

CSUN Geology 443L: Stratigraphy Syllabus, Spring 2012

Prof. Richard Heermance

- Office LO1212b; office hours: Tuesday 2-4 PM or by appointment
- email: richard.heermance@csun.edu, phone x4357
- electronic class information available on Moodle

Lecture Tuesday/Thursday 12:30-1:45, Lab Thursday 2:00-4:45, Rm LO1212

Definition of Stratigraphy: “The science of rock strata”

COURSE OBJECTIVES

This course will cover the theory and methods useful for interpreting layers of rock, called strata. Class lectures will be combined with paper reviews, field investigations, and in-class laboratory assignments where you will be introduced to a variety of methods applied to stratigraphic studies. The major objectives of the course are:

- 1) Interpret sedimentary environments from rock types.
- 2) Learn how to interpret a stratigraphic section for basin analysis.
- 3) Develop proficiency in creating a stratigraphic section from field outcrops.
- 4) Improve ability to read and comprehend scientific literature.

TEXTS AND MATERIALS

Required:

- Boggs, S., 2006, Principles of Sedimentology and Stratigraphy: New Jersey, Pearson Education, Inc., 662 p.
- Tucker, M.E., 2011, Sedimentary Rocks in the Field (fourth edition): West Sussex, John Wiley and Sons, Ltd., 275 p.

CLASS STRUCTURE

Learning will be accomplished through the combination of lecture, paper review, fieldwork, and laboratory work. Although the grades will be separated into two parts, the class and lab will be integrated to maximize time efficiency.

LABS

Laboratory assignments will take place from 2-4:45 PM Thursdays. The class will meet EVERY WEEK unless you are told otherwise. On field-trip days the labs will be combined with class in order to maximize time in the field. Lab write-ups are due on the following Thursday at the beginning of class, unless instructed otherwise.

FIELD TRIPS

There will be two multi-day weekend field trips. Dates are indicated on the attached schedule. Other field-trips will take place from 12:30-4:45 Thursdays during class and lab time. All field trips are required, and reports are due as described in the syllabus.

ACADEMIC HONESTY

Group work and discussion is strongly encouraged. All written assignments and exams, however, must be done entirely by each student unless otherwise instructed. Ideas that arise from collaboration should be individually evaluated in the write-up. Any data presented from outside readings should be clearly referenced. Honor code violations will result in automatic NO CREDIT.

GRADING

Lecture (3 units)*

- paper reviews, reports, quizzes & attendance.....25%
- midterm exam.....15%
- final exam20%
- Montana de Oro Report20%
- Orocochia Field Trip Report20%

Lab

- in-class labs (4).....40%
- Vasquez Rocks Write-Up15%
- Towsley Canyon Write-Up.....10%
- Ridge Basin Write-Up10%
- Lab take-home final25%

*Graduate students will be required to complete additional or modified projects in addition to the material listed here. Instructions for each assignment will be posted on Moodle.

Grades will be based on a class curve. At a minimum, the following percentages will correspond to each grade, although the cutoff percentage could decrease depending on the curve.

93-100 %	A	72-78%	C
90-93 %	A-	70-72%	C-
88-90%	B+	67-70%	D+
82-88%	B	63-67%	D
80-82%	B-	60-63%	D-
78-80%	C+	<60%	F

Grades of Incomplete are extremely rare and can only if be given if the student meets ALL the requirements set forth in University policy for Incompletes, including 1) has a passing grade in the work completed, 2) has completed a substantial portion of the work in the course, and 3) is able to complete the remaining work independently, with minimal assistance from the instructor. An Incomplete shall not be assigned when a student would be required to attend a major portion of the class when it is next offered.

PAPER REVIEWS

Scientific advances occur due to individual and collaborative research that is presented in peer-reviewed scientific journal articles. Therefore, one aspect of this course will be the review of pertinent articles related to stratigraphy. During this semester, you will each turn in FOUR 1- page (maximum!) reviews. Your review should include the following:

- 1) The first paragraph should state the paper purpose and the hypothesis tested. How do the authors test their hypothesis?
- 2) Second paragraph should summarize the data and results of the research.
- 3) Third paragraph should state the implications of the research.
- 4) Last paragraph should be your own thoughts on the paper. What are the weaknesses, in your opinion?
- 5) Conclude the review by writing 2 questions about the paper? These questions should be based on what you think the problems may be with the author's interpretation.

