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BIOMEDICAL ENGINEERING - BACHELOR OF SCIENCE (BSBM)

Biomedical engineering is an exciting, multidisciplinary field that lies at the interface of medicine, biology and engineering. Biomedical engineers use engineering principles to analyze and solve problems in biology and medicine, providing an overall enhancement to healthcare. Biomedical engineers create technology to save lives and improve the quality of life. Much of the equipment in hospitals and clinics across the globe was designed, built and tested by biomedical engineers. At the same time, biomedical engineers employ concepts learned from biology and medicine to generate new (biomimetic) engineering designs in fields such as robotics and artificial intelligence.

Course code for this program is BMEN.

Requirements

Prerequisites and Passing Grades

The minimum passing grade for a course that is a prerequisite or corequisite for another required course is C-. If a grade of D+ or lower is received in a course that is a prerequisite to another, the student may not register for the subsequent course and must repeat the prerequisite course until a grade of C- or higher is achieved.

The minimum passing grade for a course that is not specifically a prerequisite or corequisite for another required course is D-.

The biomedical engineering program reserves the right to drop students enrolled in BMEN courses who have not met the minimum prerequisite requirements. It is the student's responsibility to communicate with the program if summer coursework and/or transfer credit will be used to meet the prerequisite requirement.

Required Courses and Credits

Required courses in engineering, physical science, and mathematics are interwoven throughout the curriculum to provide a balanced education in the fundamentals of the biomedical engineering profession. The core courses are complemented by technical electives, humanities and social sciences electives (https://www.colorado.edu/engineering-advising/get-your-degree/degree-requirements/humanities-social-sciences-and-writing-requirements/), free electives, and a writing course (https://www.colorado.edu/engineering-advising/get-your-degree/degree-requirements/humanities-social-sciences-and-writing-requirements/), for a total of 128 credits required for the degree.

Code	Title	Credit
		Hours

Required Biomedical Courses

BMEN 1000	Exploring Biomedical Engineering	1
or AREN 1316	Introduction to Architectural Engineering	
or ASEN 1000	Introduction to Aerospace Engineering Sciences	
or CHEN 1300	Introduction to Chemical and Biological Engineering	
or CSCI 1000	Computer Science as a Field of Work and Study	
or CVEN 1317	Introduction to Civil and Environmental Engineering	

or ECEN 1100	Exploring ECE		
or EVEN 1000	Introduction to Environmental Engineering		
or MCEN 2000	Mechanical Engineering as a Profession		
BMEN 1025	Computer-Aided Design & Fabrication	4	
or MCEN 1025	Computer-Aided Design and Fabrication		
or GEEN 1017 & BMEN 1035	Engineering Drawing and Introduction to Fabrication for Biomedical Engineering		
BMEN 2100	Biomedical Engineering Principles and Methods	3	
BMEN 2010	Biomaterials	3	
BMEN 3010	Biotransport	3	
BMEN 3030	Bioinstrumentation	3	
BMEN 4010	Biomedical Engineering Capstone Design I	3	
BMEN 4020	Biomedical Engineering Capstone Design II	3	
BMEN 4117	Anatomy and Physiology for Biomedical Engineering	3	
or MCEN 4117	Anatomy and Physiology for Engineers		
or MCEN 5117	Anatomy and Physiology for Engineers		
or BMEN 5117	Anatomy and Physiology for Biomedical Engineering		
Required Mechanics Courses			

MCEN 2023	Statics and Structures	3
or GEEN 2851	Statics for Engineers	
or CVEN 2121	Analytical Mechanics 1	
MCEN 2063	Mechanics of Solids	3
or CVEN 3161	Mechanics of Materials 1	
MCEN 4133	Intro to Tissue Biomechanics	3

Required Flectrical Courses

Required Electrical Co	burses	
ECEN 2250	Introduction to Circuits and Electronics	3
or ECEN 3010	Circuits and Electronics for Mechanical Engineers	s
or GEEN 3010	Circuits for Engineers	
or MCEN 3017	Circuits and Electronics for Mechanical Engineers	s
ECEN 2260	Circuits as Systems	3
ECEN 2270	Electronics Design Lab	3
ECEN 3301	Biomedical Signals and Systems	3
or ECEN 3300	Linear Systems	

Technical Electives

Choose 15 credit hours of technical elective coursework. At least 12 of 15 must be 3000 level or above, and at least 6 of 15 must be BME-Approved Engineering technical electives, including 3 credits from focused electives.

Required Mathematic	Required Mathematics Courses			
APPM 1350	Calculus 1 for Engineers	4		
or MATH 1300	Calculus 1			
or APPM 1345	Calculus 1 with Algebra, Part B			
APPM 1360	Calculus 2 for Engineers	4		
or MATH 2300	Calculus 2			
APPM 2350	Calculus 3 for Engineers	4		
or MATH 2400	Calculus 3			
APPM 2360	Introduction to Differential Equations with Linear Algebra	4		

