# Computer Engineering

## Freshman Year

<table>
<thead>
<tr>
<th>Fall Semester</th>
<th>Spring Semester</th>
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<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>Lib Ed or Writ 1301/1401</td>
<td>EE 1001 Intro to EE and Comp Sys or CSci 1113 Intro to C/C++ (Math 1371)</td>
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<tr>
<td>Liberal Education course</td>
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<tr>
<td>CSE 1001: 1st Yr Experience</td>
<td>Lib Ed or Writ 1301/1401</td>
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## Sophomore Year

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<th>Fall Semester</th>
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<tr>
<td>CSci 1913 Intro Alg, Data, Prog (1113)</td>
<td>CSci 2011 Disc. Structures (Math 1371)</td>
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<tr>
<td>EE 2002 Intro Circ/Elec Lab (2001 or &amp;2001)</td>
<td>EE 2361 Intro to Microcontrollers (1301, 2301, or CSci 1113, or CSci 1131)</td>
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<tr>
<td>EE 2301 Intro Dig Sys Desig (Math 1372)</td>
<td>Math 2374 Multivariable Calc (1372)</td>
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<td>Math 2373 Lin Alg/Diff Eq. (1372)</td>
<td>Liberal Education course</td>
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## Junior Year

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<tr>
<td>EE 3015 Signals &amp; Systems (EE 2011)</td>
<td>CSci 4041 Algs &amp; Data Str. (1913, CSci 2011)</td>
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<tr>
<td>EE 3101 Circ &amp; Electr Lab I (3115 or &amp;3115)</td>
<td>EE 3025 Statistical Methods (3015)</td>
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<tr>
<td>EE 3115 Analog Electronics (3015 or &amp;3015)</td>
<td>EE 3102 Circ &amp; Electr Lab II (3101)</td>
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<tr>
<td>EE 4363 Computer Arch (2363, no cr if CSci 4203, 5361 or 5201 taken)</td>
<td>Technical Elective</td>
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<td>Liberal Education course</td>
<td>Technical Elective</td>
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## Senior Year

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<tr>
<th>Fall Semester</th>
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<tr>
<td>CSci 4061 Intro Oper System (2021 or EE 2361)</td>
<td>EE 4951W Senior Design Proj (3015, 3102, 3115)</td>
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<tr>
<td>Technical Elective</td>
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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.

# 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
- CORES: Bio, Phy*, Hist, SocS, Lit, AH, Mth*
- THEMES: 4 of 5: Civ, DSJ, Env, GP, TS

# Total Credits Needed for Degree: 126
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.*

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**Career Center**  
cse.umn.edu/career

**Salary Information**  
z.umn.edu/csesalary

**More Information on Undergraduate Majors**  
cse.umn.edu/majors