

ERTH 4504A
Advanced Igneous Petrology
Winter 2019

Instructor: Brian Cousens

This lecture- and seminar-style course will emphasize the processes by which igneous rocks form. We will discuss how the chemistry of igneous rocks depends on the composition of the source material that is melting, and how this primary melt composition can change as a result of the many processes that occur after this melt separates from its source and ascends through the Earth's mantle and/or crust. We will also further investigate the links between igneous rocks and tectonic setting. Weekly assignments will include reading of papers on particular topics in igneous petrology will require a written summary of the key points, or examples of manipulation of geochemical data. Each student will be involved in two seminar presentations, allowing the students to determine much of the course content depending on interest. A term project on igneous rock petrography and geochemistry will result in an appreciation of igneous petrology research.

Questions that igneous rocks can answer:

1. Was a silicate melt involved?
2. What was the composition (or compositions) of the melt?
3. Where and by what process(es) did the melt originate?
4. How did the magma(s) reach their present site?
5. What chemical fractionation processes occurred?
6. What were the thermal histories for steps #3, #4 and #5?

Lectures: Tuesday 11:35AM-2:25PM, HP 3120

<u>Grading Scheme</u> :	Seminar presentations	25%
	Term Project	35%
	Weekly Assignments	15%
	Final Exam (take home)	25%

Textbook: None assigned, but chapters from three books will be recommended for particular subjects. These books will be available for **short-term** borrowing in HP 2259. Assigned readings will be linked on cuLearn.

Office Hours: Whenever my office door is open or by appointment.

How to get in touch: Office: HP 2259
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ERTH4504 Learning Outcomes:

By the end of the semester, each successful student will acquire the following skills and knowledge sets in the seminar sessions:

- an integrated understanding of the field characteristics, chemical and mineralogical composition, and petrogenesis of the major igneous rock groups and deduce their plate tectonic association and mode of origin.
- understand the various mechanisms by which Earth materials melt to form magmas, and describe processes that modify those magmas as they pass through the lithosphere.
- master the skills used to aid the interpretation of igneous rocks using geochemical diagrams, in particular igneous phase diagrams.
- Read and understand the methodologies and major conclusions drawn in articles in research journals.
- Through oral presentations, convey the scientific goals, methodologies, and theories that explain the origin of a suite of igneous rocks.
- synthesize petrographic and geochemical information to determine the origin of rock suites in a class “rock project”.

STUDENT ACCOMMODATIONS

Examinations and Assignments

Students with conflicts for any examination must have a note from an employer or a medical certificate (see below) in order to **write the exam** at another date. Unless caused by illness, all conflicts **MUST** be reported to the instructor **PRIOR** to the exam date. In the case of a less serious illness (cold, flu), I require a medical note within one week after the exam date in order for a deferred exam to be written. In the case of a serious illness, see <http://carleton.ca/registrar/special-requests/deferral/> for the rules concerning deferral of an exam or assignment, and contact me as soon as possible.

Requests for Academic Accommodation

You may need special arrangements to meet your academic obligations during the term. For an accommodation request, the processes are as follows:

Pregnancy obligation

Please contact your instructor with any requests for academic accommodation during the first two weeks of class, or as soon as possible after the need for accommodation is known to exist. For more details, visit the Equity Services website: carleton.ca/equity/wp-content/uploads/Student-Guide-to-Academic-Accommodation.pdf

Religious obligation

Please contact your instructor with any requests for academic accommodation during the first

two weeks of class, or as soon as possible after the need for accommodation is known to exist. For more details, visit the Equity Services website: carleton.ca/equity/wp-content/uploads/Student-Guide-to-Academic-Accommodation.pdf

Academic Accommodations for Students with Disabilities

If you have a documented disability requiring academic accommodations in this course, please contact the Paul Menton Centre for Students with Disabilities (PMC) at 613-520-6608 or pmc@carleton.ca for a formal evaluation or contact your PMC coordinator to send your instructor your Letter of Accommodation at the beginning of the term. You must also contact the PMC no later than two weeks before the first in-class scheduled test or exam requiring accommodation (if applicable). After requesting accommodation from PMC, meet with your instructor as soon as possible to ensure accommodation arrangements are made. carleton.ca/pmc

Survivors of Sexual Violence

As a community, Carleton University is committed to maintaining a positive learning, working and living environment where sexual violence will not be tolerated, and its survivors are supported through academic accommodations as per Carleton's Sexual Violence Policy. For more information about the services available at the university and to obtain information about sexual violence and/or support, visit: carleton.ca/sexual-violence-support

Accommodation for Student Activities

Carleton University recognizes the substantial benefits, both to the individual student and for the university, that result from a student participating in activities beyond the classroom experience. Reasonable accommodation must be provided to students who compete or perform at the national or international level. Please contact your instructor with any requests for academic accommodation during the first two weeks of class, or as soon as possible after the need for accommodation is known to exist. <https://carleton.ca/senate/wp-content/uploads/Accommodation-for-Student-Activities-1.pdf>

For more information on academic accommodation, please contact the departmental administrator or visit: students.carleton.ca/course-outline

Medical Certificates

Please note, that in this course, on all occasions that call for a medical certificate you must use (or furnish the information demanded in): http://carleton.ca/registrar/wp-content/uploads/med_cert.pdf

PLAGIARISM

The University's Senate defines plagiarism in the regulations on instructional offences as: "to use and pass off as one's own idea or product work of another without expressly giving credit to another". *This includes copying of material from websites or other publications that is incorporated into assignments, reports, or other submissions for grading.* Borrowing someone else's answers, unauthorized possession of tests or answers to tests, or possession of material designed in answering exam questions, are all subject to university policy regarding instructional offences.

For this course (and all other courses at Carleton), it is extremely important to understand that you cannot copy and paste material from websites or publications into assignments. This is plagiarism, and it is easy to spot during grading of weekly assignments. When formulating an answer to an assignment question, be sure to reword the material from websites or publications into your own words, then type that into your assignment. Identification of copied material in an

assignment or exam answer will result in an automatic zero points for that section of an assignment2.

I encourage students to work together on assignments. HOWEVER, each student must submit answers to questions in *their own words*, not the words used by another student that you are working with. *Be sure that you and your co-worker word your submitted answers differently.* If the answers submitted by one student for an assignment are identical to those submitted by another student, both students will be assigned a grade of zero for the question.

Details regarding the Carleton University Academic Integrity policy can be found at:

<http://carleton.ca/senate/wp-content/uploads/Academic-Integrity-Policy1.pdf>