Earth Systems Science
(Geology of the National Parks)

Geo 111: Fall 2010

Goals:

- learn the geological concepts involved in shaping our landscape
- learning to apply the scientific method
- improve observational skills both in lab and in the field

Course Information:

Prof. Jen Houghton, FJ 116E. Office Hours: Anytime Monday, Tuesday or Thursday or by appointment.
Phone 3089, email: houghtonj@rhodes.edu

Time: Lecture T, Th 8:00-9:15am FJ-A
Lab T 12:30-3:30pm FJ 132E

Textbook:

Geology of National Parks, 6th ed. By A. G. Harris, E. Tuttle, S. D. Tuttle. Kendall-Hunt Publishing.

Grade distribution:

Exam questions: 30%
Final exam (Dec 7 during lab): 10%
Labs (12 total, 5 major lab reports, 6% each): 30%
Presentations about your Adopted National Park (2 during semester): 30%

Schedule:

SEDIMENTARY FEATURES			
Aug. 26	Geologic time		
Aug. 31	Rock cycle, plate tectonics Box 2.1 (p.37-39); p.2-6	LAB 1	Clastic sedimentary rocks
Sept. 2	Sedimentary rocks and depositional structures Ch. 1 (p.8-28)		
Sept. 7	Erosion by wind and rivers Ch. 6 (p.80-90)	LAB 2	Downcutting in Grand Canyon NP
CARBONATES and CARBON SEQUESTRATION			
Sept. 9	Coral reef and terrace formation, Gulf oil spill p.188-190; Ch. 18 (p.244-252)		
Sept. 14	Weathering and carbon chemistry (3 PRESENTATIONS) p.48-52; p.429-432,434; box 14.1 (p.196)	LAB 3	Carbonates and carbon sequestration in Virgin Islands NP

Sept. 16	10 PRESENTATIONS		
Sept. 21	Geologic maps, faults (3 PRESENTATIONS) p.16-19; p.652-654; p.197-201	LAB 4	Carbon release in Mammoth Caves NP
FIELD TRIP 1:	OVERNIGHT TO MAMMOTH CAVE NP (SEPT. 18-19)		
IGNEOUS AND METAMORPHIC ROCKS			
Sept. 23	PRESENTATIONS on Mammoth Cave NP Remainder of Ch. 14 (p.192-208)		
Sept. 28	Hot spots, ring of fire, magnetism (3 PRESENTATIONS) Ch. 40 (p.576-592), Box 35.1 (p.515-517), Box 30.1 (p.426)	LAB 5	Hawaii Volcanic NP and plate motions
Sept .30	Volcanic eruption styles, extrusive igneous rocks, (4 PRESENTATIONS) p.506-510; remainder of Ch. 35 (p. 512-525)		
Oct. 5	Intrusive igneous rocks, Bowen's reaction series Ch. 36 (p.528-539); Box 25.1 (p.339-341)	LAB 6	Igneous rocks and Crater Lake NP
Oct. 7	PRESENTATIONS on FIELD TRIP PROPOSALS		
Oct. 12	Metamorphic rocks and processes Ch. 24 (p.322-335)	LAB 7	Metamorphic rocks and Acadia NP
Oct. 14	PRESENTATIONS on CULTURAL PROJECTS		
FALL BREAK			
RIVER SYSTEMS, WATERSHEDS, GROUNDWATER			
Oct. 21	Hydrothermal processes and deposits		
FIELD TRIP 2:	DAY TRIP TO HOT SPRINGS NP (OCT. 23)		
Oct. 26	Yellowstone history, Columbia River basalts and hot spots Ch. 43 (p.620-642)	LAB 8	Earthquakes and groundwater at Yellowstone NP
Oct. 28	PRESENTATIONS on Hot Springs NP Ch. 52 (p.780-790)		
Nov. 2	Watersheds, groundwater-surface water interactions Ch. 19 (p.254-264);p.176-177	LAB 9	Mapping topography in the field in Memphis
STRUCTURAL GEOLOGY AND TECTONICS			
Nov. 4	Follow up lab during class		
Nov. 9	Uplift and faulting Ch. 48 (p.714-737); p.154-159	LAB 10	Uplift in Death Valley NP

