Bachelor of Science in Civil Engineering

The Bachelor of Science (BS) in Civil Engineering prepares students for a career in Civil Engineering and associated professional fields. Civil engineering is the design, construction, and maintenance of the built environment, including roads, bridges, buildings, harbors and other public works. The Civil Engineering program partners with local consulting firms, government agencies and non-profit organizations to offer students hands-on experience designing real-world projects that make a difference in our community.

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

Licensure and/or Certification

Graduates of the BS in Civil Engineering gain four years of education credit toward obtaining a Professional Engineer (P.E.) license. It also fulfills the “Arctic Engineering” requirement for registration as a P.E. in Alaska as set forth in 12 AAC 36.110.

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 courses in high school with a C or better. Insufficient preparation may increase the number of semesters required to complete the degree.
  - Algebra - 2 years
  - Chemistry - 1 year
  - English - 3 years
  - Physics - 1 year
  - Trigonometry - 1/2 year
- Bachelor of Science in Civil Engineering students must meet with their faculty advisor at least once per semester to review their academic progress and future course plan.

Graduation Requirements

- Complete the General University Requirements for Baccalaureate Degrees (http://catalog.uaa.alaska.edu/undergraduateprograms/baccalaureaterequirements/).
- Complete the General Education Requirements for Baccalaureate Degrees (http://catalog.uaa.alaska.edu/undergraduateprograms/baccalaureaterequirements/gers/).
- For 3 credits of Tier 1 Quantitative Skills, choose MATH A251.
- For 3 credits of Tier 2 Humanities, choose PHIL A305.
- Complete the following major requirements:

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CE A201</td>
<td>Introduction to Civil Engineering</td>
<td>1</td>
</tr>
<tr>
<td>CE A206</td>
<td>Civil Engineering 3D Modeling</td>
<td>1</td>
</tr>
<tr>
<td>CE A310</td>
<td>Introduction to Geotechnical Engineering</td>
<td>4</td>
</tr>
<tr>
<td>CE A310L</td>
<td>Introduction to Geotechnical Engineering Lab</td>
<td></td>
</tr>
<tr>
<td>CE A334</td>
<td>Properties of Materials and Materials Laboratory</td>
<td>1</td>
</tr>
<tr>
<td>CE A341</td>
<td>Environmental Engineering</td>
<td>1</td>
</tr>
<tr>
<td>CE A351</td>
<td>Structural Analysis</td>
<td>3</td>
</tr>
<tr>
<td>CE A403</td>
<td>Arctic Engineering</td>
<td>3</td>
</tr>
<tr>
<td>CE A420</td>
<td>Fundamentals of Transportation Engineering</td>
<td>3</td>
</tr>
<tr>
<td>CE A437</td>
<td>Project Planning</td>
<td>1</td>
</tr>
<tr>
<td>CE A438</td>
<td>Design of Civil Engineering Systems</td>
<td>3</td>
</tr>
<tr>
<td>CE A461</td>
<td>Hydraulic Analysis and Design</td>
<td>3</td>
</tr>
<tr>
<td>CHEM A105</td>
<td>General Chemistry I and General Chemistry I Laboratory</td>
<td>4</td>
</tr>
<tr>
<td>CHEM A106</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 Computation</td>
<td>3</td>
</tr>
<tr>
<td>ES A302</td>
<td>Engineering Data Analysis</td>
<td>3</td>
</tr>
<tr>
<td>ES A331</td>
<td>Mechanics of Materials</td>
<td>3</td>
</tr>
<tr>
<td>ES A341</td>
<td>Fluid Mechanics and Fluid Mechanics Laboratory</td>
<td>4</td>
</tr>
<tr>
<td>ESM A450</td>
<td>Economic Analysis and Operations</td>
<td>3</td>
</tr>
<tr>
<td>GEO A155</td>
<td>Introduction to Surveying</td>
<td>3</td>
</tr>
<tr>
<td>MATH A251</td>
<td>Calculus I</td>
<td>4</td>
</tr>
<tr>
<td>MATH A252</td>
<td>Calculus II</td>
<td>4</td>
</tr>
<tr>
<td>MATH A253</td>
<td>Calculus III</td>
<td>4</td>
</tr>
<tr>
<td>MATH A302</td>
<td>Ordinary Differential Equations</td>
<td>3</td>
</tr>
<tr>
<td>PHIL A305</td>
<td>Professional Ethics</td>
<td>3</td>
</tr>
<tr>
<td>PHYS A211</td>
<td>General Physics I and General Physics I Laboratory</td>
<td>4</td>
</tr>
</tbody>
</table>
Bachelor of Science in Civil Engineering

