

Mechanical Engineering

College of Engineering and Mines
Department of Mechanical Engineering
907-474-7136
www.uaf.edu/cem/me/

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

Minimum Requirements for Degree: B.S.: 131 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 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.

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 131. As part of the core curriculum requirements, complete MATH F200X, CHEM F105X and CHEM F106X.)
2. Complete the B.S. degree requirements. (See page 136. As part of the B.S. degree requirements, complete MATH F201X, 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 F202X—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 F487W,O—Design Project	3
ME electives**	6
Technical electives***	3
Electives	2

4. Minimum credits required131

* Student must earn a C grade or better in each of the program (major) requirements, with exception of ES F101.

** Mechanical engineering course at F400-level or above.

*** Engineering course at F400-level or above.

Note: Students electing to complete an emphasis in aerospace engineering must complete the sequence of aerospace courses (ME F450, F451, F452 and F453) 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 F409 and F416 or equivalent, plus two F400-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.

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 three letters of reference.
 - d. Submit GRE (general) scores.
 - e. Submit a study goal statement.
 - f. Submit a UAF graduate application for admission.
2. Complete the general university requirements (page 131).
3. Complete the B.S. degree requirements. (See page 136. As part of the B.S. degree requirements, complete: MATH F201X, PHYS F211X and PHYS F212X.)
4. Complete the master's degree requirements (page <?>).
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 F202X—Calculus	4
MATH F302—Differential Equations	3
ME F302—Dynamics of Machinery	3
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 F487W/O— Design Project.....	3
6. 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
7. 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)
8. Minimum credits required for both degrees151

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.

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

Baccalaureate Core Requirements

COMMUNICATION (9)

Complete the following:

ENGL F111X(3) _____
ENGL F190H may be substituted.

Complete one of the following:

ENGL F211X **OR** ENGL F213X(3) _____

Complete one of the following:

COMM F131X **OR** COMM F141X(3) _____

PERSPECTIVES ON THE HUMAN CONDITION (18)

Complete all of the following four courses:

ANTH F100X/SOC F100X(3) _____
 ECON F100X **OR** PS F100X(3) _____
 HIST F100X(3) _____
 ENGL/FL F200X(3) _____

Complete one of the following three courses:

ART/MUS/THR F200X, HUM F201X **OR** ANS F202X (3) _____

Complete one of the following six courses:

BA F323X, COMM F300X, JUST F300X, NRM F303X,
 PS F300X **OR** PHIL F322X(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 F103X, MATH F107X, MATH F161X **OR**
 STAT F200X(3 – 4) _____
** No credit may be earned for more than one of MATH F107X or F161X.*

OR complete one of the following:

MATH F200X, MATH F201X, MATH F202X,
 MATH F262X **OR** MATH F272X(4) _____
**Or any math course having one of these as a prerequisite.*

NATURAL SCIENCES (8)

Complete any two (4-credit) courses:

ATM F101X(4) _____
 BIOL F100X(4) _____
 BIOL F103X(4) _____
 BIOL F104X(4) _____
 BIOL F111X(4) _____
 BIOL F112X(4) _____
 BIOL F115X(4) _____
 BIOL F116X(4) _____
 CHEM F100X(4) _____
 CHEM F103X(4) _____
 CHEM F104X(4) _____
 CHEM F105X(4) _____
 CHEM F106X(4) _____
 GEOG F111X(4) _____
 GEOS F100X(4) _____
 GEOS F101X(4) _____
 GEOS F112X(4) _____
 GEOS F120X(4) _____
 GEOS F125X(4) _____
 MSL F111X(4) _____
 PHYS F102X(4) _____
 PHYS F103X(4) _____
 PHYS F104X(4) _____
 PHYS F115X(4) _____
 PHYS F116X(4) _____
 PHYS F175X(4) _____
 PHYS F211X(4) _____
 PHYS F212X(4) _____
 PHYS F213X(4) _____

LIBRARY AND INFORMATION RESEARCH (0 – 1)

Successful completion of library skills competency test **OR**
 LS F100X or F101X prior to junior standing.....(0 – 1) _____

UPPER-DIVISION WRITING AND ORAL COMMUNICATION (0)

Complete the following:

Two writing intensive courses designated (W)(0) _____
 and 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) _____

CORE CREDITS REQUIRED 38 – 39

Minimum credits required for degree 120



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