Arctic Engineering (AE)

Courses

AE A403 Arctic Engineering 3 Credits
Introduces students to a broad spectrum of engineering challenges unique to cold regions. Discusses physical principles and practical data collection methods, analyses, designs and construction methods. Students gain a working knowledge of cold regions engineering problems and modern solutions as a basis for more detailed study.

Special Note: Not available for credit to students who have completed AE A603.

Registration Restrictions: Junior or senior standing in an accredited undergraduate program in engineering or construction management.

May Be Stacked With: AE A603

AE A603 Arctic Engineering 3 Credits
Introduces students to a broad spectrum of engineering challenges unique to cold regions. Discusses physical principles and practical data collection methods, analyses, designs, and construction methods. Students gain a working knowledge of cold regions engineering problems and modern solutions as a basis for more detailed study. Students must submit a research paper.

Special Note: Not available for credit to students who have completed AE A403.

Registration Restrictions: Graduate standing with a baccalaureate degree in engineering.

May Be Stacked With: AE A403

AE A681 Frozen Ground Engineering 3 Credits
Introduces students to 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; and pavement design, earthwork, and field investigations for frozen ground.

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

AE A682 Ice Engineering 3 Credits
Introduces students to factors governing design of engineering works contending with the presence of ice. Includes fundamental ice properties, ice processes, ice navigation and control of ice in channels, structural and non-structural ice control measures, ice jams, bearing capacity of floating ice sheets, and ice forces on riverine and ocean structures.

Registration Restrictions: Graduate standing with a baccalaureate degree in engineering or upper class standing in an accredited undergraduate program in engineering having completed a mechanics of materials course with a minimum grade of C.

AE A683 Arctic Hydrology and Hydraulic Engineering 3 Credits
Introduces students to aspects of hydrology and hydraulics unique to engineering problems of the North. Although emphasis is placed on Alaska conditions, information from Canada and other circumpolar countries is included.

Registration Restrictions: Graduate standing with a baccalaureate degree in engineering or physical science, or upper class standing in an accredited undergraduate program in engineering having completed a water resources course with a minimum grade of C.

AE A684 Arctic Utility Distribution 3 Credits
Introduces students to physical principles and current practices associated with the 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 in rural arctic Alaska.

Registration Restrictions: Graduate standing with a baccalaureate degree in engineering or upper class standing in an accredited undergraduate program in engineering, having completed a water resources course with a minimum grade of C.

AE A685 Arctic Applications of Heat and Mass Transfer 3 Credits
Introduces 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.

Registration Restrictions: Graduate standing with a baccalaureate degree in engineering or upper class standing in an accredited undergraduate program in engineering having completed a thermodynamics course with a minimum grade of C.

AE A689 Cold Regions Pavement Design 3 Credits
Design, maintenance and rehabilitation of pavement structures in cold regions where frost, snow and ice threaten expected service life.

Registration Restrictions: Graduate standing with a baccalaureate degree in engineering, or upper-class standing in an accredited undergraduate program in engineering having completed a transportation engineering course with a minimum grade of C.

AE A698 Arctic Engineering Project 3 Credits
Culminating project for MS Arctic Engineering students. The project is arranged among the advisor, graduate advisory committee and student to solve a practical cold regions engineering problem.

Registration Restrictions: Graduate standing in arctic engineering with completion of a minimum of 9 graduate AE credits.