



Igneous Petrology Syllabus

Department of Earth and Environmental Sciences

ERTH3010 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(s)

Name	Email	Office Hours
Rebecca Scholtysik	rb998969@dal.ca	TBD
Richard Cox	richard.cox@dal.ca	TBD

Course Description

Igneous petrology is the study of the field relations, mineralogy, texture, and geochemistry of volcanic and plutonic rocks. Lectures discuss the classification and graphical representation of igneous rocks; the production, differentiation, and emplacement of magma in different tectonic environments. Practical work consists of laboratory petrographic examination and field trips.

Course Prerequisites

ERTH 2002.03 and ERTH 2380.03

Course Exclusions

N/A



Course Structure

Course Delivery

Lectures, labs, and field trips are held in person. Some course material will be shared on Brightspace.

Lectures

Tuesday and Thursdays 2:35 – 3:55PM in LSC-BIOL&EARTH B2020A

Laboratories

Wednesdays 2:35 – 5:35PM in LSC-BIOL&EARTH B2020A

Field Trips

September 22 and November 3, from approximately 8:00AM – 5:00PM. Transportation will be provided from campus.

Course Materials

- Textbook: John D. Winter “Introduction to Igneous and Metamorphic Petrology”. Prentice Hall, 2nd edition, 2010 or 1st edition, 2001. [Chapters 1-19]
- Course Brightspace page

Assessment

Assignments	Weight (%) of final grade	Date
Theory assignments (10)	25%	Weekly, as per schedule on Brightspace
Laboratory assignments	14%	Weekly, as per schedule on Brightspace
Volcano project	15%	Final due date Nov 26, 2024 with individual component deadlines as per schedule on Brightspace
Field trips* with lab component	14%	Trips scheduled for Sept 22, 2024 and Nov 3, 2024
Final lab assignment	7%	As per schedule on Brightspace



Midterm test (1.5 hours)	10%	Oct 10, 2024
Final exam (3 hours)	15%	During scheduled exam period

*There are two mandatory field trips, scheduled for September 22 and November 3.

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 not be accepted and marked unless there was an arrangement with the instructor prior to the deadline for this component.
- Late submission of the Volcano project components will not be accepted unless an arrangement with the instructor has been made prior to the deadline.
- If the students need to arrange for a late assignment or to miss a test, they can send an email to the Instructor, in advance of the deadline or test time.

Course Policies related to Academic Integrity

- All lab and theory assignments and the projects in this class are individual. Discussions during lab sessions are encouraged, however, no parts of the lab assignments and projects can be copied from another student.
- Students are encouraged to work in groups during the field trips, however they must complete their own field trip notes individually.
- No plagiarism software will be used on assignments in the course.
- Students may not use AI software (e.g., ChatGPT) to write or complete their assignments.

Learning Objectives

- Identify and classify igneous rocks in the field, in hand samples, and in thin sections, using internationally established criteria.



- Plot and interpret different types of geochemical data to learn about the origin, source and tectonic environment of magma formation and crystallization.
- Identify and interpret volcanic and plutonic rocks in the field and describe their field relationships including primary and secondary features.
- Integrate field, petrographic, and analytical data to investigate the origin and crystallization paths of igneous rocks and report the results in appropriate format.
- Understand melting mechanism and features of igneous rocks in different tectonic environments.
- Explain the significance of igneous rocks and processes to understanding tectonic and ore-forming processes. Recognize geological hazards associated with specific types of igneous activity.

Course Content

- Introduction/Fundamental Concepts [Ch. 1]
- Classification of Igneous rocks [Ch. 2]
- Textures of Igneous rocks [Ch. 3]
- Field relationships [Ch. 4]
- Introduction to Thermodynamics [Ch. 5]
- Phase rule. Binary systems [Ch.6]
- Ternary systems [Ch. 7]
- Composition and differentiation of the Earth [Ch. 1]
- Chemical Petrology-I: Major and minor elements [Ch. 8]
- Chemical Petrology-II: Trace Elements [Ch. 9]
- Chemical Petrology-III: Isotopes [Ch. 9]
- Mantle Petrology and Mantle Melting [Ch. 10]
- Generation of Basaltic Magmas [Ch. 10]
- Differentiation of Magmas [Ch. 11]
- Layered Mafic Intrusions [Ch. 12]
- Mid-Ocean-Ridge volcanism [Ch. 13]
- Oceanic Intraplate Volcanism [Ch. 14]
- Continental Flood Basalts [Ch. 15]
- Subduction-related magmatism: Island Arcs [Ch. 16]
- Subduction-related magmatism: Continental Arcs [Ch. 17]
- Granitoid Rocks [Ch. 18]



- Continental Alkaline Magmatism [Ch. 19]

Student Resources and Support

Advising

General Advising https://www.dal.ca/campus_life/academic-support/advising.html

Science Program Advisors: <https://www.dal.ca/faculty/science/current-students/undergrad-students/degree-planning.html>

Indigenous Student Centre: https://www.dal.ca/campus_life/communities/indigenous.html

Black Students Advising Centre: https://www.dal.ca/campus_life/communities/black-student-advising.html

International Centre: https://www.dal.ca/campus_life/international-centre/current-students.html

Academic supports

Library: <https://libraries.dal.ca/>

Writing Centre: https://www.dal.ca/campus_life/academic-support/writing-and-study-skills.html

Studying for Success: https://www.dal.ca/campus_life/academic-support/study-skills-and-tutoring.html

Copyright Office: <https://libraries.dal.ca/services/copyright-office.html>

Fair Dealing Guidelines <https://libraries.dal.ca/services/copyright-office/fair-dealing.html>

Other supports and services

Student Health & Wellness Centre: https://www.dal.ca/campus_life/health-and-wellness.html

Student Advocacy: <https://dsu.ca/dsas>

Ombudsperson: https://www.dal.ca/campus_life/safety-respect/student-rights-and-responsibilities/where-to-get-help/ombudsperson.html

Safety

Biosafety: <https://www.dal.ca/dept/safety/programs-services/biosafety.html>

Chemical Safety: <https://www.dal.ca/dept/safety/programs-services/chemical-safety.html>

Radiation Safety: <https://www.dal.ca/dept/safety/programs-services/radiation-safety.html>

Scent-Free Program: <https://www.dal.ca/dept/safety/programs-services/occupational-safety/scent-free.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. 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/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.