GEO 349 Metamorphic Petrology

Summer 2024

Course Credits: 4

Contact Hours: 56 hours

Instructor: TBA

Email:TBA

COURSE OBJECTIVES

Metamorphic Petrology delves into the fundamental concepts of metamorphic geology, examining the origins of metamorphic rocks within the context of plate tectonics and orogenic processes. The course explores topics such as metamorphic petrography, including the microscopic examination of mineral assemblages and textures in metamorphic rocks. Additionally, it covers the mechanisms and conditions of metamorphism, providing insights into the processes that transform rocks under high pressure and temperature conditions. Through this course, students gain a comprehensive understanding of the complexities of metamorphic processes and their significance in Earth's geological history.

Upon Completion of this Course, students will be able to:

1. Grasp fundamental principles of metamorphic rock classification, identifying key mineral assemblages and textures indicating specific environments and processes;
2. Delve into metamorphic facies and isograds, proficiently recognizing and interpreting mineral assemblages' spatial distribution in diverse terrains;
3. Attain knowledge of mineral equilibrium and thermobarometry techniques for deciphering pressure and temperature conditions in metamorphic rock formation;
4. Hone metamorphic petrography skills via microscopic examination, identifying mineral phases, textures, and structural features in varied environments;
5. Investigate the correlation between metamorphic rock occurrences and plate tectonic settings, analyzing geological processes' role in terrain formation and evolution.

PREREQUISITES

CHM 113 Principles of Chemistry; PHY 111 Introduction to Physics; GEO 223

Mineralogy

GRADING

Grades will be determined by accumulating points, with 100 points being the maximum, as follows:

ITEM	POINTS
3 Assignments	15 Points
4 Labs	40 Points
Midterm Exam	20 Points
Final Exam	25 Points
Total	100 Points

Late submissions will be graded at the end of the course. Grades will be assigned according to the following rule:

$A \geq 90 > B \geq 80 > C \geq 70 > D \geq 60 > F$.

We reserve the right to make adjustments to the overall grading policy.

COURSE MATERIALS

Required Texts:

Yardley, Bruce W, ***An Introduction to Metamorphic Petrology***, 1996, Prentice Hall PTR.

Recommended (Optional) Texts or Other Materials:

None

COURSE TOPICS

MODULE	TASKS
Module 1	**Topics:** Topic 1: Introduction to Metamorphic Geology Topic 2: Plate Tectonics and Orogenic Processes Topic 3: Identification and Classification of Metamorphic Rocks Topic 4: Mineral Equilibrium and Thermobarometry **Assessments:**

	Assignment #1
Module 2	**Topics:** Topic 5: Metamorphic Facies and Isograds Topic 6: Metamorphic Phase Diagrams Topic 7: Mechanisms of Metamorphism Topic 8: Conditions of Metamorphism **Assessments:** Lab# 1: High-Pressure, High-Temperature Experiments Assignment #2
Module 3	**Topics:** Topic 9: Fluid-Rock Interactions in Metamorphism Topic 10: Metamorphic Textures and Structures Topic 11: Metamorphic Grade and Index Minerals Topic 12: Regional Metamorphism **Assessments:** Lab #2: Microscopic Examination of Metamorphic Textures Midterm Exam
Module 4	**Topics:** Topic 13: Contact Metamorphism Topic 14: Metamorphic Aureoles Topic 15: Metamorphic Field Mapping Topic 16: Metamorphic Protoliths **Assessments:** Lab #3: Experimental Determination of Protolith Composition and Structure Assignment #3
Module 5	**Topics:** Topic 17: Metamorphic Environments Topic 18: Metamorphic Rocks and Economic Geology Topic 19: Metamorphic Petrology and Planetary Geology Topic 20: Geochronology in Metamorphic Petrology **Assessments:** Lab #4: Experimental Simulation of Different Metamorphic Environments Final Exam

ATTENDANCE

1) Class attendance is required. Missing classes without permission will lead to decrease in overall grade.

Missing less than two classes: no penalty.

Missing more than two classes: 7% will be taken off from the overall grade.

If the instructor reports a student's frequent missing of class to the Soochow University Academic Administration Office, the student might get a written warning and might be prohibited from attending final exam.

2) Participants in this course are expected to arrive in class promptly and adequately prepared. The primary objective of this course is to critically engage with the readings and the subject matter. Therefore, course participants are expected to have completed the reading prior to class and prepare thoughtful reflections/commentaries to share with fellow colleagues.

LEARNING REQUIREMENTS

1) Late assignments are not acceptable and are subjected to grade deductions.
2) Assignments submitted in the wrong format will be counted as not submitted.
3) Failure to submit or fulfill any required course component results in failure of the class.
4) Make-up for midterm and final exams only with valid excuses, as defined by the University.
5) In order to earn a Certificate of Completion, participants must thoughtfully complete all assignments by stated deadlines and earn an average quiz score of 50% or greater.

TECHNOLOGY POLICY

The use of electronic devices in class is distracting, both for the user and for the rest of the class. Only non-programmable calculators can be used in the tests and exam. Any attempts to use cell phones and other electronic communication devices will be seemed as cheating. Laptops are discouraged, unless you use them for activities DIRECTLY related to the course (eg., note taking, reading course documents).

ACEDEMIC INTEGRITY POLICY

Soochow University highly values the academic integrity and aims to promote the academic fairness, honesty and responsibility. Any academic dishonesty behaviors and any attempts to cheats and plagiarism will be reported to the university administration office. A written warning and the relevant penalties will be imposed.

The record might be shown on the official university transcript.

DISABILITY ACCOMMODATION

Soochow University is committed to maintaining a barrier-free environment so that students with disabilities can fully access programs, courses, services, and activities at Soochow University. Students with disabilities who require accommodations for access to and/or participation in this course are welcome.

Note:

Please contact the University Administrative Office immediately if you have a learning disability, a medical issue, or any other type of problem that prevents professors from seeing you have learned the course material.