and Ordinary Differential Equations or MATH 2135 Introduction to Linear Algebra for Mathematics & MATH 3430 Majors and Ordinary Differential Equations Required Physics Course PHYS 1110 General Physics 1 or PHYS 1115 General Physics 2 or PHYS 1120 General Physics 2 for Majors PHYS 1120 General Physics 2 for Majors PHYS 1140 Experimental Physics 2 or PHYS 1140 Experimental Physics 1 TRequired Chemistry Courses Select one of the following chemistry sequence options: Option 1: CHEN 1201 General Chemistry for Engineers 1 or CHEN 1211 Or CHEN 1113 General Chemistry for Engineers or CHEM 1113 General Chemistry 1 or CHEM 1400 Foundations of Chemistry CHEN 1203 General Chemistry for Engineers 2 or CHEM 1211 Accelerated Chemistry for Engineers or CHEM 1133 General Chemistry 2 CHEM 1205 Or CHEM 1101 Foundations of Chemistry 2 CHEM 1210 Or CHEM 1114 Laboratory in General Chemistry 2 Or CHEM 1114 Or CHEM 1210 CHEM 1211 Laboratory in General Chemistry 2 Or CHEM 2101 Or CHEM 2101 In General Chemistry 1 Or CHEM 1211 Accelerated Chemistry 2 Or CHEM 1114 COPTION 2: (Students who take Option 2 must take two extra Free Electives) CHEM 1211 CHEM 1221 Engineering General Chemistry Lab Or CHEM 1134 Laboratory in General Chemistry 2 Or CHEM 1114 Laboratory in General Chemistry 2 Or CHEM 1114 Laboratory in General Chemistry 1 Or CHEM 1134 Laboratory in General Chemistry 2 Or CHEM 1114 Laboratory in General Chemistry 1 Or CHEM 1134 Laboratory in General Chemistry 1 Or CHEM 1130 Or CHEM 1140 Introduction to Cellular and Molecular Biology Or EBIO 1210 General Biology 1 and General Biology 2 Required Computing Computing Or SCI 1300 Computer Science 1: Starting Computing Or SCI 1300 Computer Science 1: Starting Computing Or SCI 1300 Computer Science 1: Starting Computing CHEN 3010 Applied Data Analysis 4 SCIENTION Computer Science 3 Sciences and Writing Complete the college's humanities, social scien	Total Credit Hours		128
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& MATH 3430 Mathematics Majors and Ordinary Differential Equations or MATH 2135 Introduction to Linear Algebra for Mathematics & MATH 3430 Majors and Ordinary Differential Equations Required Physics Course PHYS 1110 General Physics 1 or PHYS 1115 General Physics 1 for Majors PHYS 1120 General Physics 2 or PHYS 1125 General Physics 2 for Majors PHYS 1140 Experimental Physics 1 Required Chemistry Courses Select one of the following chemistry sequence options: Option 1: CHEN 1201 General Chemistry for Engineers 1 or CHEM 1113 General Chemistry 1 or CHEM 1113 General Chemistry 1 or CHEM 1400 Foundations of Chemistry CHEN 1201 General Chemistry for Engineers 2 or CHEM 1131 General Chemistry for Engineers 2 or CHEM 1131 General Chemistry for Engineers 2 or CHEM 1131 General Chemistry 1 or CHEM 1201 Foundations of Chemistry 2 CHEM 1210 Foundations of Chemistry 2 CHEM 1211 Chemistry 1 Or CHEM 1134 Laboratory in General Chemistry 2 Or CHEM 1134 Laboratory in General Chemistry 1 Or CHEM 1211 Accelerated Chemistry 1 Or CHEM 1211 Laboratory in General Chemistry 2 Option 2: (Students who take Option 2 must take two extra Free Electives) CHEM 1211 Accelerated Chemistry for Engineers CHEM 1211 Chemistry 1 Or CHEM 1134 Laboratory in General Chemistry 2 Option 2: (Students who take Option 2 must take two extra Free Electives) CHEM 1211 Accelerated Chemistry for Engineers CHEM 1211 Chemistry 1 Or CHEM 1134 Laboratory in General Chemistry Lab Or CHEM 1135 Biology for Engineers CHEM 1210 General Biology 1 Accelerated Biology Course BIEN 2810 Biology for Engineers 3 Select one of the following chemistry Lab Or CHEM 1130 Introduction to Cellular and Molecular Biology or EBIO 1220 and General Biology 2 Required Computing Courses CHEN 1310 Introduction to Engineering Computing 4 Or CSCI 1300 Computer Science 1: Starting Computing 5 CHEN 3010 Applied Data Analysis 4 Or STAT 4000 Statistical Methods and Application I		_	1.9
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& MATH 3430 Mathematics Majors and Ordinary Differential Equations or MATH 2135 Introduction to Linear Algebra for Mathematics & MATH 3430 Majors and Ordinary Differential Equations Required Physics Course PHYS 1110 General Physics 1 or PHYS 1115 General Physics 2 for Majors PHYS 1120 General Physics 2 for Majors PHYS 1140 Experimental Physics 1 1 Required Chemistry Courses Select one of the following chemistry sequence options: Option 1: CHEN 1201 General Chemistry for Engineers 1 3 or CHEN 1211 Accelerated Chemistry 1 or CHEM 1113 General Chemistry 1 or CHEM 1400 Foundations of Chemistry CHEN 1203 General Chemistry for Engineers 2 3 or CHEM 1211 Accelerated Chemistry for Engineers 2 or CHEM 1133 General Chemistry 2 CHEM 1210 Foundations of Chemistry 2 Or CHEM 2100 Foundations of Chemistry 2 CHEM 1211 Laboratory in General Chemistry 1 or CHEM 1134 Laboratory in General Chemistry 1 or CHEM 2101 Laboratory in Foundations of Chemistry 2 Option 2: (Students who take Option 2 must take two extra Free Electives) CHEM 1221 Engineering General Chemistry Lab or CHEM 1211 Accelerated Chemistry for Engineers Electives) CHEM 1221 Engineering General Chemistry Lab or CHEM 1211 Accelerated Chemistry for Engineers Electives) CHEM 1221 Engineering General Chemistry Lab or CHEM 1231 Accelerated Chemistry for Engineers Electives) CHEM 1221 Engineering General Chemistry Lab or CHEM 1134 Laboratory in General Chemistry Lab or CHEM 1134 Laboratory in General Chemistry Lab Laboratory in General Chemistry Lab or CHEM 1134 Laboratory in General Chemistry Lab Laboratory in General Chemistry Lab or CHEM 1134 Laboratory in General Chemistry Lab			
MATH 3430 Mathematics Majors and Ordinary Differential Equations or MATH 2135 Introduction to Linear Algebra for Mathematics & MATH 3430 Majors and Ordinary Differential Equations Required Physics Course PHYS 1110 General Physics 1 or PHYS 1115 General Physics 2 or PHYS 1120 General Physics 2 for Majors PHYS 1125 General Physics 2 for Majors PHYS 1140 Experimental Physics 1 Required Chemistry Courses Select one of the following chemistry sequence options: Option 1: CHEN 1201 General Chemistry for Engineers 1 or CHEN 1211 Accelerated Chemistry 1 or CHEM 1113 General Chemistry 1 or CHEN 1201 General Chemistry for Engineers 2 or CHEN 1211 Accelerated Chemistry for Engineers 2 or CHEM 1133 General Chemistry for Engineers 2 or CHEM 1134 Ceclerated Chemistry 1 OF CHEM 1201 General Chemistry 1 OF CHEM 1211 Accelerated Chemistry 2 OF CHEM 1134 Laboratory in General Chemistry 2 CHEM 1221 Engineering General Chemistry 1 OF CHEM 2101 Laboratory in Foundations of Chemistry 2 Option 2: (Students who take Option 2 must take two extra Free Electives) CHEM 1221 Engineering General Chemistry Lab CHEM 1221 Engineering General Chemistry Lab			
MATH 3430 Mathematics Majors and Ordinary Differential Equations or MATH 2135 Introduction to Linear Algebra for Mathematics & MATH 3430 Majors and Ordinary Differential Equations Required Physics Course PHYS 1110 General Physics 1 or PHYS 1115 General Physics 1 for Majors PHYS 1120 General Physics 2 or PHYS 1125 General Physics 2 for Majors PHYS 1140 Experimental Physics 1 Required Chemistry Courses Select one of the following chemistry sequence options: Option 1: CHEN 1201 General Chemistry for Engineers 1 3 or CHEN 1211 Accelerated Chemistry for Engineers or CHEM 1113 General Chemistry 1 or CHEM 1400 Foundations of Chemistry CHEN 1203 General Chemistry for Engineers 2 3 or CHEN 1211 Accelerated Chemistry for Engineers 2 3 or CHEN 1211 Accelerated Chemistry 1 or CHEM 1133 General Chemistry 2 or CHEM 2100 Foundations of Chemistry 2 CHEM 1221 Engineering General Chemistry Lab or CHEM 1134 Laboratory in General Chemistry 1 or CHEM 2101 Laboratory in General Chemistry 2 Option 2: (Students who take Option 2 must take two extra Free Electives) CHEN 1211 Accelerated Chemistry for Engineers			
