

Circumpolar Studies (BCS) 311: Land and Environment I

Course Outline

COURSE DESCRIPTION

The primary aim of this course is to provide students with a more in-depth understanding of the land and environment that defines the Circumpolar North as well as the key issues involving interaction between humans and environment that were introduced through modules of BCS 100: Introduction to The Circumpolar World.

COURSE OUTCOMES

Upon successful completion of Land and Environment 1, students will have:

- ◆ A better understanding of the land, seas, climate, ecology, and natural resources of the Circumpolar North.
- ◆ An appreciation of how diverse methods contribute to understanding land and environment in the Circumpolar North.
- ◆ Insight into the challenges presented by the physical and natural universe, and an introduction to human influence on Land and Environment.
- ◆ A basic knowledge of Land and Environment to promote an integrated and multidisciplinary understanding in further studies of Peoples, Cultures and Contemporary issues in the Northern Studies program.

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%)
- ◆ Short-answer tests designed to aid the student in remaining current with material as it is introduced into the course. (3 x 10%)
- ◆ 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%)

- ◆ Research paper (topics assigned by instructors). (30%)

COURSE SYLLABUS

Module 1: Concepts of Nordicity

The concept of what constitutes the North has proven difficult to define precisely. The vast region of the circumpolar North includes portions of three continents—North America, Europe, and Asia—as well as the Arctic Ocean basin and its marginal seas, and the world's largest non-continent island, Greenland. Various classification schemes have been promoted to define the boundaries of the North. Several of these classification schemes will be examined in this module with a view to developing an appreciation of the various approaches adopted by researchers to define the North.

Module 2: Northern Climates

This module examines the influence of the flux of solar radiation and sensible and latent heat on northern climates. The nature and magnitude of the processes that affect temperature and precipitation are examined using examples from northern Canada.

Module 3: Northern Hydrology

This module identifies the various components of water balance and develops an understanding of the physical processes that influence precipitation, evapotranspiration, groundwater storage and flow, and surface runoff. Students will distinguish between nival, proglacial, and wetland flow regimes as illustrated in stream hydrographs and will practise interpreting these hydrographs.

Module 4: Physical Oceanography

This module examines the physiography of the polar seas, the physical processes that contribute to oceanic circulation and water mass formation, and the physical processes that influence the growth and decay of sea ice and the formation of polynyas.

Module 5: The Land

This module focuses on exogenic processes and explores the roles of glaciers and glacial processes, as well as those of permafrost and periglacial processes, in shaping northern landscapes.

Module 6: Ecological Principles

There are general scientific rules or principles that apply to ecological systems and that help you to explore them systematically. In this module, a series of basic principles are outlined as a framework for the contents of other modules. Students will consider three practical approaches that are widely applicable. Changes in one part of the system affect other parts, often causing a chain of effects, with positive or negative feedback to the original part.

Module 7: Life on Land

Life on land is a continuum that includes the wetlands, rivers, and lakes. In the Arctic, life is certainly dominated by climate, but climate is not simply temperature. H₂O in all its forms, as well as radiation and wind, each plays a part in defining climate. Location—where you are in the landscape—also has significance.

This module explores three aspects of life on land:

1. climate variation and its ecological effects
2. survival strategies of Arctic flora and fauna
3. ecosystems, food webs, and nutrients

Module 8: Life in the Ocean

This module explores some of the fundamental aspects of marine ecology and biodiversity. It begins with contrasting Arctic seas with temperate and Antarctic waters and explains a few key factors that characterize the physical marine environment. Most of the chapter, however, is devoted to a description of the Arctic marine ecosystem, from primary producers (phytoplankton, macroalgae), through grazers (zooplankton, gastropods, etc.), to fish and top predators (such as marine mammals and seabirds).

Module 9: Non-Living Natural Resources of the Arctic and Their Use

The Arctic is rich in natural resources: living and non-living, renewable and non-renewable. Human life and prosperity in the Arctic is dependent on the use of these resources, be it for sustenance consumption, export, or trade for other goods. Use of natural resources will always have some effects on the environment. Use of a non-renewable resource is fundamentally unsustainable because the resource will eventually be depleted. In order to be sustainable, the use of a renewable resource must harvest less than what is added through growth or recycling. The natural resources of the Arctic and their use will be discussed in this module. This module will explore non-living resources—water, oil and gas, and minerals—and their use.

Module 10: Living Terrestrial Resources of the Arctic and Their Use

This module focuses on the terrestrial living resources, including the northern boreal forest and its use; the grasslands and lichen heaths and related agriculture and reindeer husbandry; and, finally, the hunt of terrestrial wildlife.

Module 11: Living Resources in the Arctic Marine Environment

In general, the harvest of marine wild species is the single most important form of natural resource use across all the regions and peoples of the Arctic. Commercial fisheries, including whaling and sealing, are currently and historically a major economic activity. The fisheries are conducted in two major ocean systems—the North Atlantic Ocean and the Bering Sea. This module will explore these fisheries, their national importance, the type and amount of fish caught, and the status of these resources. It will also discuss the history of commercial whaling and sealing to some degree, as well as the

subsistence use of marine living resources, especially whales and seals, by indigenous peoples and local residents.

Module 12: Arctic Biodiversity in a Global Context

In this module, students will identify the main features that distinguish Arctic biodiversity from those in similar environments and in other biomes of the world; and assess the causes and threats to biodiversity in the Arctic compared to other regions of the globe and the potential impacts of these threats. The module will further discuss conservation efforts and the Arctic Climate Impact Assessment (ACIA).

Module 13: Conservation in the Arctic

This module explores various approaches to nature conservation with a focus on habitat and species conservation, co-management, and environmental impact assessments. Protected areas represent the most common habitat conservation approaches worldwide. The network of protected areas in Arctic countries is described and discussed as well as species conservation instruments, such as Red Lists. On a global and regional Arctic scale, there are several intergovernmental conventions and treaties that aim to protect biodiversity in its various forms. These are briefly identified, with a focus on the recently established Arctic Council, which provides a forum for the Arctic nations to discuss environmental protection and sustainable development initiatives in the region.