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 (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/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/).
- 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 or MATH A251F, MATH A252 or MATH A252F, and MATH A253.
  - The 7 credit Natural Science GER will be met and exceeded by the following degree requirements: CHEM A105, CHEM A105L, PHYS A211, PHYS A211L, PHYS A212, and PHYS A212L.
- Complete the following major requirements with a minimum grade of C:

Code	Title	Credits
Core Courses		
BA A300	Organizational Theory and Behavior	3
or ESM A450	Economic Analysis and Operations	
CHEM A105 & A105L	General Chemistry I and General Chemistry I 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 A309	Elements of Electrical Engineering	3
or EE A203	Fundamentals of Electrical Engineering I	

ES A331	Mechanics of Materials	3
ES A341 & ME A341L	Fluid Mechanics and Fluid Mechanics Lab	4
ES A346	Introduction to Thermodynamics	3
MATH A251	Calculus I	4-6
or MATH A251F	F.A.T. Calculus I	
MATH A252	Calculus II	4-6
or MATH A252F	F.A.T. Calculus II	
MATH A253	Calculus III	4
MATH A302	Ordinary Differential Equations	3
ME A203	Machine Design I	3
ME A303	Machine Design II	3
ME/EE A306	Dynamics of Systems	3
ME/EE A308	Instrumentation and Measurement	3
ME A334 & A334L	Materials Science and Materials Science Laboratory	4
ME A403	Machine Design III	3
ME A414 & A414L	Thermal System Design and Thermal System Design Lab	4
ME A438	Design of Mechanical Engineering Systems	3
ME A441	Heat and Mass Transfer	3
PHYS A211 & A211L	General Physics I and General Physics I Laboratory	4
PHYS A212 & A212L	General Physics II and General Physics II Laboratory	4
STAT A307	Probability and Statistics	4
Advanced Engineering Electives		
Complete 12 credits, including at least 9 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		**100-104**

A minimum of 124 credits is required for the degree, of which 39 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 minimum cumulative 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 be able to:

- identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics;
- 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;
- communicate effectively with a range of audiences;
- 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;
- function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives;
- develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgement to draw conclusions; and
- acquire and apply new knowledge as needed, using appropriate learning strategies.

Sample Plan

The academic plan below is one pathway through the degree/certificate. It includes all requirements, taking into account recommendations from program faculty. Each student's plan may vary according to their initial course placement (http://catalog.uaa.alaska.edu/academicpoliciesprocesses/academicstandardsregulations/courseplacement/), intended course load, additional majors and/or minors, and their placement into required prerequisite courses. Any change in the plan below can have an unforeseen impact on the rest of the plan. **Therefore, it is very important to meet with your academic advisor to verify your personal academic plan.**

Please review the following terms, definitions, and resources associated with the sample academic plan below.

- Each course in the far left column links to a pop-up bubble with a course description, prerequisite requirements, and associations with university requirements. For example, if a course fulfills a general education requirement, you will see that in the pop-up bubble.
- **GER**: indicates a General Education Requirement (http://catalog.uaa.alaska.edu/undergraduateprograms/baccalaureaterequirements/gers/). GERs that also count toward degree/certificate requirements appear as a specific course in the plan. For these courses, "GER" is not indicated explicitly in the table, but if you click on the course, you will see the course's GER status in the pop-up bubble.
- **Program Elective**: indicates a specific course selection determined by program faculty to fulfill a degree/certificate requirement. Students should seek assistance from their academic advisor.
- **Elective**: indicates an open selection of 100-400 level university courses to fulfill elective credits needed to meet the minimum total credits toward the degree/certificate.
- **Upper Division Program Elective**: indicates a specific 300-400 level course selection determined by the program faculty to fulfill a degree/certificate requirement. Students should seek assistance from their academic advisor.
- **Upper Division Elective**: indicates an open selection of 300-400 level courses to fulfill elective credits needed to meet the minimum total credits toward the degree/certificate. These courses must be upper division in order to meet General University Requirements for the particular degree/certificate type.

Course	Title	Credits
First Year		
Fall		
CHEM A105	General Chemistry I	3
CHEM A105L	General Chemistry I Laboratory	1
ENGR A151	Introduction to Engineering	1
MATH A251 or MATH A251F	Calculus I or F.A.T. Calculus I	4-6
WRTG A111	Writing Across Contexts	3
GER Oral Communication Skills		3
	Credits	**15-17**
Spring		
ES A106	Engineering Graphics	2
MATH A252 or MATH A252F	Calculus II or F.A.T. Calculus II	4-6
PHYS A211	General Physics I [1]	3
PHYS A211L	General Physics I Laboratory	1
GER Humanities [2]		
GER Written Communication Skills (200-level)		3
	Credits	**13-15**
Second Year		
Fall		
ES A209	Statics	3
ES A261	Introduction to Engineering Computation	3
MATH A253	Calculus III	4
PHYS A212	General Physics II	3
PHYS A212L	General Physics II Laboratory	1
GER Social Sciences		3
	Credits	**17**
Spring		
ES A210	Dynamics	3
ES A331	Mechanics of Materials	3
ES A346	Introduction to Thermodynamics	3
MATH A302	Ordinary Differential Equations	3
ME A203	Machine Design I	3
	Credits	**15**
Third Year		
Fall		
ES A309 or EE A203	Elements of Electrical Engineering or Fundamentals of Electrical Engineering I	3
ME A303	Machine Design II	3
ME A306	Dynamics of Systems	3
ME A334	Materials Science	3
ME A334L	Materials Science Laboratory	1
STAT A307	Probability and Statistics	4
	Credits	**17**
Spring		
ES A341	Fluid Mechanics	3
ME A308	Instrumentation and Measurement	3
ME A341L	Fluid Mechanics Lab	1
ME A403	Machine Design III	3
GER Humanities [2]		3
	Credits	**13**
Fourth Year		
Fall		
ME A414	Thermal System Design	3
ME A414L	Thermal System Design Lab	1
ME A441	Heat and Mass Transfer	3

Program Elective (Advanced Engineering)		3
Program Elective (Advanced Engineering)		3
GER Social Sciences		3
	Credits	**16**
Spring		
ESM A450 or BA A300	Economic Analysis and Operations or Organizational Theory and Behavior	3
ME A438	Design of Mechanical Engineering Systems	3
Program Elective (Advanced Engineering)		3
Program Elective (Advanced Engineering)		3
GER Fine Arts		3
	Credits	**15**
	Total Credits	**121-125**

[1] *In addition to mathematics prerequisites, this course requires completion of either PHYS A130 Survey of College Physics or a minimum score of 18 on UAA's Physics Placement Exam. Students who have had physics in high school should consider the Physics Placement Exam and can get more information from an advisor.*

[2] *Choose a course that also fulfills the Alaska Native-Themed GER or Diversity & Inclusion GER.*