& MATH 3430 Mathematics Majors and Ordinary Differential Equations or MATH 2135 Introduction to Linear Algebra for Mathematics & MATH 3430 Majors and Ordinary Differential Equations Required Physics Course PHYS 1110 General Physics 1 or PHYS 1115 General Physics 1 for Majors PHYS 1120 General Physics 2 or PHYS 1125 General Physics 2 for Majors PHYS 1140 Experimental Physics 1 1 Required Chemistry Courses Select one of the following chemistry sequence options: Option 1: CHEN 1201 General Chemistry for Engineers 1 3 or CHEN 1211 Accelerated Chemistry 1 or CHEM 1113 General Chemistry 1 or CHEM 1400 Foundations of Chemistry CHEN 1203 General Chemistry for Engineers 2 3 or CHEN 1211 Accelerated Chemistry for Engineers 2 or CHEM 1133 General Chemistry 2 OF CHEM 2100 Foundations of Chemistry 2 CHEM 1221 Engineering General Chemistry Lab or CHEM 1134 Laboratory in General Chemistry 1 or CHEM 1134 Laboratory in General Chemistry 2 OPTION 2: (Students who take Option 2 must take two extra Free Electives)			
& MATH 3430 Mathematics Majors and Ordinary Differential Equations or MATH 2135 Introduction to Linear Algebra for Mathematics & MATH 3430 Majors and Ordinary Differential Equations Required Physics Course PHYS 1110 General Physics 1 for Majors PHYS 1115 General Physics 2 for Majors PHYS 1120 General Physics 2 for Majors PHYS 1125 General Physics 2 for Majors PHYS 1140 Experimental Physics 1 Required Chemistry Courses Select one of the following chemistry sequence options: Option 1: CHEN 1201 General Chemistry for Engineers 1 3 or CHEN 1211 Accelerated Chemistry for Engineers or CHEM 1113 General Chemistry 1 or CHEM 1400 Foundations of Chemistry CHEN 1203 General Chemistry for Engineers 2 3 or CHEN 1211 Accelerated Chemistry for Engineers or CHEM 1131 General Chemistry 2 or CHEM 2100 Foundations of Chemistry 2 Or CHEM 2100 Foundations of Chemistry 2 OR CHEM 1134 Laboratory in General Chemistry 1 or CHEM 1114 Laboratory in General Chemistry 1 or CHEM 2101 Laboratory in Foundations of Chemistry 2 Option 2: (Students who take Option 2 must take two extra Free	· · · · · · · · · · · · · · · · · · ·		
& MATH 3430 Mathematics Majors and Ordinary Differential Equations or MATH 2135 Introduction to Linear Algebra for Mathematics & MATH 3430 Majors and Ordinary Differential Equations Required Physics Course PHYS 1110 General Physics 1 for Majors PHYS 1115 General Physics 2 or PHYS 1125 General Physics 2 for Majors PHYS 1140 Experimental Physics 1 Required Chemistry Courses Select one of the following chemistry sequence options: Option 1: CHEN 1201 General Chemistry for Engineers 1 or CHEM 1113 General Chemistry 1 or CHEM 1113 General Chemistry for Engineers 2 or CHEM 1211 Accelerated Chemistry for Engineers 2 or CHEM 1131 General Chemistry for Engineers 2 or CHEM 1133 General Chemistry 1 or CHEM 1134 General Chemistry 2 or CHEM 2100 Foundations of Chemistry 2 CHEM 1221 Engineering General Chemistry Lab or CHEM 1134 Laboratory in General Chemistry 1 or CHEM 1114 Laboratory in General Chemistry 2 or CHEM 1114 Laboratory in General Chemistry 1 or CHEM 2101 Laboratory in Foundations of Chemistry 2		who take Option 2 must take two extra Free	
& MATH 3430 Mathematics Majors and Ordinary Differential Equations or MATH 2135 Introduction to Linear Algebra for Mathematics & MATH 3430 Majors and Ordinary Differential Equations Required Physics Course PHYS 1110 General Physics 1 for Majors PHYS 1115 General Physics 2 for Majors PHYS 1120 General Physics 2 for Majors PHYS 1140 Experimental Physics 1 Required Chemistry Courses Select one of the following chemistry sequence options: Option 1: CHEN 1201 General Chemistry for Engineers 1 or CHEM 1113 General Chemistry 1 or CHEM 1400 Foundations of Chemistry CHEN 1203 General Chemistry for Engineers 2 or CHEM 1211 Accelerated Chemistry for Engineers 2 or CHEM 1133 General Chemistry for Engineers 2 or CHEM 1133 General Chemistry 2 or CHEM 2100 Foundations of Chemistry 2 CHEM 1221 Engineering General Chemistry Lab or CHEM 1134 Laboratory in General Chemistry 1	or CHEM 2101	Laboratory in Foundations of Chemistry 2	
& MATH 3430 Mathematics Majors and Ordinary Differential Equations or MATH 2135 Introduction to Linear Algebra for Mathematics & MATH 3430 Majors and Ordinary Differential Equations Required Physics Course PHYS 1110 General Physics 1 or PHYS 1115 General Physics 1 for Majors PHYS 1120 General Physics 2 or PHYS 1125 General Physics 2 for Majors PHYS 1140 Experimental Physics 1 Required Chemistry Courses Select one of the following chemistry sequence options: Option 1: CHEN 1201 General Chemistry for Engineers 1 or CHEN 1211 Accelerated Chemistry for Engineers or CHEM 1113 General Chemistry 1 or CHEM 1400 Foundations of Chemistry CHEN 1203 General Chemistry for Engineers 2 or CHEN 1211 Accelerated Chemistry for Engineers or CHEM 1131 General Chemistry for Engineers Or CHEM 1131 General Chemistry for Engineers or CHEM 1131 General Chemistry 1 or CHEM 1133 General Chemistry 2 or CHEM 2100 Foundations of Chemistry 2 CHEM 1221 Engineering General Chemistry Lab or CHEM 1134 Laboratory in General Chemistry 2			
& MATH 3430 Mathematics Majors and Ordinary Differential Equations or MATH 2135 Introduction to Linear Algebra for Mathematics & MATH 3430 Majors and Ordinary Differential Equations Required Physics Course PHYS 1110 General Physics 1 or PHYS 1115 General Physics 2 for Majors PHYS 1120 General Physics 2 for Majors PHYS 1120 Experimental Physics 1 Required Chemistry Courses Select one of the following chemistry sequence options: Option 1: CHEN 1201 General Chemistry for Engineers 1 or CHEM 1113 General Chemistry 1 or CHEM 11400 Foundations of Chemistry CHEN 1201 General Chemistry for Engineers 2 or CHEM 1400 Foundations of Chemistry CHEN 1201 General Chemistry for Engineers 2 or CHEM 1131 General Chemistry for Engineers 2 or CHEM 1131 General Chemistry for Engineers or CHEM 1133 General Chemistry 2 or CHEM 2100 Foundations of Chemistry Lab			
& MATH 3430 Mathematics Majors and Ordinary Differential Equations or MATH 2135 Introduction to Linear Algebra for Mathematics & MATH 3430 Majors and Ordinary Differential Equations Required Physics Course PHYS 1110 General Physics 1 or PHYS 1115 General Physics 1 for Majors PHYS 1120 General Physics 2 or PHYS 1125 General Physics 2 for Majors PHYS 1140 Experimental Physics 1 Required Chemistry Courses Select one of the following chemistry sequence options: Option 1: CHEN 1201 General Chemistry for Engineers 1 3 or CHEN 1211 Accelerated Chemistry for Engineers or CHEM 1113 General Chemistry 1 or CHEM 1400 Foundations of Chemistry CHEN 1203 General Chemistry for Engineers 2 3 or CHEN 1211 Accelerated Chemistry for Engineers or CHEM 1133 General Chemistry for Engineers Or CHEM 1133 General Chemistry 2 or CHEM 2100 Foundations of Chemistry 2			
& MATH 3430 Mathematics Majors and Ordinary Differential Equations or MATH 2135 Introduction to Linear Algebra for Mathematics & MATH 3430 Majors and Ordinary Differential Equations Required Physics Course PHYS 1110 General Physics 1 or PHYS 1115 General Physics 2 for Majors PHYS 1120 General Physics 2 for Majors PHYS 1140 Experimental Physics 1 Required Chemistry Courses Select one of the following chemistry sequence options: Option 1: CHEN 1201 General Chemistry for Engineers 1 3 or CHEM 1211 Accelerated Chemistry 1 or CHEM 1113 General Chemistry 1 or CHEM 1400 Foundations of Chemistry CHEN 1203 General Chemistry for Engineers 2 3 or CHEN 1211 Accelerated Chemistry for Engineers 5 or CHEM 1131 General Chemistry for Engineers 6 CHEM 1203 General Chemistry for Engineers 7 Or CHEM 1211 Accelerated Chemistry for Engineers 8 Or CHEM 1131 General Chemistry for Engineers 9 Or CHEM 1131 General Chemistry for Engineers 9 Or CHEM 1131 General Chemistry for Engineers 9 Or CHEM 1131 General Chemistry 10 Or CHEM 1133 General Chemistry 10 Or CHEM 1134 General Chemistry 10 Or CHEM 1134 General Chemistry 10 Or CHEM 1134 General Chemistry 10 Or CHE		•	
