GEOLOGY OF EARTHQUAKES AND LAB: GEOL 533, 533L

Instructor: Doug Yule, LO 1209, phone 818-677-6238, e-mail doug.yule@csun.edu
GEOL 533 CRN is 18554; GEOL 533L CRN is 18555

Office Hours – W 11-12 or whenever you can catch me in the hall or office (if door is propped open come on in!) or email to set up a convenient time

Class Time and Location: lecture Tu-Th 0930-1020, lab Tu 1400-1645, LO 1212.

Preparatory – GEOL 310 (Structural Geology)

No assigned text, though for review I recommend *Structural Geology of Rocks and Regions*, 3rd edition, by Davis, Reynolds, and Kluth

Also, available in the classroom for reference, a copy or two of *Geology of Earthquakes*, by R. S. Yeats, K. E. Sieh, and C. R. Allen: Oxford University Press.

Additional reading will include technical papers on case studies.

This course is interdisciplinary, and for those who have limited course work in geology, a brief background review is provided. The texts listed above can provide further review. The course is divided into three parts: (1) background material, (2) environment of earthquake faults and case studies, and (3) field trip and active tectonics symposium.

There will be a field trip to historical surface faulting in California leaving in the evening of Wednesday April 24 and returning by dinner on Sunday April 28. We will take University vans and camp out and cook out.

Evaluation for GEOL 533 will be class participation and by a mid-term and a final. In addition each student will participate in our class's Active Tectonics Symposium. Each student's presentation will be evaluated and included in the lecture grade.

Evaluation for GEOL 533L will be by lab assignments that will supplement the lecture component of the course. In addition, each student will prepare a poster for use at one stop on the field trip. I will evaluate your poster and your poster presentation on the field trip.

Background for Earthquake Geology

January 22, 24:

Lecture - Introduction to course (Introduction). Plate tectonics review, background on geologic structure review.

Lab 1 –Problem Set 1

January 29, 31:

Lecture - More background on geologic structure. Geology of the earthquake source.

Lab 2 – Problem Set 2

February 5, 7:

Lecture - Earthquake waves. Tectonic geodesy and in situ stress.
Lab 3 – Problem Set 3

February 12, 14:
Lecture - More tectonic geodesy and in situ stress. Quaternary timescales and dating techniques.
Lab 4 – Problem Set 4 (TBD)

February 19, 21:
Lecture - Tectonic geomorphology.
Lab 5 – Problem Set 5 (TBD)

The Earthquake Environment and Case Studies

February 26, 28:
Lecture - Strike-slip faults and case studies.
Lab 6 – Lateral Faulting exercise

March 5, 7:
Lecture - Normal faults and case studies.
Lab 7 - Normal Faulting Exercise

March 12, 14:
Lecture - Reverse faults and folds and case studies
Lab 8 - Reverse Faulting Exercise

March 19, 21:
Lecture - Paleoseismology: The geomorphic and stratigraphic record
Lab 9 - Paleoseismology Lab

March 26, 28:
Lecture - Subduction zone megathrusts
Lab 10 – Problem set 6 (TBD)

April 2, 4:
Lecture - Secondary effects of earthquakes. Earthquake hazard analysis.
Lab 11 – Prepare field trip posters

April 9, 11 – Spring Break.

Field Trip and Symposium on Active Tectonics

April 16, 18:
Lecture - Catch up, prepare for CSUN Emergency Planning Exhibition (April 18).
Lab 12 - Work on field trip posters.

April 23, 25:
Lecture/Lab 13 - Field trip week (finalize and print posters). Leave 5 p.m. on April 24 for trip to San Andreas fault and Eastern California Shear Zone. Return ~6 p.m. on April 28. Trip will be student led! Each of you will prepare a poster and present its contents at the appropriate stop on the trip.

April 30, May 2:
Lecture - TBD (case studies?)
Lab 14 - Prepare talks for symposium

May 7:
Lecture - Review session and summary. Bring your questions in preparation for the final. Take home final handed out.

Lab 15 - Oral Presentations: Symposium on Active Tectonics
May 9 – No class meeting
May 14: Take home final exam is due.

SYMPOSIUM ON ACTIVE TECTONICS
(example, subject to change)

2:00 – 6:00 pm, Tuesday, May 7, 2012, LO 1212

Crustal Faults of the Western U.S.
- chairs
- judges

2:00 Introduction: D. Yule
2:05 Active faults of the Seattle and Portland metropolitan areas:
2:20 The northern San Andreas fault:
2:35 Faults of the San Francisco Bay region:
2:50 Active tectonics in the western Transverse Ranges:
3:05 Break (10 minutes)

Megathrusts
- chairs
- judges

3:15 The central Nevada Seismic belt:
3:30 The Cascadia subduction zone:
3:45 The Sumatran subduction zone:
4:00 The Aleutian subduction zone:
4:15 Break (15 minutes)

Miscellaneous Topics
- chairs
- judges

4:30 The Himalaya collision zone:
4:45 Using GPS to study earthquakes:
5:00 Kinematic fault models:
5:15 Triggering by Seismic Waves:
5:30 Discussion

Duties of JUDGES: Complete rating sheet for each talk but do not total. Grade the abstract BEFORE coming to class (you will get it by Monday Nov 29). After grading (but before leaving the symposium), turn in your grading sheet to DY

Duties of CHAIRS: Introduce speakers. Maintain the time schedule RIGIDLY. Display a sign that shows the speaker has two minutes to go (10 minutes expired), then one minute, then time's up.

SPEAKERS distribute copies of your abstract (one for each class member and one for DY) on/before Monday Nov 29. Judges must judge your abstract before class (before Dec. 1).

Field-trip poster topics

Parkfield-Cholame section San Andreas fault
Carrizo Plain section San Andreas fault
Mojave section San Andreas fault
San Bernardino section San Andreas fault
San Gorgonio Pass section of San Andreas fault
Coachella Valley San Andreas fault
Age dating of offset geologic features
Eastern California Shear Zone
Triggered slip events of the Coachella-Imperial Valley region