The one-page review should elucidate your understanding of the paper. The review will be graded on completeness and grammar.

PAPER REVIEWS (posted in Moodle)

DeCelles, P.G., Gray, M.B., Ridgeway, K.D., Cole, R.B., Pivnik, D.A., Pequera, N., and Srivastava, P., 1991, Controls on synorogenic alluvial-fan architecture, Beartooth Conglomerate (Palaeocene), Wyoming and Montana: *Sedimentology*, v. 38, p. 567-590.

Dorsey, R.J., Housen, B.A., Janecke, S.U., Fanning, C.M., and Spears, A.L.F., in press, Stratigraphic record of basin development within the San Andreas fault system: Late Cenozoic Fish Creek, Vallecito basin, southern California: *Geological Society Of America Bulletin*.

Gómez-Paccard, M., M. López-Blanco, et al. "Tectonic and climatic controls on the sequential arrangement of an alluvial fan/fan-delta complex (Montserrat, Eocene, Ebro Basin, NE Spain)." *Basin Research* **23**: 1-19.

Monterrey Formation Papers (individual) assigned in class and posted on Moodle.

Monterrey Formation Reports: Students will be placed into pairs to give oral presentations of to-be-determined Monterrey Formation papers prior to the Montana de Oro field trip. Presentations will be 10 minutes with five minutes for discussion during lab on February 23. Presentations should include overheads or powerpoint slides of key figures to lead a discussion of the paper. You will be graded on your ability to lead a discussion and walk the class through the paper. In addition, you will also be required to turn in a write-up on your paper.

Grad Student Additional Assignments: Grad students will be required to lead a paper discussion on the Anza Borrego Fieldtrip. Details posted in Moodle later in the semester.

Some pointers for reading a scientific paper (from S. Porter, UCSB)

- *Read introduction and conclusions first. Don't try to read the whole thing in one sitting. Read part, let it rest, and then go back to the paper to complete it.*
- *Make special note of who the authors are. What are their qualifications? What are potential conflicts of interest? (I'd be very wary of a paper on evolution if it came out of the Institute for Creation Research; likewise for a paper on climate change coming from an oil company.)*
- *Make special note of when the paper was published, and in what journal it was published. Has the paper been subject to peer-review? (You can assume all mainstream journals, such as those you find on the UCSB e-journals website, are peer-reviewed.)*
- *Pay close attention to the figures and tables and their captions.*
- *Don't get bogged down in the details. Don't give up if you don't understand the Materials and Methods Section or you fall asleep during the Results Section! As with the novel Moby Dick, it's often better to read different parts of a paper at different paces.*
- *Don't shut down when you come across math. Read through the equation slowly; what's the relationship between different variables? Often it's easier than you think!*
- *If you're new to a subject, the jargon may get to be too much. Keep a dictionary (preferably a geology dictionary) or Google on hand. Usually Wikipedia.org comes through in a pinch.*
- *Be an active reader, not a passive one. This means you should:*

Ask yourself big-picture questions:

- *What's the main point of this paper?*
- *How do the authors prove – or try to prove -- their point?*
- *What is the hypothesis they want to test?*
- *What are the results?*
- *How do the authors interpret these results?*
- *What are the implications of these interpretations?*
- *What are the potential weaknesses of this paper? (The answer, by the way, is hardly ever 'none'. And you don't always have to be an expert to spot weaknesses. Often all you need is the ability to think logically.)*

Take notes, even if it's just a few lines. Try your best to write in your own words. This will help you digest the information and remember it.

When you're done, call your mother/significant other/friend/roommate/ coworker and tell him/her you just read a really interesting/stupid/ brilliant/crazy paper. Then tell him/her what the paper was about. Succinctly. Don't cheat by looking at your notes or the paper itself. If you can't do this without cheating, you didn't understand the paper. Go back and study it again.

