# ENVIRONMENTAL SCIENCE (ENVS)

**ENVS S102 *Earth and Environment**
4 credits (3+3)
GER. Examines the atmospheric, hydrospheric, lithospheric, and oceanic systems that define the environment; the interactions among these systems; energy as an environmental parameter; and the effects of physical systems on the biosphere. The labs focus on measurement and description of the environment using methods from meteorology, hydrology, and earth science. Global Positioning Systems and other relevant field techniques are introduced.
**Prerequisite:** MATH S105 or concurrent enrollment.

**ENVS S110 Introduction to ArcGIS**
1 credit (1+0)
Students will use ArcGIS software to analyze spatial and tabular data and to create maps and charts that present these data.

**ENVS S111 Introduction to Differential GPS**
1 credit (1+0)
An overview of the Global Positioning System (GPS), the development of a data dictionary, data acquisition using differential GPS, and integrating GPS data into environmental applications.

**ENVS S301 Soil Science**
4 credits (3+3)
An introduction to the nature and properties of soils. Application of science and technology to the use of this natural resource and the roles in the environment.
**Prerequisite:** CHEM S105 and S106.

**ENVS S302 Glaciology**
3 credits (3+0)
Introduction to glaciers and ice sheets and their impact on the environment. Covers glacier mass balance, ice flow, basal motion, glacier hydrology, glacier-ocean interactions, and ice core records. Examines the methods used to understand glacier behavior. Special attention will be given to the wide variety of glaciers found in Alaska.
**Prerequisite:** ENVS S102 or GEOL S104; and MATH S152.

**ENVS S309 Mobile GIS Technology and Applications**
2 credits (1+2)
Extends students' basic knowledge of GPS and GIS to allow interactive GIS mapping, data collection, and analysis in the field setting. Includes training in the use of handheld computers enabled with GPS and GIS software. Design and use of field data collection forms that integrate with GIS including the transfer and use of GIS data between desktop and field. Explore the utility of mobile GIS technology in navigation, civil engineering, environmental science, forestry, and other fields. Available as ENVS S309A for one credit with no research project.
**Prerequisite:** ENVS S110 or ENVS S111 or ENVS S338.

**ENVS S309A Mobile GIS Technology and Applications**
1 credit (1+0)
ENVS S309A is a one-credit version of ENVS S309, with no research project. Extends students' basic knowledge of GPS and GIS to allow interactive GIS mapping, data collection, and analysis in the field setting.
**Prerequisite:** ENVS S110 or ENVS S111, or ENVS S338.

**ENVS S311 Technical Writing for Science Majors**
3 credits (3+0)
Covers writing in a variety of scientific and technical forms, including reports, journal articles, and grant proposals. Also learning to write for different audiences, master the art of editing, prepare work for your ENVS portfolio or other science courses, and become adept at using online bibliographic programs.
**Prerequisites:** WRTG S211 and upper division standing in a science degree program, or permission of instructor.

**ENVS S338 Introduction to Geographic Information Systems (GIS)**
3 credits (2+3)
Examines the representation of spatial data with vector object models, explores the relationship between spatial data and automated thematic mapping, and trains students in the use of GIS software.

**ENVS S375 Current Topics in Earth and Ecosystem Research**
2 credits (2+0)
Discussion of a book or series of papers on a current topic in environmental science. May be repeated for elective credit as the topic varies.
**Prerequisite:** Completion of 3 college credits in science.

**ENVS S380 Natural Disasters**
3 credits (3+0)
Investigations into natural hazards and disasters such as earthquakes, tsunami, volcanic eruptions, landslides, flooding, fires, meteorite impacts, and extreme weather. Analysis of the geologic, hydrologic, and atmospheric processes that develop them, the interplay between natural events, anthropogenic activity, and climate change, as well as disaster mitigation and adaptation.
**Prerequisite:** ENVS S102 or GEOL S104; and MATH S151 or concurrent enrollment.

**ENVS S406 Remote Sensing**
3 credits (3+0)
Identification, interpretation and measurement of physical and cultural features using remotely sensed data. Explore image enhancement and analysis, applications of remote sensing to different scientific disciplines, and an introduction to raster-based GIS.
**Prerequisite:** MATH S151.

**ENVS S407 Snow Hydrology**
4 credits (3+2)
An in-depth look at processes related to snow in mid-latitude areas. Topics include snow formation in the atmosphere, snow accumulation and distribution, snowpack metamorphism, avalanche dynamics, snowmelt runoff and chemistry, techniques for measuring snow properties, and case studies. Labs will entail collection of field data as well as analysis of data.Required labs may take place on Saturday.
**Prerequisite:** Science or geography major with upper division standing, or instructor permission.