Nov. 11	Formation of the Rocky Mountains Ch. 25 (p.338-355)		
Nov. 16	Formation of the Appalachian Mountains Ch.54 (p.806-819)	LAB 11	Tectonics in Shenandoah Valley NP
Nov. 18	PRESENTATIONS on VALUES OF NP		
Nov. 23	Folding, hogbacks, geologic time	NO LAB	
THANKSGIVING BREAK			
GLACIAL FEATURES			
Nov. 30	Glacial features and deposits, IDEA p.290-294; Ch. 22 (p.296-306)	LAB 12	Isostatic rebound
Dec. 2	Review for final exam		
Dec. 7	NO CLASS	LAB 13	FINAL EXAM

Presentations about your Adopted National Park:
Over the semester, you will each complete TWO projects/reports about a National Park of your choice. You may choose any National Park that will not already be covered during the class. <u>One of the projects is required of everyone</u> as follows:

Present the geologic history of your Adopted National Park within the framework of the geologic time scale. You will explain in a brief oral presentation (5 minutes) the major geologic events that created the features found in your National Park and be able to place those events on the master geologic time scale we will be creating in the class.

You choose the topic of your second project from the following options:

1. How do people in today's society value your Adopted National Park?
    a. You will turn in a 5 page paper that follows the scientific method answering this question and present your findings to the class in a brief (5 minute) presentation ON NOV. 18. You will also turn in a final exam question that you feel addresses the most important (geologic) aspect of your Adopted National Park.
    b. The only requirement of this project is that you conduct interviews of a sample group of people that are a different demographic than yourself (for example, interviewing the Park staff by phone or interviewing school-aged children in Memphis or adults or a group of College students attending a different College).
2. Propose a class spring break trip to your Adopted National Park.
    a. You will turn in a 5-page proposal that follows a proposal format: background about the Park, proposed site visits with specific information about how it relates to the class, timeline, travel/lodging arrangements and estimated budget. You will also present your trip

proposal to the class (5 minutes) ON OCT. 7 with the aim of convincing us we all would like to go. You will also turn in a final exam question that you feel addresses the most important (geologic) aspect of your Adopted National Park.

3. What is the cultural significance and/or history of human involvement with your Adopted National Park?
    a. You will turn in a 5 page paper that follows the scientific method answering this question and present your findings to the class in a brief (5 minute) presentation ON OCT. 14. You will also turn in a final exam question that you feel addresses the most important (geologic) aspect of your Adopted National Park.
    b. To complete this project following the scientific method, you will have to articulate a hypothesis that you wish to test by doing research into the literature. For example, you might want to hypothesize that the Anasazi's use of the Grand Canyon as a seasonal haven from the harsh climatic conditions in the region influenced the development of their architecture.

Field trips:

There will be 2 OPTIONAL field trips that can each accommodate 10 students. Both trips will visit National Parks that are relatively close to Memphis. Upon returning from the trip, the participants may give a group lecture to the class about that National Park (class is 75 minutes long), which will be graded in lieu of the final exam. You may also choose to participate in the field trip without doing a presentation (and thus take the final exam), however, each participant is required to turn in a final exam question that they feel addresses the most important (geologic) aspect of that National Park.

Sept. 18-19: overnight camping trip to Mammoth Cave National Park (KY):
leave by 8AM Saturday, target return by 1PM Sunday.
All meals provided, tents provided, some sleeping bags available to borrow
MANDITORY MEETING Friday night Sept. 17 to briefly discuss the chapter on Mammoth Cave NP and load the van.
IN CLASS PRESENTATION ON SEPT. 23

Oct. 23: day trip to Hot Springs National Park (AR):
leave by 8AM Saturday, target return by 9PM latest
Breakfast, lunch and dinner (possibly dinner out in Little Rock) provided
MANDITORY MEETING Friday night Oct. 22 to briefly discuss the chapter on Hot Springs NP and load the van.
IN CLASS PRESENTATION ON OCT. 28