

Environmental Problem Solving I Syllabus

Department of Earth and Environmental Sciences

ENVS 3501 Fall 2026

Dalhousie University operates in the unceded territories of the Mi'kmaw, Wolastoqey, and Peskotomuhkati Peoples. These sovereign nations hold inherent rights as the original peoples of these lands, and we each carry collective obligations under the Peace and Friendship Treaties. Section 35 of the Constitution Act, 1982, recognizes and affirms Aboriginal and Treaty rights in Canada.

We recognize that African Nova Scotians are a distinct people whose histories, legacies, and contributions have enriched the part of Mi'kma'ki known as Nova Scotia for over 400 years.

Course Instructor

Name	Email	Student Hours
Dr. Caroline Franklin (she/her)	Caroline.Franklin@dal.ca	By appointment (email to schedule)

Course Description

This course introduces students to concepts and methods for analyzing environmental problems. Students will learn analytical approaches for problem solving that are appropriate for a wide range of environmental issues and apply these to the analysis of case studies.

Course Prerequisites

ENVS 1100.03 and ENVS 1200.03 (with a grade of B- or higher in each) or SUST 1000.06 or SUST 1001.06 (with a grade of B- or higher). Must be a 3rd year student OR have permission of instructor.

Course Structure

Course Delivery

In-person (attendance is mandatory and lectures will not be recorded)

Lectures

Thursdays 14:35 - 17:25 in LSC - Common Area C338

Format

This course uses a “flipped classroom” strategy for student-centred learning. Instead of passively listening to lectures, students actively engage in the course material during class time. Students are responsible for completing assigned tasks prior to class so that they are prepared to discuss and apply course material to problem solving during class.

The “team-based learning (TBL)” technique enables students to learn in strategically organized teams¹. Before any in-class work, students must study assigned reading materials because of the readiness assurance process (RAP) that provides the foundation for individual and team accountability. The RAP consists of:

1. A short multiple-choice *individual* Readiness Assurance Test (**IRAT**), which is a quiz that considers the key concepts from the readings
2. The same quiz answered as a *team* (**TRAT**) whereby teams reach consensus on answers
3. Feedback on test results
4. Instructor feedback/lecture (usually short and specific) whereby the instructor clarifies any misperceptions that become apparent during the IRAT/TRAT

Once the RATs are completed, the remainder (and the majority) of the learning unit is spent on “application activities” that promote learning, encourage team development, and require students to practice using the course content. Students are expected to accept responsibility for the initial exposure to the course content so that they are prepared for in-class teamwork.

The 4 essential components of TBL that make it successful are as follows:

1. Intentional teams: The instructor will create teams comprised of members with different backgrounds. Educational research has illuminated the positive impact of diverse input in problem-solving discussions on both learning and performance.
2. High levels of individual and group accountability: Instead of being accountable solely to the instructor, TBL requires students to be accountable to their teammates, and teams to be accountable for their joint work. This encourages preparation, as students should not disappoint their teammates (unpreparedness hurts the team, hinders development of cohesiveness, and breeds resentment).
3. Frequent and immediate feedback: Feedback is essential to learning and has a tremendous impact on group development. TBL uses multiple choice test forms and active debate/discussion in class on team decisions and justifications.
4. Assignments that promote both learning and team development: Team assignments are designed to generate a high level of interaction. They require teams to use course concepts to make decisions that involve a complex set of issues and report their decisions in a simple form. When assignments emphasize decision making, students complete tasks by engaging each other in a give-and-take content-related discussion and motivating members to challenge others’ ideas for the benefit of the team.

TBL student benefits including enhanced critical thinking skills² and increased confidence³ are well proven. In addition to ensuring that students master the basic course content, TBL enables numerous outcomes that are otherwise challenging in a lecture-based course format and rarely achieved with any other small group-based instructional approach. When TBL is implemented, students can progress considerably beyond simply acquiring factual knowledge and achieve a depth of understanding that can occur only by solving a series of problems that are too complex for even the best students to complete through their individual effort. Furthermore, students develop a deep and abiding appreciation of the value of teams for solving difficult and complex problems. They can gain profound insights into their strengths and weaknesses as learners and as team members.

¹Michaelsen, L., K., and Sweet, M. 2008. The essential elements of team-based learning. *New Directions for Teaching and Learning* 116: 7-27.

²Espey, M. 2018. Enhancing critical thinking using team-based learning. *Higher Education Research and Development* 37: 15-29.

³DiFrancesca, H. 2020. Interactive, team-based learning environment enhances students learning and confidence. *The FASEB Journal* 34: 1.

Course Materials

Students are required to check Brightspace regularly for readings, announcements, grades, materials, and other information.

Students must bring a Wi-Fi-enabled **laptop** computer to class for this course, owing to the extensive use of Brightspace, online readings, in-class quizzes, digital resources, and in-class exercises. Students should not purchase a laptop for this course and are asked to contact the instructor if they do not have a laptop available for class.

There is no required textbook for this course. Instead, required readings will be posted to Brightspace. It is expected that all assigned readings for a given week are completed **BEFORE** the class for which they are assigned. A student who does not complete the readings prior to lecture greatly impacts in-class learning opportunities and diminishes the experience of other students.

