

ERTH 4820A- Research Methods in Earth Sciences

Fall 2018

COURSE DESCRIPTION:

Research methods and resources in Earth sciences; state-of-the-art analytical techniques in determining elemental contents and isotopic ratios; data acquisition, evaluation and interpretation; effectively communicating research results.

Prerequisite(s): Third-year standing in Earth Sciences programs.

Lectures, seminars, or laboratories three hours a week. May also include tours to other research institutes and workshops given by guest instructors.

OBJECTIVES:

To help students gain: (1) knowledge of advanced analytical methods and hands-on experiences pertaining to elemental and isotopic analysis; (2) understanding of data evaluation and interpretation; (3) skills in effectively using research methods and resources in Earth sciences, in writing research proposals and in communicating research results.

CLASS ASSIGNMENTS:

Reading. You are asked to write an abstract for a journal paper.

Writing. You write a research proposal to obtain money for a potential research project.

Library assignment. A take-home exercise to search, cite and evaluate the journal articles.

Lab visit reports. To summarize your visits to GSC's and U of Ottawa's facilities, you will write a one-page report for each of your visits, focusing on the principles of IRMS, AMS, LA-ICP-MS and MC-ICP-MS, their capacities and potential applications to your research project.

Elemental and isotopic data acquisition, reduction and evaluation. You will collect isotopic data for samples or standards using a mass spectrometer and minerals compositions using an electron microprobe; you will then (1) manually calculate the isotope ratios and statistically evaluate the data; (2) calculate the minerals' formulas based on the their oxide weight percentages.

Oral presentation (10 minutes and 5 minutes for questions). You will present to the class the major points of the paper including your review of the paper. A paper can be chosen according to your choice of a sub-discipline in the Earth Sciences.

MARKS ASSIGNED:

Attendance and participation 15%

Abstract 10%

Proposal 15%

Library 10%

Lab visit reports 10%

Data reduction and evaluation 20%

Oral presentation 20%

Note: The instructor is required to report all incidents (or suspected incidents) of plagiarism to the Dean.

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LECTURES: 8:35 pm – 11:25 pm Fridays, HP3120

Note: length of class time will vary depending on topic and activity (i.e. some lectures will finish before the allotted time; seminars will use the full period).

COURSE REQUIREMENTS:

- **Check CU Learn.** It is the student's responsibility to check CU Learn for notices and course material.
- **Attendance and class participation is mandatory.** It is expected that students prepare for classes (e.g. reading, research, preparation of critiques) and participate in classes. Class participation includes contributions of critical reviews and questions about reading assignments, questions and/debate about lecture or seminar material, and presentation of assigned papers in a seminar setting.

AUDITORS are expected to register in the course, do the readings & participate in the course. Attendance is mandatory.

Recommended reading:

1. *John C. Davis, 2002, Statistics and Data Analysis in Geology, third edition: John Wiley & Sons*
2. *John H. Schuenemeyer and Lawrence J. Drew, 2011, Statistics for Earth and Environmental Scientists, John Wiley and Sons.*
3. *Francis Albarède, 1995, Introduction to Geochemical Modeling, Cambridge University Press.*
4. *Peter Copeland, 2012, Communicating Rocks: Writing, Speaking and Thinking about Geology, Pearson, Boston.*

Shuangquan Zhang's Office Hours: Mon. & Wed. 2:30 pm – 3:30 pm, HP1126, shuangquan.zhang@carleton.ca or by appointment via email or via phone 613-520 - 2600 (x6311)

ACADEMIC INTEGRITY

It is your responsibility to review Carleton's policy on Academic Integrity from Section 14 of the Calendar.

<http://calendar.carleton.ca/undergrad/regulations/academicregulationsoftheuniversity/acadregsuniv14/>

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. Plagiarism and cheating are viewed as being particularly serious and the sanctions imposed are accordingly severe. Students are expected to familiarize themselves with and follow the Carleton University Student Academic Integrity Policy. The Policy is strictly enforced and is binding on all students. Plagiarism and cheating – presenting another's ideas, arguments, words or images as your own, using unauthorized material, misrepresentation, fabricating or misrepresenting research data, unauthorized co-operation or collaboration or completing work for another

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student – weaken the quality of the graduate degree. Academic dishonesty in any form will not be tolerated. Students who infringe the Policy may be subject to one of several penalties including: expulsion; suspension from all studies at Carleton; suspension from full-time studies; a refusal of permission to continue or to register in a specific degree program; academic probation; or a grade of Failure in the course.

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 is 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

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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