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/gers/). (http://catalog.uaa.alaska.edu/undergraduateprograms/baccalaureaterequirements/)
- Complete the General Education Requirements (GER) for Baccalaureate Degrees (http://catalog.uaa.alaska.edu/undergraduateprograms/baccalaureaterequirements/gers/).
  - 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:

Code	Title	Credits
Core Courses		
CHEM A105 & A105L	General Chemistry I and General Chemistry I Laboratory	4
CHEM A106 & A106L	General Chemistry II and General Chemistry II Laboratory	4
ENGR A151	Introduction to Engineering	1
ES A106	Engineering Graphics	2
ES A209	Statics	3
ES A210	Dynamics	3
ES A261	Introduction to Engineering Computation	3
ES A302	Engineering Data Analysis	3
ES A309	Elements of Electrical Engineering	3

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	
or ME A608	Mechanical Vibrations	
ME A415	Composite Materials	
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.