Bachelor of Science in Mechanical Engineering

The Bachelor of Science (BS) in Mechanical Engineering prepares students for a career in mechanical engineering and associated professional fields. Opportunities in mechanical engineering are broad and diverse, including the automotive and aerospace industries, biotechnology, the oil and natural gas industries, renewable energy and environmental controls, manufacturing, computer and electronic hardware, and more. UAA’s BS in Mechanical Engineering program provides hands-on learning and professional networking opportunities to prepare students for a successful career.

The BS in Mechanical Engineering is accredited by the Engineering Accreditation Commission of ABET (https://www.abet.org).

Licensure and/or Certification

Graduates of the BS in Mechanical Engineering gain four years of education credit toward obtaining a Professional Engineer license in Alaska.

Please go to UAA’s Authorization by State (https://www.uaa.alaska.edu/academics/office-of-academic-affairs/provost_office/uaa-state-authorization/authorization.cshtml/) website for information about licensure or certification in a state other than Alaska.

Admission Requirements

Complete the Admission Requirements for Baccalaureate Degrees. (http://catalog.uaa.alaska.edu/academicpoliciesprocesses/admissions/undergraduate/)

Special Considerations

• Students who intend to enroll in this degree of study are strongly encouraged to complete the following content in high school with a grade of C or better: Trigonometry (1/2 year), Physics (1 year), Algebra (2 years), Chemistry (1 year), and English (3 years). Insufficient preparation may increase the number of semesters required to complete the degree.

• All prerequisites for engineering courses must be completed with a minimum grade of C, and all courses listed in the major requirements must be completed with a grade of C or higher. A student who is unable to earn a grade of C or higher in a program course offered by the College of Engineering will be required to meet with a department faculty advisor to develop a plan for improvement of academic performance before continuing in the program. A student who fails to earn a grade of C or higher on the second attempt will be required to meet with an academic advisor and a member of the College of Engineering professional advising staff to develop a plan for improvement of academic performance before continuing in the program. A student who fails to earn a grade of C or higher on the third attempt will be removed from the program. Re-admittance requires a letter of appeal from the student requesting re-admittance with an explanation of any mitigating factors and how these factors have been addressed. Re-admittance is subject to approval by the faculty of the program and is communicated by the department chair.

• The program requires its students to abide by the principles of academic integrity described in the Student Code of Conduct. Should suspected cases of academic misconduct occur, these cases may be submitted to the UAA Dean of Students Office, where the assistant director of student conduct reviews all allegations of academic misconduct. At the conclusion of the review, the assistant director of student conduct issues a notification of the findings and conclusions to the reporting faculty member, department chair and dean. Should a student from the program be found responsible for a case of academic misconduct by the UAA Dean of Students Office on two separate occasions, that student will be removed from the program. Re-admittance requires a letter of appeal from the student requesting re-admittance with an explanation of any mitigating factors and how these factors have been addressed. Re-admittance is subject to approval by the faculty of the program and is communicated by the department chair.

Graduation Requirements

- Complete the General University Requirements for Baccalaureate Degrees (http://catalog.uaa.alaska.edu/undergraduateprograms/baccalaureaterequirements/). (http://catalog.uaa.alaska.edu/undergraduateprograms/baccalaureaterequirements/)
- Complete the General Education Requirements (GER) for Baccalaureate Degrees (http://catalog.uaa.alaska.edu/undergraduateprograms/baccalaureaterequirements/ger/).
  - The 3 credit Tier 1 Quantitative Skills GER will be met and exceeded by the following degree requirements: MATH A251, MATH A252, and MATH A253.
  - The 7 credit Natural Science GER will be met and exceeded by the following degree requirements: CHEM A105, CHEM A105L, CHEM A106, CHEM A106L, PHYS A211, PHYS A211L, PHYS A212, and PHYS A212L.
- Complete the major requirements below with a minimum grade of C:

