Duluth Campus

Mechanical Engineering B.S.M.E.

UMD Mechanical/Industrial Engineering

Swenson College of Science and Engineering

- Program Type: Baccalaureate
- Requirements for this program are current for Fall 2020
- Required credits to graduate with this degree: 130 to 133
- Required credits within the major: 115 to 118
- Degree: Bachelor of Science in Mechanical Engineering

The mission of the bachelor of science in mechanical engineering is to deliver a laboratory-intensive, undergraduate mechanical engineering education that provides students with the tools and skills to excel in the engineering profession, as they pursue lifelong learning and make positive contributions to society. The student learning experience offers unique opportunities for study abroad, undergraduate research, and electives outside of mechanical engineering to develop an enhanced global perspective.

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

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

2. Design, develop, implement, and improve thermal and mechanical systems.

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

4. Continue lifelong professional development throughout their career.

5. Collaborate and communicate effectively with others as a member or leader of an engineering or multidisciplinary team in an international setting.

The BSME program integrates topics from chemistry, physics, advanced mathematics and statistics, and core engineering science to prepare graduates to work professionally in both thermal and mechanical systems, from design, development, manufacture, and use of products involving mechanical and thermal elements.

The program emphasizes the production engineering approach to mechanical and thermal systems design and development. Upper division courses provide students with a strong understanding of mechanical and thermal systems, and the skills to design, develop, and implement these systems.

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

Mechanical engineering graduates are qualified for employment in a wide variety of industries including design, manufacturing, materials, aerospace, transportation, natural resources, and energy. Graduates may pursue assignments in design, development, manufacturing, operations, project engineering, or sales, and frequently move into engineering management. They are also well-qualified to continue with graduate education.

Students in the BSME program have the opportunity to put their design and entrepreneurial skills to use in ASME design competitions, projects sponsored by regional companies, and research projects in the Undergraduate Research Opportunities Program.

Honors requirements: To graduate with department honors, a student must have 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

Freshmen, sophomores, and transfer students may declare a ME major and be admitted to lower division status. Admission to the upper division BSME 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:

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-WRIT 1120
-CS 1411 or 1511 or 1581
-ENGR 1222
-CE 2017
-ME 2105
-MATH 3280

2. A minimum cumulative UMD GPA of 2.50. Admission is competitive and applicants are admitted on a space-available basis, with priority determined by cumulative UMD 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 BSME.

2. Students must submit applications to upper division BSME program and if accepted must remain in good academic standing. BSME upper division students placed on academic probation will also be removed from upper division BSME status and will not be readmitted to BSME upper division until they achieve good academic standing with the University.

3. 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 (36 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 Statistics

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)
STAT 3411 - Engineering Statistics (3.0 cr)

Physics

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)

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

BSME Core Courses (60 cr)
Courses include fundamental material in 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 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 4993 - Industrial Engineering Seminar (1.0 cr)
ME 2105 - Introduction to Material Science for Engineers (3.0 cr)
ME 2211 - Thermodynamics [SUSTAIN] (3.0 cr)
ME 2226 - Dynamics (3.0 cr)
ME 3140 - System Dynamics and Control (3.0 cr)
ME 3222 - Controls and Kinematics Laboratory (2.0 cr)
ME 3230 - Kinematics and Mechatronics (3.0 cr)
ME 4112 - Heat and Mass Transfer (3.0 cr)
ME 4122 - Heat Transfer, Thermodynamics and Fluid Mechanics Laboratory (2.0 cr)
ME 4145 - CAD/CAM (4.0 cr)
ME 4175 - Machine Design (3.0 cr)
ME 4255 - Multidisciplinary Senior Design (4.0 cr)
ME 3111 - Fluid Mechanics (3.0 cr)
or CHE 3111 - Fluid Mechanics (3.0 cr)

