

# 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.

## Course objectives

1. Reinforce the concepts of equilibrium thermodynamics in order to estimate the conditions and driving forces of metamorphism.
2. Acquire an understanding of 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. Learn to critically evaluate research on metamorphic processes and to present and discuss it orally and in a scientific report.
5. Develop the ability to research and learn petrological topics individually and in groups.

## Times and locations

Sessions will be held Mondays 11:35 - 14:25 am in 2120 HP.

## People

Instructor: Fred Gaidies

Office hours: By appointment via email

Email: fred.gaidies@carleton.ca

Teaching assistant: Freya George

Office hours: TBA

Email: freya.george@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 (WebCT: <http://lms.carleton.ca/webct/entryPageIns.dowebct>), 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, 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. A written medical excuse must be submitted if you cannot attend class due to illness.

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 to lectures, seminars and labs 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

Note: The instructor is required to report all incidents (or suspected incidents) of plagiarism to the Dean. 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 Academic Integrity Policy (<http://www2.carleton.ca/studentaffairs/academic-integrity>). 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 data, unauthorized co-operation or collaboration or completing work for another student – weaken the quality of the undergraduate 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 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](http://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](https://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](mailto: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](https://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](https://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](https://students.carleton.ca/course-outline)