

Earth Science 450: Introduction to Petrology EXAMPLE SYLLABUS

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Office Hours: TR 11-12:15, W 9:30-Noon (or by appointment, or drop in most times)

Reading: *Earth's Materials: Minerals and Rocks*, Sen, G., 2001.
For Reference: *Minerals in Thin Section*, 2nd ed., Perkins, D., and Henke, K.R., 2004.

	<u>Percent</u>	<u>Approx. Point Distribution</u>
Grading Scheme: Midterm Exam	25 %	100-125 points
Final Exam	35 %	120-150 points
Petrographic Problem-Solving Assignments	20 %	40-60 points
<u>Exercises and Problem Sets</u>	<u>20 %</u>	<u>100-150 points</u>
TOTAL		approx. 350-500 points

Course Description:

Focus on the textures, compositions, and genetic associations of diverse suites of rock types. Study of the structure, chemistry, physical properties, and occurrences of rock-forming minerals augments the rock study. Emphasis is on the integration of hand sample study, petrographic microscopy, and digital image analysis to solve geologic problems. Four hours of lecture and active learning per week.

PREREQ: ES 201 and ES 301, or consent of instructor.

Learning Objectives:

- Students will gain experience in describing, characterizing, and identifying Earth materials in hand sample and thin section
- Students will be engaged in the scientific process by using thin sections as basis for geologic problem solving activities
- Students will gain knowledge about rock-forming minerals and a variety of igneous and metamorphic processes

Policies and Notes:

- The Schedule of Lecture Topics and Exercises may be modified, but the dates of the exams will not change without ample notification. If you are prevented from taking an exam by some *verifiable* catastrophe contact me immediately. I will not give an exam after I have returned it to the other students.
- This class is designed to be an active learning experience. As such, numerous assignments will be made during the term. Late papers will be assessed a 10%/day late penalty, meaning your score will be reduced 10% per day including weekends. I will not accept an assignment after it is graded and returned the class.

Schedule of Topics and Reading Materials for ES 450

<u>WEEK</u>	<u>LECTURE TOPICS</u> (tentative)	<u>READING</u> (All from Sen, 2001)
1	Course Overview / Classifying Earth Materials Earth: Overview, Tectonics, & Compositional Attributes Overview of Minerals / Physical Properties	Sen: pp. 16, 19, 233 Ch. 1 (1-15) Ch. 3 (52-53; 60-66)
2	Mineral Chemistry Atoms, Elements, Compounds; Chemical Bonding Classifying Minerals / Mineralogy of Silicates ASSIGN Petrographic Problem-Solving Assignment #1	Ch. 2 (p. 20-24, 26) Ch. 3 (p. 55-60)
3	Chemical Mineralogy Phase Relations and Phase Diagrams	Ch. 7 (p. 178-179; 185-212)
4	Introduction to Igneous Rocks Occurrence, Petrography, and Classification Petrographic Problem-Solving Assignment #1 DUE	Ch. 8 (p. 234-252; 257-258)
5	Midterm ASSIGN Petrographic Problem-Solving Assignment #2	
6	Petrogenesis and Modification of Magma: Magma Formation and Segregation Differentiation and Variation Diagrams	Ch. 9 (p. 266-274) Ch. 10 (p. 281-296)
7	Basaltic Magmas: Classification and Origin Layered Mafic Intrusions Relevant Mineralogy: Plagioclase and Pyroxene Petrographic Problem-Solving Assignment #2 DUE	Ch. 10 (p. 279-280); Ch. 11 Ch. 10 (p. 296-306)
8	Andesitic and Rhyolitic Magmas Volcanic Arc Rocks: Compositions and Textures ASSIGN Petrographic Problem-Solving Assignment #3	Ch. 12 (p. 333-339) Ch. 12 (p. 340-352)
9	Granitoids: Plutonic rocks Relevant Mineralogy: Potassium Feldspar and Quartz Case Study in Petrology: Origin of Arc Magmas	Ch. 12 (p. 352-360) Additional reading materials provided
10	Metamorphism and Metamorphic Rocks: Origin of Textural Features; Facies and Tectonics Relevant Mineralogy: Aluminosilicates and Garnet Petrographic Problem-Solving Assignment #3 DUE ASSIGN Take-Home Final, PPS Assignment #4	Ch. 15 Ch. 16 (p. 444-451)
Finals	Comprehensive Final Exam Petrographic Problem-Solving Assignment #4 DUE	