

# Biology of Phytoplankton Syllabus

## Department of Oceanography

OCEA 4230/5230, BIOL/MARI 4662 Winter 2025

*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
Hugh MacIntyre	hugh.macintyre@dal.ca	Mon 09:00-10:00; LSC 2633

### Course Description

This is an upper-division course on the phytoplankton in the context of their evolutionary history and ecological diversity. It has an emphasis on their adaptations and acclimation to different environments and their role in food webs and biogeochemical cycling.

#### Course Prerequisites

MATH 1000.03 and 1010.03 or MATH 1215, OCEA 2001.03 and 2002.03; or permission of Instructor

#### Course Exclusions

N/A

## **Student Resources**

Lectures, which include citations, will be posted on the course Brightspace page prior to each lecture.

## **Course Structure**

### *Course Delivery*

Delivery is in-person and students are expected to attend and engage with all lectures.

### *Lectures*

Tue & Thu 08:20–10:00, LSC 3652

### *Laboratories*

N/A

### *Tutorials*

N/A

## **Course Materials**

The course is taught from the primary literature. No textbook is required.

## Assessment

### *Assignments*

#### *Concept Maps Critiques*

Students will submit 6 critiques of AI-generated concept maps, covering Units 2-9. The concept map is a detailed analogy of a structure, concept or relationship presented in the lectures. These will be due one week after the course unit on which they are based, tentatively Jan. 28, Feb. 4, 11, Mar. 4, 18, and 25.

Concept map critiques account for 40% of the final grade in OCEA 4230 & BIOL/MARI 4662, and 30% of the grade in OCEA 5230.

Students may drop one of the concept maps if the reweighted average improves their grade.

#### *Mid-term Exam*

A mid-term exam will be held during the regular class period on Feb. 27. The exam will include short-answer and numerical assessments on all material presented prior to the study break (Reading Week). Students should bring a calculator to the exam. Neither phones nor laptops may be used for calculations.

The mid-term exam accounts for 29% of the final grade in OCEA 4230 & BIOL/MARI 4662, and 24% of the grade in OCEA 5230.

#### *Final exam*

A final exam will be held at the end of term. The exam will include short-answer and numerical assessments on all material presented but will be weighted towards material presented after the study break (Reading Week). Students should bring a calculator to the exam. Neither phones nor laptops may be used for calculations.

The final exam accounts for 29% of the final grade in OCEA 4230 & BIOL/MARI 4662, and 24% of the grade in OCEA 5230.

#### *Other course requirements*

Participation in class accounts for 2% of the final grade. This will be assessed by the instructor based on recorded attendance and engagement with the material. Engagement will be assessed from participation in discussion in class or in office hours. The default value is 0.

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

Assignments will not be accepted after the submission deadline on Brightspace.

- Students should file a Student Declaration of Absence form for missed lectures (maximum 2) to avoid penalty for the engagement grade.
- There is no make-up for missed concept map critiques. Students have the option to drop the score for one if the reweighted average improves their grade.
- Students who miss the mid-term exam or the final exam will have the other weighted for the combined contribution (58% of the final grade in OCEA 4230 & BIOL/MARI 4662, and 48% of the grade in OCEA 5230). A student who misses both exams will be referred to the Assistant Dean for Students, Faculty of Science.

## Course Policies related to Academic Integrity

Students are encouraged to discuss approaches to assignments but all work submitted for evaluation must be done by the student submitting it.

## Learning Objectives

On completion of the course, students should be able to identify the major radiations of phytoplankton; interpret remotely-sensed images of phytoplankton abundance and productivity; and predict competitive success of phytoplankton with given physiological and behavioral traits under different environmental conditions. If you have read this far by the second Unit 2 class, email the instructor with the phrase “Read it, honest guvnor” in the subject line.

## Course Content

Week	Date	Lesson Topic(s)	Assessment
1	07-Jan	Missed	
1	09-Jan	Missed	
2	14-Jan	Unit 1: Orientation and overview	
2	16-Jan	Unit 2: The marine environment	
3	21-Jan	Unit 2: The marine environment	
3	23-Jan	Unit 3: Taxonomy (additional materials will be recorded and available online)	

4	28-Jan	Unit 4: Detection	Concept Map 1 (Unit 2 & 3)
4	30-Jan	Unit 4: Detection	
5	04-Feb	Unit 5: Photosynthesis, respiration and growth (light and dark reactions)	Concept Map 2 (Unit 4)
5	06-Feb	Unit 5: Photosynthesis, respiration and growth (photoacclimation & photoprotection)	
6	11-Feb	Unit 6: Nutrient acquisition and assimilation: overview, kinetics and limitation vs starvation	Concept Map 3 (Unit 5)
6	13-Feb	Unit 6: Nutrient acquisition and assimilation: C metabolism	
	18-Feb	Reading Week	
	20-Feb	Reading Week	
7	25-Feb	Unit 6: Nutrient acquisition and assimilation: N metabolism	
7	27-Feb		Midterm
8	04-Mar	Unit 7: Thermal acclimation	Concept Map 4 (Unit 6)
8	06-Mar	Unit 8: Species interactions: mixotrophy	
9	11-Mar	Unit 8: Species interactions: grazing	
9	13-Mar	Unit 8: Species interactions: mutualism and allelopathy	
10	18-Mar	Unit 9: Cell losses: viral lysis, programmed cell death and sinking	Concept Map 5 (Unit 7 & 8)
10	20-Mar	Unit 9: Cell losses: viral lysis, programmed cell death and sinking	
11	25-Mar	Unit 10: Population dynamics: succession, bottom-up vs top-down	Concept Map 6 (Unit 9)
11	27-Mar	Unit 10: Population dynamics: ruderal niche (r-selected taxa)	
12	01-Apr	Unit 10: Population dynamics: competitive niche (r- to K-selected taxa)	
12	03-Apr	Unit 10: Population dynamics: stress-tolerant niche (K-selected taxa)	
	TBD		Final Exam; Term papers due (OCEA 5230)

## 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/original-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.