Environmental Problem Solving I Syllabus
Department of Earth and Environmental Sciences
ENVS 3501 Fall 2025

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 C238

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 teams[1]. 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 skills[2] and increased confidence[3] 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.

[1] Michaelsen, L., K., and Sweet, M. 2008. The essential elements of team-based learning. New Directions for Teaching and Learning 116: 7-27.
[2] Espey, M. 2018. Enhancing critical thinking using team-based learning. Higher Education Research and Development 37: 15-29.
[3] DiFrancesca, 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	October 5 at 11:59 pm AT	7%
Peer evaluation	December 8 at 11:59 pm AT	2%
Manifesto reflection	December 10 at 11:59 pm AT	7%
Group		
Assignment 1	October 2 in class	6%
Assignment 2	October 9 in class	6%
Assignment 3	October 16 in class	6%
Assignment 4	October 23 in class	6%
Assignment 5	October 30 in class	6%
Assignment 6	December 5 at 11:59 pm AT	20%
Quizzes		
Individual		
IRATs 1 - 5[a]	October 2 - October 30	20% (5% each; best 4 of 5)
Group		
TRATs 1 - 5[b]	October 2 - October 30	4% (1% each; best 4 of 5)
Final presentation	December 4 in class	10%

[a]IRATs (Individual Readiness Assurance Tests) must be submitted **prior to the start of each class (14:30)**
[b] TRATs (Team Readiness Assurance Tests) must be submitted as a team **during each class (allocated time at the beginning of class)**

DALHOUSIE UNIVERSITY

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 Dalhousie Grade Scale

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 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 4 of 5 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 4)
- 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

Course Policies related to Academic Integrity

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.

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 25	Introduction	Syllabus
October 2	Problem Definition & Claims Making	Miller 1999; Bardwell 1991; Hannigan 2006
October 9	Systems & Leverage Points	Meadows 1999; Fischer & Riechers 2019; Abson et al. 2017
October 16	Scientific Framework	National Academy Press 1986; Dennison 2008
October 23	Collaboration & Uncertainty in Governance	Bodin 2017; Dewulf & Biesbroek 2018
October 30	Public Perceptions & Actions	Chan et al. 2016; Singh et al. 2017; Wynes & Nicholas 2017
November 6	Structured Decision Making	-
November 13	No class (Fall Break)	
November 20	Structured Decision Making	-
November 27	Structured Decision Making	-
December 4	Team Oral Presentations	-

Please note that this schedule is tentative and subject to change.
*Readings are posted on Brightspace

Student Resources and Support

University Policies and Programs

Important Dates in the Academic Year (including add/drop dates): http://www.dal.ca/academics/important_dates.html

Classroom Recording Protocol: https://www.dal.ca/content/dam/www/about/leadership-and-governance/university-policies/class-recording-protocol.pdf

Dalhousie Grading Practices Policies: https://www.dal.ca/content/dam/www/about/leadership-and-governance/university-policies/grading-practices-policy.pdf

Grade Appeal Process: https://www.dal.ca/campus_life/academic-support/grades-and-student-records/appealing-a-grade.html

Sexualized Violence Policy: https://www.dal.ca/content/dam/www/about/leadership-and-governance/university-policies/sexualized-violence-policy.pdf

Scent-Free Program: https://www.dal.ca/dept/safety/programs-services/occupational-safety/scent-free.html

Learning and Support Resources

General Academic Support – Advising (Halifax): https://www.dal.ca/campus_life/academic-support/advising.html

General Academic Support – Advising (Truro): https://www.dal.ca/campus_life/ssc.html

Student Health & Wellness Centre: https://www.dal.ca/campus_life/health-and-wellness.html

On Track (helps you transition into university, and supports you through your first year at Dalhousie and beyond): https://www.dal.ca/campus_life/academic-support/On-track.html

Indigenous Student Centre: https://www.dal.ca/campus_life/communities/indigenous.html

Mi'kmaq and Indigenous Relations: https://www.dal.ca/about/mission-vision-values/mikmaq-indigenous-relations.html

Elders-in-Residence (The Elders in Residence program provides students with access to First Nations elders for guidance, counsel, and support. Visit the office in the Indigenous Student Centre or contact the program at elders@dal.ca or 902-494-6803: https://www.dal.ca/about/mission-vision-values/mikmaq-indigenous-relations/elders-in-residence-and-traditional-knowledge-keepers.html

Black Student Advising Centre: https://www.dal.ca/campus_life/communities/black-student-advising.html

International Centre: https://www.dal.ca/campus_life/international-centre.html

LGBTQ2SIA+ Collaborative: https://www.dal.ca/about/mission-vision-values/equity-diversity-inclusion-and-accessibility/about-office-equity-inclusion/community-specific-groups/lgbtq2sia-collaborative.html

Dalhousie Libraries: http://libraries.dal.ca/

Copyright Office: https://libraries.dal.ca/services/copyright-office.html

Dalhousie Student Advocacy Services: https://www.dsu.ca/dsas?rq=student%20advocacy

Dalhousie Ombudsperson: https://www.dal.ca/campus_life/safety-respect/ombudsperson.html

