# The Blue Planet I Syllabus

## Department of Oceanography

### OCEA 2001 Fall 2023

*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 |
|---|---|---|
| Paul Hill | paul.hill@dal.ca | By arrangement |
| Emily Sklar | Emily.Sklar@dal.ca | By arrangement |

## Course Description

This course provides a general survey of oceanography. It is designed to develop an understanding of the ocean and of the science of oceanography. Students learn about the geological, chemical, physical and biological processes at work in the ocean.

*Course Prerequisites*

None

*Course Exclusions*

OCEA 2000.06, OCEA 2850.06, OCEA 2851.03/OCEA 2852.03

## Course Structure

*Course Delivery*

The course is delivered in a blended format. Core content is delivered with online videos. Class time is used for in-depth investigations of some topics, demonstrations and "In-the-News" lectures that link core content to stories that have had recent media coverage.

In-person attendance will not be monitored, but 20% of the final exam will be on the in-class material. In-class lectures will not be recorded, but any lecture notes or videos will be posted.

Three short assessments will be available asynchronously online each week. In-person attendance is required for the final exam, which will occur during the exam period.

Students connecting to online resources from outside Canada are responsible for ensuring awareness and compliance with any applicable laws in the country from which they are connecting.

*Lectures*

Wednesday and Friday, 10:35 – 11:25 AM, Chemistry 125

*Laboratories*

None

*Tutorials*

None

## Course Materials

- The required text for the course is *Oceanography and Marine Biology*, by D. W. Townsend.
- A digital version of the text will be available for purchase through Brightspace.
- New or used hard copies of the text may also be used.
- New hard copies are available for purchase at the Dalhousie Bookstore.
- There are no other required materials.
- Course content will be delivered through Brightspace: OCEA 2001 - The Blue Planet I (Sec 01) - 2023 Fall
- Students will need access to one of the following: laptop computer, tablet computer, smart phone or desktop computer.

- The Course Instructor and TA should be contacted via email.
- If a power or internet outage occurs during an online quiz, then contact the Instructor or the TA as soon as possible to report the problem. The quiz attempt will be reset.
- Students connecting to online resources from outside Canada are responsible for ensuring awareness and compliance with any applicable laws in the country from which they are connecting.

## Assessment

Assessment will be through online quizzes delivered through Brightspace and a final exam. There are two types of online quizzes:

1. Learning Module quizzes;
2. Weekly Ocean Assessments (WOAs).

The Learning Module quizzes appear at the end of each Learning Module. The comprise 5 questions. Each question is designed to assess whether a student has attained one of the 5 Learning Outcomes for that Learning Module. Two attempts are allowed for each Learning Module quiz, and the mark for the quiz is based on the highest score for the two attempts. The Learning Module quizzes become available when the Module becomes available, at 8:30 AM on either Wednesday or Friday. They are due one week later, by 5 PM. Students have 2 hours to complete each assessment, which is ample time for all learners. The lowest Module quiz score is dropped. Overall, the top 23 Learning Module quizzes account for 50% of the overall mark, so each one is worth just under 2.2%.

The Weekly Ocean Assessments (WOAs) are based directly on the text. Each WOA is based on the two assigned readings for the week. The purpose of these assessments is to promote engagement of the students with the text, which offers a fuller treatment of the material than is possible in each module's video units. They comprise 10 questions each. Only one attempt is allowed per WOA. WOAs become available on each Thursday, and they are due by 5 PM on the Friday of the following week. The only exception is for the Remembrance Day break week, when the due date is moved to the week after. Students have 2 hours to complete each assessment, which is ample time for all learners. The first WOA, called WOA0, is for practice and will not be marked. The lowest WOA mark will be dropped. Overall, the top 10 WOAs account for 20% of the overall mark, so each one is worth 2%.

There are no other assignments.