& MATH 3430 Mathematics Majors and Ordinary Differential Equations or MATH 2135 Introduction to Linear Algebra for Mathematics & MATH 3430 Majors and Ordinary Differential Equations Required Physics Course PHYS 1110 General Physics 1 or PHYS 1115 General Physics 1 for Majors PHYS 1120 General Physics 2 or PHYS 1125 General Physics 2 for Majors PHYS 1140 Experimental Physics 1 Required Chemistry Courses Select one of the following chemistry sequence options: Option 1: CHEN 1201 General Chemistry for Engineers 1 3 or CHEN 1211 Accelerated Chemistry 1 or CHEM 1113 General Chemistry 1 or CHEM 1400 Foundations of Chemistry CHEN 1203 General Chemistry for Engineers 2 3 or CHEN 1211 Accelerated Chemistry for Engineers		•	
& MATH 3430 Mathematics Majors and Ordinary Differential Equations or MATH 2135 Introduction to Linear Algebra for Mathematics & MATH 3430 Majors and Ordinary Differential Equations Required Physics Course PHYS 1110 General Physics 1 or PHYS 1115 General Physics 1 for Majors PHYS 1120 General Physics 2 or PHYS 1125 General Physics 2 for Majors PHYS 1140 Experimental Physics 1 Required Chemistry Courses Select one of the following chemistry sequence options: Option 1: CHEN 1201 General Chemistry for Engineers 1 3 or CHEN 1211 Accelerated Chemistry for Engineers or CHEM 1113 General Chemistry 1 or CHEM 1400 Foundations of Chemistry CHEN 1203 General Chemistry for Engineers 2 3		•	
& MATH 3430 Mathematics Majors and Ordinary Differential Equations or MATH 2135 Introduction to Linear Algebra for Mathematics & MATH 3430 Majors and Ordinary Differential Equations Required Physics Course PHYS 1110 General Physics 1 or PHYS 1115 General Physics 2 for Majors PHYS 1120 General Physics 2 for Majors PHYS 1125 General Physics 2 for Majors PHYS 1140 Experimental Physics 1 Required Chemistry Courses Select one of the following chemistry sequence options: Option 1: CHEN 1201 General Chemistry for Engineers 1 3 or CHEN 1211 Accelerated Chemistry for Engineers or CHEM 1113 General Chemistry 1 or CHEM 1400 Foundations of Chemistry			
& MATH 3430 Mathematics Majors and Ordinary Differential Equations or MATH 2135 Introduction to Linear Algebra for Mathematics & MATH 3430 Majors and Ordinary Differential Equations Required Physics Course PHYS 1110 General Physics 1 or PHYS 1115 General Physics 2 for Majors PHYS 1120 General Physics 2 or PHYS 1125 General Physics 2 for Majors PHYS 1140 Experimental Physics 1 Required Chemistry Courses Select one of the following chemistry sequence options: Option 1: CHEN 1201 General Chemistry for Engineers 1 3 or CHEN 1211 Accelerated Chemistry for Engineers or CHEM 1113 General Chemistry 1		•	
& MATH 3430 Mathematics Majors and Ordinary Differential Equations or MATH 2135 Introduction to Linear Algebra for Mathematics & MATH 3430 Majors and Ordinary Differential Equations Required Physics Course PHYS 1110 General Physics 1 or PHYS 1115 General Physics 1 for Majors PHYS 1120 General Physics 2 or PHYS 1125 General Physics 2 for Majors PHYS 1140 Experimental Physics 1 Required Chemistry Courses Select one of the following chemistry sequence options: Option 1: CHEN 1201 General Chemistry for Engineers 1 3 or CHEN 1211 Accelerated Chemistry for Engineers		•	
& MATH 3430 Mathematics Majors and Ordinary Differential Equations or MATH 2135 Introduction to Linear Algebra for Mathematics & MATH 3430 Majors and Ordinary Differential Equations Required Physics Course PHYS 1110 General Physics 1 or PHYS 1115 General Physics 1 for Majors PHYS 1120 General Physics 2 or PHYS 1125 General Physics 2 for Majors PHYS 1140 Experimental Physics 1 Required Chemistry Courses Select one of the following chemistry sequence options: Option 1: CHEN 1201 General Chemistry for Engineers 1 3			
& MATH 3430 Mathematics Majors and Ordinary Differential Equations or MATH 2135 Introduction to Linear Algebra for Mathematics & MATH 3430 Majors and Ordinary Differential Equations Required Physics Course PHYS 1110 General Physics 1 or PHYS 1115 General Physics 1 for Majors PHYS 1120 General Physics 2 or PHYS 1125 General Physics 2 for Majors PHYS 1140 Experimental Physics 1 Required Chemistry Courses Select one of the following chemistry sequence options: Option 1:	CHEN 1201		
& MATH 3430 Mathematics Majors and Ordinary Differential Equations or MATH 2135 Introduction to Linear Algebra for Mathematics & MATH 3430 Majors and Ordinary Differential Equations Required Physics Course PHYS 1110 General Physics 1 or PHYS 1115 General Physics 1 for Majors PHYS 1120 General Physics 2 or PHYS 1125 General Physics 2 for Majors PHYS 1140 Experimental Physics 1 Required Chemistry Courses	•	2	
& MATH 3430 Mathematics Majors and Ordinary Differential Equations or MATH 2135 Introduction to Linear Algebra for Mathematics & MATH 3430 Majors and Ordinary Differential Equations Required Physics Course PHYS 1110 General Physics 1 or PHYS 1115 General Physics 1 for Majors PHYS 1120 General Physics 2 or PHYS 1125 General Physics 2 for Majors PHYS 1140 Experimental Physics 1 Required Chemistry Courses	Select one of the follow	ving chemistry sequence options:	7
& MATH 3430 Mathematics Majors and Ordinary Differential Equations or MATH 2135 Introduction to Linear Algebra for Mathematics & MATH 3430 Majors and Ordinary Differential Equations Required Physics Course PHYS 1110 General Physics 1 or PHYS 1115 General Physics 1 for Majors PHYS 1120 General Physics 2 or PHYS 1125 General Physics 2 for Majors	Required Chemistry C	Courses	
& MATH 3430 Mathematics Majors and Ordinary Differential Equations or MATH 2135 Introduction to Linear Algebra for Mathematics & MATH 3430 Majors and Ordinary Differential Equations Required Physics Course PHYS 1110 General Physics 1 or PHYS 1115 General Physics 1 for Majors PHYS 1120 General Physics 2	PHYS 1140	Experimental Physics 1	1
& MATH 3430 Mathematics Majors and Ordinary Differential Equations or MATH 2135 Introduction to Linear Algebra for Mathematics & MATH 3430 Majors and Ordinary Differential Equations Required Physics Course PHYS 1110 General Physics 1 or PHYS 1115 General Physics 1 for Majors	or PHYS 1125	General Physics 2 for Majors	
& MATH 3430 Mathematics Majors and Ordinary Differential Equations or MATH 2135 Introduction to Linear Algebra for Mathematics & MATH 3430 Majors and Ordinary Differential Equations Required Physics Course PHYS 1110 General Physics 1	PHYS 1120	General Physics 2	4
& MATH 3430 Mathematics Majors and Ordinary Differential Equations or MATH 2135 Introduction to Linear Algebra for Mathematics & MATH 3430 Majors and Ordinary Differential Equations Required Physics Course	or PHYS 1115	General Physics 1 for Majors	
& MATH 3430 Mathematics Majors and Ordinary Differential Equations or MATH 2135 Introduction to Linear Algebra for Mathematics & MATH 3430 Majors and Ordinary Differential Equations	PHYS 1110	General Physics 1	4
& MATH 3430 Mathematics Majors and Ordinary Differential Equations or MATH 2135 Introduction to Linear Algebra for Mathematics & MATH 3430 Majors	Required Physics Cou	ırse	
& MATH 3430 Mathematics Majors and Ordinary Differential Equations or MATH 2135 Introduction to Linear Algebra for Mathematics	Q 1111 TO 100	•	
& MATH 3430 Mathematics Majors and Ordinary Differential Equations			i
& MATH 3430 Mathematics Majors	or MATH 2125		
	& MATH 3430	•	
or MATH 2130 Introduction to Linear Algebra for Non-			

