

EENS 212**Spring Semester 2009****Petrology**

Revised 15 Jan, 2009

Instructor: Stephen A. Nelson
 email: snelson@tulane.edu

Room 208 Blessey Hall
 Office Hours - MWF 1:00 - 4:00 PM

Laboratory Instructor: Erika Gonzalez email: egcaver@tulane.edu

I. COURSE GOALS & OBJECTIVES

Since Rocks are the basic building blocks of the Earth, this course is designed to give the student a fundamental background in rocks, necessary to understand the Earth. The student will learn the principles behind rock forming processes and will learn to examine rocks in hand specimen and thin section, both as a means of identifying and describing the rocks and as a means of extracting clues to formulate hypotheses about how the rocks formed in nature.

II. TEXTBOOKS

Required Textbooks:

- *Petrology - Igneous, Sedimentary, and Metamorphic*, 3rd Ed. by Blatt, Tracy, & Owens (BTO)
- *An Introduction to the Rock Forming Minerals*, 2nd Ed., by Deer, Howie & Zussman (DHZ)

Supplementary Textbook:

- *Petrography*, 2nd Edition by H. Williams, F.J. Turner, and C.M. Gilbert: (WTG)

III. COURSE GRADING

The course grade will be determined on the basis of the number of points scored out of a possible 1000 points. These points will be apportioned as follows:

Homework and Labs	15%	Lab Midterm	15%
Lecture Midterm	20%	Lab Final	20%
Lecture Final	25%	Field Trip Participation	5%

Field Trip: The Field Trip is scheduled for April 17-20 (Thursday through Sunday). Make plans now so you won't have any excuses for not attending. (No excuses will be accepted.)

IV. WEB PAGE

A Web site has been developed for this course. It includes course materials, including a copy of this syllabus, lecture notes, announcements from the instructor, and Internet links. The site can be found on the internet at: <http://www.tulane.edu/~sanelson/eens212/>

Be sure to check this web page regularly throughout the course for important announcements and updates.

V. TENTATIVE SCHEDULE OF LECTURES AND LABS

Date	Topic	Readings
Jan 13	Lecture: Textures & Structures of Igneous Rocks	BTO Intro & Chapters 1 & 2
	Lab I: Textures of Igneous Rocks in Hand Specimen	BTO Chapter 2
Jan 15	Lecture: Textures & Structures of Igneous Rocks & General Classification of Igneous Rocks	BTO Chapter 3
	Lab II: Textures of Igneous Rocks in Thin Section	BTO Chapter 2 WTG p. 53-67
Jan 20	Lecture: Simple 1 & 2 Component Phase Diagrams	BTO Chapter 4
	Lab III: Calculation of Norm & Classification of Igneous Rocks	Handout
Jan 22	Lecture: Ternary Phase Diagrams	BTO Chapter 4
	Lab IV: Minerals in Igneous Rocks	BTO Chapter 2
Jan 27	Lecture: Ternary Phase Diagrams (cont.)	BTO Chapter 4
	Lab V: Ternary Phase Diagrams	Handout
Jan 29	Lecture: The Interior of Earth and Formation of Magmas	BTO Chapter 5 BTO Chapter 7
	Lab V: Ternary Phase Diagrams (Cont.)	Handout
Feb 3	Lecture: Magmatic Differentiation	BTO Chapter 6 BTO Chapter 5
	Lab VI: Basalts & Gabbros in Hand Specimen & Thin Section	WTG p. 94-135
Feb 5	Lecture: Magmatic Differentiation	BTO Chapter 6
	Lab VII: Variation Diagrams in Petrology	Handout
Feb 10	Lecture: Igneous Rocks of the Oceanic Lithosphere	BTO Chapter 8
	Lab VIII: Andesites & Diorites in Hand Specimen & Thin Section	WTG p. 137-158
Feb 12	Lecture: Igneous Rocks of the Oceanic Lithosphere	BTO Chapter 8
	Lab IX: Trace Elements in Igneous Processes	Handout
Feb 17	Lecture: Igneous Rocks of Convergent Margins	BTO Chapter 9
	Lab X: Siliceous Rocks in Hand Specimen & Thin Section	WTG p.159-192
Feb 19	Lecture: Igneous Rocks of Convergent Margins (cont.) and Igneous Rocks of the Continental Lithosphere	BTO Chapter 9 BTO Chapter 10
	Lab XI: Projected Phase Diagrams	Handout
Feb 24	MARDI GRAS	
Feb 26	Lecture: Igneous Rocks of the Continental Lithosphere (cont.)	BTO Chapter 10
	Lab XII: Ultrabasic & Alkaline Rocks in Hand Specimen & Thin Section	WTG p. 193-258
Mar 3	Lecture: Pyroclastic Rocks	Lecture Notes
	Lab XIII: Isotopes in Igneous Processes	Handout
Mar 5	Lecture: Types of Metamorphism	BTO Chapter 18
	Lab XIV: Pyroclastic Rocks	WTG p.260-274
Mar 10	LECTURE MIDTERM	
	No Lab	
Mar 12	Lecture: Metamorphic Rock Textures	BTO Chapter 18
	Lab - LABORATORY MIDTERM EXAM	
Mar 17	Lecture: Triangular Plots in Metamorphic Petrology	BTO Chapter 20
	Lab XV: Metamorphic Minerals & Textures	WTG p. 438-453
Mar 19	Lecture: Metamorphic Mineral Assemblages	BTO Chapter 20
	Lab XVI: Triangular Plots in Metamorphic Petrology	

