Duluth Campus

Electrical and Computer Engineering B.S.E.C.E.

Electrical Engineering

Swenson College of Science and Engineering

- **Students will no longer be accepted into this program after Summer 2012. Program requirements below are for current students only.**
- **Students interested in Electrical and Computer Engineering have the option to pursue an Electrical Engineering major with a Computer Engineering minor.**

- Program Type: Baccalaureate
- Requirements for this program are current for Summer 2012
- Required credits to graduate with this degree: 135
- Required credits within the major: 117 to 119
- Degree: Bachelor of Science in Elect and Compt Engineering

The mission of the Department of Electrical and Computer Engineering (ECE) is to provide a high quality educational opportunity for students by delivering a program with a strong hands-on laboratory and design component in conjunction with a thorough foundation in theory and to provide students with the tools and skills to be lifelong contributors to their profession and society as a whole. The B.S.E.C.E. program combines traditional electrical engineering topics with current computer design and analysis topics. The program is concerned with the theory, design, and application of electrical phenomena and digital computers, including electronic circuits, signal analysis, system design, and computer architecture. The department displays strengths in such diverse areas as electronics, signal processing, electromagnetics, digital computer systems, communications, and controls. Faculty specialize in areas such as VLSI design, microprocessor systems, image processing, robust control, solid state devices, optoelectronics, nanostructures, robotics, instrumentation, neural networks, and fuzzy logic. The program balances theoretical and practical experience in electrical and computer engineering through analysis, synthesis, and experimentation, using facilities that include major instructional and research laboratories.

Electrical and computer engineering program educational objectives:

1. Develop a productive career.

2. Advance knowledge in their field through technical innovations and scholarly research.

3. Integrate the impact ethical foundation, creative purpose, and technical knowledge into responsible citizenship.

4. Contribute to the well-being of their community.

5. Pursue lifelong learning.

Honors Requirement: To receive department honors upon graduation, students must finish the program with an overall GPA of at least 3.50, satisfactorily complete a research project under the guidance of a faculty member, and convey the results in an oral and written presentation to the department.

Program Delivery

This program is available:

- via classroom (the majority of instruction is face-to-face)

Admission Requirements

Students who enter the electrical and computer engineering program as freshmen must follow the lower division program.

Students should complete the lower division ECE program before applying to the upper division program. Admission is competitive and on a space-available basis. A minimum GPA of 2.00 is required for admission to the upper division program. See department for details.

For information about University of Minnesota admission requirements, visit the Office of Admissions website.

Required prerequisites
Lower Division (22 cr)
EE 1001 - Introduction to Electrical Engineering (2.0 cr)
EE 1315 - Digital Logic (4.0 cr)
EE 2006 - Electrical Circuit Analysis (4.0 cr)

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EE 2111 - Linear Systems and Signal Analysis (4.0 cr)
EE 2212 - Electronics I (4.0 cr)
EE 2325 - Microprocessor Systems (4.0 cr)

Lower Division From Other Programs (37 cr)
First math course is determined by math ACT score. This schedule presupposes placement into MATH 1296.
CS 1511 - Computer Science I [LE CAT3, LOGIC & QR] (5.0 cr)
CS 1521 - Computer Science II (5.0 cr)
MATH 1296 - Calculus I [LE CAT, LOGIC & QR] (5.0 cr)
MATH 1297 - Calculus II [LOGIC & QR] (5.0 cr)
MATH 3280 - Differential Equations with Linear Algebra (4.0 cr)
PHYS 2011 *{Inactive}*[LE CAT4, NAT SCI] (4.0 cr)
PHYS 2012 *{Inactive}*(4.0 cr)
CHEM 1153 - General Chemistry I [LE CAT, NAT SCI] (4.0 cr)
CHEM 1154 - General Chemistry Lab I [LE CAT, NAT SCI] (1.0 cr)

General Requirements

The Board of Regents, on recommendation of the faculty, grants degrees from the University of Minnesota. Requirements for an undergraduate degree from University of Minnesota Duluth include the following:

1. Students must meet all course and credit requirements of the departments and colleges or schools in which they are enrolled including an advanced writing course. Students seeking two degrees must fulfill the requirements of both degrees. However, two degrees cannot be awarded for the same major.
2. Students must complete all requirements of the Liberal Education Program.
3. Students must complete a minimum of 120 semester credits.
4. At least 30 of the last 60 degree credits earned immediately before graduation must be awarded by UMD.
5. Students must complete at least half of their courses at the 3xxx-level and higher at UMD. Study-abroad credits earned through courses taught by UM faculty and at institutions with which UMD has international exchange programs may be used to fulfill this requirement.
6. If a minor is required, students must take at least three upper division credits in their minor field from UMD.
7. The minimum cumulative UM GPA required for graduation will be 2.00 and will include only University of Minnesota coursework. A minimum UM GPA of 2.00 is required in each UMD undergraduate major and minor. No academic unit may impose higher grade point standards to graduate.
8. Diploma, transcripts, and certification will be withheld until all financial obligations to the University have been met.

Program Requirements

Requirements for the B.S.E.C.E. in electrical and computer engineering include:

* Completion of the ECE program as outlined satisfies the requirements for a computer science minor.

* ECE majors must meet with their advisers each semester. See department for details.

* Completion of the ECE "Exit Survey," and a one-to-one exit interview with the ECE department head.

* Final Project: Completion of a capstone team design project integrating the knowledge from their academic career. Project must involve the design of hardware or software to meet specifications agreed upon by the student and the faculty project adviser. Oral and written reports are required.

Upper Division (30 cr)
EE 3151 - Control Systems (4.0 cr)
EE 3235 - Electronics II (4.0 cr)
EE 4341 - Digital Systems (4.0 cr)
EE 3445 - Electromagnetic Fields (3.0 cr)
EE 4611 - Introduction to Solid-State Semiconductors (3.0 cr)
EE 4305 - Computer Architecture (4.0 cr)
EE 4951 - Design Workshop (4.0 cr)
or EE 4899 - Senior Design Project I (1.0 cr)
EE 4999 - Senior Design Project II (3.0 cr)
ECE Technical Electives

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NOT including 4899, 4951, 4991, 4999
Take 5 or more credit(s) from the following:
•ECE 4xxx
•ECE 5xxx

Upper Division From Other Programs (28-30 cr)
CS 2511 - Software Analysis and Design (4.0 cr)
CS 5312 - Operating Systems (4.0 cr)
MATH 3298 - Calculus III (4.0 cr)
PHIL 3242 - Values and Technology [LE CAT8, HUMANITIES] (3.0 cr)
STAT 3611 - Introduction to Probability and Statistics (4.0 cr)
WRIT 3130 - Advanced Writing: Engineering (3.0 cr)
ECON 1023 - Principles of Economics: Micro [LE CAT, SOC SCI] (3.0 cr)
or ECON 1022 - Principles of Economics: Macro [LE CAT, SOC SCI] (3.0 cr)
Engineering outside of ECE elective requirement
CE 2017 - Engineering Mechanics: Statics and Mechanics of Materials (5.0 cr)
or CHE 2001 - Introduction to Environmental Engineering (3.0 cr)
or CHE 2011 - Design of Engineering Experiments (3.0 cr)
or CHE 2111 - Material and Energy Balances (3.0 cr)
or ME 2105 - Introduction to Material Science for Engineers (3.0 cr)

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