Duluth Campus

Engineering Physics B S E P

UMD-Physics & Astronomy

Swenson College of Science and Engineering

- Program Type: Baccalaureate
- Requirements for this program are current for Fall 2021
- Required credits to graduate with this degree: 126 to 128
- Required credits within the major: 108 to 110
- Degree: Bachelor of Science in Engineering Physics

Engineering physics is the study of the combined disciplines of physics, engineering, and mathematics in order to develop an understanding of the interrelationships of these three disciplines. Fundamental physics is combined with problem solving and engineering skills, which then has broad applications. Career paths for Engineering physics is usually (broadly) "engineering, applied science, or applied physics through research, teaching, or entrepreneurial engineering." This interdisciplinary knowledge is designed for the continuous innovation occurring with technology.

Unlike traditional engineering disciplines, engineering physics is not confined to a particular branch of physics or engineering. Instead, engineering physics is meant to provide a more thorough grounding in applied physics for a selected specialty such as electrical engineering, mechanical engineering, or a combination of engineering disciplines. It is the discipline devoted to creating and optimizing engineering solutions through enhanced understanding and integrated application of mathematical, scientific, statistical, and engineering principles. The discipline is also meant for cross-functionality and bridges the gap between physics and practical engineering with emphasis in research and development, design, and analysis. The distinguishing feature of an engineering physics program is a focus on the fundamentals of physics and mathematics, both experimental and theoretical, that are at the heart of modern engineering and research and have broad applicability. In this program students combine this physics base with a firm background in engineering or applied science.

Program Delivery

This program is available:

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

Admission Requirements

A GPA above 2.5 is preferred for students already admitted to the degree-granting college, transferring from another University of Minnesota College, or transferring from outside the university.

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.

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Information current as of March 28, 2024

Program Requirements

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

Engineering Physics Foundation (50 cr)

Chemistry I with Lab

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)

Mathematics

The first math course is determined by ACT math score. The sample plan 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)
MATH 3280 - Differential Equations with Linear Algebra (4.0 cr)
MATH 3298 - Calculus III (4.0 cr)

Statistics

STAT 3411 - Engineering Statistics (3.0 cr)

Physics I Lecture

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

Physics I Lab

PHYS 2014 - General Physics Lab I [NAT SCI] (1.0 cr)

Physics II Lecture

PHYS 2015 - General Physics II (4.0 cr)
or PHYS 2018 - Honors General Physics II (4.0 cr)

Physics II Lab

PHYS 2016 - General Physics Lab II (1.0 cr)

Engineering

ENGR 1210 - Introduction to Engineering (2.0 cr)
CE 2017 - Engineering Mechanics: Statics and Mechanics of Materials (5.0 cr)
EE 2006 - Electrical Circuit Analysis (4.0 cr)
ME 2226 - Dynamics (3.0 cr)

Computer Science and Economics (7 - 8 cr)

Computer Science

CS 1411 - Introduction to Programming in Matlab (4.0 cr)
or CS 1511 - Computer Science I [LE CAT] (5.0 cr)
or CS 1581 - Honors: Computer Science I [LE CAT] (5.0 cr)

Economics

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)

Physics (14 cr)

PHYS 2021 - Relativity and Quantum Physics (4.0 cr)
PHYS 2022 - Classical Physics (4.0 cr)
PHYS 2033 - Classical and Quantum Physics Lab (2.0 cr)
PHYS 4001 - Classical Mechanics (4.0 cr)

Engineering Core (20 cr)

Thermodynamics

ME 2211 - Thermodynamics [SUSTAIN] (3.0 cr)

Electrical Engineering

EE 2111 - Linear Systems and Signal Analysis (4.0 cr)
EE 2212 - Electronics I (4.0 cr)
EE 3445 - Electromagnetic Fields (3.0 cr)

Professional and Practice

EMGT 4110 - Engineering Professionalism and Practice (2.0 cr)

Senior Project

EE 4899 - Senior Design Project I (1.0 cr)
EE 4999 - Senior Design Project II (3.0 cr)
or EE 4951 - Design Workshop (4.0 cr)
or ME 4255 - Multidisciplinary Senior Design (4.0 cr)

Advanced Writing (3 cr)

WRIT 3130 - Advanced Writing: Engineering (3.0 cr)
or WRIT 3150 - Advanced Writing: Science (3.0 cr)
or WRIT 3180 - Honors: Advanced Writing (3.0 cr)

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Program Sub-plans

Students are required to complete one of the following sub-plans.

Materials

An interdisciplinary field, which deals with the discovery and design of new materials. This sub-plan prepares students for a career in industry or graduate study in Materials Science and Engineering.

Materials (15 cr)

IE 3130 - Materials Processing Engineering (3.0 cr)
ME 2105 - Introduction to Material Science for Engineers (3.0 cr)

Electives

Take 9 or more credit(s) from the following:

- EE 4611 - Introduction to Solid-State Semiconductors (3.0 cr)
- ME 3140 - System Dynamics and Control (3.0 cr)
- ME 3230 - Kinematics and Mechatronics (3.0 cr)
- ME 5315 - Nondestructive Evaluation of Engineering Materials (3.0 cr)
- ME 5345 - Smart Materials and Structures (3.0 cr)

Systems

The application of engineering and physical principles and design concepts to enable the realization of successful systems. Successful systems must satisfy the needs of their customers, users, and other stakeholders. This sub-plan is good preparation for students who want a career in industry or entry into graduate school.

Systems (14 cr)

ENGR 1222 - Introduction to Solid Modeling (2.0 cr)
ME 3140 - System Dynamics and Control (3.0 cr)

Electives

Take 9 or more credit(s) from the following:

- EE 3235 - Electronics II (4.0 cr)
- EE 4501 - Power Systems (4.0 cr)
- EE 5501 - Energy Conversion System (3.0 cr)
- ME 4050 - Fundamentals of Nuclear Engineering (3.0 cr)
- ME 4060 - Machine Vision and Image Based Robot Control (3.0 cr)
- ME 4135 - Robotics and Controls (3.0 cr)
- ME 4145 - CAD/CAM (4.0 cr)
- ME 4175 - Machine Design (3.0 cr)

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