

# 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> (<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.

This program is designed to meet the educational requirements for professional licensure or certification in the State of Alaska. However, the program might not meet the educational requirements for professional licensure or certification in other states. Please see UAA’s Licensure and Certification website (<https://www.uaa.alaska.edu/academics/office-of-academic-affairs/licensure.cshml/>) for more information.

## 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 minimum grade of C. 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 or MATH A251F.
- For 3 credits of Tier 2 Humanities, choose PHIL A305.
- Complete the following major requirements:

Code	Title	Credits
CE A201	Introduction to Civil Engineering <sup>1</sup>	1
CE A206	Civil Engineering 3D Modeling	1
CE A310 & A310L	Introduction to Geotechnical Engineering and Introduction to Geotechnical Engineering Lab <sup>1</sup>	4
CE A334 & A334L	Properties of Materials and Properties of Materials Laboratory <sup>1</sup>	3
CE A341	Environmental Engineering <sup>1</sup>	3
CE A351	Structural Analysis <sup>1</sup>	4
CE A403	Arctic Engineering	3
CE A420	Fundamentals of Transportation Engineering <sup>1</sup>	3
CE A437	Project Planning <sup>1</sup>	1
CE A438	Design of Civil Engineering Systems	3
CE A461	Hydraulic Analysis and Design	3
CHEM A105 & A105L	General Chemistry I and General Chemistry I Laboratory <sup>1</sup>	4
CHEM A106 & A106L	General Chemistry II and General Chemistry II Laboratory <sup>1</sup>	4
ENGR A151	Introduction to Engineering <sup>1</sup>	1
ES A106	Engineering Graphics	2
ES A209	Statics <sup>1</sup>	3
ES A210	Dynamics <sup>1</sup>	3
ES A261	Introduction to Engineering Computation <sup>1</sup>	3
ES A302	Engineering Data Analysis <sup>1</sup>	3
ES A331	Mechanics of Materials <sup>1</sup>	3
ES A341 & A341L	Fluid Mechanics and Fluid Mechanics Laboratory <sup>1</sup>	4
ESM A450	Economic Analysis and Operations <sup>1</sup>	3
GEO A155	Introduction to Surveying <sup>1</sup>	3
MATH A251 or MATH A251F	Calculus I <sup>1</sup> F.A.T. Calculus I	4-6
MATH A252 or MATH A252F	Calculus II <sup>1</sup> F.A.T. Calculus II	4-6
MATH A253	Calculus III <sup>1</sup>	4

MATH A302	Ordinary Differential Equations <sup>1</sup>	3
PHIL A305	Professional Ethics	3
PHYS A211 & A211L	General Physics I and General Physics I Laboratory <sup>1</sup>	4

### 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 <sup>2</sup>

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	Planet Earth	
GEOL A115	Dangerous Earth	

### 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 unless a student has been accepted into the Accelerated Masters program. Students are encouraged to take 6 credits from a single subdiscipline. <sup>3</sup>

#### 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 <sup>2</sup>

or CE A433 Reinforced Concrete Design

CE A451 Advanced Structural Analysis

CE A454 Timber Design

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 A476 Coastal Engineering

CE A479 Sediment Transport and Coastal  
Processes

CE A663 Ground Water Dynamics

### Total

**108-112**

<sup>1</sup> Must be completed with a minimum grade of C.

<sup>2</sup> Either CE A432 or CE A433 may be chosen as a technical elective if not applied to satisfy the requirements described above.

<sup>3</sup> 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 3.00 prior to enrolling in the third technical elective.

**A minimum of 129 credits is required for the degree, of which 39 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 minimum GPA of 3.30 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

Students graduating with a Bachelor of Science in Civil Engineering will be able 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.

## 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.

### First Year

Fall		Credits
CHEM A105 & A105L	General Chemistry I and General Chemistry I Laboratory	4
ENGR A151	Introduction to Engineering	1
ES A106	Engineering Graphics	2
MATH A251 or MATH A251F	Calculus I <sup>1</sup> or F.A.T. Calculus I	4-6
WRTG A111	Writing Across Contexts	3
GER Oral Communication Skills		3
<b>Credits</b>		<b>17-19</b>

### Spring

CHEM A106 & A106L	General Chemistry II and General Chemistry II Laboratory	4
ES A261	Introduction to Engineering Computation	3
GEO A155	Introduction to Surveying	3
MATH A252 or MATH A252F	Calculus II or F.A.T. Calculus II	4-6
PHYS A211 & A211L	General Physics I and General Physics I Laboratory	4
<b>Credits</b>		<b>18-20</b>

### Second Year

Fall		Credits
CE A201	Introduction to Civil Engineering	1
ES A209	Statics	3
MATH A253	Calculus III	4
PHYS A212 & A212L	General Physics II and General Physics II Laboratory	4
GER Written Communication Skills (200-level)		3
GER Social Sciences		3
<b>Credits</b>		<b>18</b>

### Spring

CE A206	Civil Engineering 3D Modeling	1
ES A210	Dynamics	3
ES A302	Engineering Data Analysis	3
MATH A302	Ordinary Differential Equations	3
PHIL A305	Professional Ethics	3
Program Elective		3
<b>Credits</b>		<b>16</b>

### Third Year

Fall		Credits
CE A334 & A334L	Properties of Materials and Properties of Materials Laboratory	3

CE A341	Environmental Engineering	3
ES A331	Mechanics of Materials	3
ES A341 & A341L	Fluid Mechanics and Fluid Mechanics Laboratory	4
GER Social Sciences <sup>2</sup>		3
<b>Credits</b>		<b>16</b>
<b>Spring</b>		
CE A310 & A310L	Introduction to Geotechnical Engineering and Introduction to Geotechnical Engineering Lab	4
CE A351	Structural Analysis	4
CE A420	Fundamentals of Transportation Engineering	3
ESM A450	Economic Analysis and Operations	3
GER Humanities <sup>2</sup>		3
<b>Credits</b>		<b>17</b>
<b>Fourth Year</b>		
<b>Fall</b>		
CE A437	Project Planning	1
CE A461	Hydraulic Analysis and Design	3
Discipline-Specific course <sup>3</sup>		3
Discipline-Specific course <sup>3</sup>		3
GER Fine Arts		3
Upper Division Program Elective		3
<b>Credits</b>		<b>16</b>
<b>Spring</b>		
CE A403	Arctic Engineering	3
CE A438	Design of Civil Engineering Systems	3
Discipline-Specific Course <sup>3</sup>		3
Discipline-Specific Course <sup>3</sup>		3
Upper Division Program Elective		3
<b>Credits</b>		<b>15</b>
<b>Total Credits</b>		<b>133-137</b>

<sup>1</sup> MATH A251 or MATH A251F have prerequisites.

<sup>2</sup> Choose a course that also fulfills the Alaska Native-Themed GER or Diversity & Inclusion GER.

<sup>3</sup> Students must take one course in four out of the following five categories: Environmental, Water Resources, Transportation, Geotechnical, and Structural. See the section Graduation Requirements (<http://catalog.uaa.alaska.edu/undergraduateprograms/coeng/civilengineering/bs-civilengineering/>): *Discipline-Specific Courses for the list of approved courses.*