STRATIGRAPHY SYLLABUS, SPRING 2012

Week	Dates	Tuesday	Thursday	Lab	Paper Review Due Thursday at the start of class
1	Jan 23-29	Introduction to Stratigraphy & Field Techniques (Tucker ch 1-2, 7; Boggs ch 3,4)	FT#1: Vasquez Rocks Field Trip A (meet at 12:15 at loading dock)		
2	Jan 30-Feb 5	N. American Strat. Code (Boggs appendix C)	FT #2: Vasquez Rocks Field Trip B (meet at 12:15 at loading dock)		DeCelles et al. (1991)
3	Feb 6-12	Lithostratigraphy (Boggs, ch 12)	Lithostratigraphy and correlation (Boggs ch. 12 & 15.4) Vasquez Rocks DUE	LAB: correlation lab	
4	Feb 13-19	Lithostratigraphy (Boggs, ch 12)	<i>Field Trip: Towsley Canyon Field Trip (correlation lab due, meet at 12:15 at loading dock)</i>		
5	Feb 20-26	Biostratigraphy (Boggs ch 14; Tucker ch 6)	Biostratigraphy (Boggs ch 14; Tucker ch 6) DUE: Towsley Canyon Lab Due	Monterrey Fm Paper Reports	Mont. Fm reports
6	Feb 27-Mar 4	Biostratigraphy (Boggs ch 14; Tucker ch 6)	<i>Weekend Field Trip: Mar 1-Mar 4: Montana de Oro (12:30 Thurs-Sunday PM)</i>		
7	Mar 5-11	Facies & Depositional Environments (Boggs ch 8-11)	Facies & Depositional Environments (Boggs ch 8-11)	Montana de Oro write ups (due Tuesday, Mar 6)	
8	Mar 12-18	Facies & Depositional Environments (Boggs ch 8-11) DUE: Montana de Oro Reports	MIDTERM (Depo Environments, Facies, Correlation)	no lab	
9	Mar 19-25	Seismic, Sequence and Magnetic Stratigraphy (Boggs ch 13)	Seismic, Sequence and Magnetic Stratigraphy (Boggs ch 13)	LAB: Fence Diagrams and Isopachs	Gomez-Paccard et al. (2011)
10	Mar 26-Mar 29	Seismic, Sequence and Magnetic Stratigraphy (Boggs ch 13)	Seismic, Sequence and Magnetic Stratigraphy (Boggs ch 13) DUE: Fence Diagrams and Isopachs	LAB: magnetostratigraphy	
Spring Break (Mar 30- Apr 8)					
11	Apr 9-15	Seismic, Sequence and Magnetic Stratigraphy (Boggs ch 13)	<i>Weekend Field Trip Apr 11-15, Anza Borrego & Orocochia Mts Field Trip (joint with Structure, (12:30 Wednesday PM))</i>		Dorsey et al. (2011)
12	Apr 16-22	Basin Analysis, Tectonics, and Sedimentation (Boggs ch 16)	Basin Analysis, Tectonics, and Sedimentation (Boggs ch 16) DUE: magstrat lab	Orocochia write ups (due Tuesday, April 17)	
13	Apr 23-29	Basin Analysis, Tectonics, and Sedimentation (Boggs ch 16) DUE: Orocochia Reports	<i>Field Trip Ridge Basin (meet at 12:15 at loading dock)</i>		
14	April 30-May 6	Basin Analysis, Tectonics, and Sedimentation (Boggs ch 16)	Basin Analysis, Tectonics, and Sedimentation (Boggs ch 16)	LAB: Sequence Stratigraphy	
15	May 7-May 11	Basin Analysis, Tectonics, and Sedimentation (Boggs ch 16)	Basin Analysis, Tectonics, and Sedimentation (Boggs ch 16) DUE: subsidence lab	LAB FINAL (take home given out in lab)	
FINAL EXAM, May 17, 12:45-2:45 in the classroom					