

## GEOLOGY 3412: "Geoscience Processes"

University of Texas at El Paso

Department of Geological Sciences

Fall Semester 2006

**Instructor:**

Dr. José M. Hurtado, Jr.  
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**TAs:**

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**Class Website**

<http://www.geo.utep.edu/pub/hurtado/3412>

**Class Meetings:**

Lectures: MWF 9:30 – 10:20 am in Geology 320  
Lab: F 1:30 – 4:20 pm in Geology 320  
Office Hours: W 11 am – 1 pm in Geology room 319  
Department Seminar: Th 3:30 – 4:20 pm in Geology 123  
Geology Club Meetings: TBA

**Text:**

Edgar W. Spencer, 2000, *Geologic Maps: A Practical Guide to the Preparation and Interpretation of Geologic Maps (2<sup>nd</sup> ed.)*, Prentice Hall: Upper Saddle River, NJ, 147 p +. (ISBN 0130115835)

A large number of handouts and supplemental materials from a variety of sources will also be provided throughout the semester.

**Grading:**

12 laboratory/field/homework assignments (75%); 1 final examination (15%); participation (10 %)

**Fieldwork:**

There will be short excursions to field localities on or close to campus during some of the Friday laboratory times. In addition, there will be several labs that will require travel off campus on Friday and/or Saturday (see schedule). ***All labs (especially the trips) are mandatory! Talk to Professor Hurtado ASAP about any scheduling concerns! It will be very difficult to accommodate make-ups for many of the trips!*** Due to UTEP rules, we will need to fill out insurance and release forms before our trips. We will discuss and fill out the forms in class.

Please be prepared when we go outdoors (e.g. have **water, sunscreen, hat, and good walking shoes**)! Among the items you will need for your assignments are:

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**a clipboard, a small field notebook, 1-cm grid graph paper, a sharp mechanical pencil, fine-tipped ink pen, metric scale ruler, protractor, colored pencils, and calculator.** In addition, there will be rock hammers, hand-lenses, and Brunton compasses available for your use on the days we need them. Talk to Professor Hurtado if you have any concerns about field equipment.

### **Policies:**

Please contact Dr. Hurtado about any concerns, schedule conflicts, missed work, etc. **IN ADVANCE** or otherwise **AS SOON AS POSSIBLE!** Valid excuses include illness, absence with the instructor's prior approval, official University business, etc., but all require documentation. Otherwise, there are **NO** make-ups for missed assignments/exams/etc., and **late work will lose 50% of its value for each day it is late!**

**Attendance and participation are mandatory, in particular for the Friday labs! Absences may result in being dropped from the course!** Do each reading assignment before attending class and come to class prepared with questions. I expect **everyone** to contribute to class discussions.

**Reasonable collaboration is allowed** on lab/field/homework assignments. However, **I expect everyone to turn in work that is his or her own!** You **MUST** learn to trust your own observations and **NOT** rely on the interpretations of others, otherwise you are wasting your time. The assignments are your opportunity to learn the material and to learn how to be a field scientist. **Show all your work and be prepared to explain it!** Copying of other's work **WILL** be noticed and **WILL NOT** be tolerated. **The University guidelines for academic dishonesty are very specific and will be strictly followed.** Please familiarize yourself with them, and contact the **Dean of Students or Professor Hurtado** if you have any concerns.

### **Goals and Expectations:**

From the UTEP catalog: *3412 Geoscience Processes (3-3): Field-oriented, problem-solving studies emphasizing field identification of rocks; study of landforms and processes that create them; and the use of maps, aerial photographs, and satellite imagery. Emphasis on developing observational and analytical skills and the use of multiple working hypotheses. Prerequisites: (1) GEOL 1301, GEOL 1101, GEOL 1302, GEOL 1102 or (2) GEOL 1303 and GEOL 1304.*

I hope to teach you how to describe geologic materials and processes in the field and in the laboratory, and – equally important – how to record those observations in a meaningful way. Specifically, among the variety of skills you can expect to learn include:

1. Use of a topographic map for navigation and recording of spatial data.

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2. Construction and use of topographic maps, topographic profiles, stratigraphic columns, and geologic maps.
3. Use of a Brunton compass for measuring geologic structures.
4. Use of a geologic map, aerial photos, and remotely-sensed data in the field.
5. Keeping an organized and complete field book.
6. Understanding of basic concepts and analytical tools in structural geology.
7. Visualization of geologic data and relationships in three-dimensions.
8. Analysis of crosscutting relationships.
9. Identification and description of common rocks, minerals, soils, and other geologic materials.
10. Identification and interpretation of tectonic, volcanic, and other landforms.
11. Survey of basic concepts in structural geology, petrology, sedimentology, geomorphology, and neotectonics.
12. Introduction to basic engineering geology topics.

