

Graduate Level – Arctic Engineering Course Descriptions**CE A603 Arctic Engineering 3 CR**

Registration Restrictions: Graduate standing with a baccalaureate degree in engineering.
May be stacked with: CE A403.

Introduces a broad spectrum of engineering challenges unique to cold regions. Physical principles and practical data collection methods, analyses, designs, and construction methods are discussed. Students gain a working knowledge of cold regions engineering problems and modern solutions as a basis for more detailed study.

- Offered fall & spring semesters.

CE A681 Frozen Ground Engineering 3 CR

Prerequisites: CE A435.

Registration Restrictions: Graduate standing, with a baccalaureate degree in engineering, or upper class standing in an accredited undergraduate program in engineering.

Physical, thermal, and mechanical properties of frozen soils, frost action, heat flow in soils, thaw behavior of frozen ground, foundations in frozen ground, construction ground freezing, pavement design, earthwork, and field investigations for frozen ground.

- Offered alternate fall semesters.

CE A682 Ice Engineering 3 CR

Prerequisites: ES A331.

Registration Restrictions: Graduate standing, with a degree in engineering or physical science, or upper class standing in an accredited undergraduate program in these categories.

Factors are reviewed governing design of engineering works which must contend with the presence of ice. Topics discussed include fundamental ice properties, river, lake, and sea ice processes, ice navigation and control of ice in channels, structural and nonstructural ice control measures, ice jams, bearing capacity of floating ice sheets, ice forces on riverine and ocean structures.

- Offered alternate spring semesters.

CE A683 Arctic Hydrology and Hydraulic Engineering 3 CR

Prerequisites: CE A344.

Registration Restrictions: Graduate standing, with degree in engineering or physical science, or upper class standing in an accredited undergraduate program in these categories.

Aspects of hydrology and hydraulics unique to engineering problems of the North. Emphasis on Alaskan conditions, information from Canada and other circumpolar

countries included.

- Offered fall semesters.

CE A684 Arctic Utility Distribution 3 CR

Prerequisites: ES A344.

Registration Restrictions: Graduate standing, with a degree in engineering or physical science, or upper class standing in an accredited undergraduate program in these categories.

Reviews physical principles and current practices associated with planning and design of safe, efficient, and affordable water supply, fire protection, wastewater collection and disposal, and solid waste disposal works in cold regions, with a view toward conditions of rural Arctic Alaska.

- Offered spring semesters.

ES A411 Northern Design 3 CR

Registration Restrictions: Senior standing or graduate standing in an accredited program in architecture or engineering, or instructor permission.

Introduction to design and maintenance of facilities in northern climates to construct sustainable, energy-efficient and durable buildings and infrastructure suitable for the unique needs of northern inhabitants.

- Offered fall semesters.

ME A685 Arctic Heat and Mass Transfer 3 CR

Prerequisites: ES A346. Registration Restrictions: Graduate standing, with a degree in engineering or physical science, or upper class standing in an accredited undergraduate program in these categories.

Application of the principles of heat and mass transfer with special emphasis on application to problems encountered in the Arctic such as ice and frost formation, permafrost, condensation, and heat loss in structures.

- Offered fall semesters.

ME A687 Arctic Materials Engineering 3 CR

Prerequisites: CE A603.

The performance of materials subjected to temperature extremes typical of the Arctic are examined. Specific topics covered include metallic and nonmetallic solids, fuels and lubricants, batteries, electrical considerations, corrosions and human performance.

- See Engineering department for next time course is offered.

UAA's Arctic Engineering Program web page: <http://www.engr.uaa.alaska.edu/programs/arctic/index.cfm>

Register at: <http://www.uaa.alaska.edu/admissions/>

Contact Hannele Zubeck at afhkhz@uaa.alaska.edu for questions.