

# Cutting Edge in Marine Science Syllabus

## Department of Biology

MARI 4350/5350 Winter 2024/25

*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(s)

Name	Email	Office Hours
Boris Worm (Instructor)	Boris.Worm@dal.ca	After class or by appointment
Heike Lotze (Instructor)	Heike.Lotze@dal.ca	After class or by appointment
Zoya Tyabji (TA)	Zoya.Tyabji@dal.ca	After class or by appointment

### Course Description

This course focuses on current, often hotly debated topics in marine science. The goal is to explore what specific topics are dominating the field of marine science now and where they will be heading in the near future. We intend for students to become comfortable in exploring research areas that are so novel that little is known and much of what we think we know is hypothetical. We explore these rapidly growing research areas by discussing recently published papers and current research initiatives on urgent issues, including biodiversity, oceanography, conservation, management, climate change, ocean education, and human-ocean interactions. Class format includes lectures, case-studies, as well as active discussion, debates, group work and hands-on assignments.

#### *Course Prerequisites for undergraduate students*

BIOL 2060.03 and OCEA 2000X/Y.06 (or OCEA 2001.03 and OCEA 2002.03) and one of the following: BIOL 3065.03 or MARI 3063.03 or MARI 3080.03 or MARI 3602.03 or MARI 3761.03.

#### *Course Prerequisites for graduate students*

None.

#### *Course Exclusions*

None.

## Student Resources

All necessary information for this course will be posted on Brightspace:

[Homepage - MARI5350 MARI4350 - Cutting Edge Marine Science - Sec: 01 - 2024/2025 Winter \(brightspace.com\)](#)

Please read the Class Schedule and this Course Syllabus before the first class.

See also the Faculty of Science "Student Resources and Support" section below (page 11-12).

## Course Structure

### *Course Delivery*

Lectures & Tutorials will be in-person and often interactive and interspersed, thus in-class attendance is required for the entire 1.5-hour sessions:

- Attendance is required, sessions will not be recorded.
- Lecture slides will be posted as pdfs on Brightspace after each session.
- For some Tutorials, students will need to prepare activities beforehand, which will be announced and posted ahead of time.
- Assignments and their instructions will be introduced in class and posted on Brightspace.

Contact with instructors and TA:

- There is time after each session to ask questions in person.
- Use the discussion board on Brightspace to ask questions.
- Email us with any other questions or concerns, or to schedule an individual meeting.

### *Lectures & Tutorial*

Wednesdays & Fridays: 11:35-12:55, LSC C216

## Course Materials

All relevant materials and information will be posted and can be accessed via Brightspace website: [Homepage - MARI5350 MARI4350 - Cutting Edge Marine Science - Sec: 01 - 2024/2025 Winter \(brightspace.com\)](#)

Literature reading assignments (all students) will be introduced & selected in the 1st class of the term.

Research project assignments (undergraduate students) and Graduate student assignments will be introduced in the 2nd class of the term.

All lecture slides will be available as pdf files that can be accessed on any laptop or personal computer.

## Assessment

To account for different knowledge levels of undergraduate and graduate students, we will have different *major* assignments for each group (short written & oral presentations vs entire lecture), yet similar *minor* assignments and contributions to common components (literature review, participation, final exam).

### MAJOR COURSE ASSIGNMENT for Undergraduate Class:

Undergraduate students will engage in developing a research project proposal on a cutting-edge topic that is of interest to them and prepare a **2-part assignment** that contains:

1. A **written research proposal** outlining a novel and self-created research project idea that clearly advances our understanding of a cutting-edge topic in marine science. This research idea should be presented with (i) some introductory background that identifies its importance and where the science gaps are, (ii) a clearly defined research question and hypothesis, (iii) sufficient details on the method that is proposed to collect the data and answer the research question, (iv) a description of anticipated outcomes, and (v) a discussion of how this project would benefit the scientific enterprise and/or society at large.
2. An **oral presentation** that presents and discusses the same novel research project idea to the class. This should contain all main elements outlined for the written research proposal (i-v), communicate the importance of this topic to a scientific audience and highlight its relevance for the general public.

During the second half of term students will explore and discuss their ideas in class with peers and instructors (Research Briefs, Feb 26 & Feb 28). The **oral presentation will be 8-10 minutes long** (depending on # of students) and **due on March 21, 26, or 28** (depending on schedule), and will be discussed and critiqued by the class. The **written proposal is due one week after their oral presentation** to allow for incorporating feedback and discussion points.

