

# Mechanical Engineering

College of Engineering and Mines  
Department of Mechanical Engineering  
(907) 474-7136  
www.uaf.edu/mechengr/

## B.S. Degree

Minimum Requirements for Degree: 131 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 an emphasis in 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.

## Major—B.S. Degree

1. Complete the general university requirements. (See page 116. As part of the core curriculum requirements, complete MATH 200X, CHEM 105X and CHEM 106X.)
2. Complete the B.S. degree requirements. (See page 121. As part of the B.S. degree requirements, complete MATH 201X, PHYS 211X and PHYS 212X.)

3. Complete the following program (major) requirements:\*

ES 101—Introduction to Engineering.....	3
ES 201—Computer Techniques .....	3
ES 209—Statics .....	3
ES 210—Dynamics .....	3
ES 301—Engineering Analysis.....	3
ES 307—Elements of Electrical Engineering .....	3
ES 331—Mechanics of Materials.....	3
ES 341—Fluid Mechanics .....	4
ES 346—Basic Thermodynamics.....	3
ESM 450W—Economic Analysis and Operations.....	3
MATH 202X—Calculus.....	4
MATH 302—Differential Equations .....	3
ME 302—Dynamics of Machinery .....	4
ME 308—Measurement and Instrumentation.....	3
ME 313—Mechanical Engineering Thermodynamics.....	3
ME 321—Industrial Processes .....	3
ME 334—Elements of Material Science/Engineering.....	3
ME 403—Machine Design .....	3
ME 408—Mechanical Vibrations .....	3
ME 415W—Thermal Systems Laboratory.....	3
ME 441—Heat and Mass Transfer.....	3
ME 487W,O—Design Project .....	3
ME electives** .....	6
Technical electives*** .....	3
Electives.....	2

4. Minimum credits required .....131

\* Student must earn a C grade or better in each of the program (major) requirements, with exception of ES 101.

\*\* Mechanical engineering course at 400-level or above.

\*\*\* Engineering course at 400-level or above.

Note: Students electing to complete an emphasis in aerospace engineering must complete the sequence of aerospace courses (ME 450, 451, 452 and 453) as part of their program requirements and complete a senior design project that is related to aerospace engineering.

Note: Students electing to complete an emphasis in petroleum engineering must complete the sequence of petroleum-related course (ME 409 and 416 or equivalent, plus two 400-level PETE courses) as part of their program requirements and complete a senior design project that is related to petroleum engineering.

Note: Students must plan their elective courses in consultation with their mechanical engineering faculty advisor, and obtain the advisor's approval for all elective courses.

## Baccalaureate Core Requirements

All degrees (e.g. B.A., B.S., etc.) require additional courses.  
Refer to specific degree and program requirements.

### COMMUNICATION (9)

**Complete the following:**

ENGL 111X .....(3) \_\_\_\_\_  
ENGL 190H may be substituted.

**Complete one of the following:**

ENGL 211X OR ENGL 213X .....(3) \_\_\_\_\_

**Complete one of the following:**

COMM 131X OR COMM 141X .....(3) \_\_\_\_\_

### PERSPECTIVES ON THE HUMAN CONDITION (18)

**Complete all of the following four courses:**

ANTH 100X/SOC 100X .....(3) \_\_\_\_\_  
ECON 100X OR PS 100X .....(3) \_\_\_\_\_  
HIST 100X .....(3) \_\_\_\_\_  
ENGL/FL 200X .....(3) \_\_\_\_\_

**Complete one of the following three courses:**

ART/MUS/THR 200X, HUM 201X OR ANS 202X .....(3) \_\_\_\_\_

**Complete one of the following six courses:**

BA 323X, COMM 300X, JUST 300X, NRM 303X,  
PS 300X OR PHIL 322X .....(3) \_\_\_\_\_

**OR complete 12 credits from the above courses PLUS**

- two semester-length courses in a single Alaska Native language or other non-English language **OR**
- three semester-length courses (9 credits) in American Sign Language taken at the university level.

### MATHEMATICS (3)

**Complete one of the following:**

MATH 103X, MATH 107X, MATH 161X OR STAT 200X .....(3-4) \_\_\_\_\_  
\* No credit may be earned for more than one of MATH 107X or 161X.

**OR complete one of the following:\***

MATH 200X, MATH 201X, MATH 202X,  
MATH 262X OR MATH 272X .....(4) \_\_\_\_\_  
\*Or any math course having one of these as a prerequisite

### NATURAL SCIENCES (8)

**Complete any two (4-credit) courses:**

ATM 101X .....(4) \_\_\_\_\_  
BIOL 100X .....(4) \_\_\_\_\_  
BIOL 103X .....(4) \_\_\_\_\_  
BIOL 104X .....(4) \_\_\_\_\_  
BIOL 105X .....(4) \_\_\_\_\_  
BIOL 106X .....(4) \_\_\_\_\_  
BIOL 111X .....(4) \_\_\_\_\_  
BIOL 112X .....(4) \_\_\_\_\_  
CHEM 100X .....(4) \_\_\_\_\_  
CHEM 103X .....(4) \_\_\_\_\_  
CHEM 104X .....(4) \_\_\_\_\_  
CHEM 105X .....(4) \_\_\_\_\_  
CHEM 106X .....(4) \_\_\_\_\_  
GEOG 205X .....(4) \_\_\_\_\_  
GEOS 100X .....(4) \_\_\_\_\_  
GEOS 101X .....(4) \_\_\_\_\_  
GEOS 112X .....(4) \_\_\_\_\_  
GEOS 120X .....(4) \_\_\_\_\_  
GEOS 125X .....(4) \_\_\_\_\_  
MSL 111X .....(4) \_\_\_\_\_  
PHYS 102X .....(4) \_\_\_\_\_  
PHYS 103X .....(4) \_\_\_\_\_  
PHYS 104X .....(4) \_\_\_\_\_  
PHYS 115X .....(4) \_\_\_\_\_  
PHYS 116X .....(4) \_\_\_\_\_  
PHYS 175X .....(4) \_\_\_\_\_  
PHYS 211X .....(4) \_\_\_\_\_  
PHYS 212X .....(4) \_\_\_\_\_  
PHYS 213X .....(4) \_\_\_\_\_

### LIBRARY AND INFORMATION RESEARCH (0-1)

Successful completion of library skills competency test **OR**

LS 100X or 101X prior to junior standing .....(0-1) \_\_\_\_\_

### UPPER-DIVISION WRITING AND ORAL COMMUNICATION (0)

**Complete the following:**

Two writing intensive courses designated (W) .....(0) \_\_\_\_\_  
One oral communication intensive course designated (O) .....(0) \_\_\_\_\_  
**OR** two oral communication intensive courses designated (O/2), at the upper-division level (see degree and/or major requirements).....(0) \_\_\_\_\_

**TOTAL CREDITS REQUIRED.....38-39**