Assessment

Assessment	Due date	Weight (% of final grade)
Assignments		
Individual		
Problem-solving manifesto	September 18 at 11:59 pm AT	5%
Peer evaluation	December 8 at 11:59 pm AT	2%
Manifesto reflection	December 10 at 11:59 pm AT	8%
Group		
Assignment 1	September 17 in class	5%
Assignment 2	September 24 in class	5%
Assignment 3	October 1 in class	5%
Assignment 4	October 8 in class	5%
Assignment 5	October 15 in class	5%
Assignment 6	October 22 in class	5%
Assignment 7	October 29 in class	5%
Assignment 8	December 7 at 11:59 pm AT	15%
Quizzes		
Individual		
IRATs 1 - 7 ^a	September 17 - October 29	24% (4% each; best 6 of 7)
Group		
TRATs 1 - 7 ^b	September 17 - October 29	6% (1% each; best 6 of 7)
Final presentation	December 3 in class	5%

^aIRATs (Individual Readiness Assurance Tests) must be submitted **prior to the start of each class (14:30)**

^bTRATs (Team Readiness Assurance Tests) must be submitted as a team **during each class (allocated time at the beginning of class)**

Other course requirements

Students are required to attend all classes and complete the mandatory background quiz on Brightspace the first week of classes.

Conversion of numerical grades to final letter grades follows the undergraduate

<u>Dalhousie Grade Scale</u>			
A+ (90-100)	B+ (77-79)	C+ (65-69)	D (50-54)
A (85-89)	B (73-76)	C (60-64)	F (0-49)
A- (80-84)	B- (70-72)	C- (55-59)	

Course Policies on Missed or Late Academic Requirements

- Late assignments will be deducted 10%/day including weekends up to a maximum of six days, after which a grade of zero will be assigned, unless a Student Declaration of Absence Form was submitted to the instructor by email at least one week prior to the assignment deadline
- Missed quizzes (i.e., failure to submit quiz prior to deadline) will receive a grade of zero; however, only the 6 of 7 IRATS and TRATS with the highest grades will be counted towards the final grade
- A student will receive a grade of zero when their team submits a TRAT in their absence
- Students will receive a grade of zero for the final presentation if they are absent from class on the presentation date (December 3)
- If a student is unable to attend class/submit assessment, they must notify the instructor by email prior to class/submission deadline and email a Student Declaration of Absence Form to the instructor as soon as possible and by no later than three days after the missed class/submission deadline or a grade of zero will be assigned for the missed assessment
- Students may not submit the Student Declaration of Absence form more than twice

Course Policies related to Academic Integrity & Artificial Intelligence

Students are expected to complete individual assignments and quizzes (IRATS) independently. For team assessments, team quizzes (TRATS), and the final presentation, students are expected to collaborate with their teammates to learn from each other and share responsibilities.

Students are not allowed to use generative AI in this course. If generative AI is used, it will be considered an academic integrity offence, and the student will be subject to appropriate disciplinary and/or corrective measures. Each group member is responsible for ensuring generative AI was not used for the entirety of group submissions (i.e., a student is not only responsible for their contribution to the submission).

Learning Objectives

- Identify and describe “wicked” environmental problems
- Understand the process of claims making and the concept of systems thinking
- Investigate the complex interactions between economic, environmental, and social dimensions of environmental problems
- Reflect on personal beliefs and values
- Apply structured decision making to a current environmental problem
- Provide constructive peer feedback
- Develop interpersonal, teamwork, communication, and critical thinking skills

Course Content

Date	Topic	Required readings* (listed in recommended order)
September 10	Introduction	Syllabus
September 17	Problem Definition & Framing	Miller 1999; Bardwell 1991
September 24	Claims Making	Hannigan 2006
October 1	Systems & Leverage Points	Meadows 1999; Fischer & Riechers 2019; Abson et al. 2017
October 8	Scientific Framework	National Academy Press 1986; Dennison 2008
October 15	Economic Degrowth & Localism	Rees 2014
October 22	Collaboration & Uncertainty in Governance	Bodin 2017; Dewulf & Biesbroek 2018
October 29	Public Perceptions & Actions	Chan et al. 2016; Singh et al. 2017; Wynes & Nicholas 2017
November 5	Structured Decision Making	-
November 12	No class (Fall Break)	
November 19	Structured Decision Making	-
November 26	Structured Decision Making	-
December 3	Team Oral Presentations	-

Please note that this schedule is tentative and subject to change.

*Readings are posted on Brightspace

Course Accessibility

Students should contact the [Student Accessibility Centre](#) if they want to begin the process of requesting a formal academic accommodation.

Students are eligible for accommodations based on [protected characteristics](#) such as religion. If you have [religious, cultural, or community-significant observances](#) that conflict with course requirements, contact the instructor as soon as possible to collaboratively find alternatives for completing the course requirements.

Syllabus Appendix

Syllabus Appendix: Student Supports & University Statements, Policies, and Guidelines