

# Computer Engineering Curriculum Notes 2009-10

## Technical Electives

Students fulfill 15 credits of technical electives by completing at least one of the tracks specified below. Each track is completed by taking at least 15 credit hours of courses specified by the track:

### **Hardware Systems (HWS) Track:**

- Students must take the following 3-credit hour courses:
  - ❖ CSE 464 - Introduction to VLSI Design
  - ❖ CSE 561 - Digital Machine Design
  - ❖ CSE 565 - Digital Design Test and Verification
- Students select at least one of the following 3-credit hour courses:
  - ❖ CSE 471 - Introduction to Embedded System Design
  - ❖ CSE 591 - Topics in Computer Systems Engineering: Topics Related to Hardware
  - ❖ CIS 483 - Introduction to Computer and Network Security
  - ❖ CIS 543/ELE 516 - Control of Robots
  - ❖ ELE 333 - Analog Circuits
  - ❖ ELE 346 - Semiconductor Devices
  - ❖ ELE 351 - System and Signal Analysis
  - ❖ ELE 424 - Fundamentals of RF and Microwaves
  - ❖ ELE 431 - Analog Circuits and Systems
- Students select at least one technical course, 300-level or above, from the Department of Electrical Engineering and Computer Science (EECS), except CIS 554 and CPS courses (see General Information at the end of these Curriculum Notes), or one technical course, 300-level or above, from the Department of Mathematics.

### **Software Systems (SWS) Track:**

- Students must take the following 3-credit hour courses:
  - ❖ CIS 453 - Software Specification and Design
  - ❖ CIS 454 - Software Implementation
- Students select at least two of the following 3-credit hour courses:
  - ❖ CSE 482 - Principles of Software Engineering
  - ❖ CSE 483 - Windows Programming
  - ❖ CSE 581 - Introduction to Database Management Systems
  - ❖ CSE 588 - Translator Design
  - ❖ CSE 591 - Topics in Computer Systems Engineering: Topics Related to Software
  - ❖ CIS 352 - Programming Languages: Theory and Practice
  - ❖ CIS 373 - Introduction to Automata Theory
  - ❖ CIS 401 - Multimedia Systems and Tools
  - ❖ CIS 425 - Introduction to Computer Graphics
  - ❖ CIS 467 - Introduction to Artificial Intelligence
  - ❖ CIS 473 - Logic and Computability Theory
  - ❖ CIS 483 - Introduction to Computer and Network Security
  - ❖ CIS 500 - Programming in Java 5.0
  - ❖ CIS 543/ELE 516 - Control of Robots
  - ❖ CIS 581 - Concurrent Programming
- Students select at least one technical course, 300-level or above, from the Department of Electrical Engineering and Computer Science (EECS), except CIS 554 and CPS courses (see General Information at the end of these Curriculum Notes), or one technical course, 300-level or above, from the Department of Mathematics.

**Hardware/Software Systems (HSS) Track:**

- Students must take the following 3-credit hour courses:
  - ❖ CIS 453 - Software Specification and Design
  - ❖ CIS 454 - Software Implementation
  - ❖ CSE 464 - Introduction to VLSI Design
  - ❖ CSE 561 - Digital Machine Design
  - ❖ CSE 565 - Digital Design Test and Verification

**Interdisciplinary (INT) Track:**

- **Objective:** To allow students to have a more broad education by being able to take more courses outside of the Department of Electrical Engineering and Computer Science (EECS).
- **Requirements to complete this track:**
  - ❖ Student must be awarded a minor or a second major in a discipline outside of the Department of Electrical Engineering and Computer Science (EECS), excluding a minor in Mathematics\*;
  - ❖ Student may substitute up to 9 credit hours of technical elective courses to fulfill this minor or second major;
  - ❖ All of the remaining credit hours (six or more) of technical electives must be taken from one of the following tracks:
    - **Hardware Systems (HWS) Track:** In this case, student needs to take at least two core courses of the HWS Track if the remaining number of credits of technical electives the student must fulfill is six credit hours, or all the core courses of this track if the remaining number of credit hours of technical electives required is more than six;
    - **Software Systems (SWS) Track:** In this case, students need to take at least all the core courses of the SWS Track.