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
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<tbody>
<tr>
<td>CHEM A105 &amp; A105L</td>
<td>General Chemistry I and General Chemistry I Laboratory</td>
<td>4</td>
</tr>
<tr>
<td>CHEM A106 &amp; A106L</td>
<td>General Chemistry II and General Chemistry II Laboratory</td>
<td>4</td>
</tr>
<tr>
<td>ENGR A151</td>
<td>Introduction to Engineering</td>
<td>1</td>
</tr>
<tr>
<td>ES A106</td>
<td>Engineering Graphics</td>
<td>2</td>
</tr>
<tr>
<td>ES A209</td>
<td>Statics</td>
<td>3</td>
</tr>
<tr>
<td>ES A210</td>
<td>Dynamics</td>
<td>3</td>
</tr>
<tr>
<td>ES A261</td>
<td>Introduction to Engineering</td>
<td>3</td>
</tr>
<tr>
<td>ES A302</td>
<td>Engineering Data Analysis</td>
<td>3</td>
</tr>
<tr>
<td>ES A309</td>
<td>Elements of Electrical Engineering</td>
<td>3</td>
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ES A331  Mechanics of Materials  3
ES A341 & A341L  Fluid Mechanics and Fluid Mechanics Laboratory  4
ES A346  Introduction to Thermodynamics  3
ESM A450  Economic Analysis and Operations  3
MATH A251  Calculus I  4
MATH A252  Calculus II  4
MATH A253  Calculus III  4
MATH A302  Ordinary Differential Equations  3
ME A280  Solid Modeling for Engineers  3
ME/EE A306  Dynamics of Systems  3
ME/EE A308  Instrumentation and Measurement  3
ME A313  Mechanical Engineering Thermodynamics  3
ME A334 & A334L  Materials Science and Materials Science Laboratory  4
ME A403  Machine Design  3
ME A414 & A414L  Thermal System Design and Thermal System Design Lab  4
ME A438  Design of Mechanical Engineering Systems  3
ME A441 & A441L  Heat and Mass Transfer and Heat and Mass Transfer Lab  4
PHYS A211 & A211L  General Physics I and General Physics I Laboratory  4
PHYS A212 & A212L  General Physics II and General Physics II Laboratory  4

Advanced Mathematics Electives

Complete one of the following:  3
MATH A314  Linear Algebra
MATH A371  Stochastic Processes
MATH A407  Mathematical Statistics
MATH A410  Introduction to Complex Analysis
MATH A424  Advanced Engineering Mathematics: Linear Algebra and Numerical Analysis
MATH A425  Advanced Engineering Mathematics: Partial Differential Equations and Complex Variables
MATH A426  Numerical Analysis
MATH A432  Partial Differential Equations

Advanced Engineering Electives

Complete 12 credits, including at least 6 credits of ME courses, from the following:  12
ME A408  Mechanical Vibrations
ME A408 or ME A608  Mechanical Vibrations
ME A415  Composite Materials
ME A415 or ME A615  Composite Materials
ME A420  Automotive Engineering
ME A421  Engineering Finite Element Analysis
or ME A621  Engineering Finite Element Analysis
ME A432  Analytical Dynamics
or ME A632  Analytical Dynamics
ME A434  Materials Selection for Design
ME A442  Advanced Fluid Mechanics
or ME A642  Advanced Fluid Mechanics
ME A451  Aerodynamics
or ME A651  Aerodynamics
ME A454  Manufacturing Design
ME A455  HVAC Systems Optimization
or ME A655  HVAC Systems Optimization
ME A456  Renewable Energy Systems Engineering
or ME A656  Renewable Energy Systems Engineering
ME A459  Fracture Mechanics
or ME A659  Fracture Mechanics
ME A460  Turbomachinery
or ME A660  Turbomachinery
ME/EE A471  Automatic Control
ME A610  Biomechanics
ME A630  Advanced Mechanics of Materials
ME A664  Corrosion Processes and Engineering
ME A672  Advanced Linear Systems
or EE A472  Advanced Linear Systems

Total  107

A minimum of 131 credits is required for the degree, of which 42 credits must be upper-division.

Honors in Mechanical Engineering

The BS in Mechanical Engineering recognizes distinguished achievement by conferring programmatic honors in mechanical engineering. In order to receive honors in mechanical engineering, a student must meet the following requirements:

- Complete all program requirements.
- Earn a GPA of 3.50 or above in the courses required for the major.
- Gain approval for, complete and present a design/research project prior to applying for graduation. The project proposal, presentation and final written report must be approved by the program faculty.

Program Student Learning Outcomes

Students graduating with a BS in Mechanical Engineering will have:

- an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics;
- an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety,
and welfare, as well as global, cultural, social, environmental, and economic factors;
• an ability to communicate effectively with a range of audiences;
• an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts;
• an ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives;
• an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgement to draw conclusions; and
• an ability to acquire and apply new knowledge as needed, using appropriate learning strategies.