction to Thermal Sciences	3
MECH 262	Engineering Mechanics	4
MECH 307	Mechatronics and Measurement Systems	4
MECH 331	Introduction to Engineering Materials	4
MECH 342	Fluid Mechanics for Mechanical Engineers	3

A maximum of 1 course may be selected from the following non-engineering and independent study/practicum courses; a maximum of 3 credits of BIOM 495 may be counted toward the minor.

BIOM 476	Biomedical Engineering Clinical Practicum
BIOM 495	Independent Study
ECE 303/ STAT 303	Introduction to Communications Principles
MATH 340	Intro to Ordinary Differential Equations
PH 245	Introduction to Electronics
STAT 315	Intro to Theory and Practice of Statistics

Science, Engineering, Animal Research, Bioethics, and Entrepreneurship Courses Elective List (Select a minimum of 6 credits from this list.)

Code	Title	Credits
BC 351	Principles of Biochemistry	4
BIOM 300	Problem-Based Learning Biomedical Engr Lab	4
BIOM 421	Transport Phenomena in Biomedical Engineering	3
BIOM 422	Quantitative Systems and Synthetic Biology	3
BIOM 431/ECE 431	Biomedical Signal and Image Processing	3
BIOM 441	Biomechanics and Biomaterials	3
BIOM 476	Biomedical Engineering Clinical Practicum	1-3
BIOM 495	Independent Study	1-6
BIOM 525/MECH 525	Cell and Tissue Engineering	3
BIOM 533/CIVE 533	Biomolecular Tools for Engineers	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
BMS 300	Principles of Human Physiology	4
BMS 301	Human Gross Anatomy	5
BMS 325	Cellular Neurobiology	3
BMS 345	Functional Neuroanatomy	4
BMS 360	Fundamentals of Physiology	4
BMS 405	Nerve and Muscle-Toxins, Trauma and Disease	3
BMS 420	Cardiopulmonary Physiology	3
BMS 430	Endocrinology	3
BZ 310	Cell Biology	4
CHEM 113	General Chemistry II	3
CHEM 245	Fundamentals of Organic Chemistry	4
CHEM 341 or CHEM 345	Modern Organic Chemistry I Organic Chemistry I	3 or 4
CHEM 344	Modern Organic Chemistry Laboratory	2
HES 207	Anatomical Kinesiology	4
HES 307	Biomechanical Principles of Human Movement	3
HES 403	Physiology of Exercise	3
HES 420	Electrocardiography and Exercise Management	3

HES 476	Exercise and Chronic Disease	3
LIFE 102	Attributes of Living Systems (GT-SC1)	4
LIFE 103	Biology of Organisms-Animals and Plants (GT-SC1)	4
LIFE 210	Introductory Eukaryotic Cell Biology	3
MIP 300	General Microbiology	3
OT 215	Medical Terminology	1
PSY 456	Sensation and Perception	3
PSY 457	Sensation and Perception Laboratory	2

A maximum of one course (3 credits) may be selected from the following non-technical courses:

BUS 205	Legal and Ethical Issues in Business
MGT 420	New Venture Creation
MGT 440	New Venture Management
PHIL 205	Introduction to Ethics