

COMPUTER ENGINEERING MAJOR: BIOMEDICAL ENGINEERING OPTION (B.S.)

<https://ceps.unh.edu/electrical-computer-engineering/program/bs/computer-engineering-biomedical-engineering-option>

Description

The Biomedical Engineering (BME) Option is intended to provide the core of knowledge expected of a computer and/or electrical engineer to provide engineering services in the biomedical field. Electrical and/or computer engineers with this option in biomedical engineering combine engineering principles with medical and biological sciences to design and create equipment, devices, computer systems, and software used in healthcare. The BME option is embedded in both the Electrical Engineering (EE) program and the Computer Engineering (CE) program.

The Computer Engineering (B Sci in Computer Engineering) program is accredited by the Engineering Accreditation Commission of ABET, <https://www.abet.org>, under the General Criteria and the Program Criteria for Electrical, Computer, Communications, Telecommunication(s) and Similarly Named Engineering Programs.

Requirements

Degree Requirements

Minimum Credit Requirement: 129 credits

Minimum Residency Requirement: 32 credits must be taken at UNH

Minimum GPA: 2.0 required for conferral*

Core Curriculum Required: Discovery & Writing Program Requirements

Foreign Language Requirement: No

All Major, Option and Elective Requirements as indicated.

*Major GPA requirements as indicated.

Major Requirements

In addition to Discovery Program requirements, the department has a number of grade-point average and course requirements:

- Any computer engineering major whose cumulative grade-point average in ECE and CS courses is less than 2.0 during any three semesters will not be allowed to continue as a computer engineering major.
- Computer engineering majors must achieve a 2.0 grade-point average in all ECE and CS courses as a requirement for graduation.

To make an exception to any of these departmental requirements based on extenuating circumstances, students must petition the department's undergraduate committee. Mindful of these rules, students, with their adviser's assistance, should plan their programs based on the distribution of courses found in the Degree Plan tab.

Required Courses

Code	Title	Credits
BMS 508	Human Anatomy and Physiology II	4
CS 410C	Introduction to Scientific Programming/C	4
CS 419	Computer Science for Engineers and Scientists	4
ECE 401	Perspectives in Electrical and Computer Engineering	4
ECE 541	Electric Circuits	4
ECE 543	Introduction to Digital Systems	4
ECE 548	Electronic Design I	4
ECE 562	Computer Organization	4
ECE 583	Designing with Programmable Logic	6
ECE 602	Engineering Analysis	3
ECE 603	Electromagnetic Fields and Waves I	3
ECE 633	Signals and Systems I	3
ECE 634	Signals and Systems II	3
ECE 647	Random Processes and Signals in Engineering	3
ECE 649	Embedded Microcomputer Based Design	6
ECON 402	Principles of Economics (Micro)	4
or EREC 411	Environmental and Resource Economics Perspectives	
MATH 425	Calculus I	4
MATH 426	Calculus II	4
MATH 527	Differential Equations with Linear Algebra	4
MATH 645	Linear Algebra for Applications	4
PHYS 407	General Physics I	4
PHYS 408	General Physics II	4
Capstone²		
ECE 791	Senior Project I	3
ECE 792	Senior Project II	3
Professional Electives		
Choose one professional elective course ¹		4
Biomedical Engineering Option Required Courses		
ECE 717	Introduction to Digital Image Processing	4
ECE 784	Biomedical Instrumentation	4
CHBE 762	Biomedical Engineering	4
or CHBE 766	Biomaterials	
Other Courses		
Discovery requirements not already covered by required courses ²		20
Total Credits		129

¹ Professional electives must be selected as follows:

- Choose any one ECE 700-level courses.
- Students are allowed to take only one as ECE 795 Electrical and Computer Engineering Projects or ECE 796 Special Topics

² Fulfilling the CE Program curriculum taking ECE 401 Perspectives in Electrical and Computer Engineering, ECE 791 Senior Project I, and ECE 792 Senior Project II curriculum will automatically meet Discovery Category, "Environment, Technology and Society."

Degree Plan

First Year

Fall		Credits
ECE 401	Perspectives in Electrical and Computer Engineering	4
MATH 425	Calculus I	4
CS 410C	Introduction to Scientific Programming/C	4
ENGL 401	First-Year Writing	4
Credits		16

Spring

PHYS 407	General Physics I	4
MATH 426	Calculus II	4

CS 419	Computer Science for Engineers and Scientists	4
BMS 508	Human Anatomy and Physiology II	4
Credits		16

Second Year**Fall**

ECE 541	Electric Circuits	4
ECE 543	Introduction to Digital Systems	4
MATH 527	Differential Equations with Linear Algebra	4
PHYS 408	General Physics II	4
Credits		16

Spring

ECE 548	Electronic Design I	4
ECE 562	Computer Organization	4
MATH 645	Linear Algebra for Applications	4
ECON 402 or EREC 411	Principles of Economics (Micro) ¹ or Environmental and Resource Economics Perspectives	4
Credits		16

Third Year**Fall**

ECE 583	Designing with Programmable Logic	6
ECE 602	Engineering Analysis	3
ECE 633	Signals and Systems I	3
Discovery Program Category		4
Credits		16

Spring

ECE 603	Electromagnetic Fields and Waves I	3
ECE 634	Signals and Systems II	3
ECE 647	Random Processes and Signals in Engineering	3
ECE 649	Embedded Microcomputer Based Design	6
Discovery Program Category		4
Credits		19

Fourth Year**Fall**

ECE 791	Senior Project I	3
CHBE 762 or CHBE 766	Biomedical Engineering or Biomaterials	4
One Professional Elective Course ²		4
Discovery Program Category		4
Credits		15

Spring

ECE 717	Introduction to Digital Image Processing	4
ECE 784	Biomedical Instrumentation	4
ECE 792	Senior Project II	3
Discovery Program Category		4
Credits		15

Total Credits **129**

Perspectives to fulfill the Social Science Category of the Discovery Program.

² One professional elective must be selected as follows:

- Choose any one ECE 7XX course

ECE 791 Senior Project I and ECE 792H Senior Honors Project II fulfill Discovery Program Capstone Experience.

Fulfilling the EE Program curriculum taking ECE 401 Perspectives in Electrical and Computer Engineering, ECE 791 Senior Project I, and ECE 792 Senior Project II curriculum will automatically meet Discovery Category, "Environment, Technology and Society."

Student Learning Outcomes

The Department of Electrical and Computer Engineering has adopted a set of student outcomes that consists of statements describing what students are expected to know and be able to do by the time of graduation, the achievement of which indicates that the student is equipped to achieve the program objectives. The current student outcomes are:

- An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.
- An ability to 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.
- An ability to communicate effectively with a range of audiences.
- An ability to 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.
- An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives.
- An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.
- An ability to acquire and apply new knowledge as needed, using appropriate learning strategies.

¹ Students are required to take either ECON 402 Principles of Economics (Micro) or EREC 411 Environmental and Resource Economics