GEOL 3217 — Metamorphic Petrology

COURSE OVERVIEW

In this course, students will learn to describe and analyze metamorphic rocks at both the macroscopic (hand sample) and microscopic (thin section) scales. By developing an understanding of metamorphic processes (including diffusion, solid-state reactions, and plastic deformation) students will learn to interpret the pressure-temperature conditions and geologic histories recorded by metamorphic rocks and metamorphic terranes.

The course includes **3 hours of lectures** and a **3 hour laboratory** exercise every week.

Instructor: Dr Tobias Stephan
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Office hours: Thu 1–3 pm

Teaching Assistant: Hanna Tiitto
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Class Schedule: Lectures: MW 4:00–5:30 pm (CB-XXXX)
Labs: M 11:30 am–2:30 pm (CB-XXXX)

Grading: Midterm 20 %
Final 35 %
Labs 25 %
Research project 15 %
In-Class Participation 5 %

TENTATIVE CLASS SCHEDULE

Week	Subject	Laboratories
1	Introduction (Definitions, Agents, Types)	
2	Classification and Fabrics	Metamorphic rocks in hand samples
3	Chemical Equilibrium and the Phase Rule	Metamorphic Minerals under the microscope
4	Chemographics	chemical equilibrium & reactions
5	Metamorphic Facies and Metabasites	Metabasites
6	Metapelites	
7	*Reading Week*	
8	Calcareous Rocks and Ultramafic Rocks	Mid-term exam
9	*PDAC*	
10	Migmatites and Granulites	Metapelites
11	Metamorphic Fluids and Metasomatism	Marbles
12	Thermodynamics & Geothermobarometry	Geothermometry and Geobarometry
13	Tectonics and Case Studies	Final Projects
14	Final Project Presentations	Final Project Presentations

LEARNING OUTCOMES

Upon successful completion of this course, students will be able to:

- Identify and describe metamorphic rocks and textures in hand sample and thin section
- Recognize metamorphic protoliths and interpret the tectonic settings in which metamorphic rocks form
- Understand metamorphic reactions and why and when they occur
- Use mineral chemistry and rock type to determine the temperature-pressure-time (T-P-t) evolution of metamorphic rocks

TECHNOLOGY GUIDELINES

- *Note taking*: Students are encouraged to take notes on paper rather than on laptops, as extensive drawings will be made on the board. If you feel you need to use a device for note-taking, please speak with me in advance. Photographs of the board are not permitted without explicit permission.
- *Calculators*: A physical calculator is strongly recommended over a phone, as phones will not be permitted in class (see below). All calculators must comply with the Faculty of Engineering's calculator policy.
- *Phones*: This course will follow a strict **no-phone policy**. Phones are not to be used or visible at any time during lectures or labs. The labs can be quite

demanding, and staying focussed is essential. A computer may be used during lab if a calculator is required.

- No photographs of the board or laboratory materials are permitted without prior permission.

CLASS PARTICIPATION

Active class participation and attendance are expected for all lectures and labs. If you are too ill to attend class, please notify me by email prior to the start of class whenever possible. Group work will be used frequently; students should be prepared to work with different partners throughout the term. Developing effective collaboration skills is an important component of this course.

LABS

This course includes a weekly laboratory component. Each lab report must be completed and submitted by the start of the following lab session.

TEXTBOOKS

This course does not require the purchase of a textbook. However, the following three books are highly **recommended** as excellent companions to the lectures and labs. They offer clear explanations, worked examples, and valuable reference material that many students find extremely helpful for mastering metamorphic petrology.

BEST, M. G. (2003). *Igneous and metamorphic petrology* (2nd ed.). Blackwell Publishers.

WINTER, J. D. (2010). *Principles of igneous and metamorphic petrology* (2nd ed.). Prentice Hall. Price: $90.00.

DEER, W. A., HOWIE, R. A., ZUSSMAN, J. (2013). *An introduction to the rock-forming minerals* (3rd ed.). The Mineralogical Society

Access to at least one of these books (physical or digital) is strongly encouraged.

EXAM POLICY

All materials from the course including lectures, readings, and laboratories are testable materials for the midterm exams.

ACADEMIC INTEGRITY

Standard rules of academic integrity apply to all assignments. Namely, your work should be your own. If you solve problems with other students, please list their names and explain the nature of your collaboration. Please review the University's webpage about academic integrity incl. plagiarism. No ChatGPT or other generative AI will be necessary for this class. These tools are not allowed, so please use your own words.

Last updated: December 17, 2025