

The Solid Earth Syllabus

Department of Earth and Environmental Sciences

ERTH/OCEA/PHYC 3270 Fall 2026

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(s)

Name	Email	Office Hours
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Course Description

This course aims to understand the structures and dynamics of the Solid Earth system from the surface to the inner core and from the ocean to the continent. Topics covered will include the internal structure of the Earth, plate tectonics, earthquakes, seismology, gravity, magnetic field, heat flow, and mantle convection.

Course Prerequisites

Mathematics: MATH 1000 or MATH 1215, and MATH 1010.

Physics: PHYC 1190/1290 (preferred) or PHYC 1310/1320.

Student Resources

Similar prerequisite courses for self-learning:

- Calculus: <https://ocw.mit.edu/courses/mathematics/18-01sc-single-variable-calculus-fall-2010/index.htm>
- Linear Algebra: <https://ocw.mit.edu/courses/mathematics/18-06-linear-algebra-spring-2010/>

Course Structure

Course Delivery: In-person

Lectures: Tuesdays and Thursdays, 10:05 – 11:25 pm, LSC-PSYCHOLOGY P5208

Tutorials: Mondays, 11:35 – 12:25 pm, LSC-COMMON AREA C210

Course Materials

Textbook 1 – C. M. R. Fowler, *The Solid Earth: An Introduction to Global Geophysics*, Cambridge University Press, 2nd Edition, 2004 (PDF version is available online).

Textbook 2 – R. J. Lillie, *Whole Earth Geophysics: An Introductory Textbook for Geologists and Geophysicists*, Prentice-Hall, Upper Saddle River, New Jersey 07458, 1999 (PDF version is available online).

Paper readings will be posted on Brightspace.

Learning Objectives

By the end of this course, students will be able to:

- Explain fundamental earth science concepts and phenomena using sketches.
- Gain knowledge of plate tectonics and its driving forces.
- Understand the Earth as a unified dynamic system.
- Appreciate the importance of multidisciplinary approaches in Earth sciences.
- Read, analyze, and critique scientific papers, and effectively communicate scientific concepts.

Assessment

The final grade of the class will be based on the following:

Four Assignments (TBD)	44%
Mid-term (TBD)	20%
Final Examination (TBD)	20%
Quizzes	11%
Participation	5%

Detailed descriptions could be found as below:

1. Assignments

Assignment 1: Lectures 2-6, Due date: TBD	(11%)
Assignment 2: Lectures 8-12, Due date: TBD	(11%)
Assignment 3: Lecture 14-17, Due date: TBD	(11%)
Assignment 4: Lectures 19-22, Due date: TBD	(11%)

Assignments will involve problem-solving and/or paper review.

2. Mid-term and final examinations

Both exams are closed-book. The mid-term will be in class, and the final exam will be scheduled by the registrar. (20% x2)

4. Quizzes

Test the understanding of the past lectures or reading materials. (11%)

5. Participation

Active participation in discussions and question sessions. (5%)

Conversion of numerical grades to final letter grades follows the **undergraduate***

[Dalhousie Grade Scale](#)

(*for graduate courses, be sure to include the [graduate](#) 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 handed in late will be deducted 10% per day. Assignments handed in more than 5 days late will not be graded. There will be no make-up mid-term or final exams. If you must miss an exam due to illness or unavoidable circumstances (please notify the instructor in advance), the missing exam will have its weight redistributed among your assignments. For example, if you missed the final exam, the 20% weight will be equally distributed among your four assignments. Students must use the Student Declaration of Absence form for missed lectures or tutorials (at most twice). If you have absences lasting longer than three consecutive days, you need to contact the instructor and your advisor to explore other accommodations.

Course Policies related to Academic Integrity & Artificial Intelligence

Students are not permitted to work together on individual assignments, but they are encouraged to discuss the questions fully when preparing group presentations. Students are not permitted to use AI tools for assignments, presentations or exams. Additional information from the syllabus template is provided below: According to Dalhousie and Nova Scotia privacy laws, instructors are not permitted to require students to use generative AI tools other than Microsoft 365 Copilot Chat, which is a free AI-powered tool included with all Dalhousie accounts. More policies can be found at the Syllabus Appendix.

Course Accessibility

You are eligible for accommodations based on protected characteristics such as religion. If you have religious, cultural, or community-significant observances that conflict with course requirements, reach out to me to collaboratively find alternatives for completing the course requirements. To begin the process of requesting a formal academic accommodation, contact the Student Accessibility Centre. Please refer to the Student Accommodation Policy for more information.

Course Content

Lecture#	Lecture content	Assignment#
Lecture 1	Course policy and introduction of the course	
Lecture 2	Plate tectonics: geometry and boundaries	
Lecture 3	Earthquakes: release of Earth's energy	
Lecture 4	Seismic wave propagation	
Lecture 5	Probing the deep Earth: seismic tomography	
Lecture 6	Internal structure of the Earth	Assignment#1
Lecture 7	Paper presentation and discussion	
Lecture 8	Global magnetic field	
Lecture 9	Global gravity	
Lecture 10	Gravity anomalies and their relation to global tectonics	
Lecture 11	Reconstruction of past plate motions	
Lecture 12	Review and discussion: Earth's structures, tectonics, and earthquakes	Assignment#2
Lecture 13	Paper presentation and discussion	
Lecture 14	Oceanic lithosphere: mid-ocean ridges	
Lecture 15	Oceanic lithosphere: subduction zones	
Lecture 16	Continental lithosphere: sedimentary basins and continental margins	
Lecture 17	Continental lithosphere: continental rift zones	Assignment#3
Lecture 18	Paper presentation and discussion	
Lecture 19	Introductory heat flow	
Lecture 20	Heat flow and tectonics	
Lecture 21	Mantle convection: Earth's geological engine	
Lecture 22	Overview: understand the Earth as a unified dynamic system	Assignment#4
Lecture 23	Paper presentation and discussion	

Syllabus Appendix

(Formerly University Policies and Statements)

[Syllabus Appendix: Student Supports & University Statements, Policies, and Guidelines](#)