

# Mechanical Engineering

College of Science, Engineering and Mathematics  
Department of Mechanical Engineering  
(907) 474-7136  
[www.uaf.edu/mechengr/](http://www.uaf.edu/mechengr/)

## B.S. Degree

Minimum Requirements for Degree: 130 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 goals and objectives of the mechanical engineering program are to: offer a mechanical engineering program designed to prepare its graduates for careers at the professional level; to maintain, as a base, ABET accreditation of the undergraduate program; provide continuing educational opportunities for graduate engineers; serve as a resource of technical knowledge for the state as well as the nation; conduct research in all areas of mechanical engineering including cold regions mechanical engineering; and offer a graduate program in mechanical engineering at the M.S. and Ph.D. levels. The Engineering Accreditation Commission of ABET has accredited the B.S. degree program in mechanical engineering since 1980.

The educational objectives of the department are that graduates from the mechanical engineering program must: be able to apply the knowledge of mathematics, science and engineering; be able to design and conduct experiments, as well as to analyze and interpret data; be able to design a system, component or process to meet desired needs, be able to function on multi-interdisciplinary teams; be able to identify, formulate and solve engineering problems; understand professional and ethical responsibility; be able to communicate effectively; have the broad education necessary to understand the impact of engineering solutions in a global and societal context; recognize the need for, and be able to engage in, life-long learning; understand contemporary issues; and be able to use the techniques, skills and modern engineering tools necessary for engineering practice. The department ensures that each course in the curriculum plays a meaningful role in satisfying one or more of these objectives.

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 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 (page 106. As part of the core curriculum requirements, complete: MATH 200X; CHEM 105X and CHEM 106X.)
  2. Complete the B.S. degree requirements (page 112. As part of the B.S. degree requirements, complete: MATH 201X, PHYS 211X and PHYS 212X.)
  3. Complete the following: program (major) requirements:\*
- |  |   |
|--|---|
| ME 302—Mechanical Design I.....                      | 4 |
| ME 313—Mechanical Engineering Thermodynamics .....   | 3 |
| ME 321—Industrial Processes .....                    | 3 |
| ME 334—Elements of Material Science/Engineering..... | 3 |
| ME 403—Mechanical Design II .....                    | 3 |
| ME 408—Dynamics of Systems .....                     | 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 |
4. Complete the following program (major) requirements:
- |  |   |
|--|---|
| ES 101—Introduction to Engineering.....          | 2 |
| 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/ME 308—Instrumentation and Measurement* ..... | 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 |
| Electives.....                                   | 2 |
5. Minimum credits required .....

\* Student must earn a C grade or better in each mechanical engineering, technical elective, ES/ME 308, ES 331, ES 341 and ES 346 course.

\*\* 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, ME 451, ME 452 and ME 453) as part of their program requirements.

Note: Students must plan their elective courses in consultation with their mechanical engineering faculty advisor, and all elective courses must be approved by their mechanical engineering faculty advisor.

**Note: Page numbers refer to the UAF 2004-2005 academic catalog, which can be viewed online at [www.uaf.edu/catalog/](http://www.uaf.edu/catalog/).**

## General University Requirements

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

### COMMUNICATIONS (9)

Complete the following:

ENGL 111X.....	(3)	_____
ENGL 211X OR 213X.....	(3)	_____
COMM 131X OR 141X.....	(3)	_____

### LIBRARY & INFORMATION SKILLS (0-1)

Complete the following:

LS 100X OR 101X.....	(0-1)	_____
----------------------	-------	-------

OR Successful completion of library skills competency test.

### PERSPECTIVES ON THE HUMAN CONDITION (18)

Complete either the following six courses:

ANTH 100X OR SOC 100X.....	(3)	_____
ECON/PS 100X.....	(3)	_____
HIST 100X.....	(3)	_____
ART/MUS/THR 200X, HUM 201X OR ANS 202X.....	(3)	_____
ENGL/FL 200X.....	(3)	_____
PHIL 322X, NRM 303X, COMM 300X, PS 300X OR JUST 300X.....	(3)	_____

OR Complete 12 cr from the above list **PLUS** two semester-length courses in a single non-English or Alaska Native language at the university level OR three semester-length courses (9 cr) in American Sign Language.

### MATHEMATICS (3-4)

Complete 3-4 credits from the following:

MATH 107X.....	(3)	_____
OR MATH 131X (except for BBA).....	(3)	_____
OR MATH 161X.....	(3)	_____
MATH 200X.....	(4)	_____
MATH 201X.....	(4)	_____
MATH 202X.....	(4)	_____
MATH 262X.....	(4)	_____
MATH 272X.....	(3)	_____

NOTE: Additional 3 cr of math needed for degree requirements.

### NATURAL SCIENCES (8)

Complete 8 credits from the following:

ATM 101X.....	(4)	_____
BIOL 103X OR 104X.....	(4)	_____
BIOL 105X-106X.....	(8)	_____
BIOL 111X-112X.....	(8)	_____
CHEM 100X.....	(4)	_____
CHEM 103X-104X.....	(8)	_____
CHEM 105X-106X.....	(8)	_____
GEOG 205X.....	(4)	_____
GEOS 100X OR 120X OR 125X.....	(4)	_____
GEOS 101X-112X.....	(8)	_____
MSL 111X.....	(4)	_____
PHYS 102X OR 175X.....	(4)	_____
PHYS 103X-104X.....	(8)	_____
PHYS 211X-212X.....	(8)	_____
PHYS 211X-213X.....	(8)	_____
PHYS 212X-213X.....	(8)	_____