Mechanical Engineering Advanced Electives (3 cr)
These courses help a mechanical engineer develop skills in a particular technical area.
Take 3 or more credit(s) from the following:
•IE 4495 - Special Topics: (Various Titles to be Assigned) (1.0 - 4.0 cr)
•ME 4135 - Robotics and Controls (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 5050 - Fundamentals of Nuclear Engineering (3.0 cr)
•ME 5060 - Machine Vision and Image Based Robot Control (3.0 cr)
•ME 5110 - Analytic Techniques in Mechanical Engineering (3.0 cr)
•ME 5120 - Advanced Dynamics and Control (3.0 cr)
•ME 5210 - Advanced Thermal Fluid Sciences (3.0 cr)
•ME 5220 - Advanced Mechanics of Materials (3.0 cr)
•ME 5305 - Computational Fluid Dynamics (3.0 cr)
•ME 5315 - Nondestructive Evaluation of Engineering Materials (3.0 cr)
•ME 5325 - Sustainable Energy System (3.0 cr)
•ME 5345 - Smart Materials and Structures (3.0 cr)
•ME 5355 - Gas Turbines (3.0 cr)
•ME 5365 - Introduction to Medical Device Development (3.0 cr)

Mechanical Engineering Technical Electives (6 - 8 cr)
Take 2 or more course(s) totaling 6 or more credit(s) from the following:
•CHE 4301 - Chemical Reaction Engineering (3.0 cr)
•CHE 5022 *{Inactive}*(3.0 cr)
•EE 2111 - Linear Systems and Signal Analysis (4.0 cr)
•EE 3445 - Electromagnetic Fields (3.0 cr)
•EE 4501 - Power Systems (4.0 cr)
•EE 4611 - Introduction to Solid-State Semiconductors (3.0 cr)
•IE 3115 - Operations Research (4.0 cr)
•IE 4010 - Six Sigma Quality Control (3.0 cr)
•IE 4020 - Lean Production Management (3.0 cr)
•IE 4495 - Special Topics: (Various Titles to be Assigned) (1.0 - 4.0 cr)

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- IE 4993 - Industrial Engineering Seminar (1.0 cr)
- IE 5315 *{Inactive}*(3.0 cr)
- IE 5325 - Advanced Engineering Economics (3.0 cr)
- ME 3010 - Fundamentals of Machining and Manufacturing (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 4196 - Cooperative Education I (1.0 cr)
- ME 4197 - Mechanical Engineering Internship (1.0 cr)
- ME 4296 - Cooperative Education II (2.0 cr)
- ME 4297 - Mechanical Engineering Internship (2.0 cr)
- ME 4365 - Global Sustainability Experience in Design/Manufacturing in Africa (3.0 cr)
- ME 4375 - Pipeline Engineering (3.0 cr)
- ME 4491 - Independent Study in Mechanical Engineering (1.0 - 4.0 cr)
- ME 4495 - Special Topics: (Various Titles to be Assigned) (1.0 - 4.0 cr)
- ME 5050 - Fundamentals of Nuclear Engineering (3.0 cr)
- ME 5060 - Machine Vision and Image Based Robot Control (3.0 cr)
- ME 5110 - Analytic Techniques in Mechanical Engineering (3.0 cr)
- ME 5120 - Advanced Dynamics and Control (3.0 cr)
- ME 5210 - Advanced Thermal Fluid Sciences (3.0 cr)
- ME 5220 - Advanced Mechanics of Materials (3.0 cr)
- ME 5305 - Computational Fluid Dynamics (3.0 cr)
- ME 5315 - Nondestructive Evaluation of Engineering Materials (3.0 cr)
- ME 5325 - Sustainable Energy System (3.0 cr)
- ME 5335 - Introduction to Finite Element Analysis (3.0 cr)
- ME 5345 - Smart Materials and Structures (3.0 cr)
- ME 5355 - Gas Turbines (3.0 cr)
- ME 5365 - Introduction to Medical Device Development (3.0 cr)
- ME 5991 - Independent Study in Mechanical Engineering (1.0 - 4.0 cr)
- MGTS 4472 - Entrepreneurship (3.0 cr)
- PHYS 2021 - Relativity and Quantum Physics (4.0 cr)
- PHYS 4021 - Quantum Physics II (4.0 cr)
- PHYS 4031 - Thermal and Statistical Physics (4.0 cr)
- TH 3375 - Mechanical Design for Stage (3.0 cr)

Courses From Other Programs (10 - 11 cr)

These courses help engineers develop a foundation of communication, computer, and economics skills.

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)

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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