

CIVIL, GEOLOGICAL AND ENVIRONMENTAL ENGINEERING

B.S., M.S., B.S./M.S., Ph.D. Degrees

Civil engineers plan, design and supervise the construction of public and private structures such as bridges, buildings, tunnels, highways, transit systems, dams, offshore structures, airports, irrigation projects and water treatment and distribution facilities. Civil engineers use critical thinking, sophisticated technology and computer-aided engineering during the design, construction, project scheduling and cost-control project phases. Civil engineers are creative problem solvers involved in community development and in addressing challenges of pollution, deteriorating infrastructure, traffic safety, energy needs, floods, earthquakes and urban planning.

Geological engineering integrates geology and engineering concepts to mitigate geohazards like landslides, ensure safe construction at a site, find and manage groundwater, and locate mineral resources. Geological engineers are also interested in what the terrain can tell us about the stability of the soil or rock underneath. The Geological Engineering program at UAF has maintained ABET accreditation since 1941. Our program prepares students for employment with industry, consulting companies and government agencies.

College of Engineering and Mines

Department of Civil, Geological and Environmental Engineering
(Civil Engineering website (<https://www.uaf.edu/cem/programs/civil-engineering/>), Geological Engineering website (<https://www.uaf.edu/cem/programs/geological-engineering/>))
907-474-7241

B.S., CIVIL ENGINEERING

The mission of the civil engineering program is to provide the highest level of undergraduate education, including competency in mathematics, science and engineering fundamentals, as well as training in design, the latest engineering applications and professional practice; to provide an environment encouraging research for engineers at the undergraduate, master's and doctorate levels; and to impart a desire for lifelong learning so that engineers from our program remain atop their field throughout their careers. The civil engineering program at UAF has maintained accreditation since 1940 and is currently accredited by the Engineering Accreditation Commission of ABET.

Educational Objectives of the B.S. Civil Engineering Program

1. Our graduates use their education to pursue professional careers in civil engineering and/or related fields in the public or private sectors, and/or graduate education.
2. Our graduates possess the knowledge required to meet the challenges of civil engineering problems, including those unique to remote locations and cold regions including Alaska.
3. Our graduates demonstrate professionalism through clear communication, actively serving the community, teamwork, commitment to ethical standards, and pursuit of licensure.

In addition to general civil engineering courses, the department offers specialties in transportation, geotechnical, structures, water resources, hydrology and environmental studies.

Minimum Requirements for Civil Engineering Bachelor's Degree: 125 credits

Learn more about the bachelor's degree in civil engineering (<https://uaf.edu/academics/programs/bachelors/civil-engineering.php>), including an overview of the program, career opportunities and more.

B.S., GEOLOGICAL ENGINEERING

The mission of the geological engineering program is to advance and disseminate knowledge related to geologic hazard assessment; engineering site selection; construction and construction material production; groundwater and geo-environmental engineering; and mineral and energy exploration, evaluation, development and production, through creative teaching, research and public service with an emphasis on Alaska, the North and its diverse peoples.

Educational Objectives of the B.S. Geological Engineering Program:

1. Our graduates use their broad education to serve as the foundation of successful careers in geological engineering and/or related fields in the public or private sectors, and/or graduate education.
2. Our graduates possess the technical knowledge required to meet the unique challenges of geological engineering problems, especially those germane to cold regions including Alaska.
3. Our graduates demonstrate professionalism through clear communication, actively serving the community, teamwork, commitment to ethical standards, and lifelong learning.

Minimum Requirements for Geological Engineering Bachelor's Degree: 127 credits

Learn more about the bachelor's degree in geological engineering, including an overview of the program, career opportunities and more.

ACCELERATED B.S./M.S., CIVIL ENGINEERING

The civil engineering integrated B.S./M.S. program allows qualified and dedicated students to complete both B.S. and M.S. degrees in a shorter time (typically, five years instead of six) than traditional B.S. plus M.S. degrees and with less cost than earning the degrees individually. This is accomplished by having 12 credits of F400- and F600-level courses count toward both degrees. The B.S. degree is accredited by the Accreditation Board for Engineering and Technology (ABET). Students will need to apply for the B.S./M.S. option at the start of their third year in the B.S. program and form a graduate committee by the fourth year. For the M.S. portion of this integrated B.S./M.S. degree, students will select one of two tracks: environmental/water resources or civil infrastructure.

To complete the M.S. portion of this program, students will complete a research thesis or a project in addition to the coursework. This will allow students to tailor their graduate studies to meet their interests and prospective career needs. Students admitted to the B.S./M.S. program typically begin their research thesis or project during their third year. This early research start allows students to develop technical skills and to become familiar with their potential M.S. project early on in their program. Students pursuing an M.S. with a research thesis will conduct field/laboratory research and produce a thesis generally equivalent to a manuscript for a peer-reviewed

journal. Students pursuing an M.S. with a project will conduct a research project that may be based solely or partly on technical analysis, meta-analysis or literature review and synthesis. This can include writing a technical report, review article or a different activity as decided by the faculty advisor and the student committee. To ensure the success of students in this program, students will need to closely work with their faculty advisor and the graduate committee.

