## Electrical 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 (Math 1371)</td>
<td>Phys 1302W Intro Physics II (Math 1372)</td>
</tr>
<tr>
<td>Liberal Education course or Writ 1301</td>
<td>EE 1301 Intro to Computing Systems (Math 1371)</td>
</tr>
<tr>
<td>Liberal Education course</td>
<td>EE 1001 Intro to EE and CompE</td>
</tr>
<tr>
<td>CSE 1001: 1st Yr Experience</td>
<td>Liberal Education course or Writ 1301</td>
</tr>
</tbody>
</table>

### Sophomore Year

<table>
<thead>
<tr>
<th>Fall Semester</th>
<th>Spring Semester</th>
</tr>
</thead>
<tbody>
<tr>
<td>EE 1001 Intro to EE and CompE</td>
<td>EE 1301 Intro to Computing Systems (Math 1371)</td>
</tr>
<tr>
<td>Liberal Education course or Writ 1301</td>
<td>EE 1001 Intro to EE and CompE</td>
</tr>
<tr>
<td>Technical Elective as needed</td>
<td>Liberal Education course or Writ 1301</td>
</tr>
<tr>
<td>Liberal Education course</td>
<td>EE 2361 Intro to Microcontrollers (1301 or CSci 1113, 2301)</td>
</tr>
<tr>
<td>EE 2001 Intro to Circ &amp; Elec Lab (2001 or &amp;2001)</td>
<td>EE 2301 Intro Dig Sys Desig (Math 1372)</td>
</tr>
<tr>
<td>Math 2373 Lin Alg/Diff Eq. (1372)</td>
<td>Math 2373 Lin Alg/Diff Eq. (1372)</td>
</tr>
</tbody>
</table>

### Junior Year

<table>
<thead>
<tr>
<th>Fall Semester</th>
<th>Spring Semester</th>
</tr>
</thead>
<tbody>
<tr>
<td>EE 3015 Signals &amp; Systems (2011)</td>
<td>EE 3025 Statistical Methods (3015)</td>
</tr>
<tr>
<td>EE 3101 Circ &amp; Electr Lab I (3115 or &amp;3115)</td>
<td>EE 3102 Circ &amp; Electr Lab II (3101)</td>
</tr>
<tr>
<td>EE 3115 Analog Electronics (3015 or &amp;3015)</td>
<td>EE 3161 Semiconductor Dev (3101)</td>
</tr>
<tr>
<td>EE 3601 or EE 3611, or Technical/Additional Elective as needed</td>
<td>EE 3601 Transmission Lines (2011, Phys 1302, Math 2373)</td>
</tr>
<tr>
<td>Liberal Education course or Technical Elective as needed</td>
<td>Liberal Education course or Technical Elective as needed</td>
</tr>
</tbody>
</table>

### Senior Year

<table>
<thead>
<tr>
<th>Fall Semester</th>
<th>Spring Semester</th>
</tr>
</thead>
<tbody>
<tr>
<td>Technical Elective (Breadth or Depth)</td>
<td>Technical Elective (Breadth or Depth)</td>
</tr>
<tr>
<td>Technical Elective (Breadth or Depth)</td>
<td>Technical Elective (Breadth or Depth)</td>
</tr>
<tr>
<td>Technical Elective (Breadth or Depth)</td>
<td>Technical Elective (Breadth or Depth)</td>
</tr>
<tr>
<td>Technical Elective (Breadth or Depth)</td>
<td>Technical Elective (Breadth or Depth)</td>
</tr>
<tr>
<td>Liberal Education course</td>
<td>Technical Elective (Breadth or Depth)</td>
</tr>
</tbody>
</table>

### 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.
- Chemical Principles labs (1065/1066) must be taken concurrently with the lectures (1061/1062).
- Liberal Education and Writing requirements with an (*) will be fulfilled by taking courses required for this major at UM-TC.

### 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.

### 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
- Department Advisor: Frances Wood; ecugeadv@umn.edu

### Liberal Education Information

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>
</tr>
</thead>
<tbody>
<tr>
<td>Bio</td>
<td>Civ</td>
</tr>
<tr>
<td>Phy*</td>
<td>DSJ</td>
</tr>
<tr>
<td>His</td>
<td>Env</td>
</tr>
<tr>
<td>SocS</td>
<td>GP</td>
</tr>
<tr>
<td>Ltr</td>
<td>TS</td>
</tr>
<tr>
<td>AH</td>
<td></td>
</tr>
<tr>
<td>Mth*</td>
<td></td>
</tr>
</tbody>
</table>

### Total Credits Needed for Degree: 126, incl 34 tech credits
What can I do with a major in electrical engineering?

From geographical information systems that can provide the location of a vehicle to giant electric power generators, electrical and electronics engineers are responsible for a wide range of technologies. Electrical engineers design, develop, document, and test electrical and electronic equipment and systems. This includes utility systems, electric motors, and machinery as well as wiring in buildings, automobiles, and airplanes. Electronic equipment includes radar, computers, communication equipment and home entertainment. They apply the concepts and knowledge of science to help solve problems, generally specializing in fields such as power distribution, integrated circuits, computers, manufacturing or communications. There is a growing need for electrical engineers specializing in industrial robots and automation systems as well as lasers and electro-optics.

**Employers** *(sample listing)*
- Caterpillar
- Cargill
- Cummins
- Tata Consultancy Services
- Avery Dennison
- LasX
- Beckman Coulter
- Alliant Techsystems
- Boston Scientific
- 3M
- Boeing Company
- Cummins Inc
- Dow Chemical Company
- Eaton Corp.
- Flint Hills Resources
- Garmin International
- Dell
- General Mills Inc.
- Mayo Clinic
- IBM
- Ingersoll Rand
- ExxonMobil
- Siemens
- Dupont
- Accenture
- Microsoft Co.
- Logic PD
- Lockheed Martin
- Medtronic
- National Instruments
- Polaris Industries
- Schlumberger
- Seagate Technology

**Industries** *(sample listing)*
- Acoustics
- Antennas and propagation
- Broadcasting
- Electrical insulation
- Geoscience
- Circuits and systems
- Magnetics
- Power electronics
- Robotics
- Consulting
- Ultrasonics
- Oceanic engineering
- Automotive
- Nuclear and plasma sciences
- Industrial/food products
- Lasers and electro-optics
- Supercomputing
- Telecommunications
- Automation
- Genetics
- HVAC systems
- Medical technologies
- Healthcare
- Supercomputing

**Positions** *(sample listing)*

**Computer Hardware Engineer:** Designs and develops computer hardware, such as computer chips, circuit boards, modems, and printers. Computer hardware engineers also test hardware and supervise its installation.

**Power Engineer:** Deals with the generation, transmission and distribution of electricity as well as the design of related devices, including transformers, electric generators, electric motors, high voltage engineering, and power electronics.

**Control Engineer:** Focuses on the modeling of a diverse range of dynamic systems and the design of controllers that will cause these systems to behave in the desired manner.

**Electronic Engineer:** Focuses on the modeling of a diverse range of dynamic systems and the design of controllers that will cause these systems to behave in the desired manner.

**Telecommunication Engineer:** Focuses on the transmission of information across a channel such as a coax cable, optical fiber, or free space.

*Some positions may require an advanced degree.*