Duluth Campus

Industrial Engineering B.S.I.E.

UMD Mechanical/Industrial Engineering

Swenson College of Science and Engineering

- Program Type: Baccalaureate
- Requirements for this program are current for Spring 2020
- Required credits to graduate with this degree: 126 to 127
- Required credits within the major: 117 to 118
- Degree: Bachelor of Science in Industrial Engineering

The mission of the bachelor of science in industrial engineering program is to deliver a hands-on, laboratory-intensive undergraduate education that provides students with the tools and skills to excel in the profession as they pursue lifelong learning and make positive contributions to society. The program emphasizes integrated systems and offers unique opportunities for undergraduate research.

The educational objectives of the industrial engineering program are to produce graduates who:

1. Solve industrial engineering problems by applying contemporary engineering tools to propose and implement effective solutions.

2. Design, develop, implement, and improve integrated systems that include people, materials, information, equipment, and energy.

3. Contribute as informed, ethical, and responsible members of the engineering profession and society as a whole.

4. Continue lifelong professional development throughout their careers.

5. Collaborate and communicate effectively with others as members or leaders of engineering or multidisciplinary teams in international settings.

Industrial engineering integrates topics from manufacturing, management, service, and traditional design. Industrial engineers are proficient in the design, improvement, and management of complex systems of people, materials, equipment, and energy. They study and adapt product designs and the associated plant facilities to optimize production, while considering economic, technical, and human factors.

The curriculum rounds out the learning experience by providing skills in the mathematical and physical sciences, economics, composition, and humanities and social sciences.

The industrial engineering program is accredited by the Engineering Accreditation Commission of ABET, http://www.abet.org.

The industrial engineering program emphasizes the overall perspective of people and productivity in any type of system, including manufacturing, service, health care, transportation, communication, and agriculture.

Honors requirements: To graduate with department honors, a student must graduate with a 3.40 GPA, be an active member of Tau Beta Pi or a professional engineering society (ASME, ASSE, IIE, MSPE, SME or SWE), and be nominated by a department faculty member.

Program Delivery

This program is available:

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

Admission Requirements

Freshman and transfer students students are usually admitted to pre-major status before admission to this major

Freshman, sophomores, and transfer students may declare an IE major and be admitted to lower division status. Admission to upper division B.S.I.E. program is competitive and based on performance in lower division courses, and space availability. To be considered, students must complete the MIE Application to upper division. The following requirements must be met:

1. Completion of the following courses or their transfer equivalents:
- WRIT 1120
- CS 1121 or 1411
- ENGR 1222
- CE 2017
- ME 2105

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- MATH 3280

2. A minimum cumulative University of Minnesota, Duluth GPA of 2.50

Applicants not meeting these requirements may be admitted to the upper division B.S.I.E. program on a space-available basis with priority determined by cumulative University of Minnesota, Duluth GPA.

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.I.E.

2. Students must submit application to the upper division B.S.I.E. program and, if accepted, must remain in good academic standing. BSIE upper division students placed on academic probation will also be removed from upper division BSIE status and will not be readmitted to BSIE upper division until they achieve good academic standing with the University.

Students must complete a minimum of 32 credits of math and science courses. The mechanical engineering curriculum uses the math and science required courses, listed below, to meet this requirement. Courses transferred from other institutions may transfer with fewer credits than the UMD equivalent(s). In this case, to reach the 32 credit minimum, additional coursework within the approved subjects of BIOL, CHEM, ESCI, GEOL, MATH, PHYS, and STAT at the 1xxx - 4xxx level, can be applied to satisfy this credit difference.

Math and Science Required Courses (32 cr)

Students who transfer courses with fewer credits than the UMD equivalent(s) must complete an additional approved math or science credits as noted above.

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 and Statistic

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)
STAT 3411 - Engineering Statistics (3.0 cr)

Physics I course

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 course

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

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Physics II lab
PHYS 2016 - General Physics Lab II (1.0 cr)

B.S.I.E. Core and Engineering Courses (58 cr)
Required courses include fundamental material in civil engineering, electrical engineering, engineering management, engineering science, industrial engineering, and mechanical engineering. Concepts are delivered in lecture and reinforced in lab experiences.
CE 2017 - Engineering Mechanics: Statics and Mechanics of Materials (5.0 cr)
EE 2006 - Electrical Circuit Analysis (4.0 cr)
EMGT 4110 - Engineering Professionalism and Practice (2.0 cr)
ENGR 1210 - Introduction to Engineering (2.0 cr)
ENGR 1222 - Introduction to Solid Modeling (2.0 cr)
IE 3115 - Operations Research (4.0 cr)
IE 3122 - Materials Engineering Laboratory (2.0 cr)
IE 3125 - Engineering Economic Analysis [SOC SCI] (3.0 cr)
IE 3130 - Materials Processing Engineering (3.0 cr)
IE 3140 - Human Factors and Ergonomic Design (3.0 cr)
IE 3222 - Occupational Systems Laboratory (2.0 cr)
IE 4010 - Six Sigma Quality Control (3.0 cr)
IE 4020 - Lean Production Management (3.0 cr)
IE 4115 - Facility Planning and Simulation (4.0 cr)
IE 4222 - Systems Integration Laboratory (2.0 cr)
IE 4230 - Systems Integration (3.0 cr)
IE 4255 - Multidisciplinary Senior Design (4.0 cr)
IE 4993 - Industrial Engineering Seminar (1.0 cr)
ME 2105 - Introduction to Material Science for Engineers (3.0 cr)
ME 2226 - Dynamics (3.0 cr)