Choose from the course options listed on the program's Advising & Curriculum webpage.

- For more information, see the College of Engineering & Applied Science (https://www.colorado.edu/engineering-advising/get-your-degree/degree-requirements/humanities-social-sciences-and-writing-requirements/) website.
- For CHEN 1201-CHEM 1113 and CHEM 1400 substitutions and for CHEN 1203-CHEM 1133 substitution are restricted to transfer students only.
- For CHEN 1310-CSCI 1300 and for CHEN 3010-STAT 4000 substitutions are restricted to CS minors only.

Optional Program Tracks

Two distinct tracks are offered for students preparing for medical school:

- Pre-medical track biomechanics option (https://www.colorado.edu/bme/academics/bachelors-program/advising-curriculum/#pre_med_biomechanics_track_sample_curriculum-287): For students interested in going to medical school and are interested in human motion, performance, disabilities, prosthetics or orthopedics.
- Pre-medical track bioinstrumentation option (https://www.colorado.edu/bme/academics/bachelors-program/advising-curriculum/#pre_med_bioinstrumentation_track_sample_curriculum-287): For students interested in going to medical school and are interested in medical devices, such as biosensors and imaging systems, or robotic surgical tools.

Premedical Biomechanics Track

For more information, including curriculum requirements, visit the program's Advising & Curriculum (https://www.colorado.edu/bme/academics/bachelors-program/advising-curriculum/) webpage.

Code	Title	Credit
		Hours

Required Biomedical Courses

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BMEN 1000	Exploring Biomedical Engineering	1
or AREN 1316	Introduction to Architectural Engineering	
or ASEN 1000	Introduction to Aerospace Engineering Sciences	
or CHEN 1300	Introduction to Chemical and Biological Engineering	
or CSCI 1000	Computer Science as a Field of Work and Study	
or CVEN 1317	Introduction to Civil and Environmental Engineering	
or ECEN 1100	Exploring ECE	
or EVEN 1000	Introduction to Environmental Engineering	
or MCEN 2000	Mechanical Engineering as a Profession	
BMEN 1025	Computer-Aided Design & Fabrication	4
or MCEN 1025	Computer-Aided Design and Fabrication	
or GEEN 1017	Engineering Drawing	
& BMEN 1035	and Introduction to Fabrication for Biomedical Engineering	
BMEN 2100	Biomedical Engineering Principles and Methods	3
BMEN 2010	Biomaterials	3
BMEN 3010	Biotransport	3
BMEN 4010	Biomedical Engineering Capstone Design	3
BMEN 4020	Biomedical Engineering Capstone Design	3

BMEN 4117	Anatomy and Physiology for Biomedical Engineering	3
or MCEN 4117	Anatomy and Physiology for Engineers	
or MCEN 5117	Anatomy and Physiology for Engineers	
or BMEN 5117	Anatomy and Physiology for Biomedical Engineering	
or IPHY 3410 & IPHY 3430	Human Anatomy and Human Physiology	
Required Mechanics	s Courses	
MCEN 2023	Statics and Structures	3
or GEEN 2851	Statics for Engineers	
or CVEN 2121	Analytical Mechanics 1	
MCEN 2063	Mechanics of Solids	3
or CVEN 3161	Mechanics of Materials 1	
MCEN 3017	Circuits and Electronics for Mechanical Engineers	3
or ECEN 2250	Introduction to Circuits and Electronics	
MCEN 4133	Intro to Tissue Biomechanics	3
Technical Electives		J
least 9 of 12 must b	ours of technical elective coursework. At e 3000 level or above, and 12 must be BME- ing technical electives, including 3 credits ves. 1	12
Required Mathemat	ics Courses	
APPM 1350	Calculus 1 for Engineers	4
or MATH 1300	Calculus 1	
or APPM 1345	Calculus 1 with Algebra, Part B	
APPM 1360	Calculus 2 for Engineers	4
or MATH 2300	Calculus 2	
APPM 2350	Calculus 3 for Engineers	4
or MATH 2400	Calculus 3	
APPM 2360	Introduction to Differential Equations with Linear Algebra	4
or MATH 2130 & MATH 3430	Introduction to Linear Algebra for Non- Mathematics Majors and Ordinary Differential Equations	
or MATH 2135 & MATH 3430	Introduction to Linear Algebra for Mathematics Majors	
Demained Division C	and Ordinary Differential Equations	
Required Physics Co		
PHYS 1110	General Physics 1	4
or PHYS 1115	General Physics 1 for Majors	
PHYS 1120	General Physics 2	4
or PHYS 1125	General Physics 2 for Majors	
PHYS 1140	Experimental Physics 1	1
Required Chemistry		
CHEN 1201	General Chemistry for Engineers 1 ³	4
or CHEN 1211	Accelerated Chemistry for Engineers	
or CHEM 1113	General Chemistry 1	
or CHEM 1400	Foundations of Chemistry	
CHEM 1114	Laboratory in General Chemistry 1	1
or CHEM 1221	Engineering General Chemistry Lab	
or CHEM 1401	Foundations of Chemistry Lab	
CHEM 1133	General Chemistry 2	4
	•	