The final exam will be written, in person, during exam period, with the date and time arranged by the Registrar. The exam will have 24 short-answer questions, with one from each module. Each question will be worth 4 points. The questions will be on one of the identified Learning

Outcomes from each module, and a list of these 24 Learning Outcomes will be provided to the students near the end of the term. The exam also will have 12 multiple choice questions based on in-class lectures and activities. Each question will be worth 2 points. With these weightings, the Short Answer questions account for 80% of the final exam mark, and the questions on in-class material account for 20% of the final mark. In total, the final exam will account for 30% of the overall mark.

| **Assessment** | **Due Date** | **Weight (%)** | **Total (%)** |
|---|---|---|---|
| Introduction Module Quiz | 13.09.23 | 2.2 | 50 |
| Foundations Module Quiz | 15.09.23 | 2.2 | |
| Origins Module Quiz | 20.09.23 | 2.2 | |
| Origin of Life Module Quiz | 22.09.23 | 2.2 | |
| Structure of the Earth Module Quiz | 27.09.23 | 2.2 | |
| Continental Drift Module Quiz | 29.09.23 | 2.2 | |
| Plate Tectonics Module Quiz | 04.10.23 | 2.2 | |
| Marine Sediments Module Quiz | 06.10.23 | 2.2 | |
| The Water Molecule Module Quiz | 11.10.23 | 2.2 | |
| Sea Water Module Quiz | 13.10.23 | 2.2 | |
| Vertical Structure of the Ocean Module Quiz | 18.10.23 | 2.2 | |
| Light in the Ocean Module Quiz | 20.10.23 | 2.2 | |
| Atmospheric Circulation Module Quiz | 25.10.23 | 2.2 | |
| Ocean Weather Module Quiz | 27.10.23 | 2.2 | |
| Surface Ocean Circulation Module Quiz | 01.11.23 | 2.2 | |
| Deep Ocean Circulation Module Quiz | 03.11.23 | 2.2 | |
| Waves Module Quiz | 08.11.23 | 2.2 | |
| Waves in Shallow Water Module Quiz | 10.11.23 | 2.2 | |
| Other Types of Waves Module Quiz | 22.11.23 | 2.2 | |
| Tides Module Quiz | 24.11.23 | 2.2 | |
| Tides at the Shore Module Quiz | 29.11.23 | 2.2 | |
| Basics of Marine Biology Module Quiz | 01.12.23 | 2.2 | |
| Biological Production in the Ocean Module Quiz | 06.12.23 | 2.2 | |
| Classification of Marine Life Module Quiz | 08.12.23 | 2.2 | |
| Weekly Ocean Assessment 00 | 15.09.23 | 0 | 20 |
| Weekly Ocean Assessment 01 | 22.09.23 | 2.0 | |

| | | | |
|---|---|---|---|
| Weekly Ocean Assessment 02 | 29.09.23 | 2.0 | |
| Weekly Ocean Assessment 03 | 06.10.23 | 2.0 | |
| Weekly Ocean Assessment 04 | 13.10.23 | 2.0 | |
| Weekly Ocean Assessment 05 | 20.10.23 | 2.0 | |
| Weekly Ocean Assessment 06 | 27.10.23 | 2.0 | |
| Weekly Ocean Assessment 07 | 03.11.23 | 2.0 | |
| Weekly Ocean Assessment 08 | 10.11.23 | 2.0 | |
| Weekly Ocean Assessment 09 | 24.11.23 | 2.0 | |
| Weekly Ocean Assessment 10 | 01.12.23 | 2.0 | |
| Weekly Ocean Assessment 11 | 08.12.23 | 2.0 | |
| Final Exam | Exam period | 30.0 | 30 |

*Other course requirements*

None

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

Course assessments, apart from the Final Exam, are asynchronous. Module quizzes are available for 7 days, and Weekly Ocean Assessments are available for a minimum of 8 days. As a result, students with circumstances that keep them away from school for 3 days or less will still have time to complete their assessments. **Students will not be able to make up any missed work.** The lowest mark in each assessment category will be dropped.

Students with longer absences should coordinate with the Instructor and the Assistant Dean of Student Affairs Patricia Laws to make a plan for completing academic requirements.