**ENVS S410 Advanced Geographic Information Systems**
3 credits (2 + 3)
Advanced GIS examines the object models used for the representation of spatially continuous data and the analysis of those data. Specific topics include terrain models; classification; suitability analysis; utilizing imagery; local, focal and zonal functions; surface modeling, and geo-referencing.
**Prerequisite:** ENVS S338.

**ENVS S414 Biogeochemistry**
3 credits (3+0)
Explores how biological and geochemical processes affect element cycles at a variety of spatial and temporal scales. Emphasizes contemporary research in the biogeochemistry of carbon, nitrogen, sulfur, selected metals, and organic compounds of natural and anthropogenic origin.
**Prerequisite:** ENVS S102 and CHEM S106/CHEM S106L, or instructor permission.

**ENVS S416 Biogeography and Landscape Ecology**
4 credits (3+2)
An introduction to two related disciplines emphasizing a geographical focus on natural processes. Landscape ecology studies large-scale ecological patterns and processes occurring on whole landscapes. Biogeography studies species distribution in relation to environmental and historical factors. Students learn how these disciplines serve as foundations for decision making in land use planning, resource management, and biological conservation. Labs include the use of geospatial tools like GIS and remote sensing and hands-on field exercises.
**Prerequisite:** ENVS S102 or BIOL S104 or BIOL S115.

**ENVS S422 Earth's Climate System**
3 credits (3+0)
Explores how components of the Earth system influence climate. Special emphasis will be placed on thinking of the Earth as a highly coupled complex system. Topics include the global energy balance, atmospheric and ocean heat transport, ice-albedo feedback, plate tectonics, glaciations, sea level variability, the carbon cycle, and the evolution of Earth's climate.
**Prerequisite:** ENVS S102 and PHYS S123 or PHYS S211; or instructor permission.

**ENVS S430 Forest Ecosystems**
3 credits (3+0)
An exploration of the ecosystem ecology of forests around the world, with emphasis on biological characterization, nutrient dynamics, and change processes, as well as interactions with other systems such as the hydrological cycle. The roles of climate change and human management are discussed.
**Prerequisite:** ENVS S102 or BIOL S271, or instructor permission.

**ENVS S431 Forest Field Ecology Lab**
3 credits (0+6)
An immersive field course involving demonstrations and applications of several research and management measurement methods in forest ecology. Outdoor activities include utilizing several techniques such as laser mapping, soil pit excavation, biomass estimation, tree coring, and pathogen monitoring. Indoor activities include dendroclimatology and the analysis of student-collected data using the statistical software R. Local research scientists and land managers will lead field trips and will be featured as guest speakers.
**Prerequisite:** BIOL S271, or instructor permission.

**ENVS S475 Field Studies in Environmental Science**
1-4 credits variable (1-3 + 2-6)
An immersive field course with revolving topics in environmental science. May be repeated for degree credit when content differs.
**Prerequisite:** ENVS S102.

**ENVS S491 Internship:**
1-12 credits (0+0+ 4-48)
Part-time work in an approved science agency where the student is supervised by a senior employee of the agency in cooperation with the faculty advisor.

**ENVS S492 Environmental Careers Seminar**
1 credits (1+0)
This capstone seminar is a survey of career options in environmental science and environmental studies. Students will meet each week with environmental professionals and gain exposure to different applications of environmental science research as well as an understanding of the requirements for and entry points into a wide variety of environmental fields. Students will be evaluated on preparation, participation in class discussions, and an environmental career presentation.

**ENVS S496 Juneau Icefield Research Program**
6 credits (2+8)
This 8-week field course integrates field techniques in glacial geomorphology and glaciology, and explores the key relationships between the Earth, atmospheric, and climate sciences. Students will conduct original research on the icefield and present their findings at the end of the course. Research projects may be associated with ongoing research or new projects developed by the students and instructor.
**Prerequisite:** Instructor permission.

**ENVS S498 Research in Environmental Science**
1-6 credits, (0+0+ 4-24)
Individual research in the environmental sciences undertaken by a student in consultation with a member of the ENVS faculty. Student may submit research ideas, and with faculty input, develop them into a project. Requires consent of advisor and appropriate faculty sponsor, signed study contract, and instructor approval form.
**Prerequisite:** Upper division standing and signed permission forms.