

**EENS 2120****Spring Semester 2018****Petrology**

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 Office Hours - By Appointment

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## 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:**

An Introduction to the Rock Forming Minerals, 2<sup>nd</sup> Ed., by Deer, Howie & Zussman (**DHZ**)

### **Supplementary Textbooks:**

*Earth Materials* by Hefferan and O'Brien (**H&O**)

*Petrography*, 2<sup>nd</sup> 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 5 - 8 (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.

In addition PDF versions of the actual lectures will be posted on the Canvas site for this course as they become available.

**V. TENTATIVE SCHEDULE OF LECTURES AND LABS**

<b>Date</b>	<b>Topic</b>	<b>Readings</b>
Jan 16	<b>Lecture:</b> Textures & Structures of Igneous Rocks	H&O p. 181-197, 227-263
	<b>Lab I:</b> Textures of Igneous Rocks in Hand Specimen	H&O p. 185-197
Jan 23	<b>Lecture:</b> Textures & Structures of Igneous Rocks & General Classification of Igneous Rocks	H&O p. 197-211
	<b>Lab II:</b> Textures of Igneous Rocks in Thin Section	WTG p. 53-67
Jan 25	<b>Lecture:</b> Simple 1 & 2 Component Phase Diagrams	H&O p. 50-65 Lecture Notes
	<b>Lab III:</b> Calculation of Norm & Classification of Igneous Rocks	Handout
Jan 30	<b>Lecture:</b> Ternary Phase Diagrams	Lecture Notes
	<b>Lab IV:</b> Minerals in Igneous Rocks	Handout
Feb 1	<b>Lecture:</b> Ternary Phase Diagrams (cont.)	Lecture Notes
	<b>Lab V:</b> Ternary Phase Diagrams	Handout
Feb 6	<b>Lecture:</b> The Interior of Earth and Formation of Magmas	H&O Ch. 1 & p. 212-216
	<b>Lab V:</b> Ternary Phase Diagrams (Cont.)	Handout
Feb 8	<b>Lecture:</b> Magmatic Differentiation	H&O 216-227
	<b>Lab VI:</b> Basalts & Gabbros in Hand Specimen & Thin Section	WTG p. 94-135
Feb 13	<b>MARDI GRAS - NO CLASS</b>	
Feb 15	<b>Lecture:</b> Magmatic Differentiation	H&O 216-227
	<b>Lab VII:</b> Variation Diagrams in Petrology	Handout
Feb 20	<b>Lecture:</b> Igneous Rocks of the Oceanic Lithosphere	H&O p. 264-268
	<b>Lab VIII:</b> Andesites & Diorites in Hand Specimen & Thin Section	WTG p. 137-158
Feb 22	<b>Lecture:</b> Igneous Rocks of the Oceanic Lithosphere	H&O p. 264-268
	<b>Lab IX:</b> Trace Elements in Igneous Processes	Handout
Feb 27	<b>Lecture:</b> Igneous Rocks of Convergent Margins	H&O p. 268-278
	<b>Lab X:</b> Siliceous Rocks in Hand Specimen & Thin Section	WTG p.159-192
Mar 1	<b>Lecture:</b> Igneous Rocks of Convergent Margins (cont.) and Igneous Rocks of the Continental Lithosphere	H&O p. 268-278 H&O p. 278-294
	<b>Lab XI:</b> Projected Phase Diagrams	Handout
Mar 6	<b>Lecture:</b> Igneous Rocks of the Continental Lithosphere (cont.)	H&O p. 278-294
	<b>Lab XII:</b> Ultrabasic & Alkaline Rocks in Hand Specimen & Thin Section	WTG p. 193-258
Mar 8	<b>Lecture:</b> Pyroclastic Rocks	Lecture Notes H&O p. 249-262
	<b>Lab XIII:</b> Isotopes in Igneous Processes	Handout
Mar 13	<b>Lecture:</b> Types of Metamorphism	H&O Ch. 15
	<b>Lab XIV:</b> Pyroclastic Rocks	WTG p.260-274
Mar 15	<b>LECTURE MIDTERM EXAM</b> <b>No Lab</b>	
Mar 20	<b>Lecture:</b> Metamorphic Rock Textures	H&O Ch. 16 & 17
	<b>Lab - LABORATORY MIDTERM EXAM</b>	
Mar 22	<b>Lecture:</b> Triangular Plots in Metamorphic Petrology	Lecture Notes H&O p. 526-530
	<b>Lab: XV:</b> Metamorphic Minerals & Textures	WTG p. 438-453
Mar 27-29	<b>Spring Break No Class</b>	

Apr 3	<b>Lecture:</b> Metamorphic Mineral Assemblages	H&O Ch. 18
	<b>Lab XVI:</b> Triangular Plots in Metamorphic Petrology	
Apr 5 - 8	Field Trip	
Apr 10	<b>Lecture:</b> Metamorphic Mineral Assemblages & Thermodynamics & Metamorphic Reactions	Lecture Notes
	<b>Lab XVI:</b> Triangular Plots in Metamorphic Petrology (cont.)	Handout
Apr 12	<b>Lecture:</b> Thermodynamics & Metamorphic Reactions	H&O Ch. 18 Lecture Notes
	<b>Lab XVII:</b> Thermodynamics and Metamorphic Reactions	Lecture Notes Handout
Apr 17	<b>Lecture:</b> Metamorphic Reactions	H&O Ch. 18 Lecture Notes
	<b>Lab XVIII:</b> Contact Metamorphic Rocks in Hand Specimen and Thin Section	WTG p. 476-499
Apr 19	<b>Lecture:</b> Metamorphic Reactions	Lecture Notes
	<b>Lab XIX &amp; XX:</b> Low - Medium Grade Metamorphic Rocks in Hand Spec.	WTG p. 514-546
Apr 24	<b>Lecture:</b> Contact Metamorphism Regional Metamorphism	H&O p. 450-452 Lecture Notes
	<b>Lab XXI &amp; XXII:</b> High Grade Metamorphic Rocks in Hand	WTG p. 514-546
Apr 26	Regional Metamorphism	H&O Ch. 16 & 18
	Lab Catch up day	WTG p. 547-571
May 1	<b>Lecture:</b> Radiometric Age Dating of Igneous & Metamorphic Rocks	H&O 64-74 Lecture Notes
	<b>Lab XXIII:</b> Radiometric Age Dating of Igneous & Metamorphic Rocks	Handout
May 6	<b>LECTURE FINAL EXAMINATION 8:00 A.M. to 12:00 P.M</b>	
May 9	<b>LAB FINAL EXAMINATION 1:00 P.M. to 5:00 P.M</b>	

### 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.

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