The Computer Engineering Program Committee will determine if a specific CSE 591 course can be used to fulfill one of the tracks.

**Social Sciences and Humanities Electives**

This 6-credit requirement may be fulfilled by any combination of courses whose contents are in the social science and humanities area. A glossary of course designations with such contents can be found in the Humanities Division and the Social Sciences Division of the College of Arts and Sciences with the exception of the following Anthropology - Physical courses: ANT 131, 331, 431, 432, and 433. These glossaries are given in The College of Arts and Sciences section of the Undergraduate Catalog.

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\* Students can fulfill the requirements for a minor in Mathematics within 129 credit hours required by the BSCE program if they opt to fulfill the Hardware Systems Track, the Software Systems Track, or the Hardware/Software Systems Track.

## Non-Engineering/Computer Science Electives

The purpose of this 9-credit requirement of non-engineering/computer science elective courses is to provide students with a broad educational experience in a diversity of subjects. These elective courses---either by themselves or in combination with social science and humanities electives---present an attractive opportunity to complete one of the many non-technical minors offered in the University.

Courses that cannot be used to satisfy this requirement include technical courses offered by (or crosslisted with) the College of Engineering and Computer Science (ECS), remedial math courses, and courses with engineering or computer science content that are taught by academic units outside the College of ECS. A list of non-conforming courses appears below.

At most three conforming courses of 1-credit each can be used to satisfy this 9-credit requirement of non-engineering/computer science elective courses. However, if you want these courses to be used to fulfill this requirement, they must receive a letter grade and, therefore, cannot be taken under the pass/fail option.

Glossary of course designators which **cannot** be taken to fulfill the non-engineering/computer science elective requirement (non-conforming courses):

<b>AEE</b>	Aerospace Engineering	<b>MAE</b>	Mechanical and Aerospace Engineering
<b>ASC</b>	Aerospace Studies	<b>MAT</b>	Mathematics: remedial math courses (200-level or below)
<b>BEN</b>	Bioengineering	<b>MEE</b>	Mechanical Engineering
<b>CEN</b>	Chemical Engineering	<b>MFE</b>	Manufacturing Engineering
<b>CGR</b>	Computer Graphics	<b>MTS</b>	Materials Science
<b>CIE</b>	Civil Engineering	<b>NEU</b>	Neuroscience
<b>CIS</b>	Computer and Information Science	<b>STS</b>	Science, Technology, and Society; courses with contents in engineering/computer science (STS/ECS 203, STS/HNR/ECS 318)
<b>CPS</b>	Computational Science	<b>SST</b>	Solid State Technology
<b>CSE</b>	Computer Engineering	<b>URP</b>	Undergraduate Research Program (unless approved by petition)
<b>ECS</b>	Engineering and Computer Science		
<b>EGR</b>	Engineering		
<b>ELE</b>	Electrical Engineering		
<b>IST</b>	Information Studies: courses with technical contents engineering/computer science (IST 195, 200, 233, 256, 257, 300, 356, 430, 433, 442, 449, 452, 454, 459, 463, 475, 476, 555, 556, 565)		

### **General Information**

Note that **you cannot take CIS 554 – Object-Oriented Programming in C++**, to fulfill any requirement in the Computer Engineering undergraduate program. This is because a considerable amount of material covered in this course overlaps with the material covered in the core course CSE 283 – Introduction to Object-Oriented Design.

Note that **CPS courses cannot be taken** to fulfill any of the requirements for the Computer Engineering undergraduate program. These courses are designed for non-majors in Computer Engineering or in Computer Science.