# Computer Engineering

## Freshman Year

<table>
<thead>
<tr>
<th>Fall Semester</th>
<th>Spring Semester</th>
</tr>
</thead>
<tbody>
<tr>
<td>Math 1371 Calculus I (placement into course or pre-req)</td>
<td>Math 1372 Calculus II (1371)</td>
</tr>
<tr>
<td>Phys 1301W Intro Physics I (&amp;Math 1371)</td>
<td>Phys 1302W Intro Physics II (1301, &amp;Math 1372)</td>
</tr>
<tr>
<td>Liberal Education course or Writ 1301</td>
<td>EE 1301 Intro to Comp Sys (&amp;Math 1371) or CSci 1113 Intro to C/C++ (Math 1371)</td>
</tr>
<tr>
<td>Liberal Education course</td>
<td>EE 1001 Intro to EE and CompE (optional)</td>
</tr>
<tr>
<td>CSE 1001: 1st Yr Experience</td>
<td>Liberal Education course or Writ 1301</td>
</tr>
</tbody>
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## Sophomore Year

<table>
<thead>
<tr>
<th>Fall Semester</th>
<th>Spring Semester</th>
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<tbody>
<tr>
<td>Math 2373 Lin Alg/Diff Eq. (1372)</td>
<td>Liberal Education course or Technical Elective as needed</td>
</tr>
<tr>
<td>EE 2001 Intro to Circ &amp; Elec (&amp;Math 2373, &amp;Phys 1302)</td>
<td>Math 2374 Multivariable Calc (1372)</td>
</tr>
<tr>
<td>EE 2002 Intro Circ/Elec Lab (2001 or &amp;2001)</td>
<td>EE 2361 Intro to Microcontrollers (1301, 2001, or CSci 1113)</td>
</tr>
<tr>
<td>EE 2301 Intro Dig Sys Desig (Math 1372)</td>
<td>CSci 4061 Intro Oper System (2021 or EE 2361)</td>
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## Junior Year

<table>
<thead>
<tr>
<th>Fall Semester</th>
<th>Spring Semester</th>
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<tbody>
<tr>
<td>EE 3015 Signals &amp; Systems (EE 2011)</td>
<td>CSci 4041 Algs &amp; Data Str. (1913, CSci 2011)</td>
</tr>
<tr>
<td>EE 3101 Circ &amp; Elec Lab I (3115 or &amp;3115)</td>
<td>EE 3025 Statistical Methods (3015)</td>
</tr>
<tr>
<td>EE 3115 Analog Electronics (3015 or &amp;3015)</td>
<td>EE 3102 Circ &amp; Elec Lab II (3101)</td>
</tr>
<tr>
<td>EE 4363 Computer Arch (2361, no or if CSci 4203, 3631 or 5201 taken)</td>
<td>Technical Elective (Breadth or Depth)</td>
</tr>
<tr>
<td>Liberal Education course or Technical Elective as needed</td>
<td>Technical Elective (Breadth or Depth)</td>
</tr>
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### About This Plan
- This plan is not a contract. Curriculum can change.
- Shaded courses are only offered in the indicated semester.
- Course 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).
- Double boxed courses are required for application to this major.
- Liberal Education and Writing requirements with an (*) will be fulfilled by taking courses required for this major at UM-TC.
- Students admitted prior to Fall 2013 may use CSci 1901/1902 in lieu of CSci 1113/1913.

### Applying to your Major
Students who have completed the required courses for admission to this major 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.

### Senior Year

<table>
<thead>
<tr>
<th>Fall Semester</th>
<th>Spring Semester</th>
</tr>
</thead>
<tbody>
<tr>
<td>EE 4951W Senior Design Proj (3015, 3102, 3115)</td>
<td>Technical Elective (Breadth or Depth)</td>
</tr>
<tr>
<td>Technical Elective (Breadth or Depth)</td>
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</tbody>
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## 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; cceugadv@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: Writ 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.)*

### Liberal Education

<table>
<thead>
<tr>
<th>CORES:</th>
<th>THEMES:</th>
<th>Liberal Education</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bio</td>
<td>Ctv</td>
<td>Bio*</td>
</tr>
<tr>
<td>Phy*</td>
<td>DSJ</td>
<td>Phy*</td>
</tr>
<tr>
<td>His</td>
<td>Env</td>
<td>His*</td>
</tr>
<tr>
<td>SocS</td>
<td>GP</td>
<td>SocS</td>
</tr>
<tr>
<td>Ltr</td>
<td>AH</td>
<td>Ltr*</td>
</tr>
<tr>
<td>Mth*</td>
<td>TS</td>
<td>Mth*</td>
</tr>
</tbody>
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### Total Credits Needed for Degree: 126, incl 28 tech credits
What can I do with a major in computer engineering?

Computer engineers are knowledgeable in the hardware and software aspects of computer science as well as circuit theory and electronic circuits. Careers in computer engineering may include writing software and firmware for embedded microcontrollers, or designing VLSI chips, analog sensors, mixed signal circuit boards, and operating systems. Computer engineers are also suited for robotics research, which relies heavily on using digital systems to control and monitor electrical systems like 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: architecture, parallel processing, and dependability
- Computer vision and robotics
- Embedded systems
- Integrated circuits, VLSI design, testing, and CAD
- Signal, image, and speech processing

Employers (sample listing)

Alliant TechSystems
Nest Labs
General Electric
Cisco Systems
Target Corporation
Cray Inc.
Intel Corporation
Honeywell
IBM Corporation
Logic PD
Microsoft Corporation
Seagate Technology
Medtronic
Symantec Corporation
Fast Enterprises
Sun Microsystems
Unisys
UnitedHealth Group

Industries (sample listing)

Communication technology
Electronic components
Government safety agencies
Hardware design
Human genetics engineering
Information technology
Medical technologies
Open systems control
Semiconductors
Software developers
Software systems
Telecommunications
Computer aided engineering
Manufacturing
Automation
High speed supercomputers
Hardware manufacturer

Positions (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. Computer hardware engineers work with computers and computer-related equipment exclusively.

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 their many applications. Software engineers are concerned with developing algorithms and analyzing and solving programming problems.

Network Systems and Data Communications Analysts/Specialist: Plans, designs, builds, maintains, and tests networks and other data communications systems.

Database Administrator: Organizes, tracks, and stores information for businesses and organizations. Database administrators also design and coordinate database security systems.

*Some positions may require an advanced degree.