The major course assignment **can be completed individually or in a group of 2-3 students**. If students choose a group assignment, they need to inform course instructors before Feb 26. The same grade will be given to all students in that group. More time (up to 5 minutes per student, 10-15 mins total) can be allotted for group presentations.

### MAJOR COURSE ASSIGNMENT for Graduate Class:

Each graduate student individually will review the current scientific literature and **prepare a 30-40 minute lecture** on a current cutting edge topic of their interest and prepare an **associated 20-30 min in-class activity** to engage students in the presented topic and critically discuss its importance for science and society, existing gaps, and next steps in this line of research.

The lecture should introduce the topic and its importance, review the state of science in the chosen field, and highlight/present a few recent research papers that illustrate where the cutting edge of research is now, including open questions that will need to be answered next.

The associated activity should engage students in a hands-on way with the chosen topic and could include some form of quiz, data analysis, discussion, or a combination thereof.

Please discuss your ideas about topics & activities with instructors before the lecture is due.

### **MINOR COURSE ASSIGNMENTS for all students:**

One minor graded assignment will be completed by each undergraduate and graduate student:

- Cutting edge literature review: Each individual student will research a pre-assigned month of issues of the journals *Science*, *Nature* or *PNAS* for current marine topics and present a selected research article in a **short (8-minute) oral presentation on Jan 29, Jan 31, or Feb 5**. The student will also fill out an online Google Sheet (due Jan 22) with a summary of this and other prominent marine research topics in the respective journal issues and provide a brief highlight on up to 3 interesting topics in class (Jan 22).

### **RUBRICS for grading all oral presentations and written assignments:**

- Style [15%] (Clarity of speaking/writing, flow, engagement)
- Format [15%] (Organization/structure, design/format, length)
- Content [60%] (Depth of research; Detail of background information; Highlight of main question/hypothesis; Understanding of methods and approach; Critical evaluation of facts and results; Proposed gaps and next steps; Significance to science and society)
- Referencing [10%] (correct citations in presentation/proposal text and reference list)

**Graduate students need to achieve a B- to pass the course (anything below B- is an F).**

### **CONTRIBUTION TO DISCUSSION AND ACTIVITIES**

A participation grade will be given that reflects both regular attendance in classes and regular contributions to class discussion and activities. This is a very interactive class, and students are expected to actively participate in the tutorial section of the class.

#### *Final exam*

There will be a **cumulative Final Exam** written on the collective material from all lectures given during the term. The exam will be scheduled during the April Exam Period and contains short answer questions, graph evaluations, and written reflections.

#### *Other course requirements*

Each student will participate in an anonymous review process to evaluate and rank a sub-set of oral presentations. This will allow students to become familiar with the scientific peer-review process, objectively evaluate and learn from other's research, and provide critical yet constructive feedback. An anonymous summary of review comments and joint ranking will be revealed back to the presenting student for feedback.

### Overview of Course Assessment for undergraduate students

Component	Weight (% of final grade)	Due date
<i>Final exam</i>	35	<i>April (Exam period)</i>
<i>Contribution to discussion &amp; activities</i>	10	<i>Throughout term</i>
<i>Assignment: Cutting edge literature review</i>	15	<i>Jan 29, 31, Feb 5</i>
<i>Major assignment (research idea): Oral presentation</i>	15	<i>March 21, 26, 28</i>
<i>Major assignment (research idea): Written proposal</i>	25	<i>One week after oral</i>

### Overview of Course Assessment for graduate students

Component	Weight (% of final grade)	
<i>Final exam</i>	35	<i>April (Exam period)</i>
<i>Contribution to discussion &amp; activities</i>	10	<i>Throughout term</i>
<i>Assignment: Cutting edge journal review</i>	15	<i>Jan 29, 31, Feb 5</i>
<i>Major assignment (Lecture): Oral presentation</i>	25	<i>Assigned</i>
<i>Major assignment (Class Activity)</i>	15	<i>Assigned</i>

Conversion of numerical grades to final letter grades follows the			
<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

- This is a highly interactive class, and students need to attend classes and tutorials at all times and contribute to class discussions, hands-on activities, and presentation feedback. Missing more than 2 classes without a Student Declaration of Absence (SDA) form will lower the grade on in-class activities.
- All assignments have a strict deadline; late assignments will be docked 10% per day late; missed assignments and exams will count 0%; with the following exceptions:
- In case of illness, please use the Student Declaration of Absence (SDA) form for late or missed academic requirements. Late penalties will not apply if SDA is submitted prior to the due date. Maximum 2 uses of the SDA per term. Students who are ill for an extended period and thus miss multiple requirements should contact Patricia Laws, Assistant Dean (Student Affairs).
- In case of technological malfunction (internet failure, power outage), please notify the instructor via email as soon as possible and provide a written explanation.