or CHEM 2100	Foundations of Chemistry 2	
CHEM 1134	Laboratory in General Chemistry 2	1
or CHEM 2101	Laboratory in Foundations of Chemistry 2	
CHEM 3311	Organic Chemistry 1	4
CHEM 3321	Laboratory in Organic Chemistry 1	1
CHEM 3331	Organic Chemistry 2	4
CHEM 3341	Laboratory in Organic Chemistry 2	1
Required Biochemist	ry Course	
BCHM 4611	Principles of Biochemistry	3
Required Biology Co	urses	
MCDB 1150	Introduction to Cellular and Molecular Biology	3
or BIEN 2810	Biology for Engineers	
or EBIO 1210 & EBIO 1220	General Biology 1 and General Biology 2	
MCDB 1161	From Dirt to DNA: Phage Genomics Laboratory I	2
or MCDB 1171	Antibiotics Discovery Through Hands-on Sc	reens I
or MCDB 1181	Biological Probiotic/Drug Discovery Throug Hands-on Screens	h
or MCDB 2171	Chemotherapeutic Discovery Through Hand Screens 2	ls-On
MCDB 2150	Principles of Genetics	3
Required Computing	Courses	
CHEN 1310	Introduction to Engineering Computing ⁴	3
or CSCI 1300	Computer Science 1: Starting Computing	
CHEN 3010	Applied Data Analysis ⁴	3
or STAT 4000	Statistical Methods and Application I	
Humanities, Social S	ciences and Writing	
Complete the college requirement as spec	e's humanities, social sciences and writing ified ²	18
Free Electives		
	edit hours of free electives to meet the hours required for the bachelor's degree.	1
Total Credit Hours		128
1		
Vioit the program	'a Advising & Curriculum wahnaga for antion	_

- Visit the program's Advising & Curriculum webpage for options.
- For more information, see the College of Engineering & Applied Science website.
- For CHEN 1201 CHEM 1113 and CHEM 1400 substitutions are restricted to transfer students.
- For CHEN 1310-CSCI 1300 and for CHEN 3010-STAT 4000 substitutions are restricted to CS minors only.

Premedical Bioinstrumentation Track

For more information, including curriculum requirements, visit the program's Advising & Curriculum (https://www.colorado.edu/bme/academics/bachelors-program/advising-curriculum/) webpage.

Code	Title	Credit
		Hours

Required Biomedical Courses

BMEN 1000	Exploring Biomedical Engineering	1
or AREN 1316	Introduction to Architectural Engineering	
or ASEN 1000	Introduction to Aerospace Engineering Sciences	

	Introduction to Chemical and Biological Engineering	
or CSCI 1000	Computer Science as a Field of Work and Study	
or CVEN 1317	Introduction to Civil and Environmental Engineering	
or ECEN 1100	Exploring ECE	
or EVEN 1000	Introduction to Environmental Engineering	
or MCEN 2000	Mechanical Engineering as a Profession	
BMEN 1025	Computer-Aided Design & Fabrication	4
or MCEN 1025	Computer-Aided Design and Fabrication	
or GEEN 1017 & BMEN 1035	Engineering Drawing and Introduction to Fabrication for Biomedical Engineering	
BMEN 2100	Biomedical Engineering Principles and Methods	3
BMEN 2010	Biomaterials	3
BMEN 3010	Biotransport	3
BMEN 3030	Bioinstrumentation	3
BMEN 4010	Biomedical Engineering Capstone Design	3
BMEN 4020	Biomedical Engineering Capstone Design	3
Required Electrical (Courses	
ECEN 2250	Introduction to Circuits and Electronics	3
or ECEN 3010	Circuits and Electronics for Mechanical Engineer	'S
or GEEN 3010	Circuits for Engineers	
or MCEN 3017	Circuits and Electronics for Mechanical Engineer	'S
ECEN 2260	Circuits as Systems	3
ECEN 2270	Electronics Design Lab	3
ECEN 3301	Biomedical Signals and Systems	3
or ECEN 3300	Linear Systems	
At least 6 of 9 must 9 must be BME-app including 3 credits f	be 3000 level or above, and at least 6 of roved engineering technical electives, rom focused electives.	9
Required Mathemat		
APPM 1350	Calculus 1 for Engineers	4
NAATU 1000	Calculus 1	
or MATH 1300		
or APPM 1345	Calculus 1 with Algebra, Part B	1
or APPM 1345 APPM 1360	Calculus 2 for Engineers	4
or APPM 1345 APPM 1360 or MATH 2300	Calculus 2 for Engineers Calculus 2	
or APPM 1345 APPM 1360 or MATH 2300 APPM 2350	Calculus 2 for Engineers Calculus 2 Calculus 3 for Engineers	4
or APPM 1345 APPM 1360 or MATH 2300 APPM 2350 or MATH 2400	Calculus 2 for Engineers Calculus 2 Calculus 3 for Engineers Calculus 3	4
or APPM 1345 APPM 1360 or MATH 2300 APPM 2350 or MATH 2400	Calculus 2 for Engineers Calculus 2 Calculus 3 for Engineers Calculus 3 Introduction to Differential Equations	
or APPM 1345 APPM 1360 or MATH 2300 APPM 2350 or MATH 2400	Calculus 2 for Engineers Calculus 2 Calculus 3 for Engineers Calculus 3	4
or APPM 1345 APPM 1360 or MATH 2300 APPM 2350 or MATH 2400 APPM 2360 or MATH 2130	Calculus 2 for Engineers Calculus 2 Calculus 3 for Engineers Calculus 3 Introduction to Differential Equations with Linear Algebra Introduction to Linear Algebra for Non- Mathematics Majors	4
or APPM 1345 APPM 1360 or MATH 2300 APPM 2350 or MATH 2400 APPM 2360 or MATH 2130 & MATH 3430 or MATH 2135	Calculus 2 for Engineers Calculus 2 Calculus 3 for Engineers Calculus 3 Introduction to Differential Equations with Linear Algebra Introduction to Linear Algebra for Non- Mathematics Majors and Ordinary Differential Equations Introduction to Linear Algebra for Mathematics Majors and Ordinary Differential Equations	4

