

Circumpolar Studies (BCS) 312: Land and Environment II Course Outline

COURSE DESCRIPTION

The primary aim of this course is to provide students with a more in-depth exploration of topics introduced in BCS 100 and BCS 311. As in those courses, this course details the science underlying key issues involving interactions between people and their environment.

COURSE OUTCOMES

Upon successful completion of Land and Environment II, students will have:

- ◆ A more detailed basic chemical and biological knowledge of the general concepts underlying selected natural resources.
- ◆ An appreciation of how scientific methods contribute to the understanding of resource management and human health.
- ◆ Insight into the complexity of environmental and human systems, and the effects of change on northern ecosystems.
- ◆ An interdisciplinary understanding of relationships between cultures of the north, stewardship values and scientific knowledge.

COURSE FORMAT

This course has been designed for web-based delivery. It consists of at least twelve modules, each comprised of a "lecture" or module text, required and suggested readings, and study questions. Students will discuss the module text in online fora. Alternatively, the course may be offered consisting of in-class lectures and discussions of readings.

ASSESSMENT

The model of student activities and assessment is as follows:

- ◆ Comprehensive final online exam. (30%) (end of course)
- ◆ Short-answer tests designed to aid the student in remaining current with material as it is introduced into the course. (3 x 10%) (weeks 2, 4 and 8)
- ◆ Short essay/report on a specific problem or issue so that the student may acquire in-depth understanding of material introduced in the course. (10%) (week 6)
- ◆ Research paper (topics assigned by instructors). (30%) (week 11)

COURSE SYLLABUS

Module 1: Frameworks for Analysis of Land and Environment in the Arctic

The application of scientific knowledge is essential in order to improve the human condition. This is especially true in the Arctic. Science draws on the wisdom of generations and constantly synthesizes new information in order to explain land and environment relations in the circumpolar North. How do environmental factors affect habitat? What role do human beings play in sustaining the Arctic ecosystem? How is human health linked to environmental change in the Arctic? These and other questions are addressed in this module.

Module 2: Biocomplexity in the North

Life on Earth is supported by the natural cycling of chemical elements. The availability and interaction of these elements on multiple scales has both direct and indirect influences on individual organisms and environmental systems. Living systems also depend on energy flow.

Understanding the sources, sinks, transformations, and feedbacks of these essential elements and energy is a critical step in determining their behaviour under specific environmental conditions. The consequences of human perturbations on essential nutrient cycles in soils, sediments, and other systems must also be recognized.

Module 3: Fisheries

This module outlines the history of fishing in Alaska from prehistoric to modern times. There are detailed descriptions of modern harvesting methods including trawling, seining, longlining, pots, and others. Fish is an excellent food and provides many nutrients that are identified and described. How fish are transformed into food and how they are stabilized against degradation through freezing or canning is described, as is the fate of the by-products of seafood processing. There are many rules and regulations by which harvesters and processors must abide. Discussions of these, as well as of sustainable harvesting and the effective monitoring of fish stocks, are also included.

Module 4: Marine Mammals and Fisheries

This module evaluates declining marine mammal populations in Alaska and the causes of such declines, as well as the science involved in counting and protecting these mammals. The module also evaluates the Endangered Species Act and the Marine Mammal Protection Act and how they interact with fisheries in Alaska. Students will identify some of the political, economic, and legal implications of the decline and the subsequent reactions.

Module 5: Natural Resources: Chemistry and Environmental Sustainability

This module examines the mineral resources of Earth's crust and identifies some metal elements that are extracted from ores. It also evaluates various alternative sources of energy, describes the origin and chemistry of the fossil fuels, and describes the environmental impacts of resource use.

Module 6: Water Supply and Waste Treatment in the Arctic

This module discusses water and waste water management options for Arctic communities. The module begins with a discussion of the relationship between clean water and disease in Arctic communities. An overview of how water is collected and treated for human consumption in the Arctic is then presented. Finally, methods for waste water treatment and disposal are discussed.

Module 7: Observations, Sustainability, and the Impacts of Change

This module evaluates international efforts to address environmental problems in the Arctic and the concept of stewardship. Furthermore, it examines scientific methods and uncertainty; reviews risk assessment; and identifies environmental threats, including pollution, climate change, and contaminants in the Arctic, and their effects on human and wildlife populations.

Module 8: Food Chemistry, Subsistence Webs, and Nutrition

In this module, the structure and properties of carbohydrates, proteins, and fats are identified; and the dietary needs for carbohydrates, fats, proteins, and vitamins are outlined. The laws of energy, caloric intake, and energy storage are examined. The presence of food additives and contaminants in the wild and in traditional foods, as well as their effect on nutrition and health, are considered.

Module 9: Diet and Mental Health of Circumpolar Peoples

The aim of this module is to promote an understanding of a possible link between changing traditional diets and mental health that may have substantial consequences for circumpolar peoples. The people living in Arctic and Subarctic environments have adapted to cold temperatures, short growing seasons, and low precipitation, but their traditional ways are now changing because of increased contact with Western society. The rapid alteration of circumpolar cultures has led to generational changes in diet from traditional foods to the processed groceries common in modern stores. This module examines the possible consequences of diet changes.

Module 10: Food Traditions and Food Systems in Rural Alaska

The study of regional food traditions and food systems is one way to understand individual and community identity and community health. In part, food system studies strive to identify and understand nutritional, physiological, and cultural dimensions of what people eat at home and in celebration, how and when food is prepared, and how food is shared among family and friends. Healthy foods harvested and consumed locally by local residents make for healthy communities.

This module examines food systems and subsistence in rural Alaska, the changes they have faced in the past 30 years, and the effects of these changes for Alaska's indigenous peoples.

Module 11: Nuclear Chemistry, Radioecology, and Stewardship

This module examines the science of nuclear chemistry and radioactivity, the effect on health of radiation, and the need for effective stewardship and containment of radioactive waste. The module further investigates the use of nuclear energy and weapons, the effects of this use on northern environments, and related ethical issues.

Module 12: Cancer and Biomarkers of Health

This module provides a brief background on cancer and its relation to environmental factors, including pollutants and the use of biomarkers in determining environmental carcinogens. The module also offers case studies, in the Arctic and around the world, to help explain incidences and complex processes of cancer.