



GEOS 3422 SEDIMENTOLOGY & STRATIGRAPHY SPRING 2007

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Office hours by appointment

Lecture: MMS 257/274, MWF 11:30-12:20
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Welcome to Stratigraphy and Sedimentology! Sedimentology is the study of sediment, particularly focusing on how it is transported and deposited, and stratigraphy emphasizes the analysis of sedimentary strata, the layers of sedimentary (and some volcanic) rocks that cover most of Earth's surface. Given that about 75% of the rocks exposed on Earth's surface are sedimentary, it is fair to say that your ability to interpret them plays a significant role in your abilities as a geologist in general. In addition, you might note that most of the world's petroleum and natural gas, groundwater, and many natural ore bodies (gold, copper, silver, mercury, iron, etc.) are found in sedimentary rock strata, and the record of Earth's past climate and life resides almost exclusively in sedimentary rocks.

COURSE DESCRIPTION AND GOALS

The purpose of this course is to teach you how to think like a geologist and, more specifically, like a sedimentologist. This course will cover the basics of sediment transport, sedimentary textures and structures, and depositional sedimentary environments and stratigraphy. In addition to "thinking like a geologist," I have two main objectives that I want you to reach by the end of this course:

1. Given a stratigraphic section, core, outcrop, correlation diagram, or other representation of stratigraphy, you should be able to interpret the environment of deposition of the rocks and develop an internally consistent hypothesis about the depositional history of the sequence, including the relative importance of sediment supply, subsidence, and base level in creating the sequence; and,
2. Given a tectonic setting, you should be able to predict what types of sedimentary processes and depositional environments would result and what their stratigraphic signature would be.

I have organized this course around four projects, each of which will emphasize these goals. As you work on these projects, you will tackle smaller tasks and activities designed to give you the tools you'll need to complete the projects effectively. Despite our traditional lecture-lab course schedule, I will not always distinguish between lecture and lab periods – we may be doing either one or both in any given class session.

REQUIRED TEXT

The textbook for this course is *Principles of Sedimentology and Stratigraphy*, 4th Edition, by Sam Boggs, Jr. I will assign readings from this text, but given the project-based nature of the course, do not expect to follow the textbook in any linear way. Instead, think of the text as a reference source that you should use to successfully complete the projects.

In addition, Robert L. Folk has made his text, *The Petrology of Sedimentary Rocks*, available online. It is meant to accompany a book like Boggs', and I may assign readings from it. To access the text, go to: <http://www.lib.utexas.edu/geo/folkready/folkprefrev.html>. Another valuable online resource is the Atlas of Sedimentary Rocks available at <http://plaza.snu.ac.kr/%7Elee2602/atlas/atlas.html>.

THE PROJECTS

1. ***Study of the Jackfork Group, Arkansas, Weeks 1-3*** (lab and “virtual field”-based)
 - a. Observe and interpret basic clastic lithologies, bedding geometry, and sedimentary textures (primarily grain size)
 - b. Sedimentary facies analysis and vertical and lateral successions; stratigraphic columns
 - c. Basic sedimentary petrography
 - d. Sediment-gravity flow deposition
2. ***Study of the Hickory Sandstone, Weeks 4-8*** (lab and field-based)
 - a. Goals a-c of Project 1, and...
 - b. Observe and interpret Hickory Sandstone outcrops, hand samples, and thin sections
 - c. Quantify relationship between fluid flow, transport, and bedform development
 - d. Observe and interpret primary and secondary sedimentary structures
 - e. Interpret depositional environment(s) and evolution throughout the section
3. ***Study of Cretaceous Carbonate Rocks, Weeks 9-12*** (lab and field-based)
 - a. Observe and interpret basic carbonate lithologies in hand sample and thin section
 - b. Observe and interpret primary and secondary sedimentary structures
 - c. Interpret electric well data
 - d. Measure stratigraphic sections in the field and log core samples
 - e. Interpret depositional environment(s) and evolution throughout the section
4. ***Field Trip Report for the Brownwood Foreland Basin Trip, Weeks 13-15*** (literature and field-based)
 - a. Observe and interpret sedimentary facies at the basin scale
 - b. Apply tools of basin analysis to understand tectonics and sedimentation of the Ouachita system

EVALUATION

The four projects form the core assessment tools of the course. You will do some of the work on these projects outside of class sessions, but much of what you do in class will be directed towards completing these projects. Many of the short, in-class assignments are designed to provide practice with the techniques you'll need to accomplish the projects, so I will look them over to make sure you “got it” and I will use these assignments to find and correct misconceptions. Some assignments will require more effort on your part and may feel more like typical lab exercises. All assignments will be assessed based on the following criteria:

1. Did you put in the effort necessary to do the assignment?
2. Did you take some care in completing the assignment?
3. Did you get the main point(s)?

