

# Environmental Problem Solving I Syllabus

## Department of Earth and Environmental Sciences

ENVS 3501 Fall 2024

*Dalhousie University acknowledges that we are in Mi'kma'ki, the ancestral and unceded territory of the Mi'kmaq People and pays respect to the Indigenous knowledges held by the Mi'kmaq People, and to the wisdom of their Elders past and present. The Mi'kmaq People signed Peace and Friendship Treaties with the Crown, and section 35 of the Constitution Act, 1982 recognizes and affirms Aboriginal and Treaty rights. We are all Treaty people.*

*Dalhousie University also acknowledges the histories, contributions, and legacies of African Nova Scotians, who have been here 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

Mondays 8:35 – 11:25 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<sup>1</sup>. 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<sup>2</sup> and increased confidence<sup>3</sup> 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.

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

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

<sup>3</sup>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)
<b>Assignments</b>		
Individual		
Problem-solving manifesto	September 25 at 11:59 pm AT	5%
Peer evaluation	December 4 at 11:59 pm AT	3%
Manifesto reflection	December 5 at 11:59 pm AT	7%
Group		
Assignment 1	September 16 in class	5%
Assignment 2	September 23 in class	5%
Assignment 3	October 7 in class	5%
Assignment 4	October 21 in class	5%
Assignment 5	October 28 in class	5%
Assignment 6	November 4 in class	5%
Assignment 7	November 18 in class	5%
Assignment 8	December 4 at 11:59 pm AT	15%
<b>Quizzes</b>		
Individual		
IRATs 1 - 7 <sup>a</sup>	September 16-November 18	24% (4% each; best 6 of 7)
Group		
TRATs 1 - 7 <sup>b</sup>	September 16-November 18	6% (1% each; best 6 of 7)
<b>Final presentation</b>	December 4 in class	5%

<sup>a</sup>IRATs (Individual Readiness Assurance Tests) must be submitted **prior to the start of each class (14:30)**

<sup>b</sup>TRATs (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 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 or in person 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 (November 28)
- 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 9	Introduction	Syllabus
September 16	Problem Definition & Framing	Miller 1999; Bardwell 1991
September 23	Claims Making	Hannigan 2006
September 30	No class (University closed for National Day for Truth and Reconciliation)	
October 7	Systems & Leverage Points	Meadows 1999; Fischer & Riechers 2019; Abson et al. 2017
October 14	No class (University closed for Thanksgiving Day)	
October 21	Scientific Framework	National Academy Press 1986; Dennison 2008
October 28	Economic Degrowth & Localism	Rees 2014
November 4	Collaboration & Uncertainty in Governance	Bodin 2017; Dewulf & Biesbroek 2018
November 11	No class (University closed for Remembrance Day; Fall Study Break)	
November 18	Public Perceptions & Actions	Chan et al. 2016; Singh et al. 2017; Wynes & Nicholas 2017
November 25	Structured Decision Making	-
December 2	Structured Decision Making	-
December 3	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

### University Policies and Programs

Important Dates in the Academic Year (including add/drop dates):

[http://www.dal.ca/academics/important\\_dates.html](http://www.dal.ca/academics/important_dates.html)

Classroom Recording Protocol:

[https://www.dal.ca/dept/university\\_secretariat/policies/academic/classroom-recording-protocol.html](https://www.dal.ca/dept/university_secretariat/policies/academic/classroom-recording-protocol.html)

Dalhousie Grading Practices Policies:

[https://www.dal.ca/dept/university\\_secretariat/policies/academic/grading-practices-policy.html](https://www.dal.ca/dept/university_secretariat/policies/academic/grading-practices-policy.html)

Grade Appeal Process: [https://www.dal.ca/campus\\_life/academic-support/grades-and-student-records/appealing-a-grade.html](https://www.dal.ca/campus_life/academic-support/grades-and-student-records/appealing-a-grade.html)

Sexualized Violence Policy: [https://www.dal.ca/dept/university\\_secretariat/policies/health-and-safety/sexualized-violence-policy.html](https://www.dal.ca/dept/university_secretariat/policies/health-and-safety/sexualized-violence-policy.html)

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](https://www.dal.ca/campus_life/academic-support/advising.html)

General Academic Support – Advising (Truro): <https://www.dal.ca/about-dal/agricultural-campus/ssc/academic-support/advising.html>

Student Health & Wellness Centre: [https://www.dal.ca/campus\\_life/health-and-wellness.html](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](https://www.dal.ca/campus_life/academic-support/On-track.html)

Indigenous Student Centre: [https://www.dal.ca/campus\\_life/communities/indigenous.html](https://www.dal.ca/campus_life/communities/indigenous.html)

Indigenous Connection: <https://www.dal.ca/about-dal/indigenous-connection.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](mailto:elders@dal.ca) or 902-494-6803: <https://cdn.dal.ca/content/dam/dalhousie/pdf/academics/UG/indigenous-studies/Elder-Protocol-July2018.pdf>

Black Student Advising Centre: [https://www.dal.ca/campus\\_life/communities/black-student-advising.html](https://www.dal.ca/campus_life/communities/black-student-advising.html)

International Centre: [https://www.dal.ca/campus\\_life/international-centre.html](https://www.dal.ca/campus_life/international-centre.html)

South House Sexual and Gender Resource Centre: <https://southhousehalifax.ca/about/>

LGBTQ2SIA+ Collaborative: <https://www.dal.ca/dept/vpei/edia/education/community-specific-spaces/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/student-rights-and-responsibilities/where-to-get-help/ombudsperson.html](https://www.dal.ca/campus_life/safety-respect/student-rights-and-responsibilities/where-to-get-help/ombudsperson.html)

Human Rights and Equity Services: <https://www.dal.ca/dept/hres.html>

Writing Centre: [https://www.dal.ca/campus\\_life/academic-support/writing-and-study-skills.html](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](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](mailto:elders@dal.ca). Additional information regarding the Indigenous Student Centre can be found at: [https://www.dal.ca/campus\\_life/communities/indigenous.html](https://www.dal.ca/campus_life/communities/indigenous.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-dal/internationalization.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](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](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/about-dal/agricultural-campus/student-success-centre.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: <http://www.dal.ca/cultureofrespect.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/dept/university\\_secretariat/policies/student-life/code-of-student-conduct.html](https://www.dal.ca/dept/university_secretariat/policies/student-life/code-of-student-conduct.html)



## **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/dept/university\\_secretariat/policies/academic/fair-dealing-policy-.html](https://www.dal.ca/dept/university_secretariat/policies/academic/fair-dealing-policy-.html)

## **Originality Checking Software**

The course instructor may use Dalhousie's approved originality checking software and Google to check the originality of any work submitted for credit, in accordance with the Student Submission of Assignments and Use of Originality Checking Software Policy. Students are free, without penalty of grade, to choose an alternative method of attesting to the authenticity of their work and must inform the instructor no later than the last day to add/drop classes of their intent to choose an alternate method. Additional information regarding Originality Checking Software can be found at:

[https://www.dal.ca/dept/university\\_secretariat/policies/academic/student-submission-of-assignments-and-use-of-originality-checking-software-policy-.html](https://www.dal.ca/dept/university_secretariat/policies/academic/student-submission-of-assignments-and-use-of-originality-checking-software-policy-.html)

## **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.