Minimum Requirements for Civil Engineering B.S./M.S.
Degrees: 144 credits

M.S., CIVIL ENGINEERING

Civil engineers plan, design and supervise the construction of facilities essential to modern life in both the public and private sectors. These facilities vary widely in nature, size and scope: space launching facilities, offshore structures, bridges, buildings, tunnels, highways, transit systems, dams, airports, irrigation projects, treatment and distribution facilities for water and collection and treatment facilities for wastewater.

Civil engineers use sophisticated technology and employ computer-aided engineering during project phases of design, construction, project scheduling and cost control. Civil engineers are problem solvers involved in community development and improvement. They meet the challenges of pollution, deteriorating infrastructure, traffic congestion, energy needs, floods, earthquakes, urban redevelopment and community planning. The opportunity for creativity is unlimited.

The civil engineering program at UAF began in 1922, had its first graduate in 1931 and since has graduated more than 800 men and women. Many of these graduates work in Alaska's cities, towns and villages in a wide range of responsible positions. More than 60 percent of Alaska's professional engineers practice in civil engineering. The UAF civil engineering program has been accredited since 1940 by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology. All engineering programs in the department give special attention to problems of Northern regions.

In addition to general civil engineering courses, specialties are available in Arctic engineering, transportation, geotechnical, structures, water resources, hydrology, and design and construction management. Many courses emphasize principles of analysis, planning and engineering design in northern regions.

A master's degree program can include courses in environmental engineering, engineering management and other areas. An advanced degree in water and environmental science, administered within the Civil Engineering Department, is available.

Minimum Requirements for Civil Engineering Master's Degree: 30 credits

M.S., PH.D., EARTH SYSTEM SCIENCE

Earth System Science at UAF is a multidisciplinary degree program that provides the option for a disciplinary concentration in one of eight topics:

- Sustainability
- Ecosystems
- Hydrology
- Atmospheric and Climate Sciences
- Cryosphere
- Solid Earth Geophysics

- Geoscience
- Geospatial Science

The ESS program involves faculty participation from six departments and programs:

- Natural Resources and Environment
- Center for Cross-Cultural Studies
- Biology and Wildlife
- Civil, Geological, and Environmental Engineering
- Atmospheric Sciences
- Geosciences

and five research institutes:

- Institute of Agriculture/Natural Resources and Extension
- Institute of Arctic Biology
- Institute of Northern Engineering
- International Arctic Research Center
- Geophysical Institute.

Minimum Requirements for Earth System Science Degrees: M.S.: 30 credits; Ph.D.: 26-41 credits.

M.S., GEOLOGICAL ENGINEERING

Geological engineers apply their strong backgrounds in geology and engineering science to solve problems at the intersection of the natural and built environments. They use their knowledge and interpretation of the Earth's surface and near-subsurface to recognize and mitigate geohazards, such as landslides, floods and earthquakes; identify, develop and protect groundwater resources; locate and investigate potential sites for infrastructure and property development; and locate and harvest natural resources, such as minerals, coal, oil and gas, in an environmentally sustainable way. As part of America's Arctic University, UAF's geological engineering program provides training in recognizing and mitigating problems associated with frozen ground, such as frost heaving, thaw settlement and slope stability in a permafrost environment.

The graduate program prepares students for employment with industry, consulting companies and government agencies.

Minimum Requirements for Geological Engineering M.S. Degree: 30-33 credits

Learn more about the master's degree in geological engineering, including an overview of the program, career opportunities and more.

PH.D., ENGINEERING

Engineers use knowledge of the mathematical and natural sciences to develop economical uses of materials and forces of nature for human benefit. The professional practice of engineering requires sophisticated skills, the use of judgment and the exercise of discretion. The basic education necessary for the professional practice of engineering is provided by the engineering bachelor's and master's degrees. Doctoral-level education requires independent research that generates fundamental advances in technology and discovers new knowledge for the benefit of society. Engineering Ph.D. degrees provide leadership in scientific research, academia and industrial research and development. The Ph.D. degree in engineering draws on the combined strength of the

College of Engineering and Mines and offers opportunities for engineers at other UA campuses to participate.

Minimum Requirements for Engineering Doctorate Degree: 36 credits

Programs Degrees

- B.S., Civil Engineering (<https://catalog.uaf.edu/bachelors/civil-engineering-bs/>)
- B.S., Geological Engineering (<https://catalog.uaf.edu/bachelors/geological-engineering-bs/>)
- Accelerated B.S./M.S., Civil Engineering (<https://catalog.uaf.edu/accelerated-programs/civil-engineering-bs-ms/>)
- M.S., Civil Engineering (<https://catalog.uaf.edu/masters/civil-engineering/>)
- M.S., Earth System Science (<https://catalog.uaf.edu/masters/earth-system-science/>)
- M.S. Geological Engineering (<https://catalog.uaf.edu/masters/geological-engineering/>)
- Ph.D., Earth System Science (<https://catalog.uaf.edu/phd/earth-system-science/>)
- Ph.D., Engineering (<https://catalog.uaf.edu/phd/engineering/>)