Duluth Campus

Electrical Engineering B.S.E.E.

Electrical Engineering

Swenson College of Science and Engineering

- Program Type: Baccalaureate
- Requirements for this program are current for Fall 2023
- Required credits to graduate with this degree: 127 to 129
- Required credits within the major: 112 to 114
- Degree: Bachelor of Science in Electrical Engineering

The electrical engineering BSEE program is concerned with the theory, design, and application of electrical phenomena. The department displays strengths in such diverse areas as microelectronics and VLSI, Communication and signal processing, digital computer systems, automatic control, robotics, and power and energy. The program balances theoretical and practical experience in electrical engineering through analysis, synthesis, and experimentation, using facilities that include both instructional and research laboratories.

The bachelor of science in electrical engineering is accredited by the Engineering Accreditation Commission of ABET, http://www.abet.org

Program Delivery

This program is available:

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

Admission Requirements

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

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

1. A minor or second major is not required for B.S.E.E.

2. EE majors must meet with their advisers each semester. See department for details.

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

Introduction to Electrical Engineering (2 cr)

EE 1001 - Introduction to Electrical Engineering (2.0 cr)

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Calculus I and II (10 cr)
First math course is determined by the ACT math score. This schedule presupposes placement into Math 1296.
MATH 1296 - Calculus I [LE CAT, LOGIC & QR] (5.0 cr)
MATH 1297 - Calculus II [LOGIC & QR] (5.0 cr)

Foundations (8 cr)
EE 1315 - Digital Logic (4.0 cr)
EE 2006 - Electrical Circuit Analysis (4.0 cr)

Computer Science (5 cr)
CS 1511 - Computer Science I [LE CAT] (5.0 cr)
or CS 1581 - Honors: Computer Science I [LE CAT] (5.0 cr)

Physics I with Lab (5 cr)
PHYS 2013 - General Physics I [LE CAT, NAT SCI] (4.0 cr)
or PHYS 2017 - Honors: General Physics I [NAT SCI] (4.0 cr)
with PHYS 2014 - General Physics Lab I [NAT SCI] (1.0 cr)

Physics II with Lab (5 cr)
PHYS 2015 - General Physics II (4.0 cr)
or PHYS 2018 - Honors General Physics II (4.0 cr)
with PHYS 2016 - General Physics Lab II (1.0 cr)

Advanced Mathematics and Statistics (12 cr)
MATH 3280 - Differential Equations with Linear Algebra (4.0 cr)
MATH 3298 - Calculus III (4.0 cr)
STAT 3611 - Introduction to Probability and Statistics (4.0 cr)

Chemistry I with Lab (5 cr)
First math course is determined by the ACT math score. This schedule presupposes placement into Math 1296.
CHEM 1153 - General Chemistry I [LE CAT, NAT SCI] (4.0 cr)
with CHEM 1154 - General Chemistry Lab I [LE CAT, NAT SCI] (1.0 cr)

Economics (3 cr)
ECON 1022 - Principles of Economics: Macro [LE CAT, SOC SCI] (3.0 cr)
or ECON 1023 - Principles of Economics: Micro [LE CAT, SOC SCI] (3.0 cr)

Core I (12 cr)
EE 2111 - Linear Systems and Signal Analysis (4.0 cr)
EE 2212 - Electronics I (4.0 cr)
EE 2325 - Microprocessor Systems (4.0 cr)

Core II (11 cr)
EE 3151 - Control Systems (4.0 cr)
EE 3235 - Electronics II (4.0 cr)
EE 3445 - Electromagnetic Fields (3.0 cr)

Ethics (3 - 4 cr)
CS 3111 - Computer Ethics [HUMANITIES] (4.0 cr)
or PHIL 3242 - Values and Technology [LE CAT8, HUMANITIES] (3.0 cr)
or PHIL 3325 - Environmental Ethics [HUMANITIES, SUSTAIN] (4.0 cr)

EE Electives (21 cr)
Minimum one course from four out of the five areas of specialization. The rest of the credits can be filled from any of the five areas.
With approval, students may also take EE 5995 Special Topics course; group assigned will depend upon topics title.
Take 21 or more credit(s) from the following:

Communications and Signal Processing
- EE 4477 - Antennas and Transmission Lines (3.0 cr)
or EE 4765 - Modern Communication Systems (4.0 cr)
or EE 5479 - Antennas and Transmission Lines Laboratory (1.0 cr)
or EE 5741 - Digital Signal Processing (3.0 cr)
or EE 5745 - Medical Imaging (3.0 cr)

Controls and Robotics
- EE 4151 - Digital Control System Design (3.0 cr)
or EE 4161 - Linear State=Space Control Systems (3.0 cr)
or EE 4171 - Introduction to Robotics and Mobile Control Architecture (3.0 cr)

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or EE 5742 - Pattern Recognition and Machine Learning (4.0 cr)

- **Digital Systems**
  - EE 4305 - Computer Architecture (4.0 cr)
  - *or* EE 4321 - Computer Networks (3.0 cr)
  - *or* EE 4171 - Introduction to Robotics and Mobile Control Architecture (3.0 cr)
- **Microelectronics and VLSI**
  - EE 4311 - Design of VLSI Circuits (4.0 cr)
  - *or* EE 4611 - Introduction to Solid-State Semiconductors (3.0 cr)
  - *or* EE 4621 - Microelectronics Technology (3.0 cr)
- **Power and Energy**
  - EE 4501 - Power Systems (4.0 cr)
  - *or* EE 4522 - Power Electronics I (3.0 cr)
  - *or* EE 4533 - Grid - Resiliency, Efficiency and Technology (3.0 cr)
  - *or* EE 5501 - Energy Conversion System (3.0 cr)

Non-EE Electives (3 - 4 cr)

Take 1 or more course(s) from the following:

- CE 2015 - Engineering Statics (3.0 cr)
- CE 2016 - Engineering Mechanics of Materials (3.0 cr)
- CHE 2001 - Introduction to Environmental Engineering (3.0 cr)
- CHE 2111 - Material and Energy Balances (3.0 cr)
- CHE 2211 - Materials and Energy Balances (4.0 cr)
- IE 3115 - Operations Research (4.0 cr)
- ME 2105 - Introduction to Material Science for Engineers (3.0 cr)
- ME 2211 - Thermodynamics [SUSTAIN] (3.0 cr)

Advanced Writing (3 cr)

WRIT 3130 - Advanced Writing: Engineering (3.0 cr)

Senior Design (4 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)

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