

GEOL S104 – Physical Geology

Upon successful completion of this course, students will be able to:

1. Identify the common rock-forming minerals, the common rocks that form Earth's crust, and their environments of origin.
2. Explain Earth's tectonic processes, the theory of plate tectonics, Earth's internal properties, and how our planet's dynamism is linked with earthquakes and volcanic eruptions.
3. Describe fundamental concepts of Earth's surficial process, such as glacial advance and retreat, stream erosion, chemical and mechanical weathering, mass wasting, and atmospheric and oceanic circulation and chemistry, especially as they relate to climate.
4. Explain the fundamental processes governing the distribution, types, and dynamism of coastlines, ground and surface water resources, soils, landscapes, and mineral and energy resources.
5. Use various field and lab tools and instruments to collect structural, geomorphic, and geochemical data in the field and to transfer data for computational analyses using basic graphing and statistics.
Describe potential consequences of abrupt future environmental change to Earth's physical environments.

GEOL S105 – Geological History of Life

Upon successful completion of this course, students will be able to:

1. Explain the basic processes driving the evolution and extinction of life, and identify the general sequence of earth's lifeforms over the past 4 billion years
2. Identify the factors influencing climatic variations over the course of earth's history.
3. Explain how scientists reconstruct paleoclimatic conditions, and apply this knowledge to interpret modern climate change
4. Describe the rock cycle and plate tectonic processes, major atmospheric patterns, main ecoregions, and their linkages; and identify conditions conducive to fossilization of organisms.
5. Describe the scientific evidence for the origin of our universe, solar system, moon, and our planet as well its water, atmosphere, and presence of life.
6. Explain how geologists unravel the history of our planet based on evidence in the rock and fossil records.

GEOL S300 – Geology of Alaska

Upon successful completion of this course, students will be able to:

1. Explain the geologic processes of the past several hundred million years that led to the geologic assemblage of Alaska.
2. Use geologic maps of the state to interpret the structural, compositional, and geomorphic features of various regions of the state.
3. Identify locations of various geologic hazards and their underlying sources.
4. Describe the formation of energy and mineral resources throughout the state.
5. Identify how current anthropogenically-driven changes in climate and land use affect physical, chemical, and geomorphic processes, especially in coastal, permafrost, glaciated, and mined landscapes.

GEOL S301 – Geomorphology

Upon successful completion of this course, students will be able to:

1. Explain how Earth surface processes are linked with the hydrosphere, atmosphere, biosphere, and lithosphere.
2. Identify causes and consequences of both natural and anthropogenic alterations to Earth's surface.
3. Describe landform patterns and identify their controlling factors based on cartographic, geologic, climatic, and hydrologic data as well as direct observation.

GEOL S302 – Hydrology

Upon successful completion of this course, students will be able to:

1. Explain how water moves through the components of the atmospheric and terrestrial hydrologic cycle including: precipitation, evaporated water, soil water, groundwater, and streamflow.
2. Describe the catchment properties and anthropogenic drivers that influence water quality at the watershed scale.
3. Identify the unique processes that characterize the hydrologic cycle in sub-arctic and arctic watersheds.
4. Quantify the movement of water across the hydrologic cascade from atmospheric water to streamflow using field measurements and relevant datasets.

GEOL S310 – Glaciation and Climate Change

Upon successful completion of this course, students will be able to:

1. Explain basic glacial processes and glacier response to climate.
2. Use glacial landforms and other climate proxies to interpret climate variability.
3. Describe the glacial and climate histories of Southeast Alaska.

GEOL S320 – Geological Resources and the Environment

Upon successful completion of this course, students will be able to:

1. Explain the geological processes that lead to formation of mineral, energy, and groundwater resources.
2. Use geologic maps and other tools to interpret the structure, composition, and age of geological resources.
3. Identify the resource needs and impacts of renewable/recyclable geological resources.
4. Describe and quantify how extractive industries alter earth's physical, chemical, and hydrological systems and impact environmental health.