

# CSUN Stratigraphy Spring 2014 Syllabus

Prof. Richard Heermance

-Office LO1212b; office hours: Tuesday 2-4 PM or by appointment

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-electronic class information available on Moodle

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

## 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 to synthesize datasets to understand basin evolution.
- 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., 2012, Principles of Sedimentology and Stratigraphy, Fifth Edition: New Jersey, Pearson Education, Inc., 585 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.

## GRADING

### Lecture (3 units)\*

- paper reviews, in class quizzes, classwork, and participation.....20%
- midterm exam.....20%
- final exam .....20%
- Red Rock Field Trip Report.....20%
- Rainbow Basin field trip report.....20%

### Lab

- Lab 1.....10%
- Depositional Environments Presentations and Write-ups.....15%
- Vasquez Rocks Lab.....15%
- Lab 2.....10%
- Lab 3.....10%
- Lab 4.....10%

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- Lab 5.....10%
- Lab 6.....20%

\*Graduate students will be required to complete a modified project at RAINBOW BASIN 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.

### ACADEMIC HONESTY

Group 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.

Official California State University policy states:

“The maintenance of academic integrity and quality education is the responsibility of each student within this university and the California State University system. Cheating or plagiarism in connection with an academic program at a campus is listed in Section 41301, Title 5, California Code of Regulations, as an offense for which a student may be expelled, suspended, or given a less severe disciplinary sanction. Academic dishonesty is an especially serious offense and diminishes the quality of scholarship and defrauds those who depend upon the integrity of the campus programs. Such dishonesty includes but is not limited to: **cheating, fabrication, facilitating academic dishonesty, and plagiarism.**”

Any evidence of academic dishonesty will result in an automatic no credit for the assignment and possible a failing grade in the course depending on the severity of the offense. The severity of each offense is at my discretion. All offenses will be reported to the Office of the Vice President for Student Affairs.

### **CLASS CONDUCT**

I encourage you to bring tablets, laptops, or other wifi-enabled apparatus to class, as we will often use online material for class exercises. If you cannot bring your own device to class, please let me know in advance and I will do my best to provide one for you. **DO NOT EMAIL OR WORK ON ANY NON-CLASS RELATED MATERIAL** during lecture, or your class participation grade will suffer.

### **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. For field trips please meet at the Eucalyptus Hall loading dock by 12:25. We will depart **PROMPTLY** at 12:30. Lab write-ups are due on the following Thursday at the beginning of class, unless instructed otherwise. Please see the attached schedule for details.

### **FIELD TRIPS**

There will be two **REQUIRED** multi-day weekend field trip and two half-day field trips. Dates are indicated on the attached schedule. All field trips are required, and reports are due as described in the syllabus. The two weekend field trips are as follows:

- 1) Red Rock Canyon Field trip (Sat-Sun, Mar 8-9). We will take a one-night field trip to Red Rock Canyon where we will measure section and map stratigraphy. We will leave at 7:30 AM **SHARP** from the loading dock, and return by 7 PM on Sunday.
- 2) Rainbow Basin Field Trip (Fri-Sun, Apr. 18-20). We will take a 2-night field trip to Rainbow Basin, leaving at 7:30 AM **SHARP** on Friday morning from the loading dock. We will return by ~7 PM on Sunday.

### **SAFETY AND RESPONSIBILITY IN THE FIELD**

Working in the field, while rewarding and exciting, can also be dangerous if you are unprepared or careless. Dangers in the field include: sunburn; heat exhaustion; hypothermia; giardia; insect stings/bites; allergic reactions; ticks; snake bites; cactus needles; poison oak and poison ivy; cuts, abrasions, sprains, broken bones, or concussion from falling or being hit by falling rocks; and flash flooding. To decrease your chance of injury, we advise you to:

- Work with a field partner
- Wear suitable field attire
- Carry rain gear, first aid, medications, etc. in your daypack
- Drink plenty of water, and carry at *least* 2 liters with you in hot weather
- Work at a pace suited to your fitness level
- Exercise caution on steep slopes, especially when others are working downhill from you
- Use protective eyewear when hammering on the outcrop

We may be working in remote areas that are out of cell phone service range. Medical help could take several hours to reach you in the event of an emergency. It is also

important to emphasize that normal standards of student conduct apply in the field, though it is somewhat of a more casual setting. I expect that you will behave with professionalism towards the instructors and your fellow students. Should you fail to employ appropriate precautions regarding your health and safety, or if your behavior in the field is deemed inappropriate and interferes with the activities of the field trip, you will be sent home immediately at your own expense. What is considered unsafe or inappropriate behavior is entirely at my discretion, and may be subject to disciplinary action by the student conduct code upon return to CSUN. If you are dismissed from the field for these reasons, you are responsible for making travel arrangements and paying out of pocket for any associated expenses with your departure.