Total Credit Hours		128
minimum 128 credit	edit hours of free electives to meet the hours required for the bachelor's degree.	100
Free Electives		
Complete the college requirement as spec	e's humanities, social sciences and writing ified ²	18
	Sciences and Writing	
or STAT 4000	Statistical Methods and Application I	
CHEN 3010	Applied Data Analysis ⁴	3
or CSCI 1300	Computer Science 1: Starting Computing	
CHEN 1310	Introduction to Engineering Computing ⁴	3
Required Computing	Courses	
MCDB 2150	Principles of Genetics	3
or MCDB 2171	Chemotherapeutic Discovery Through Hands Screens 2	s-On
or MCDB 1181	Biological Probiotic/Drug Discovery Through Hands-on Screens	l
or MCDB 1171	Antibiotics Discovery Through Hands-on Scr	eens I
MCDB 1161	From Dirt to DNA: Phage Genomics Laboratory I	2
& EBIO 1220	and General Biology 2	
or EBIO 1210	General Biology 1	
or BIEN 2810	Biology Biology for Engineers	J
MCDB 1150	Introduction to Cellular and Molecular	3
Required Biology Co	· · · · · · · · · · · · · · · · · · ·	Ü
BCHM 4611	Principles of Biochemistry	3
Required Biochemis		'
CHEM 3341	Laboratory in Organic Chemistry 2	1
CHEM 3331	Organic Chemistry 2	4
CHEM 3321	Laboratory in Organic Chemistry 1	1
CHEM 3311	Laboratory in Foundations of Chemistry 2 Organic Chemistry 1	4
Or CHEM 2101	Laboratory in General Chemistry 2	1
or CHEM 2100	Foundations of Chemistry 2	1
CHEM 1133	General Chemistry 2	4
or CHEM 1401	Foundations of Chemistry Lab	_
or CHEM 1221	Engineering General Chemistry Lab	
CHEM 1114	Laboratory in General Chemistry 1	1
or CHEM 1400	Foundations of Chemistry	
or CHEM 1113	General Chemistry 1	
or CHEN 1211	Accelerated Chemistry for Engineers	
CHEN 1201	General Chemistry for Engineers 1 ³	4
Required Chemistry	Courses	
PHYS 1140	Experimental Physics 1	1
or PHYS 1125	General Physics 2 for Majors	
	General i flysics 2	
PHYS 1120	General Physics 2	4

- Choose from the course options listed on the program's Advising & Curriculum webpage.
- For more information, see the College of Engineering & Applied Science website.

- For CHEN 1201—CHEM 1113 and CHEM 1400 substitutions are restricted to transfer students only.
- For CHEN 1310—CSCI 1300 and for CHEN 3010—STAT 4000 substitutions are restricted to CS minors only.

Plan(s) of Study

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Year One		
Fall Semester		Credit
		Hours
BMEN 1025	Computer-Aided Design & Fabrication	4
APPM 1350	Calculus 1 for Engineers	4
CHEN 1201	General Chemistry for Engineers 1	4
BIEN 2810	Biology for Engineers	3
	Credit Hours	15
Spring Semester		
BMEN 1000	Exploring Biomedical Engineering	1
APPM 1360	Calculus 2 for Engineers	4
CHEN 1203	General Chemistry for Engineers 2	2
CHEM 1221	Engineering General Chemistry Lab	1
CHEN 1310	Introduction to Engineering Computing	3
PHYS 1110	General Physics 1	4
	Credit Hours	15
Year Two		
Fall Semester		
BMEN 2100	Biomedical Engineering Principles and Methods	3
APPM 2350	Calculus 3 for Engineers	4
PHYS 1120	General Physics 2	4
Humanities or Soci	al Science Elective ¹	6
	Credit Hours	17
Spring Semester		
BMEN 2010	Biomaterials	3
APPM 2360	Introduction to Differential Equations with Linear Algebra	4
ECEN 2250	Introduction to Circuits and Electronics	3
MCEN 2023	Statics and Structures	3
PHYS 1140	Experimental Physics 1	1
	al Science Elective ¹	3
	Credit Hours	17
Year Three	orealt moure	• • •
Fall Semester		
BMEN 3010	Biotransport	3
ECEN 2260	Circuits as Systems	3
ECEN 2270	Electronics Design Lab	3
MCEN 2063	Mechanics of Solids	3
Technical Elective 3		3
Technical Liective	Credit Hours	
Curium Comoctor	Credit Hours	15
Spring Semester	Dicinatrumentation	•
BMEN 3030	Bioinstrumentation	3
MCEN 4133	Intro to Tissue Biomechanics	3
ECEN 3301	Biomedical Signals and Systems	3
Technical Elective 3		3
Humanities or Soci	al Sciences Elective ¹	3

Free Elective		3
	Credit Hours	18
Year Four		
Fall Semester		
BMEN 4010	Biomedical Engineering Capstone Design	3
BMEN 4117	Anatomy and Physiology for Biomedical Engineering	3
CHEN 3010	Applied Data Analysis	3
Technical Elective ³		3
College-Approved Writing Course ²		3
	Credit Hours	15
Spring Semester		
BMEN 4020	Biomedical Engineering Capstone Design	3
Focus Technical Elective ³		3
Technical Elective ³		3
Humanities or Social Sciences Elective ¹		3
Free Elective		4
	Credit Hours	16
	Total Credit Hours	128

- Students may choose courses from the list of college-approved humanities and social sciences (HSS) electives. (http://www.colorado.edu/engineering/academics/policies/hss/)
- Students may choose a course from the list of college-approved writing courses (http://www.colorado.edu/engineering/academics/ policies/hss/). (https://www.colorado.edu/engineering-advising/getyour-degree/degree-requirements/humanities-social-sciences-andwriting-requirements/)
- Standard curriculum requires a total of 15 credit hours of technical elective coursework. At least 12 of 15 must be 3000 level or above, and at least 6 of 15 must be BME- Approved Engineering technical electives with 3 credits from the approved focus technical elective list. Visit the program's Advising & Curriculum webpage for options.

Premedical Biomechanics Track

Year One

Fall Semester		Credit Hours
BMEN 1025	Computer-Aided Design & Fabrication	4
APPM 1350	Calculus 1 for Engineers	4
CHEN 1201	General Chemistry for Engineers 1	4
CHEM 1114	Laboratory in General Chemistry 1	1
MCDB 1150	Introduction to Cellular and Molecular Biology	3
	Credit Hours	16
Spring Semester		
BMEN 1000	Exploring Biomedical Engineering	1
APPM 1360	Calculus 2 for Engineers	4
CHEM 1133	General Chemistry 2	4
CHEM 1134	Laboratory in General Chemistry 2	1
CHEN 1310	Introduction to Engineering Computing	3
PHYS 1110	General Physics 1	4
	Credit Hours	17

Year Two		
Fall Semester		
BMEN 2100	Biomedical Engineering Principles and Methods	3
APPM 2350	Calculus 3 for Engineers	4
PHYS 1120	General Physics 2	4
PHYS 1140	Experimental Physics 1	1
Humanities or Social	Science Elective ¹	3
	Credit Hours	15
Spring Semester		
BMEN 2010	Biomaterials	3
APPM 2360	Introduction to Differential Equations with Linear Algebra	4
CHEM 3311	Organic Chemistry 1	4
CHEM 3321	Laboratory in Organic Chemistry 1	1
MCDB 1161	From Dirt to DNA: Phage Genomics Laboratory I	2
MCEN 2023	Statics and Structures	3
	Credit Hours	17
Year Three		
Fall Semester		
BMEN 3010	Biotransport	3
CHEM 3331	Organic Chemistry 2	4
CHEM 3341	Laboratory in Organic Chemistry 2	1
MCEN 2063	Mechanics of Solids	3
Technical Elective ³		3
Humanities or Social	Sciences Elective ¹	3
	Credit Hours	17
Spring Semester		
MCEN 3017	Circuits and Electronics for Mechanical Engineers	3
MCEN 4133	Intro to Tissue Biomechanics	3
BCHM 4611	Principles of Biochemistry	3
Humanities or Social	Sciences Elective ¹	6
Free Elective		1
	Credit Hours	16
Year Four		
Fall Semester		
BMEN 4010	Biomedical Engineering Capstone Design	3
BMEN 4117	Anatomy and Physiology for Biomedical Engineering	3
CHEN 3010	Applied Data Analysis	3
Technical Elective ³		3
College-Approved Wr	iting Course ²	3
	Credit Hours	15
Spring Semester		
BMEN 4020	Biomedical Engineering Capstone Design	3
MCDB 2150	Principles of Genetics	3
Focus Technical Elec	tive ³	3
Technical Elective ³		3

Total Credit Hours	128
Credit Hours	15
Humanities or Social Sciences Elective ¹	

- Students may choose courses from the list of college-approved humanities and social sciences (HSS) electives.
- Students may choose a course from the list of college-approved writing courses.
- Pre-Med Biomechanics requires a total of 12 credit hours of engineering technical elective coursework. At least 9 of 12 must be 3000 level or above, and 12 must be BME- Approved Engineering technical electives with 3 credits from the approved focus technical elective list. Visit the program's Advising & Curriculum webpage for options.