PHYS A212 & A212L General Physics II and General Physics II Laboratory 4
or PHYS A214 & A214L Waves, Thermodynamics and Electricity and Waves, Thermodynamics and Electricity Laboratory

Discipline-Specific Courses
Complete 12 credits of discipline-specific courses from the following list in the disciplines of environmental, geotechnical, structural, transportation and water resources engineering. At least one course must be taken in four of the five disciplines.

Environmental Engineering
CE A442 Environmental Engineering Design

Geotechnical Engineering
CE A410 Foundation Engineering

Structural Engineering
CE A432 Steel Design 2
CE A433 Reinforced Concrete Design

Transportation Engineering
CE A421 Design of Highways

Water Resources Engineering
CE A464 Hydrologic Analysis and Design

Basic Science Elective
Select one of the following: 3
BIOL/GEOL A178 Introduction to Oceanography
BIOL A271 Principles of Ecology
GEOL A111 Physical Geology
GEOL A115 Environmental Geology

Technical Electives
Complete 6 credits of technical elective courses from the following list. Graduate courses may not be applied to both a baccalaureate and master degree. Students are encouraged to take 6 credits from a single subdiscipline. 3

Environmental Engineering
AEST A601 Aquatic Process Chemistry
CE A445 Chemical and Physical Water and Wastewater Treatment Processes

Geotechnical Engineering
CE A414 Soil Strength and Slope Stability
CE A611 Geotechnical Earthquake Engineering
CE A612 Advanced Foundation Design

Structural Engineering
CE A432 Steel Design 2
or CE A433 Reinforced Concrete Design
CE A451 Advanced Structural Analysis
CE A454 Timber Design
CE A631 Structural Finite Elements
CE A652 Advanced Steel Design

Transportation Engineering
CE A423 Traffic Engineering
CE A424 Pavement Design
CE A425 Highway Engineering

Water Resources Engineering
CE A462 Surface Water Dynamics
CE A475 Design of Ports and Harbors
CE A476 Coastal Engineering
CE A479 Sediment Transport and Coastal Processes
CE A663 Ground Water Dynamics

Total 111

1 Must be completed with a minimum grade of C.
2 Either CE A432 or CE A433 may be chosen as a technical elective if not applied to satisfy the requirements described above.
3 Three credits of technical electives may be substituted for one discipline-specific course, provided the following criteria are met: all 9 credits of technical electives are completed in the same discipline, and the student has a minimum GPA of 3.0 prior to enrolling in the 3rd technical elective.

A minimum of 132 credits is required for the degree, of which 42 credits must be upper-division.

Honors in Civil Engineering

The Bachelor of Science in Civil Engineering recognizes distinguished achievement by conferring programmatic honors in civil engineering. In order to receive honors in civil engineering, a student must meet the following requirements:

• Complete all requirements for a BS in Civil Engineering. A minimum of 30 credits applicable to the civil engineering degree must be completed at UAA.
• Be an active member for at least one year of both a national and an on-campus student chapter of a professional engineering society that addresses issues relevant to the civil engineering profession.
• Have a GPA of 3.30 or higher in courses applicable to the BS in Civil Engineering.
• Complete one of the following:
  • Complete an approved design or research project (other than projects completed in CE A438) prior to applying for graduation. Gain project approval through a written proposal submitted to the project advisor no later than the semester prior to applying for graduation. Present an oral presentation and written report of project results four weeks prior to graduation. The project proposal and final written report must be approved by the student’s project advisor and acknowledged by the chair of the Department of Civil Engineering.
  • Document a minimum of eight weeks of work experience in an engineering or engineering-related position and pass the Fundamentals of Engineering Examination prior to applying for graduation.
Program Student Learning Outcomes

Graduates of the UAA civil engineering program will have an ability to:

- Identify, formulate, and solve complex civil engineering problems by applying principles of engineering, science, and mathematics;
- Apply civil engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as cold regions, 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 judgment to draw conclusions; and
- Acquire and apply new knowledge as needed, using appropriate learning strategies.