

# MECHANICAL ENGINEERING

College of Engineering and Mines  
Department of Mechanical Engineering  
907-474-7136  
<http://cem.uaf.edu/me/>

## B.S., B.S./M.S. Degrees

Minimum Requirements for Degree: B.S.: 130 credits;  
B.S./M.S.: 151 credits

The mission of the mechanical engineering department at UAF is to offer the highest quality contemporary education at undergraduate and graduate levels, and to perform research appropriate to the technical needs of the state of Alaska, the nation and the world.

Mechanical engineers conceive, plan, design and direct the manufacturing, distribution and operation of a wide variety of devices, machines and systems for energy conversion, environmental control, materials processing, transportation, materials handling and other purposes. Mechanical engineers are engaged in creative design, applied research, development and management. A degree in mechanical engineering also frequently forms the base for entering law, medical or business school, as well as for graduate work in engineering.

The objectives of the mechanical engineering program are to produce graduates who are able to compete successfully on the world stage at the professional level; deal with the significant local, regional, national and global issues facing humankind; continue to develop as engineers through lifelong learning; and serve as resources of technical knowledge for the state as well as the nation, especially with respect to northern issues. The Engineering Accreditation Commission of ABET has accredited the B.S. degree program in mechanical engineering since 1980.

Because engineering is based on mathematics, chemistry and physics, students are introduced to the basic principles in these areas during their first two years of study. The third year encompasses courses in the engineering science — extensions to the basic sciences forming the foundation to engineering synthesis and design. The design project course draws on much of the student's previous learning through a simulated industrial design project. Throughout the four-year program, courses in communication, humanities and social sciences are required because mechanical engineers must be able to communicate effectively in written, oral and graphical form.

Students may choose a concentration in mechanical, aerospace or petroleum engineering. Because of UAF's unique location, special emphasis is placed on cold regions engineering problems. This fact is highlighted in the technical elective, Arctic engineering. Candidates for the B.S. degree in mechanical engineering are required to take the State of Alaska Fundamentals of Engineering examination in their general field.

Undergraduate students who plan to pursue graduate studies in engineering may also choose an accelerated degree for a master's in mechanical engineering. This program speeds the process and allows qualified mechanical engineering students to complete both a Bachelor of Science and a Master of Science degree in five years.

## Major — B.S. Degree

1. Complete the general university requirements. (See page 178. As part of the core curriculum requirements, complete MATH F251X, CHEM F105X and CHEM F106X.)
2. Complete the B.S. degree requirements. (See page 178. As part of the B.S. degree requirements, complete MATH F252X, PHYS F211X and PHYS F212X.)
3. Complete the following program (major) requirements:

ES F101—Introduction to Engineering .....	3
ES F201—Computer Techniques.....	3
ES F209—Statics .....	3
ES F210—Dynamics.....	3
ES F301—Engineering Analysis .....	3
ES F307—Elements of Electrical Engineering.....	3
ES F331—Mechanics of Materials .....	3
ES F341—Fluid Mechanics.....	4
ES F346—Basic Thermodynamics .....	3
ESM F450W—Economic Analysis and Operations.....	3
MATH F253X—Calculus III.....	4
MATH F302—Differential Equations .....	3
ME F302—Dynamics of Machinery .....	4
ME F308—Measurement and Instrumentation .....	3
ME F313—Mechanical Engineering Thermodynamics.....	3
ME F321—Industrial Processes.....	3
ME F334—Elements of Material Science/Engineering.....	3
ME F403—Machine Design.....	3
ME F408—Mechanical Vibrations .....	3
ME F415W—Thermal Systems Laboratory.....	3
ME F441—Heat and Mass Transfer .....	3
ME F486—Senior Design.....	1
ME F487W,O**—Design Project .....	3
4. Complete the Fundamentals of Engineering (FE) examination administered by the State of Alaska.
5. Complete one of the following concentrations:  
**Mechanical**
  - Complete the following:  
Mechanical Engineering electives at the F400-level or above.....6  
Advisor approved engineering elective at the F400-level or above .3**Aerospace**
  - Complete the following:  
ME F450—Theory of Flight .....

3  
3  
3  
3

### Petroleum

- Complete the following:  
ME F409—Controls.....3  
ME F416—Mechanical Equipment for the Petroleum Industry.....3  
ME F464—Corrosion Engineering.....3  
PETE F426—Drilling Engineering .....

3  
130

\* Students must earn a C- grade or better in each of the program (major) requirements.

\*\* Design project must be related to area of concentration.

## Major — B.S./M.S. Degree

1. Complete the following admission requirements:
    - a. ME major (junior preferred) or senior standing.
    - b. GPA 3.25 or above (based on minimum of 24 credits in ME major requirements). Students must maintain a cumulative GPA of 3.0 to remain in the program.
    - c. Submit GRE (general) scores.
    - d. Submit a study goal statement.
    - e. Submit a UAF graduate application for admission.
  2. Complete the general university requirements (page 179).
  3. Complete the B.S. degree requirements. (See page 179. As part of the B.S. degree requirements, complete: MATH F252X, PHYS F211X and PHYS F212X.)
  4. Complete the master's degree requirements (page 179).
  5. Complete the following B.S. program (major) requirements:\*

ES F101—Introduction to Engineering .....	3
ES F201—Computer Techniques.....	3
ES F209—Statics .....	3
ES F210—Dynamics.....	3
ES F301—Engineering Analysis .....	3
ES F307—Elements of Electrical Engineering.....	3
ES F331—Mechanics of Materials .....	3
ES F341—Fluid Mechanics.....	4
ES F346—Basic Thermodynamics .....	3
ESM F450W—Economic Analysis and Operations.....	3
MATH F253X—Calculus III.....	4
MATH F302—Differential Equations .....	3
ME F302—Dynamics of Machinery .....	4
ME F308—Measurement and Instrumentation .....	3
ME F313—Mechanical Engineering Thermodynamics.....	3
ME F321—Industrial Processes.....	3
ME F334—Elements of Materials Science/Engineering.....	3
ME F403—Machine Design .....	3
ME F408—Mechanical Vibrations .....	3
ME F415W—Thermal Systems Laboratory.....	3
ME F441—Heat and Mass Transfer .....	3
ME F486—Senior Design.....	1
ME F487W/O—Design Project .....	3

  6. Complete State of Alaska Fundamentals of Engineering examination.
  7. Complete the following M.S. program (major) requirements:\*

ME F608—Advanced Dynamics .....	3
ME F631—Advanced Mechanics of Materials.....	3
ME F634—Advanced Materials Engineering.....	3
ME F641—Advanced Fluid Mechanics .....	3
ME F642—Advanced Heat Transfer.....	3

  8. Complete the thesis or non-thesis requirements:  
**Thesis**  
ME F699—Thesis ..... 6 |  
Electives\* ..... 9 |  
(Electives approved by student's advisory committee with at least 3 credits at the graduate level)  
**Non-Thesis**  
ME F698—Project ..... 3 |  
Electives\* ..... 12 |  
(Electives approved by student's advisory committee with at least 6 credits at the graduate level)
  9. Minimum credits required for both degrees.....151
- \* Students must satisfy the General University Requirements for minimum grades for the respective B.S. or M.S. program (major) requirements.  
Note: This degree program must be completed in seven years or the student will be disqualified from the program. If a student is disqualified for exceeding the seven year limit, a mechanical engineering B.S. degree will be awarded if: 1) course work is completed in 10 years, and 2) the student meets all ME B.S. requirements.