Mechanical Engineering

Mechanical engineering (ME) is a very broad field that provides opportunities for interesting and challenging work in every phase of modern technology. The curriculum in the mechanical engineering department is designed to give students a thorough knowledge of the fundamental principles of engineering and science within the major areas of mechanical engineering: thermal science, mechanics, and robotics and controls. Beyond this basic foundation, the curriculum also develops:

1. The various aspects of engineering design including design theory and teamwork;
2. An effective integration of computer technology;
3. Communication skills and effective presentations; and
4. Improved understanding of engineering theory through practical laboratory experience.

In the senior year, students select from course electives that best reflect their interests and career objectives. Students may select courses from one or more of the following general areas:

1. Manufacturing, e.g., control, design, development, and manufacture of diverse equipment and processes;
2. Thermal Science/Energy, e.g., design of power systems and heating/air conditioning systems.
3. Mechanical Systems/Design, e.g., design of machines, structures, and systems.

Vision

Our vision is to become one of the leading undergraduate mechanical engineering programs in the nation by offering a premier engineering design curriculum and by providing our graduates with a superior educational experience through teaching and learning, research and development, and service and responsibility. Most immediately, our goal is to be recognized as the mechanical engineering program-of-choice within South Dakota and among our peer groups of specialized science and engineering schools across the nation.

Mission

The mission of the mechanical engineering program is to prepare our graduates for leadership roles in the mechanical engineering profession by:

- Offering a quality education to foster a distinctive curriculum accentuating design and project-based learning;
- Committing to individual development while emphasizing the values of teamwork in a culturally diverse, multidisciplinary environment; and
- Encouraging undergraduate and graduate research to nurture creative solutions to complex engineering problems.

Objectives
Building upon the department's tradition of excellence requires continual development of active partnerships among the faculty, the students, and our constituents. In keeping with this tradition, the mechanical engineering program produces graduates who are able to perform at a level that meets or exceeds industry expectations. ME students will be able to achieve the objectives listed below within a few years of graduation through attainment of the outcomes listed below at the time of graduation.

**OBJECTIVE 1:** Lead and/or manage effective engineering design analyses

Outcomes

- Apply skills in engineering, science, and mathematics
- Practice effective analysis
- Conduct data analyses and analyses verification

**OBJECTIVE 2:** Lead and/or manage effective engineering design teams

Outcomes

- Apply effective engineering design skills
- Demonstrate teaming proficiency
- Participate in research and professional development

Students may participate in the Cooperative Education Internship Program. In some instances, credits earned during the co-op may be applied toward department elective requirements. The mechanical engineering department does not offer a minor.

The [bachelor of science](http://www.abet.org) program in mechanical engineering is accredited by the Engineering Accreditation Commission of ABET, [http://www.abet.org](http://www.abet.org)
Students are responsible for checking with their advisors for any program modifications that may occur after the publication of this catalog. To graduate, students must attain a grade of C or better in all ME core courses (noted below with an *)

**Freshman Year**
First Semester

- MATH 123 Calculus I Credits: (4-0) 4
- CHEM 112 General Chemistry I Credits: (3-0) 3
- CHEM 112L General Chemistry I Lab Credits: (0-1) 1
- ME 110/110L Introduction to Mechanical Engineering/Lab Credits: (1-1) 2
- ENGL 101 Composition I Credits: (3-0) 3
- PE Physical Education Credits: 1
- 1 Humanities or Social Sciences Elective(s) Credits: 3

Total: 17

Second Semester

- MATH 125 Calculus II Credits: (4-0) 4
- PHYS 211 University Physics I Credits: (3-0) 3
- CSC 150/150L Computer Science I/Lab Credits: (2-1) 3
- PE Physical Education Credits: 1
- Humanities or Social Sciences Elective(s) Credits: 6

Total: 17

Sophomore Year

First Semester

- EM 214 Statics Credits: (3-0) 3
- ENGL 279 Technical Communications I Credits: (3-0) 3
- ME 262 Product Development Credits: (2-0) 2
- ME 264/264L Sophomore Design/Lab Credits: (1-1) 2
- MATH 225 Calculus III Credits: (4-0) 4
- PHYS 213 University Physics II Credits: (3-0) 3
- PHYS 213L University Physics II Laboratory Credits: (0-1) 1

Total: 18

Second Semester
- **ME 221 Dynamics of Mechanisms** Credits: (3-0) 3
- **ME 211 Introduction to Thermodynamics** Credits: (3-0) 3
- **MATH 321 Differential Equations** Credits: (3-0) 3
- **ME 216 Introduction to Solid Mechanics** Credits: (3-0) 3
- **MET 231 Structures and Properties of Materials Lab** Credits: (0-1) 1
- **MET 232 Properties of Materials** Credits: (3-0) 3

Total: 16

### Junior Year

**First Semester**

- **ENGL 289 Technical Communications II** Credits: (3-0) 3
- **ME 316 Solid Mechanics** Credits: (3-0) 3
- **EE 301/301L Introduction to Circuits, Machines, and Systems/Lab** Credits: (3-1) 4
- **ME 331 Thermo Fluid Dynamics** Credits: (3-0) 3
- **MATH 373 Introduction to Numerical Analysis** Credits: (3-0) 3

Total: 16

**Second Semester**

- **ME 312 Thermodynamics II** Credits: (3-0) 3
- **ME 313 Heat Transfer** Credits: (3-0) 3
- **ME 352 Introduction to Dynamic Systems** Credits: (3-0) 3
- **ME 322 Machine Design I** Credits: (3-0) 3
- **ME 351/351L Mechatronics and Measurement Systems/Lab** Credits: (3-1) 4

Total: 16

### Senior Year

**First Semester**

- **ME 477 Mechanical Engineering Design I** Credits: (0-2) 2
- MATH 381 Introduction to Probability and Statistics Credits: (3-0) 3
- ME 4XX Mechanical Engr Elective #1 Credits: 4
- Humanities or Social Sciences Elective(s) Credits: 3
- ME 4XX Mechanical Engr Elective # 2 Credits: 3

Total: 15

Second Semester

- ME 479 Mechanical Systems Design II Credits: (0-2) 2
- ME 482L Advanced Product Development Lab II Credits: (0-2) 2
- ME 4XX Mechanical Engr Elective #3 Credits: 3
- ME 4XX Mechanical Engr Elective #4 Credits: 3
- Humanities or Social Sciences Elective(s) Credits: 3
- IENG 301 Basic Engineering Economics Credits: (2-0) 2

Total: 15

130 credits required for graduation

Curriculum Notes

* A minimum grade of C required for graduation

1 Many courses are prerequisites for other courses, and their sequencing is important. A faculty advisor should be consulted for any deviation from the above schedule.