Computer Engineering

Freshman Year

Fall Semester
- Math 1371 Calculus I (placement into course or pre-req)
- Phys 1301W Intro Physics I (Math 1371)
- CSE 1001 1st Yr Experience (optional)
- Liberal Education course or Writ 1301

Spring Semester
- Math 1372 Calculus II (Math 1371)
- Phys 1302W Intro Physics II (Math 1372)
- EE 1301 Intro to Comp Sys (Math 1371) or
  CSci 1113 Intro to C/C++ (Math 1371)
- EE 1001 Intro to EE and CompE (optional)
- Liberal Education course or Writ 1301

Sophomore Year

Fall Semester
- Math 2373 Lin Alg/Diff Eq (1372)
- CSci 1913 Intro Alg, Data, Prog (1113 or EE 1301)
- EE 1302W Intro Physics II (1301, &Math 1372)
- EE 1001 Intro to EE and CompE (optional)
- Liberal Education course or Writ 1301

Spring Semester
- Math 2374 Multivariable Calc (1372)
- CSci 2011 Disc Structures (Math 1371)
- EE 2001 Intro to Circ & Elec (Math 1373, &Phys 1302)
- EE 2361 Intro Microcontrollers (CSE, 1301 or CSci 1113, 2301)
- Liberal Education course 3/4

Junior Year

Fall Semester
- EE 3015 Signals & Systems (UD, EE 2011)
- EE 3101 Circ & Electr Lab I (2002, 3115 or & 3115)
- EE 3115 Analog Electronics (UD, 3015 or & 3015)
- EE 4363 Computer Arch (2361)
- Liberal Education course 3/4

Spring Semester
- CSci 4041 Algs & Data Str. (1913, CSci 2011)
- EE 3025 Statistical Methods (UD, 3015)
- EE 3102 Circ & Electr Lab II (3101)
- Technical Elective (Breadth or Depth)
- Technical Elective (Breadth or Depth)

Senior Year

Fall Semester
- CSci 4061 Intro Oper System (UD, 2021 or EE 2361)
- EE 3015 Signals & Systems (UD, 2011)
- EE 3101 Circ & Electr Lab I (2002, 3115 or & 3115)
- EE 3115 Analog Electronics (UD, 3015 or & 3015)
- EE 4363 Computer Arch (2361)
- Liberal Education course 3/4

Spring Semester
- EE 4951W Senior Design Proj (3015, 3101, 3115, 2361 preferred)
- Technical Elective (Breadth or Depth)
- Technical Elective (Breadth or Depth)
- Technical Elective (Breadth or Depth)
- Technical Elective (Breadth or Depth)

About This Plan
- This plan is not a contract. Curriculum can change. The APAS is the official method for tracking completion of University degree requirements.
- Shaded courses are only offered in the indicated semester.
- Courses pre-requisites and co-requisites (designated by &) are listed below the course number and title.
- Students can take either the CSE-only or University-wide versions of the math course (Math 1371/1271, 1372/1272, 2373/2243, 2374/2263).

Applying to your Major
Students who have completed the required courses for admission to this major (indicated with double boxes on plan) and have a 3.2 UM-TC technical GPA at the end of the fall semester will be guaranteed admission. All other students who have completed the required courses will be considered for admission on a space-available basis. Admission following the spring semester is only based on space availability. The major application database is available at z.umn.edu/csemajorapp.

Total Credits Needed for Degree: 124

Department Contact Information
- Website: www.ece.umn.edu/undergraduate/
- Additional Information: z.umn.edu/ecematrix
- Main Office: 3-166 Keller; Main Phone: 612-624-7777
- Director of Undergraduate Studies: Professor Jim Leger
- Departmental Advisor: Frances Wood; fkwood@umn.edu

University Degree Requirements
All students must complete the following Writing & Liberal Education requirements, as noted on their APAS report. See link for full Core & Theme names: z.umn.edu/liberaleducation

Writing Requirements:
- University Writing: Writt 1301/1401 or equivalent
- Writing Intensive (WI):
  Two: 1xxx or 2xxx level **
  One: 3/4/5xxx level (in major) *
  One: 3/4/5xxx level (any dept.)
- Requirements with an (*) will be fulfilled by taking courses at UM-TC required for this major.

Liberal Education
- CORES: Bio, Ph, His, SocS, Lit, AH, Mth
- THEMES: 4 of 5: Civ, DSJ, Env, GP, TS

Rev. 5/2017
What can I do with a major in...
Computer Engineering?

ACTIVITIES COMPUTER ENGINEERING MAJORS DO:

Computer engineers learn about the hardware and software aspects of computer science. They have a solid understanding of circuit theory and electronic circuits. Computer engineering is closely linked with electrical engineering, and is often found in the same department. Many undergraduate programs incorporate most of the core curricula in both electrical engineering and computer science so graduates will be prepared to work in either field. Usual tasks involving computer engineers include writing software and firmware for embedded microcontrollers, designing VLSI chips, designing analog sensors, designing mixed signal circuit boards, and designing operating systems. Computer engineers are also suited for robotics research, which relies heavily on using digital systems to control and monitor electrical systems such as motors, communications, and sensors.

Several specialty areas within computer engineering include:

- Coding, cryptography, and information protection
- Communications and wireless networks
- Compilers and operating systems
- Computational science and engineering
- Computer networks, mobile computing, and distributed systems
- Computer systems for architecture, parallel processing, and dependability
- Computer vision and robotics
- Embedded systems
- Integrated circuits, VLSI design, testing, and CAD
- Signal, image, and speech processing

INDUSTRIES COMPUTER ENGINEERING MAJORS WORK IN (SAMPLE LISTING):

<table>
<thead>
<tr>
<th>Communication technology</th>
<th>Electronic components</th>
<th>Government safety agencies</th>
<th>Semiconductors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hardware design</td>
<td>Human genetics engineering</td>
<td>Information technology</td>
<td>Telecommunications</td>
</tr>
<tr>
<td>Medical technologies</td>
<td>Open systems control</td>
<td>Hardware manufacturing</td>
<td>Software systems</td>
</tr>
<tr>
<td>Software development</td>
<td>Computer aided engineering</td>
<td>High speed supercomputers</td>
<td>Automation manufacturing</td>
</tr>
</tbody>
</table>

EMPLOYERS WHO HIRE COMPUTER ENGINEERING MAJORS (SAMPLE LISTING):

- Alliant Tech Systems
- Cisco Systems
- Honeywell
- Medtronic
- Symantec Corp.
- Amazon
- Cray Inc.
- IBM
- Microsoft
- Target Corp.
- Apple
- Facebook
- Intel Corp.
- Seagate Technology
- Unisys
- Boston Scientific
- Fast Enterprise
- Logic PD
- Sun Microsystem
- United Health Group

TYPES OF POSITIONS FOR COMPUTER ENGINEERING MAJORS (SAMPLE LISTING):

- **Hardware engineer**: Researches, designs, develops, and tests computer hardware and supervises its manufacture and installation. Hardware refers to computer chips, circuit boards, computer systems, and related equipment such as keyboards, modems, and printers.

- **Software engineer**: Applies the principles and techniques of computer science, engineering, and mathematical analysis to the design, development, testing, and evaluation of the software and systems that enable computers to perform applications.

- **Network systems and data communications analyst/specialist**: Plans, designs, builds, maintains, and tests networks and other data communications systems.

- **Database administrator**: Organizes, tracks, and stores information for businesses and other organizations. Design and coordinate database security systems.

**Some of these positions may require an advanced degree.**