Environmental Science (ENSC) 510

Earth System Science (Revision 1)

Status:	Replaced with new revision, see the **course listing** for the current revision
Delivery mode:	**Individualized study online**. Delivered via Brightspace.
Credits:	3
Area of study:	Science
Prerequisite:	None
Precluded:	None

Faculty:	**Faculty of Science and Technology**
Notes:	To take this graduate-level course, you must apply and be approved to one of the graduate programs or as a non-program **Centre for Science** graduate student. Minimum admission requirements must be met. Undergraduate students who do not meet the admission requirements will not normally be permitted to take this course.

Overview

Environmental Science 510: Earth System Science introduces the fundamentals of Earth system science, which is a multi-disciplinary field that studies the interactions between Earth's major spheres—geosphere, atmosphere, hydrosphere, and biosphere—to understand environmental changes and solve problems.

Outline

ENSC 510 is divided into six units:

- Unit 1: The Earth System

- Unit 2: The Geosphere
- Unit 3: The Hydrosphere
- Unit 4: The Atmosphere
- Unit 5: The Biosphere
- Unit 6: The Anthroposphere

Learning outcomes

Upon successful completion of this course, you should be able to

- describe how Earth system science studies the entire planet as a system of interrelated parts.
- review the role played by energy in the Earth system.
- discuss plate tectonics as the unifying concept behind multiple Earth processes.
- analyze the reservoirs and pathways of the hydrologic cycle.
- investigate the pivotal role played by water in human society.
- evaluate the current composition and structure of the Earth’s atmosphere.
- analyze Earth’s natural climatic variations from the past and their causative ages.
- investigate the basic processes and necessities of life, including metabolism, reproduction, growth, and evolution.
- evaluate how life emerged on Earth and how it has affected the Earth system.
- reflect on the global-scale impacts of human activity on the Earth system.

Evaluation

To **receive credit** for ENSC 510, you must achieve a course composite grade of at least **B– (70 percent)** and a grade of at least B– (70 percent) on the midterm paper and final paper, as well as an average grade of at least B– (70 percent) on the three assignments.

The weighting of the composite grade is as follows:

Activity	Weight
Assignment 1	15%
Assignment 2	15%
Midterm paper	20%
Assignment 3	15%
Final paper	35%
Total	**100%**

Materials

Digital course materials

Links to the following course materials will be made available in the course:

Skinner, B. J., & Murck, B. W. (2011). *The blue planet: An introduction to Earth system science* (3rd ed.). Wiley.

Important links

- **Important Dates and Deadlines**
- **MSc ESS Contact Information**
- **MSc ESS Program Regulations**

Athabasca University reserves the right to amend course outlines occasionally and without notice. Courses offered by other delivery modes may vary from their individualized study counterparts.

Opened in Revision 1, July 3, 2025

Updated June 16, 2026