

ERTH 3003 - Geochemistry and Isotope Geochemistry - Fall 2020

Course Description:

This course looks at geochemical processes from deep Earth to surface environments, and the use of isotopic variations to define geochronological frameworks and geochemical pathways, in order to better understand the Earth's history.

Prerequisites: ERTH 2102 (mineralogy to petrology), 2104 (igneous systems, geochemistry and processes) and 2105 (geodynamics).

Learning Objectives:

The main objective of this course is to understand how the principles of chemistry are used in order to study different processes in Earth Sciences. At the end of the course, each successful student should be able to:

- 1) understand how different chemical elements behave and are distributed in different geological environments
- 2) have insight into the Earth's chemical differentiation into core, mantle, crust, as well as the origin its oceans and atmosphere
- 3) be familiar with several geochronological techniques and their applications
- 4) understand elemental and isotopic fractionation
- 5) understand element behaviour during igneous processes, alteration of rocks, and its impact on the composition of the rivers and oceans.

Times and Location:

Lectures: to be delivered synchronously 2:30-5:30 Mondays. Lectures to be delivered online using Big Blue Button (BBB), recorded and posted to cuLearn within 24h. Access to BBB is through cuLearn

Laboratories: 8:30-10:30 Wednesdays, and 11:30-1:30 Thursdays. To be held in a BBB session. I will ask that you stay in your registered laboratory session. Special consideration to switch a single session may be granted through me.

Class Schedule: TBA and posted on cuLearn

People:

- *Instructor:* Chris Rogers
 - Office hours: TBA or by appointment
 - Email: chris.rogers@carleton.ca
 - For privacy reasons I only respond to emails sent through the Carleton University email system. *No Gmail, Hotmail etc*
 - Forum: "Ask your Instructor"

- *Teaching assistants:* TBA
 - Forum: "Ask your TA's"
 - Office hours: via BBB time TBA

- *Group discussions:*
 - Forum: “Student Coffee Shop”
 - BBB - General discussion

Textbooks:

- *Recommended Reading:*
 - White, W.M., 2013. *Geochemistry*. John Wiley & Sons, Inc. (Also available as an e-book).
- *Useful Resources:*
 - Dickin, A.P., 2005. *Radiogenic Isotope Geology*. Cambridge University Press. There is an online version of his radiogenic isotope textbook here: <http://www.onafarawayday.com/Radiogenic/> (site was down at time of writing, not sure if it is still running)
 - Faure, G., 1998. *Principles and Applications of Geochemistry: a comprehensive textbook for geology students*. Prentice-Hall
 - Albarède, F., 2013. *Geochemistry; An Introduction*. Cambridge University Press. (Also available as an e-book).
- *Websites:*
 - Webelements: <http://www.webelements.com/>
 - Geochemical Earth Reference Model (GERM): <http://earthref.org/GERM/>
 - GEOROC - Geochemical Database on magmatic Rocks: <http://georoc.mpch-mainz.gwdg.de/georoc/>

Online Resources:

This document is available on CULearn as are many others relevant to the course. Frequently, visit the homepage of this course for updates with respect to the course plan. The course plan contains information on lecture and laboratory topics, reading assignments, homework, and pre-lecture as well as pre-lab preparations. Note that this course plan may alter during the term. The course website contains most of the laboratory assignments and homework, and you will have to print and read them carefully before the respective labs and lectures. Lectures and lecture notes will be made available after each lecture.

Course requirements:

You are expected to attend/watch all lectures and laboratories.

If attending class synchronously:

- You will be required to click on BigBlueButton to enter the lecture
- Because not everyone will be able to attend lectures they will be recorded and will be posted as soon as the server processes them (up to 24hr)
- In the recording of the lecture:
- You can have your video on if you wish, that way I can see if people look confused. If bandwidth or a reliable connection is a problem, you can turn off your video during the lecture.
- Please wear headphones with a mic if possible. It cuts down on background noise when talking.

- When I start lecturing, I will mute all of your microphones to avoid background noises.
- If you want to ask a question, please type your question in the public chat box. If I need clarification, I will ask you to unmute yourself.
- Public chats can be downloaded to your computer before the end of class.
- If you don't want to ask a question in the public chat, please send me a private chat.
- There is also an option to raise your hand if you have a comment or complex question
- I may assign one random person per lecture to help moderate. That person may point out to me if people want to ask questions.

Grading:

40% Laboratory exercises (@5% each)

10% Mid-term Exam

10% Class participation

40% Final Project (2-3 weeks to complete)

The lab component of the course must be passed in order to pass the course. Laboratory exercises will be due 1 week after it is assigned. Late labs will be penalized 15% per day for a maximum of 3 days.

Academic Integrity at Carleton

Carleton University demands academic integrity from all its members. It is your responsibility to review Carleton's policy on Academic Integrity. The Academic Integrity Policy (<http://carleton.ca/secretariat/wp-content/uploads/Academic-Integrity-Policy.pdf>) governs the academic behaviour of students. Academic Integrity is defined as:

“A commitment even in the face of adversity to five fundamental values: honesty, trust, fairness, respect, and responsibility.” – Centre for Academic Integrity (1999)

Academic dishonesty, in whatever form, is destructive to the values of the university, and risks harming the university's reputation as place of learning and innovation. Furthermore, it is unfair and discouraging to those students who pursue their studies honestly.

Process

The Academic Integrity Policy is implemented at the faculty level across the university. Appeals of the Academic Integrity Policy are administered by the Director, Student Affairs.

Step 1: Instructor believes misconduct has occurred

Step 2: Faculty Dean reviews documentation

Step 3: Student is contacted by email and letter

Step 4: Meeting with student, Dean and Advisor

Step 5: Dean informs student of decision

Appeal: Student has the right to appeal the decision

Examples of Violations

The following list includes, but is not limited to, examples of violations under the Academic Integrity policy. Please refer to the full Academic Integrity Policy (PDF) for more information.

Plagiarism:

The instructor is required to report all incidents (or suspected incidents) of plagiarism to the Dean. All work handed in must be your own work. The Policy is strictly enforced and is binding on all students.

Examples include:

- Submitting work written in whole or in part by someone else
- Failing to acknowledge sources through the use of proper citations when using another's work
- Test and Exam Rules:
- Attempting to read another student's exam paper
- Speaking to another student (even if subject matter is irrelevant to text)
- Using material not authorized by the examiner

Other Violations:

- Improper access to confidential information such as exams or test questions
- Disruption of classroom activities or periods of instruction
- Misrepresentation of facts for any academic purpose

Examples of Sanctions

The following list includes, but is not limited to, a few examples of sanctions that may be used independently or in combination, depending on the details of the academic integrity violation. Repeat or multiple violations will increase the sanction. Refer to the Academic Integrity Policy (PDF) for more information.

- A grade of zero, a failure or a reduced grade for the piece of academic work
- Reduction of final grade in the course
- Completion of a remediation process
- Resubmission of academic work
- Withdrawal from course(s)
- Suspension from a program of study
- A letter of reprimand

Academic Accommodations

Carleton University is committed to providing access to the educational experience in order to promote academic accessibility for all individuals.

Academic accommodation refers to educational practices, systems and support mechanisms designed to accommodate diversity and difference. The purpose of accommodation is to enable students to perform the essential requirements of their academic programs. At no time does

academic accommodation undermine or compromise the learning objectives that are established by the academic authorities of the University.

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:

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

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

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

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