### **PAPER REVIEWS**

Scientific advances occur due to individual and collaborative research that is presented in peer-reviewed scientific journal articles. One aspect of this course will be the review of pertinent articles related to stratigraphy. During this semester, you will each turn in ONE page (maximum!) reviews of scientific literature. 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? Do you have any questions about this research?

The one-page review should elucidate your understanding of the paper. The review will be graded on completeness, grammar, and overall writing quality and thoughtfulness. Please turn in all reviews digitally in "Turnitin" via Moodle.

### **PAPER REVIEWS** (posted in Moodle as necessary)

1. 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.
2. Charreau J, Gumiaux C, Avouac J-P, Augier R, Chen Y, Barrier L, et al., 2009, The Neogene Xiyu Formation, a diachronous prograding gravel wedge at front of the Tianshan: Climatic and tectonic implications. *Earth and Planetary Science Letters*.
- 3a. Burbank, D. W., Beck, R. A., Reynolds, R. G. H., Hobbs, R., and Tahirkheli, R. A. K., 1988, Thrusting and gravel progradation in foreland basins: A test of post-thrusting gravel dispersal: *Geology*, v. 16, p. 1143-1146.
- 3b. Heller, P. L., C.L., A., Winslow, N. S., and Paola, C., 1988, Two-phase stratigraphic model of foreland-basin sequences: *Geology*, v. 16, p. 501-504.
- 3c. Heller, P. L., Angevine, C. L., Paola, C., Burbank, D. W., Beck, R. A., and Reynolds, R. G. H., 1989, Comment and reply on "Thrusting and gravel progradation in foreland basins: a test of post-thrusting gravel dispersal": *Geology*, v. 17, no. 10, p. 959-961.

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.*

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### TENTATIVE SCHEDULE

Week	Dates	Lecture Topic	Lab (Thursday)	Due Dates
1	Jan 20-26	ch 3 & 4; review, ch 12 Tucker ch 3-5 review	Lab 1: Contacts, Formations, and Strat Relations	
2	Jan 27-Feb 2	Tucker ch 2, 7	Ridge Basin Field Trip	<i>Lab 1 due Thursday</i>
3	Feb 3-9	Ch 12 cont. Tucker ch 8	Depositional Environment Presentations	
4	Feb 10-16	Ch. 15: Time	Vasquez Rocks Field Trip	
5	Feb 17-24	Stratigraphic Column Digitization	NO CLASS: Digitize Strat Columns	<i>DeCelles et al. due Tues. NO CLASS THURSDAY</i>
6	Feb 25-Mar 2	Ch. 15 cont.: Time Ch. 16.6: "techniques"	Lab 2: Correlation & Fence Diagrams	<i>Vasquez Rocks Lab DUE TH</i>
7	Mar 3-9	<b>MIDTERM TUESDAY</b>	Red Rock Canyon Weekend Field Trip	<i>Lab 2 DUE TH</i>
8	Mar 10-16	Ch. 13 Seismic and Sequence Stratigraphy	Red Rock Canyon Report work	
9	Mar 17-23	Ch. 13 Seismic and Sequence Stratigraphy	Lab 3: Sequence & Seismic Stratigraphy	<i>Tuesday 4 PM: Red Rock Cyn Reports DUE</i>
10	Mar 24-30	Ch 13: Magnetostratigraphy	Lab 4: Magnetostratigraphy	<i>Lab 3 DUE TH Charreau et al. due Thurs</i>
11	Mar 31-Apr 6	Ch 14: Biostratigraphy	Lab 5: Isopachs and Paleogeography	<i>Lab 4 DUE TH</i>
<b>Spring Break (April 5-12)</b>				
12	Apr 14-20	Ch 14: Biostratigraphy	Rainbow Basin Weekend Field Trip	<i>Lab 5 DUE TH</i>
13	Apr 21-27	Ch 16	Rainbow Basin Trip Report and Write-up	
14	Apr 28-May 4	Ch. 16 cont.	Lab 6: Ventura Basin Analysis	<i>Tuesday 4 PM: Rainbow Basin Report DUE</i>
15	May 5-11	Ch. 16 cont.	Lab 6 continued...	<i>Burbank et al. or Heller et al. due TU. Lab 6 DUE TH</i>
<b>FINAL EXAM (TAKE-HOME)</b>				