Premedical Bioinstrumentation Track

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Fall Semester		Credit Hours
BMEN 1025	Computer-Aided Design & Fabrication	4
APPM 1350	Calculus 1 for Engineers	4
CHEN 1201	General Chemistry for Engineers 1	4
CHEM 1114	Laboratory in General Chemistry 1	1
MCDB 1150	Introduction to Cellular and Molecular Biology	3
	Credit Hours	16
Spring Semester		
BMEN 1000	Exploring Biomedical Engineering	1
APPM 1360	Calculus 2 for Engineers	4
CHEM 1133	General Chemistry 2	4
CHEM 1134	Laboratory in General Chemistry 2	1
CHEN 1310	Introduction to Engineering Computing	3
PHYS 1110	General Physics 1	4
	Credit Hours	17
Year Two		
Fall Semester		
BMEN 2100	Biomedical Engineering Principles and Methods	3
APPM 2350	Calculus 3 for Engineers	4
PHYS 1120	General Physics 2	4
PHYS 1140	Experimental Physics 1	1
Humanities or Social	Science Elective ¹	6
	Credit Hours	18
Spring Semester		
BMEN 2010	Biomaterials	3
APPM 2360	Introduction to Differential Equations with Linear Algebra	4
CHEM 3311	Organic Chemistry 1	4
CHEM 3321	Laboratory in Organic Chemistry 1	1
ECEN 2250	Introduction to Circuits and Electronics	3
MCDB 1161	From Dirt to DNA: Phage Genomics Laboratory I	2
	Credit Hours	17

Year Three Fall Semester BMEN 3010 3 Biotransport 4 **CHEM 3331** Organic Chemistry 2 **CHEM 3341** Laboratory in Organic Chemistry 2 1 3 **ECEN 2260** Circuits as Systems **ECEN 2270** Electronics Design Lab 3 1 Free Elective 15 **Credit Hours** Spring Semester **BMEN 3030** Bioinstrumentation 3 **ECEN 3301** Biomedical Signals and Systems 3 **BCHM 4611** Principles of Biochemistry 3 Humanities and Social Sciences Elective 1 3 Writing Requirement 2 3 **Credit Hours** 15 Year Four **Fall Semester BMEN 4010** Biomedical Engineering Capstone Design 3 **CHEN 3010 Applied Data Analysis** 3 Technical Elective 3 3 Humanities or Social Science Elective 1 3 Eng Technical Elective 3 3 **Credit Hours** 15 **Spring Semester BMEN 4020** Biomedical Engineering Capstone Design 3 Focus Technical Elective 3 3 3 MCDB 2150 **Principles of Genetics Humanities or Social Science Elective** 3 3 Free Electives **Credit Hours** 15 **Total Credit Hours** 128

- Students may choose courses from the list of college-approved humanities and social sciences (HSS) electives.
- Students may choose a course from the list of college-approved writing courses.
- Pre-Med Bioinstrumentation requires a total of 9 credit hours of technical elective coursework. At least 6 of 9 must be 3000 level or above, and at least 6 of 9 must be BME-approved engineering technical electives with 3 credits from the approved focus technical elective list. Visit the program's Advising & Curriculum webpage for options.

Learning Outcomes Program Educational Object

Program Educational Objectives

The biomedical engineering program at CU Boulder is dedicated to preparing each of our graduating students for one or more the following achievements within 5-10 years of receiving their undergraduate degrees:

 Professional engineering employment in life sciences and healthcare industries, in interdisciplinary areas including but not limited to the medical device industry, engineering consulting,

- biomechanics, digital health and biotechnology, with promotions and increasing levels of leadership and responsibility over time.
- Completion of graduate degree in biomedical engineering or related fields, with subsequent employment in academy, industry or related professions.
- Completion of medical or other professional school, with subsequent placement in residency, clinical practice and/or other professional employment.

General Learning Outcomes

Upon graduation, students will be able to:

- Identify, formulate and solve complex engineering problems by applying principles of engineering, science and mathematics.
- Apply engineering design to produce solutions that meet specified needs with consideration of public health, safety and welfare, as well as global, cultural, social, environmental and economic factors.
- · Communicate effectively with a range of audiences.
- Recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental and societal contexts.
- Function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks and meet objectives.
- Develop and conduct appropriate experimentation, analyze and interpret data and use engineering judgment to draw conclusions.
- Acquire and apply new knowledge as needed, using appropriate learning strategies.

Biomedical Engineering Specific Outcomes

Upon graduation, students will be able to:

- Apply principles of engineering, biology, human physiology, chemistry, calculus-based physics, mathematics (through differential equations) and statistics.
- Solve biomedical engineering problems, including those associated with the interaction between living and non-living systems.
- Analyze, model, design and realize biomedical engineering devices, systems, components or processes.
- Make measurements on and interpret data from living systems.

Bachelor's-Accelerated Master's Degree Program(s)

The bachelor's—accelerated master's (BAM) degree program options offer currently enrolled CU Boulder undergraduate students the opportunity to receive a bachelor's and master's degree in a shorter period of time. Students receive the bachelor's degree first but begin taking graduate coursework as undergraduates (typically in their senior year).

Because some courses are allowed to double count for both the bachelor's and the master's degrees, students receive a master's degree in less time and at a lower cost than if they were to enroll in a stand-alone master's degree program after completion of their baccalaureate degree. In addition, staying at CU Boulder to pursue a bachelor's—accelerated master's program enables students to continue working with their established faculty mentors.

BS and **MS** in Biomedical Engineering

Admission Requirements

In order to gain admission to the BAM program named above, a student must meet the following criteria:

- · Have a cumulative GPA of 3.000 or higher.
- Have no MAPS deficiencies (students admitted to CU Boulder prior to Summer 2023 only).
- · Have at least junior class standing.
- Have completed all prerequisite courses with a passing grade at the time of admission: BMEN 2000, BMEN 2010 and BMEN 3010.

Program Requirements

Students may take up to and including 12 hours while in the undergraduate program which can later be used toward the master's degree. However, only 6 credits may be double-counted toward the bachelor's degree and the master's degree. Students must maintain a 3.000 GPA while in the BAM program.

Students must apply to graduate with the bachelor's degree and apply to continue with the master's degree early in the semester in which the undergraduate requirements will be completed.