Mar 24, 26	Spring Break	
Mar 31	Lecture: Metamorphic Mineral Assemblages & Thermodynamics & Metamorphic Reactions	BTO Chapter 19 BTO Chapter 21
	Lab XVI: Triangular Plots in Metamorphic Petrology (cont.)	BTO Chapter 20
Apr 2	Lecture: Thermodynamics & Metamorphic Reactions & Geology of Field Trip Area	Handout Lecture Notes
	Lab XVII: Thermodynamics and Metamorphic Reactions	Lecture Notes
Apr 4-7	Field Trip to Southern Appalachians	Handout
Apr 9	Lecture: Contact Metamorphism	BTO Chapter 21
	Lab XVIII: Contact Metamorphic Rocks in Hand Specimen and Thin Section	WTG p. 476-499
Apr 14	Lecture: Metamorphic Reactions	BTO Chapter 20
	Lab XIX: Low - Medium Grade Metamorphic Rocks in Hand Spec.	WTG p. 514-546
Apr 16	Lecture: Metamorphic Reactions	BTO Chapter 20
	Lab XX: Low to Medium Grade Metamorphic Rocks in Thin Section	WTG p. 514-546
Apr 21	Lecture: Regional Metamorphism	BTO Ch 22, 23, 24
	Lab XXI: High Grade Metamorphic Rocks in Hand Specimen	WTG p. 547-571
Apr 23	Lecture: Regional Metamorphism	BTO Ch 22, 23, 24
	Lab XXII: High Grade Metamorphic Rocks in Thin Section	WTG p. 547-571
Apr 28	Lecture: Radiometric Age Dating of Igneous & Metamorphic Rocks	Lecture Notes
	Lab XXIII: Radiometric Age Dating of Igneous & Metamorphic Rocks	Handout
May 5	LAB FINAL EXAMINATION 12:00 P.M. to 5:00 P.M	
May 8	LECTURE FINAL EXAMINATION 9:00 A.M. to 12:00 P.M	

Learning Outcomes for this Course

1. The student will gain an understanding of the processes responsible for forming igneous and metamorphic rocks.
2. The student will gain an understanding of how the chemical composition, structure and texture of rocks can be used to interpret past geologic processes and the geologic history of the earth.
3. The student will be able to identify igneous and metamorphic rocks in hand specimen and thin section.
4. The student will learn how to manipulate chemical data using computer programs and spreadsheets.

This course contributes to satisfying or partially satisfying the learning outcomes for the undergraduate program in Geology as those marked by bold-face type below.

We expect our graduates with a major in Geology to demonstrate that they have the ability to

1. **solve a wide variety of scientific problems.**
2. **analyze and interpret scientific data.**

3. communicate effectively through written work and presentations
4. **explain the effects of geological processes in a societal context in terms of mineral and energy resources, geological hazards, and environmental change.**
5. participate in the public discussion of geoscience issues, including discussion of scientific findings and data.
6. **identify and interpret the origin of igneous, sedimentary, and metamorphic rocks and minerals in both hand specimen and thin section.**
7. use and interpret geologic maps in cross-sections in terms of the geologic and tectonic history of any region.
8. construct a geologic map based on field studies.
9. be conversant with fossils in their sedimentary settings and understand mode and tempo of their evolutionary changes.

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