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

https://ceps.unh.edu/electrical-computer-engineering/program/bsee/electrical-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 Electrical Engineering (B Sci in Electrical 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.

1. Any electrical engineering major whose cumulative grade-point average in ECE courses is less than 2.0 during any three semesters will not be allowed to continue as an electrical engineering major.

2. Electrical 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**

**Degree Plan**

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>BMS 508</td>
<td>Human Anatomy and Physiology II</td>
<td>4</td>
</tr>
<tr>
<td>CS 410C</td>
<td>Introduction to Scientific Programming/C</td>
<td>4</td>
</tr>
<tr>
<td>CS 419</td>
<td>Computer Science for Engineers and Scientists</td>
<td>4</td>
</tr>
<tr>
<td>ECE 401</td>
<td>Perspectives in Electrical and Computer Engineering</td>
<td>4</td>
</tr>
<tr>
<td>ECE 541</td>
<td>Electric Circuits</td>
<td>4</td>
</tr>
<tr>
<td>ECE 543</td>
<td>Introduction to Digital Systems</td>
<td>4</td>
</tr>
<tr>
<td>ECE 548</td>
<td>Electronic Design I</td>
<td>4</td>
</tr>
<tr>
<td>ECE 562</td>
<td>Computer Organization</td>
<td>4</td>
</tr>
<tr>
<td>ECE 602</td>
<td>Engineering Analysis</td>
<td>4</td>
</tr>
<tr>
<td>ECE 603</td>
<td>Electromagnetic Fields and Waves I</td>
<td>3</td>
</tr>
<tr>
<td>ECE 633</td>
<td>Signals and Systems I</td>
<td>3</td>
</tr>
<tr>
<td>ECE 634</td>
<td>Signals and Systems II</td>
<td>3</td>
</tr>
<tr>
<td>ECE 647</td>
<td>Random Processes and Signals in Engineering</td>
<td>3</td>
</tr>
<tr>
<td>ECE 652</td>
<td>Electronic Design II</td>
<td>6</td>
</tr>
<tr>
<td>ECE 653</td>
<td>Electronic Design III</td>
<td>6</td>
</tr>
<tr>
<td>ECON 402</td>
<td>Principles of Economics (Micro)</td>
<td>4</td>
</tr>
<tr>
<td>or EREC 411</td>
<td>Environmental and Resource Economics Perspectives</td>
<td>4</td>
</tr>
<tr>
<td>MATH 425</td>
<td>Calculus I</td>
<td>4</td>
</tr>
<tr>
<td>MATH 426</td>
<td>Calculus II</td>
<td>4</td>
</tr>
<tr>
<td>MATH 527</td>
<td>Differential Equations with Linear Algebra</td>
<td>4</td>
</tr>
<tr>
<td>MATH 645</td>
<td>Linear Algebra for Applications</td>
<td>4</td>
</tr>
<tr>
<td>PHYS 407</td>
<td>General Physics I</td>
<td>4</td>
</tr>
<tr>
<td>PHYS 408</td>
<td>General Physics II</td>
<td>4</td>
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</table>

Capstone

| ECE 791| Senior Project I                           | 3       |
| ECE 792| Senior Project II                          | 3       |

Professional Electives

Choose one professional elective course

**Biomedical Engineering Option Required Courses**

| ECE 717| Introduction to Digital Image Processing  | 4       |
| ECE 794| Biomedical Instrumentation                | 4       |
| CHBE 762| Biomedical Engineering                       | 4     |
| or CHBE 766| Biomaterials                                      | 4   |

Other Courses

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."

1 Professional electives must be selected as follows:

- Choose one ECE 700-level course

- Students are allowed to take only one ECE 795 Electrical and Computer Engineering Projects or ECE 796 Special Topics

2 Filling 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."

**First Year**

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<td>ENGL 401</td>
<td>First-Year Writing</td>
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Total Credits 16

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<th>Spring</th>
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<td>CHBE 762</td>
<td>Biomedical Engineering or CHBE 766 or Biomaterials</td>
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<td>or ECE 717</td>
<td>Introduction to Digital Image Processing</td>
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<tr>
<td>ECE 792</td>
<td>Senior Project II</td>
</tr>
<tr>
<td>ECE 784</td>
<td>Biomedical Instrumentation</td>
</tr>
<tr>
<td>ECE 791</td>
<td>Senior Project I (ECE 792 Senior Project II)</td>
</tr>
</tbody>
</table>

**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.

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