Human Rights and Equity Services: https://www.dal.ca/about/mission-vision-values/equity-diversity-inclusion-and-accessibility/about-office-equity-inclusion/human-rights-and-equity-services.html

Writing Centre: https://www.dal.ca/campus_life/academic-support/writing-and-study-skills.html

Study Skills/Tutoring: http://www.dal.ca/campus_life/academic-support/study-skills-and-tutoring.html

Faculty of Science Advising Support: https://www.dal.ca/faculty/science/current-students/undergrad-students/degree-planning.html

Safety

Biosafety: http://www.dal.ca/dept/safety/programs-services/biosafety.html

Chemical Safety: https://www.dal.ca/dept/safety/programs-services/chemical-safety.html

Radiation Safety: http://www.dal.ca/dept/safety/programs-services/radiation-safety.html

Laser Safety: https://www.dal.ca/dept/safety/programs-services/radiation-safety/laser-safety.html

University Policies and Statements

Recognition of Mi'kmaq Territory

Dalhousie University would like to acknowledge that the University is on Traditional Mi'kmaq Territory. The Elders in Residence program provides students with access to First Nations elders for guidance, counsel, and support. Visit or e-mail the Indigenous Student Centre at 1321 Edward St or elders@dal.ca. Additional information regarding Mi'kmaq and Indigenous Relations (including the Elders in Residence program, Land Acknowledgements, Understanding Our Roots, and much more) can be found at: https://www.dal.ca/about/mission-vision-values/mikmaq-indigenous-relations.html

Internationalization

At Dalhousie, 'thinking and acting globally' enhances the quality and impact of education, supporting learning that is "interdisciplinary, cross-cultural, global in reach, and orientated toward solving problems that extend across national borders." Additional internationalization information can be found at: https://www.dal.ca/about/mission-vision-values/global-relations.html

Academic Integrity

At Dalhousie University, we are guided in all our work by the values of academic integrity: honesty, trust, fairness, responsibility, and respect. As a student, you are required to demonstrate these values in all the work you do. The University provides policies and procedures that every member of the university community is required to follow to ensure academic integrity. Additional academic integrity information can be found at: https://www.dal.ca/dept/university_secretariat/academic-integrity.html

Accessibility

The Student Accessibility Centre is Dalhousie's centre of expertise for matters related to student accessibility and accommodation. If there are aspects of the design, instruction, and/or experiences within this course (online or in-person) that result in barriers to your inclusion, please contact the Student Accessibility Centre (https://www.dal.ca/campus_life/academic-support/accessibility.html) for all courses offered by Dalhousie with the exception of Truro. For courses offered by the Faculty of Agriculture, please contact the Student Success Centre in Truro (https://www.dal.ca/campus_life/ssc.html).

Conduct in the Classroom – Culture of Respect

Substantial and constructive dialogue on challenging issues is an important part of academic inquiry and exchange. It requires willingness to listen and tolerance of opposing points of view. Consideration of individual differences and alternative viewpoints is required of all class members, towards each other, towards instructors, and towards guest speakers. While expressions of differing perspectives are welcome and encouraged, the words and language used should remain within acceptable bounds of civility and respect.

Diversity and Inclusion – Culture of Respect

Every person at Dalhousie has a right to be respected and safe. We believe inclusiveness is fundamental to education. We stand for equality. Dalhousie is strengthened in our diversity. We are a respectful and inclusive community. We are committed to being a place where everyone feels welcome and supported, which is why our Strategic Direction prioritizes fostering a culture of diversity and inclusiveness (Strategic Priority 5.2). Additional diversity and inclusion information can be found at: https://www.dal.ca/about/mission-vision-values/equity-diversity-inclusion-and-accessibility/about-office-equity-inclusion.html

Student Code of Conduct

Everyone at Dalhousie is expected to treat others with dignity and respect. The Code of Student Conduct allows Dalhousie to take disciplinary action if students don't follow this community expectation. When appropriate, violations of the code can be resolved in a reasonable and informal manner - perhaps through a restorative justice process. If an informal resolution can't be reached, or would be inappropriate, procedures exist for formal dispute resolution. The full Code of Student Conduct can be found at: https://www.dal.ca/content/dam/www/about/leadership-and-governance/governing-bodies/code-student-conduct.pdf

Fair Dealing Policy

The Dalhousie University Fair Dealing Policy provides guidance for the limited use of copyright protected material without the risk of infringement and without having to seek the permission of copyright owners. It is intended to provide a balance between the rights of creators and the rights of users at Dalhousie. Additional information regarding the Fair Dealing Policy can be found at: https://www.dal.ca/content/dam/www/about/leadership-and-governance/university-policies/fair-dealing-policy.pdf

Student Use of Course Materials

Course materials are designed for use as part of this course at Dalhousie University and are the property of the instructor unless otherwise stated. Third party copyrighted materials (such as books, journal articles, music, videos, etc.) have either been licensed for use in this course or fall under an exception or limitation in Canadian Copyright law. Copying this course material for distribution (e.g. uploading to a commercial third-party website) may lead to a violation of Copyright law.