- If excused, we will provide the following alternative arrangements:
  - missed assignments: an extended deadline will be offered.
  - missed final exam: a make-up exam will be offered on another date.
- The content of cancelled lectures or tutorials due to inclement weather or technological malfunction (internet failure, power outage) or other unforeseen circumstances will either be shifted to a later date or dropped from the course. Only topics presented and discussed in lectures and tutorials will be tested in the exam.
- In case of group projects, each student is required to contribute to the group's work, and the group will be assigned one grade.
- Plagiarism software will be used to check for the originality of each student's written assignments.

### **Course Policies related to Academic Integrity**

- In case of group projects, each student is required to contribute to the group's work, and the group will be assigned one grade.
- Plagiarism software will be used to check for the originality of each student's written assignments.
- As all written assignments require critical thinking and evaluation, the use of generative AI and large language models (e.g., ChatGPT) is NOT recommended.

### **Learning Objectives**

- Students will learn about and discuss current topics in marine sciences that are at the forefront of fundamental and applied research.
- Students will critically evaluate recent, high-profile publications and identify their importance, strengths, and weaknesses.
- Students will think about and explore possible next steps for current research topics and initiatives.
- Students will assess the importance of those topics to society and how to best communicate these to non-specialist audiences.
- Students will debate the relevance and importance of newly gained knowledge for management, conservation, education, and policy development.
- Undergraduate students will prepare a 1-page scientific briefing on how to advance a selected topic, how this benefits society, and how to communicate this through visual means, and give a short oral summary.
- Graduate students will prepare a lecture-style presentation and class activity on a selected topic.

## Course Content

List of the approximate course content and schedule for delivery. Note that this is an interactive class that requires a bit of flexibility, so topics and schedule may change.

### Course Content

#### Cutting Edge in Marine Science MARI 4350/5350

Week	Day	Lecture & Tutorial Topics	Activity
1	W - 8 Jan	1 – Introduction to Cutting Edge Science	<i>guidelines for assignments</i>
	Fr - 10 Jan	2 – How to find the Cutting Edge	<i>guidelines for research projects</i>
2	W - 15 JAN	3 – Current state of the Ocean	TBD
	Fr - 17 JAN	4 – Fisheries & Aquaculture trends, impacts & management	TBD
3	W - 22 JAN	<i>Literature briefs</i>	<i>present &amp; Google Sheet</i>
	Fr - 24 JAN	5 – Biodiversity patterns, impacts & conservation	<i>species discovery</i>
4	W - 29 JAN	<i>Literature review presentations 1</i>	<i>rank (1 day each)</i>
	Fr - 31 JAN	<i>Literature review presentations 2</i>	<i>rank (1 day each)</i>
5	W - 5 FEB	<i>Literature review presentations 3</i>	<i>rank (1 day each)</i>
	Fr - 7 FEB	MUNRO DAY – no class	
6	W - 12 FEB	6 – Climate change impacts, projections & policy	<i>projection exercise</i>
	Fr - 14 FEB	7 – Ocean literacy & education	TBD
--- STUDY BREAK ---			
7	W - 26 FEB	<i>Research project briefs</i>	<i>discussion of ideas</i>
	Fr - 28 FEB	<i>Research project briefs</i>	<i>discussion of ideas</i>
8	W - 5 MAR	8 – Ocean sound & Noise pollution	TBD
	Fr - 7 MAR	9 – Graduate Student Lecture 1	TBD
9	W - 12 MAR	10 – Arctic food webs & ecosystems	TBD
	Fr - 14 MAR	11 – Graduate Student Lecture 2	TBD
10	W - 19 MAR	12 – Seagrass restoration & Blue carbon	TBD
	Fr - 21 MAR	<i>Projects presentations 1: topics</i>	<i>rank (1 day per group)</i>
11	W - 26 MAR	<i>Projects presentations 2: topics</i>	<i>rank (1 day per group)</i>
	Fr - 28 MAR	<i>Projects presentations 3: topics</i>	<i>rank (1 day per group)</i>
12	W - 2 APR	13 – Sharks & rays in a changing ocean	TBD
	Fr - 4 APR	14 – Indigenous perspectives	TBD
13	M - 7 APR (Fr)	15 – Highlights, Closing remarks and Q&A for exam	



## 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/about/leadership-governance/academic-integrity/faculty-resources/ouriginal-plagiarism-detection.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.

## Faculty of Science

# 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](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)

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>