Syllabus: High Arctic Field Course, Thule, Greenland

We're looking for engaged students who are eager to learn about the Arctic, are willing to work hard, and are ready for an arctic adventure!

This three week field course will provide a comprehensive introduction to the High Arctic. Students will receive classroom instruction on current topics including climate change in the Arctic and on topics in ecology and earth sciences (as outline below). We will discuss the intertwined physical, chemical, and biological processes of the Arctic. While the lectures are important for background information, the primary activity will be daily excursions to the Thule peninsula, field studies, and experiments. Students will gain field experience in soil science, arctic vegetation and succession, geomorphology, and hydrology. They will also learn how to use instruments to measure net ecosystem gas exchange, river discharge and water chemistry, and microclimate and soil physical parameters.

We will spend the first 5 days at the Thule airbase and after this introduction to the Arctic, students and faculty will fly by helicopter to a remote valley south of Thule where a base camp will be established. This valley reveals strong terrestrial-marine interactions as several million birds (dovekies, aka little auks) nest in the talus slopes. We will tent camp in the valley for 5-6 days during which time the student will conduct small group projects focusing on their individual interests. The group will then return to the Thule Air Base for a course wrap-up and for presentation of the students' project results.

We envision that this course will bring together students of diverse backgrounds and will provide participants with a broader understanding interdisciplinary research in Arctic system science.

Travel details

Travel to Albany, NY is the only student's expense. From this point until returning to Albany, all housing, meals, and expenses will be provided by our NSF-funded project. Students are expected to arrive to Albany, New York on July 10, 2005. On July 11, the students and several faculty will fly via a military LC-130 to Kangerlussuaq, Greenland. After an overnight there, we leave the next day to Thule Air Base, arriving July 12. We will be in the vicinity of the Thule Air Base, including the 5-6 day excursion to the southern region of the Thule peninsula, until July 28 when we return to Kangerlussuaq. On July 29, we will visit around Kangerlussuaq area to compare this warmer ecosystem to that of Thule. On July 30, we return to Albany, NY.

Topic covered

The High Arctic and its role in global Climate Change

Current perspective and likely scenarios

A greener Arctic, a long-term carbon source or sink?

Climate and Geography of the Arctic

Geology of the Arctic

Vegetation of the Arctic

Landscapes & Soil Processes

Permafrost and glaciers

Pattern ground and solifluction

Soils classification

Weathering

Soil organic matter traits/dynamics

Soil microbial dynamics

Paleoclimate and paleo ice sheets

Thule glaciations

Lake cores and paleo-records

Ecology

Primary production

Species composition

High Arctic types and distribution

Soil-vegetation interactions

Water relations

Plant and soil water dynamics

Plant water sources

Biogeochemistry (elemental cycling)

Production and gas fluxes

Field Activities

- Landscape and Soil processes
- Patterned ground and vegetation and carbon distribution
- Hydrology, water cycle, from the glacier to the ocean (measure discharge, EC, pH, turbidity)
- Monitoring microclimate, instrumentation and interpretation
- Spatial properties and associations-soils, water, plants
- Long-term and successional processes, successional walk from Tuto to Thule
- Geomorphic/disturbance effects on ecosystem C loss
- The role of periglacial activity on carbon cycling
- Polar semi-desert vs. polar desert responses to snow additions-respiration, NEE
- Water relations-^{13}C, ^{18}O, role of water in the high arctic
- Marine-terrestrial linkages, bird N input effects on C cycling
- Carbon from fens to polar deserts (fluxes, stores)
- Simulated changes in climate