COMPUTER ENGINEERING MAJOR

The computer engineering major combines the strengths of both the Department of Electrical and Computer Engineering and the Department of Computer Science to prepare students for careers in the computer industry. The program encompasses the study of hardware, software, and systems questions that arise in the design, development, and application of computers and embedded systems. Specifically, computer engineering students will have a knowledge of hardware systems (electrical networks, electronics, and VLSI); a knowledge of software systems (algorithms, data structures, and operating systems); and a knowledge of how these two domains interact (digital logic, signal and system theory, computer architectural and performance analysis). Computer Engineering students will learn about everything that goes into digital and computing systems, from solid state physics to CMOS VLSI design, to computer architecture to programming, and from operating systems to compiler and language theory. Courses offered by this department may be found under the following acronym: ENEE and CMSC.


PROGRAM OBJECTIVES

Broadly stated, the Program Educational Objectives (PEOs) for the undergraduate major in computer engineering pertain to the accomplishments and performance of our students 3-5 years after graduation. These objectives are determined in consultation with the various constituencies of the computer engineering program and agreed upon and approved by a consensus of the faculty.

1. Advance to a leadership position in a reputable industry or government institution
2. Earn a graduate degree from a top ranked graduate program in Computer Engineering or related field.
3. Have our graduates become an innovator and/or entrepreneur in a Computer Engineering or related space.

PROGRAM LEARNING OUTCOMES

A comprehensive set of Student Learning Outcomes (SLOs) has been derived from the Program Educational Objectives (PEOs). These SLOs comprise the knowledge and skills all Computer Engineering students are expected to possess by the time they graduate so the PEOs can be accomplished. The SLOs are:

(a) An ability to apply knowledge of mathematics, science, and engineering
(b) An ability to design and conduct experiments, as well as analyze and interpret data
(c) An ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability
(d) An ability to function on multi-disciplinary teams
(e) An ability to identify, formulate, and solve engineering problems
(f) An understanding of professional and ethical responsibility
(g) An ability to communicate effectively
(h) The broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context
(i) A recognition of the need for, and an ability to engage in, life-long learning
(j) A knowledge of contemporary issues
(k) An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice
(l) Program specific outcome: an ability to apply knowledge of probability and statistics in computer engineering

Requirements

As in all engineering degrees, the student starts out with a core curriculum in mathematics and basic science. Subsequent years of study involve courses covering a balanced mixture of hardware, software, hardware-software trade-offs, and basic modeling techniques used to represent the computing process. Courses covering algorithms, data structures, digital systems, computer organization and architecture, software and hardware design and testing, operating systems, and programming languages will be included. Elective courses must include electrical engineering and computer science courses and technical courses outside the departments. Students must earn a grade of "C-" or higher in all engineering, mathematics, and science courses as well as the prerequisites for these courses. A sample program is shown below.
Computer Engineering Major

Senior Year
First Semester

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
<th>Second Semester</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENGL393</td>
<td>3</td>
<td>CMSC412 or ENEE 447</td>
</tr>
<tr>
<td>Total Credits</td>
<td>15</td>
<td>14</td>
</tr>
</tbody>
</table>

Total Credits 122

1. Note: Please see www.4yearplans.umd.edu
2. Students may need to take CMSC131 or the computer science exemption exam before taking CMSC132.

Technical Elective Requirements

Effective Spring 2010, all BSCP graduates must distribute their 22 credits of technical electives among the following course categories:

<table>
<thead>
<tr>
<th>Category</th>
<th>Electives</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Category A</td>
<td>Mathematics and Basic Science Electives</td>
<td>minimum of 6</td>
</tr>
<tr>
<td>Category B</td>
<td>Computer Science Theory and Applications</td>
<td>minimum of 3</td>
</tr>
<tr>
<td>Category C</td>
<td>Electrical Engineering Theory and Applications</td>
<td>minimum of 3</td>
</tr>
<tr>
<td>Category D</td>
<td>Advanced Laboratory</td>
<td>minimum of 2</td>
</tr>
<tr>
<td>Category E</td>
<td>Capstone Design</td>
<td>minimum of 3</td>
</tr>
<tr>
<td>Category F</td>
<td>General Technical Electives</td>
<td>minimum of 3</td>
</tr>
</tbody>
</table>

Please read carefully, and make a note of the following special cases and other items:

1. General Technical Electives. They may be any upper-level course (300 level or higher) from the math, engineering, and basic science disciplines whose courses start with the following prefixes and who do not appear on the list of unacceptable courses available from the Undergraduate Studies Office: AMSC, BCHM, BIOE, BSCI, CHEM, CMSC, ENAE, ENCE, ENCH, ENEE, ENES, ENFP, ENMA, ENME, ENU, ENRE, MATH, PHYS, and STAT. Students may use upper level course (300 level or higher) whose prefix is not given in the list above, assuming they received approval to use such courses and the following conditions are met: (i) a student selects two or more such courses which are closely related by a theme and (ii) the student demonstrates how these courses complement their professional goals. The most up-to-date list of approved and unacceptable courses will always be available from the Undergraduate Studies Office and on the ECE website.

2. Two credits of ENEE499 may be used to satisfy the Advanced Laboratory requirement subject to approval by the faculty supervisor and the Associate Chair. The maximum number of ENEE499 credits that may be applied towards EE technical elective requirements if five.

3. Additional Capstone Design courses can be used as substitutes for the required Electrical Engineering Theory and Applications course, and/or the required Advanced Laboratory course, provided one of the following is completed: ENEE408A, ENEE408B or ENEE408C.

4. If you have any questions on how these requirements affect your current selection of technical electives, please contact an advisor.

Four Year Plan

Click here (https://eng.umd.edu/four-year-plans) for roadmaps for four-year plans in the A. James Clark School of Engineering.

Additional information on developing a four-year academic plan can be found on the following pages:

- 4yearplans.umd.edu
- the Student Academic Success-Degree Completion Policy (https://academiccatalog.umd.edu/undergraduate/registration-academic-requirements-regulations/academic-advising) section of this catalog