

Igneous Petrology Syllabus

Department of Earth and Environmental Sciences

ERTH 3010 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
Yana Fedortchouk	yana@dal.ca	Tuesday, 3 - 4 pm, LSC-B 3050
Richard Cox	Richard.cox @dal.ca	TBD, LSC-B 3080

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 and ERTH2380

Course Exclusions

n/a

Student Resources

Students can use the Teams channel for this class to post questions for the instructors.

Students can reach both instructors during their office hours.

Students can use the textbooks and all reference materials located in the lab 2020A.

Course Structure

Course Delivery

All lectures, labs, quizzes and exams are in-person. There are two mandatory in-person field trips.

If a student is sick and unable to come to the lecture component of the class, the instructor can add a hybrid component to that one class and run it on Teams. The student needs to email to the instructor with such request at least 1 hour prior to the beginning of the class.

Lectures

Tuesday and Thursday, 13:05 – 14:25 pm, LSC-B 2020A.

Laboratories

Thursday, 14:35 – 17:25pm, LSC-B 2020A, weekly.

Field Trips

Sundays: September 20, 9:00 – 18:00 (North Mountain Basalt); November 1, 9:00 – 17:00 (South Mountain Batholith).

Course Materials

Course materials are posted on Course Brightspace page.

There are two textbooks used in this class:

John D. Winter “Introduction to Igneous and Metamorphic Petrology”. Prentice Hall, 2001 or 2010. [Chapters 1-19]. Several copies of this textbook are available in the LSC-B 2020A lab.

An open-access online textbook by Dexter Perkins “Petrology: An Introduction to Igneous and Metamorphic Rocks and Processes” [Chapters 2 – 8], 2022: <https://opengeology.org/petrology/>

For the field trips the students will need hammers, safety goggles, field notebooks, hand lens, sample bags with markers, proper field footwear and rain gear.

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.

Assessment

Assignments

Theory assignments (5)	Due Tuesdays (09/22, 10/13, 10/27, 11/17, 12/1)	10%
Lab assignments (9)	Due Fridays starting September 17	18%
Field trips with lab component (2)	Due October 8 and November 5	12%
Volcano Project	Due 09/22, 10/20, 11/24	10%

Tests/quizzes

- Midterm 1 **September 29, 13:45-14:25am, 40 min** **10%**
Will cover material from the unit "Introductory concepts; Igneous rocks and landforms" lectures 1-6.
- Midterm 2 **October 29, 13:45-14:25am, 40 min** **10%**
Will cover material from units "Thermodynamics" and "Geochemistry" lectures 7-13.
- Lab Exam **December 3, 14:35 - 17:25am, 3 hours** **10%**
Will cover material from all the laboratory sections.

Final exam

- will take place during the exam period **20%**

Other course requirements

There are two mandatory Sunday field trips on September 20 and November 1.

Conversion of numerical grades to final letter grades follows the **undergraduate***
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, labs, Volcano project presentations will not be accepted and marked unless an arrangement with the instructor has been made prior to the deadline for this component.

A make-up for a missed midterm will be made if an arrangement with the instructor has been made prior to the midterm.

There is no make-up option for the field trips.

In order to arrange for a late assignment or to miss a test, send email to the Instructor (yana@dal.ca) for arranging to miss a lab sessions email to (richard.cox@dal.ca).

Course Policies related to Academic Integrity & Artificial Intelligence

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 while must complete their own field trip notes individually.

No plagiarism software will be used in course.

Students are advised **not to use or rely on generative AI and large language models (e.g., Copilot, Claude, ChatGPT, etc.)** when completing the assignments. If they chose to do so – the students are fully responsible for all the mistakes made by AI software. Theory assignments are designed to prepare students for the midterm and final exam tests. Therefore, it is essential that students do these assignments to prepare for the tests.

All tests and exams are closed books and allow no electronics including electronic glasses, watches, pens, etc. A simple calculator without internet access is allowed. The students will be able to use a formula sheet, which they can prepare and bring for each test and exam.

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

Course Content

Week	Date	Lesson Topic(s)	Assessment
1	September 8	Composition and differentiation of the Earth	
2	September 15	Geotherm, magma generation; Classification, textures of igneous rocks;	
3	September 22	Properties of magma, eruption styles Volcanic and intrusive landforms;	Assignment 1; Volcano presentations-1
4	September 29	Introduction to Thermodynamics; Phase rule	Midterm 1
5	October 6	Phase diagrams; effect of volatiles and pressure	
6	October 13	Geochemistry: major and trace elements	Assignment 2
7	October 20	Isotopes; Mantle petrology	Volcano presentations-2
8	October 27	Magma generation and differentiation	Assignment 3; Midterm 2
9	November 3	Layered mafic intrusions (LMI) & Basaltic provinces: MORB, OIB	
	November 10	READING BREAK	
10	November 17	Continental flood basalts and island arcs	Assignment 4
11	November 24	Arc magmatism and Granitoids	Volcano presentations-3
12	December 1	Continental Alkaline magmatism; Evolution of magmatism on Earth	Assignment 5; Lab Exam

Syllabus Appendix

(Formerly University Policies and Statements)

Syllabus Appendix: Student Supports & University Statements, Policies, and Guidelines