Industrial Engineering Electives (3 cr)
These courses help an industrial engineer develop systems skills in technical areas. (Cannot count credits from other requirement categories.)
Take 3 or more credit(s) from the following:
•IE 4495 - Special Topics: (Various Titles to be Assigned) (1.0 - 4.0 cr)
•IE 5305 - Supply Chain Management (3.0 cr)
•IE 5315 *{Inactive}*(3.0 cr)
•IE 5325 - Advanced Engineering Economics (3.0 cr)
•IE 5335 *{Inactive}*(3.0 cr)

Additional Electives (9 cr)
(Cannot count credits from other requirement categories.)
Take 3 or more course(s) totaling 9 or more credit(s) from the following:
•CHE 2111 - Material and Energy Balances (3.0 cr)
•CS 1121 - Introduction to Programming in Visual BASIC.NET [LE CAT, LOGIC & QR] (3.0 cr)
•CS 1411 - Introduction to Programming in Matlab (4.0 cr)
•CS 1511 - Computer Science I [LE CAT] (5.0 cr)
•CS 1521 - Computer Science II (5.0 cr)
•EE 1315 - Digital Logic (4.0 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)
•EE 3151 - Control Systems (4.0 cr)
•EE 5995 - Special Topics: (Various Titles to be Assigned) (1.0 - 3.0 cr)
•IE 4196 - Cooperative Education I (1.0 cr)
•IE 4197 - Industrial Engineering Internship (1.0 cr)
•IE 4296 - Cooperative Education II (2.0 cr)
•IE 4297 - Industrial Engineering Internship (2.0 cr)
•IE 4491 - Independent Study (1.0 - 4.0 cr)
•IE 4495 - Special Topics: (Various Titles to be Assigned) (1.0 - 4.0 cr)
•IE 4993 - Industrial Engineering Seminar (1.0 cr)
•IE 5305 - Supply Chain Management (3.0 cr)
•IE 5315 *{Inactive}*(3.0 cr)
•IE 5325 - Advanced Engineering Economics (3.0 cr)
•IE 5335 *{Inactive}*(3.0 cr)
•IE 5991 - Independent Study in Industrial Engineering (1.0 - 4.0 cr)
•MATH 3298 - Calculus III (4.0 cr)
•MATH 3355 - Discrete Mathematics (4.0 cr)
•ME 2211 - Thermodynamics [SUSTAIN] (3.0 cr)

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•ME 3010 - Fundamentals of Machining and Manufacturing (3.0 cr)
•ME 3140 - System Dynamics and 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)
•ME 4365 - Global Sustainability Experience in Design/Manufacturing in Africa (3.0 cr)
•ME 4495 - Special Topics: (Various Titles to be Assigned) (1.0 - 4.0 cr)
•ME 5315 - Nondestructive Evaluation of Engineering Materials (3.0 cr)
•ME 5325 - Sustainable Energy System (3.0 cr)
•MGTS 4472 - Entrepreneurship (3.0 cr)
•STAT 5411 - Analysis of Variance (3.0 cr)
•STAT 5511 - Regression Analysis (3.0 cr)
•ME 3111 - Fluid Mechanics (3.0 cr)
or CHE 3111 - Fluid Mechanics (3.0 cr)

Courses From Other Programs (15 - 16 cr)

These courses help engineers develop a foundation of economics and communication skills. Students entering the program as transfer students must complete each of these courses at UMD if the direct equivalent for each course did not transfer in from another institution.

Business

ACCT 2001 - Principles of Financial Accounting (3.0 cr)
or BLAW 2001 - The Legal Environment [LE CAT8, HUMANITIES] (3.0 cr)
or MGTS 1101 - Introduction to Business [LE CAT8] (3.0 cr)
or MKTG 3701 - Principles of Marketing (3.0 cr)

Communication

COMM 1112 - Public Speaking [LE CAT, COMM & LAN] (3.0 cr)
or COMM 1222 - Interpersonal Communication [LE CAT, LECD C, COMM & LAN] (3.0 cr)

Computer Science

CS 1121 - Introduction to Programming in Visual BASIC.NET [LE CAT, LOGIC & QR] (3.0 cr)
or CS 1411 - Introduction to Programming in Matlab (4.0 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)

Advanced Writing

WRIT 3130 is preferred
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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