

ERTH 5105 Thermodynamics, Kinetic Theory, and Metamorphic Petrology

Course description

ERTH 5105 Thermodynamics, Kinetic Theory, and Metamorphic Petrology [0.5 credit]

Phase equilibria, phase diagrams, and the kinetics of mineral reactions; mass transfer; regional and global aspects of metamorphic petrogenesis. Course may include one or two weeks of field-based instruction with costs borne by students.

Learning outcomes

1. Remember and reinforce the concepts of equilibrium thermodynamics in order to estimate the conditions and driving forces of metamorphism.
2. Understand the role of kinetics of mineral reactions during metamorphic petrogenesis.
3. Apply, discuss and interpret geochemical and petrological datasets in order to appreciate metamorphic pressure-temperature-time evolution.
4. Evaluate research on metamorphic processes and present and discuss it orally and in a scientific report.
5. Create the ability to research and learn petrological topics individually and in groups.

Times and locations

Sessions will be held online Tuesdays from 8:35 - 11:25. Online sessions will be conducted synchronous using the Zoom video conferencing platform. Zoom sessions will be recorded and provided to the students not able to attend the live sessions. Zoom invitations will be sent out by the teaching team prior to each session.

People

Instructor: Fred Gaidies

Office hours: By appointment via email

Email: fred.gaidies@carleton.ca

Teaching assistant: Yingzhou Li

Office hours: TBA

Email: yingzhouli@cmail.carleton.ca

Textbook

Spear, F. S., 1993. Metamorphic Phase Equilibria and Pressure-Temperature-Time Paths. Mineralogical Society of America, Washington, D.C.

This text has an excellent coverage of topics relevant to the quantitative analysis of metamorphic rocks, and serves as a **recommended reference** for this course.

Note: This book is on reserve in the library, and should preferably be obtained from the Mineralogical Society of America website: <https://msa.minsocam.org/publications.html>.

Online resources

This document is available online, 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 in-

formation on lecture, talk and exercise topics, reading assignments, and pre-lecture preparations. Note that this course plan may alter during the term.

The course website contains most of the exercises, and you will have to print and read them carefully before the respective sessions. Lecture notes will be made available after each lecture.

Course requirements

You are expected to attend all sessions. Arriving late to class is distracting to students, professor, and teaching assistants. Students are required to download, install, and use the Zoom videoconferencing software. Instructions can be found here: <https://carleton.ca/culearnsupport/instructors/zoom-web-conferencing/#download4>.

The exercises will be completed and handed in no longer than one week after the session in which they have been assigned (no exceptions).

Reading assignments and pre-lecture preparations are mandatory. It is the student's responsibility to come prepared.

There will be no examinations during the course. The final grade will be determined like follows:

Grading

- 30% Exercises
- 30% Research talk and participation
- 10% Research talk poster/handout
- 30% Research report

Academic Integrity

It is your responsibility to review Carleton's policy on Academic Integrity - Section 10.1 of the Calendar: <https://calendar.carleton.ca/undergrad/regulations/academicregulationsoftheuniversity/academic-integrity-and-offenses-of-conduct/#academic-integrity-policy>

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. 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 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.

Academic Accommodations

You may need special arrangements to meet your academic obligations during the term. For an accommodation request, the necessary processes are described here: <https://students.carleton.ca/course-outline/>

Recording of Class Sessions

This class or portions of this class will be recorded by the instructor for educational purposes. These recordings will be shared only with students enrolled in the course. Your instructor will communicate how you can access the recordings.

Unauthorized student recording of classroom or other academic activities (including advising sessions or office hours) is prohibited. Unauthorized recording is unethical and may also be a violation of University policy. Students requesting the use of assistive technology as an accommodation should contact the [Paul Menton Centre](#). Unauthorized use of classroom recordings – including distributing or posting them – is also prohibited. Under the University's [Copyright Policy](#), faculty own the copyright to instructional materials – including those resources created specifically for the purposes of instruction, such as lectures slides, lecture notes, and presentations. Students cannot copy, reproduce, display, or distribute these materials or otherwise circulate these materials without the instructor's written permission. Students who engage in unauthorized recording, unauthorized use of a recording, or unauthorized distribution of instructional materials will be referred to the appropriate University office for follow-up.