Ideally, you will learn to operate as a scientist when solving problems: asking questions; making careful observations; thinking critically and quantitatively about those observations; developing multiple working hypotheses; and testing those hypotheses. Part of this will involve working cooperatively and communicating your ideas to others. Most importantly, you must learn to be honest with yourself and **trust your own observations**.

### Course Outline:

Note that the details of our schedule (see attached) are subject to change as the semester progresses. Please be flexible, and let Professor Hurtado know if you have any questions or concerns.

#### *Schedule Notes:*

1. *No lecture or lab on the following days: Sept. 4 (Labor Day); Nov. 24 (Thanksgiving); Dec. 1 (Dead day).*
2. *Although JMH may be out of town on Sept. 1, Sept. 29, and Oct. 23-25 and may miss class, there WILL be lecture/lab (as scheduled) in his absence.*
3. *There is no Friday lab on Aug. 25 or Sept. 1. You will instead meet with Dr. Goodell's mineralogy class on Thursday of those weeks at 1 pm in Geology room 222.*
4. *Field trip dates are italicized: FFT = Friday field trip; SFT = Saturday field trip. Saturday field trips will be all day and will leave UTEP early in the morning (by 8 am or earlier) and return in the early evening (by 6 pm or so). Friday field trips will last all afternoon, and we will try to leave a little before 1:30 pm and may be back a bit after 4:30 pm. There is no Friday lab during those weeks when there is a Saturday field trip, but there WILL be Friday lecture. There is the option to overnight camp and/or BBQ on some trips.*

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<u>Week</u>	<u>Dates</u>	<u>Topics</u>	<u>Assignments</u>
Week 1	Aug. 21, 23, 25	Introduction; Rocks & minerals <b>Lab 1a: Rocks and minerals</b> <i>(meet with mineralogy class for lab)</i>	Handouts; Spencer, Ch. 4, 12
Week 2	Aug. 28, 30, Sept. 1	Engineering properties of rocks <b>Lab 1b: Rocks and minerals</b>	Handouts; <b>Homework 1</b>
Week 3	Sept. 6, 8	Topographic & geologic maps <b>Lab 2: Maps (FFT)</b>	Handouts; Spencer, Ch. 1-2, 5
Week 4	Sept. 11, 13, 15 <i>(possible, optional Sat. trip to Orogrande or Organ Mts.?)</i>	Maps; Geologic time and stratigraphy <b>Lab 3: Indoor Mapping Exercise</b>	Handouts; Spencer, Ch. 3, 6-7
Week 5	Sept. 18, 20, 22, 23	Aeolian processes; Sedimentary rocks <b>Lab 4: White Sands (SFT)</b>	Handouts; Spencer, Ch. 4
Week 6	Sept. 25, 27, 29	Fluvial processes; Sedimentary rocks <b>Lab 5: Fitness Center Mapping (FFT)</b>	Handouts; Spencer, Ch. 4
Week 7	Oct. 2, 4, 6, 7(?) <i>(Petrology field trip to Valles Caldera 10/6-10/8)</i>	Geologic mapping; Plate tectonics <b>Lab 6: Mt. Cristo Rey &amp; Transmountain Road (FFT; SFT(?))</b>	Handouts; Spencer, Ch. 8-11
Week 8	Oct. 9, 11, 13, 14(?)	Tectonic landforms; (Paleo)Seismology <b>Lab 7: Paleoseismology (FFT; SFT(?))</b>	Handouts Spencer, Ch. 8-11
Week 9	Oct. 16, 18, 20, 21	Geomorphology; Structural geology <b>Lab 8a: Bishop's Cap Hills I (SFT)</b>	Handouts
Week 10	Oct. 23, 25, 27, 28	Geomorphology; Structural geology <b>Lab 8b: Bishop's Cap Hills II (SFT)</b>	Handouts
Week 11	Oct. 30, Nov. 1, 3 <i>(possible, optional Sat. trip to Orogrande or Organ Mts.?)</i>	Metamorphic rocks <b>No Fri. lab</b>	Handouts; Spencer, Ch. 12
Week 12	Nov. 6, 8, 10, 11	Volcanoes and igneous rocks <b>Lab 9: Volcanoes (SFT)</b>	Handouts Spencer, Ch. 12
Week 13	Nov. 13, 15, 17 <i>(possible, optional Sat. trip to Orogrande or Organ Mts.? Petrology field trip to Big Bend 11/15-11/20)</i>	Weathering; Soils; Soil Mechanics <b>Lab 10: Soils</b>	Handouts
Week 14	Nov. 20, 22	Weathering; Slope Stability <b>No Fri. lab</b>	Handouts; <b>Homework 2</b>
Week 15	Nov. 27, 29	Groundwater <b>No Fri. lab</b>	Handouts

**Final: Wed., Dec. 6, 10 am – 12:45 pm, Geology 320 (subject to change)**

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