## Course Policies related to Academic Integrity

Students must complete all assessments by themselves.

## Learning Objectives

The course is divided into 24 modules, and each module has 5 specific Learning Outcomes. These outcomes are listed at the beginning of each module, and a quiz at the end of each module is designed to assess whether the outcome has been attained. Since they are too numerous to list here, a summary for each module, except the Introduction module, is given instead.

At the end of the course, students should be able to do the following:

- Relate some major achievements in early investigations of the ocean.
- Describe the mechanisms and ages of the origins of the universe, solar system, earth, moon, and oceans.
- Review the major hypotheses for the origin of life on Earth.
- Compare the physical and compositional layering of the Earth's interior.
- Explain the evidence for continental drift and seafloor spreading.
- Account for the major geographic features on the Earth's surface in the context of the theory of plate tectonics.
- Identify the types and distributions of marine sediments.
- Account for the unique properties of water based on its molecular structure.
- Describe salinity and its effects on the properties of water.
- Explain the causes and consequences of vertical stratification in the ocean.
- Describe the fate of light that enters the surface ocean.
- Explain the processes responsible for creating the large-scale patterns of atmospheric circulation on Earth.
- Review the role of the oceans in generating interesting and dangerous weather phenomena.
- Explain the processes responsible for large-scale patterns of surface-ocean circulation on Earth.
- Review the causes and consequences of thermohaline circulation on Earth.
- Describe the physical properties of waves.
- Describe the evolution of wave properties as waves approach the shore.
- Summarize the properties of waves in the ocean that have longer wavelengths than wind-generated waves and shorter wavelengths than the tides.
- Explain the equilibrium theory of the tides.
- Describe various processes that affect timing and height of tides at the shore.
- Describe the basics of the processes of photosynthesis, respiration, and growth in the ocean.
- Explain seasonal and geographic patterns of primary production in the ocean.
- Describe various schemes to classify life in the ocean.

## Course Content

| Module | Availability Date | Reading |
|---|---|---|
| Introduction to the Blue Planet | September 6 | Townsend, pp. xvi-xviii. |
| Foundations of Ocean Science | September 8 | Townsend, pp. 3-31 |
| Origins | September 13 | Townsend, pp. 38-47 |
| Origin of Life | September 15 | Townsend, pp. 56-59 |
| Structure of the Earth | September 20 | Townsend, pp. 48-56 |
| Continental Drift | September 22 | Townsend, pp. 62-84 |
| Plate Tectonics | September 27 | Townsend, pp. 84-98 |
| Marine Sediments | September 29 | Townsend, pp. 98-109 |
| The Water Molecule | October 4 | Townsend, pp. 112-126 |
| Sea Water | October 6 | Townsend, pp. 126-142 |
| Vertical Structure in the Ocean | October 11 | Townsend, pp. 142-146 |
| Light in the Ocean | October 13 | Townsend, pp. 150-155 |
| Atmospheric Circulation | October 18 | Townsend, pp. 155-171 |
| Ocean Weather | October 20 | Townsend, pp. 171-178 |
| Surface Ocean Circulation | October 25 | Townsend, pp. 178-185, Appendix, pp. A-5 to A-8 |
| Deep Ocean Circulation | October 27 | Townsend, pp. 185-189 |
| Waves | November 1 | Townsend, pp. 192-203 |
| Waves in Shallow Water | November 3 | Townsend, pp. 203-207 |
| Other Types of Waves | November 8 | Townsend, pp. 207-210 |
| Tides | November 10 | Townsend, pp. 210-218 |
| Tides at the Shore | November 22 | Townsend, pp. 218-223 |
| Basics of Marine Biology | November 24 | Townsend, pp. 226-233 and 246-249 |
| Biological Production | November 29 | Townsend, pp. 233-246 |
| Classification of Marine Life | December 1 | Townsend, pp. 249-257 |

# 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 the Indigenous Student Centre can be found at: 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

## 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/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

## 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

## 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

## 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.