

Geology 422/622 — Petrology 2008
Department of Geosciences, NDSU

Time: Tuesday and Thursday, 9:30 - 10:45 a.m.
Location: Stevens Hall 134
Instructor: B. Saini-Eidukat, office 129 Stevens Hall, ext. 1-8785
 email: bernhardt.saini-eidukat@ndsu.edu
Office hours: Wednesdays, 2:00 - 4:00 p.m.
Texts: Winter, J.D., 2001, "Igneous and Metamorphic Petrology,"
 Prentice Hall.
 Supplemental (not required): "Igneous Petrology" by A. McBirney,
 2nd ed.; "An Introduction to Metamorphic Petrology" by B. Yardley;
 also texts by Wilson (1989); Philpotts; Klein and Dutrow.
Web Site: www.ndsu.edu/instruct/sainieid/pet/

This course provides an introduction to the Earth's igneous and metamorphic rocks. The prerequisite is a course in mineralogy. We will investigate how these rocks were formed, their geochemical and mineralogical characteristics, and how to interpret them to understand their genesis. We will learn from a combination of lectures, in-class exercises and discussion, guest speakers, homework, and a hands-on term project.

Tentative Lecture and Exam Schedule; Readings

			Chapter
T	8 Jan	Earth composition and structure; Igneous rock classification	1,2
Th	10	Volcanic & intrusive landforms and morphologies	4
T	15	Intro to thermodynamics; One-component systems	5 & 6
Th	17	One- and two-component systems	6
T	22	Two-component systems; Partial melting	6 & 7
Th	24	Guest Lecturer	
T	29	Two- and three-component systems	6 & 7
Th	31	Three-component systems	7
T	5 Feb	Exam 1	1,2 4-7
Th	7	Major and minor element chemistry	8
T	12	Major and minor element chemistry	8
Th	14	Mantle stratigraphy, magma generation, diversification	10, 11
T	19	Trace element and isotope chemistry	9
Th	21	Trace element and isotope chemistry	9
T	26	Exam 2	(covers 8-11)
Th	28	Mafic volcanism	portions of 12, 13, 14, 15
T	4 Mar	Spring Break	
Th	6	Spring Break	

T	11 Mar	Subduction-related volcanism	16, 17
Th	13	Granites and rhyolites; kimberlites	18, portions of 19
T	18	Intro to metamorphic rocks; Nomenclature	21 & 22
Th	20	Metamorphic textures, facies, and indicator minerals	23
T	25	Metamorphic phase equilibria	24
Th	27	Metamorphic facies and metamorphism of mafic rocks	25
T	1 Apr	Metamorphic reactions; Petrogenetic grids	portions of 26
Th	3	Exam 3 (covers mafic and silicic volcanism, plus 21 - 24)	
T	8	Thermodynamics of metamorphic reactions	portions of 27
Th	10	Metamorphism of pelites	28
T	15	Metamorphism of pelites	28
Th	17	Metamorphism of calc-silicates	29
T	22	Metamorphism of ultramafic rocks	29
Th	24	Global tectonics	outside readings
T	29	Student presentations	
Th	1 May	Student presentations	
M	5 May	Final Exam 1:00 – 3:00 p.m.	

This schedule is subject to change.

Examinations: Four exams will be given on the dates indicated above. These exams will include questions derived from lecture material, homeworks, and assigned reading.

Grading:	Exams 1 – 3	45%
	Final Exam	20%
	Quizzes & Homework	20%
	Project	15%

Special Needs:

Any Students who need special accommodations for learning or who have special needs are invited to share these concerns or requests with the instructor as soon as possible.

Academic Responsibility:

All work in this course must be completed in a manner consistent with NDSU University Senate Policy, section 335: Code of Academic Responsibility and Conduct (<http://www.ndsu.edu/policy/335.htm>).

Intended Student Outcomes:

- To understand the processes which form igneous and metamorphic rocks.
- To understand the basis of and the use of phase diagrams in petrology.
- To use mineral reactions to describe the formation of metamorphic rocks.
- To appreciate the relationships between Earth history, igneous and metamorphic processes, and plate tectonics.