I will use the following grading rubric for all assignments and final reports.

GRADING RUBRIC	
Grade	Meaning
A	Put in more effort than required to simply complete the assignment; no grammatical/spelling errors (if a write-up is required); work is neat and professional; computations correctly done and answered (if calculations are required); work is easy to follow; clearly understands the main point and contains insightful and/or in-depth analysis or commentary.
B	Put in sufficient effort to complete the assignment; few grammatical/spelling errors (if a write-up is required); work is neat; computations correctly done and answered (if calculations are required); work is reasonably easy to follow; clearly understands the main point.
C	Put in just enough effort to complete the assignment; work is reasonably neat; multiple grammatical/spelling errors (if a write-up is required); computations correctly done and answered (if calculations are required); work is difficult to follow; appears to have understood the main point, but I can't tell for sure.
D	Didn't quite complete the assignment; multiple grammatical/spelling errors (if a write-up is required); computations incorrectly done and answered (if calculations are required); evidence suggests that the main point was mostly missed.
F	Assignment lacking or essentially incomplete; many grammatical/spelling errors (if a write-up is required); computations incorrectly done and answered (if calculations are required); little evidence that the main point was understood.

There are no midterm exams in this course, but there will be a final exam that will test whether you can complete the primary objectives for the course. How else could I effectively assess whether you achieved these goals, unless I put you in a new situation and turn you loose?

GRADE BREAKDOWN	
Grade Component	Weight
In-class, lab, and homework assignments	25%
Project 1: Jackfork Group	20%
Project 2: Hickory Sandstone with formal poster presentation	20%
Project 3: Canyon Lake Gorge Carbonates	20%
Project 4: Brownwood Field Trip Report	5%
Final Exam	10%

SUCCESS IN THIS COURSE

I want you to come out of this course with the ability to interpret sedimentary strata in an effective and meaningful way. In other words, you will be able to make the detailed observations and process interpretations for an unknown outcrop or graphical depiction of sedimentary strata that will allow you to come up with a well-substantiated hypothesis about the environment in which the rocks were formed. I will work with you to achieve this, but you have a lot of responsibility here, too.

- First, push yourself to understand material in some depth, beyond simply getting the basics right. For many assignments, there is no single correct answer, but some answers are better than others. "Better" usually means greater depth, more detail, more care in crafting a response or write-up, and more organization that shows you understand how things fit together.

- Second, be present and make careful observations. This course will give you the practice you need to make careful observations, but for this to be effective, you must be present and focused. I have no formal attendance policy for this course, but I think it is apparent that missing class will be extremely detrimental to your success in the course.
- Third, ask questions and be curious. Make sure that you “get it.” Talk with your classmates as well as with me about things you don’t understand – it may be that your fellow students will be better at explaining something than I am.
- Fourth, revise your writing and, better yet, have someone else edit it – never turn in a first draft! Be neat and careful, because sloppy work most certainly affects your grade (note the grading rubric).
- Finally, use your textbook as a reference tool, not just a place to go for assigned readings. Using the book as a reference tool will help you achieve the greater depth of understanding you need to produce quality work.

IMPORTANT DATES

Project 1 due.....	Friday, February 2
Day-long Hickory Sandstone field trip	Saturday, February 10
Project 2 due (poster in digital format).....	Monday, March 5
Project 2 Poster Presentations	Thursday, March 8
Afternoon Canyon Lake Spillway Gorge field trips.....	1-6 pm, Thursdays, March 22 and 29
Project 3 due.....	Monday, April 9
Two-day field trip	Friday-Saturday, April 20-21
Project 4 Brownwood Field Trip Report due.....	Friday, April 27
Final Exam.....	2:00 pm, Friday, May 4

THE HONOR CODE/ACADEMIC INTEGRITY POLICY

I expect you to understand and adhere to the Honor Code/Academic Integrity Policy. I encourage and expect you to work collaboratively in this course, but unless otherwise indicated explicitly on the assignment (in which case you will identify your collaborators), you must ensure that any written work you submit is entirely your own. Examples of policy violations include using other students’ materials, collaborating with another student to write an assignment (unless explicitly directed to do so), using unauthorized material during the exam, submitting work written by another student (in full or in part) as your own, and failing to cite sources for information in reports. If you have any concern or uncertainty regarding the Honor Code/Integrity Policy, please ask me. Ignorance does not constitute a valid excuse.