

GEOLOGY 3312/3112: “Geoscience Processes”
The University of Texas at El Paso **Department of Geological Sciences**
Fall Semester 2015

Instructor:

Dr. J. M. Hurtado, Jr.
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TAs:

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Class Website

Check the web resources often for important class news and material!

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

Class Meetings:

Lectures: T **AND** Th 9-10:20 am in Geology 123

Lab: T **OR** Th 12:30-3:20 pm in Geology 320; **some weekend trips also**

Office Hours:

Dr. Hurtado: MW 12-1 pm and TTh 10:45 am-12 pm in Geology 301

MG: M 4:30-5:30 pm, F 11 am-1pm in Geology 302

CG: M 9-10 am in Geology Geology 306

Department Seminar: Th 3:30-4:20 pm in Geology 123

Geology Club Meetings, etc.: TBD

Text:

There is no required textbook to buy, but there will be required readings.

Readings from a variety of books will be given as PDFs available for download from the class website. These books include, but are not limited to:

Compton, 1985, *Geology in the Field*, John Wiley & Sons, Inc: New York, 416 p.
(ISBN-13: 978-0471829027)

Maley, 2005, *Field Geology Illustrated* (2nd edition): Mineral Land Publications:
Boise, ID, 704 p. (ISBN 0940949059)

Reynolds, Johnson, Kelly, Morin, and Carter, 2008, *Exploring Geology*, McGraw-Hill Higher Education: Boston, 575 p. (ISBN 978-0-07-313515-1)

Spencer, 2000, *Geologic Maps: A Practical Guide to the Preparation and Interpretation of Geologic Maps* (2nd edition), Prentice Hall: Upper Saddle River, NJ, 148p. (ISBN 0130115835)

West, 1994, *Geology Applied to Engineering*, Prentice Hall: Upper Saddle River, NJ, 560 p. (ISBN 0024258814)

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Copies of these books will be available to borrow for short periods of time from Dr. Hurtado. In addition, a large number of supplemental materials from a variety of other sources will also be provided as PDF readings for discussion throughout the semester.

Grading:

~15 assignments (70%); 1 midterm examination (10%); 1 final examination (10%); participation (10%)

Your participation/attendance will, in part, be evaluated based on a number of in-class quizzes.

Fieldwork:

There will be short excursions to field localities on or close to campus during some of the Tuesday/Thursday laboratory times. There will also be several labs that will require more extensive travel off campus in (usually in UTEP vehicles) during lab and/or Saturday (see schedule). ***All labs (especially the trips) are mandatory! Talk to the instructors 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 all need to fill out insurance and release forms in class before our trips. Please consult the instructors if you have health or other concerns about doing fieldwork.***

Please be prepared when we go outdoors (e.g. have water, sunscreen, hat, good walking shoes, etc.)! Among the items you will need (e.g. they are required) for your field assignments are: ***a field notebook (notebooks will be provided to you by the instructors), handlens (these will be provided to you by Dr. Goodell), a clipboard, 1-cm grid graph paper, a sharp mechanical pencil, a fine-tipped ink pen, a metric scale ruler, a protractor, colored pencils, and a calculator.*** In addition, rock hammers and Brunton compasses will be available for your use on the days we need them (*no need to purchase these*). **Talk to the instructors if you have any concerns about field equipment.**

Policies:

Please contact the instructors 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 work, and **late work will lose 50% of its value for each day it is late!**

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

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If you are in the military with the potential of being called to military service and /or training during the course of the semester, you are encouraged to contact the instructor as soon as possible.

If you think you may have a disability or if you are experiencing learning difficulties, please contact the Disabled Student Services Office (DSSO) at (915) 747-5148. They're located in Union East room 106 or you can reach them by e-mail at dss@utep.edu. The student is responsible for presenting to the instructor any DSS accommodation letters and instructions.

Reasonable collaboration is allowed on assignments (not exams). However, **we 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 read the guidelines (see <http://studentaffairs.utep.edu/dos>), and contact the Dean of Students or the instructors if you have any concerns.*

Because they are vital venues for all course business, **computer and internet use outside of class are required.** You need to have your free UTEP email account activated for this course and you need to check it regularly. If you do not have one, go to <https://newaccount.utep.edu/> to activate yours. **You will also be expected to stay continually up to date with all information posted on the course website, which will include course notes, readings, supplemental material, and assignments.** We may be experimenting with internet activities this semester so the syllabus may change as the class evolves.

Goals and Expectations:

From the UTEP catalog: *GEOL 3312/3112 Geoscience Processes: Field-oriented, problem-solving studies emphasizing field identification of rocks; study of landforms and processes that create them; use of maps, aerial photographs, and satellite imagery; skills used in geologic mapping and field work. Emphasis on developing observational and analytical skills and the development of multiple working hypotheses. Prerequisite: Junior standing in Geology* or permission of instructor.*

*Note that this usually means having taken “Physical Geology” and “Historical Geology”. **Also note that you should be taking both “Geoscience Processes” and Mineralogy together during the same semester!** We will often be doing joint assignments, lectures, and field trips between the two courses. In addition, both courses are prerequisites for all other courses in the Geology program, and the two courses are only offered once per year. Talk to your advisor if you have questions!

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We 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, we will cover the following topics and skills:

1. Use of a topographic map for navigation and recording of spatial data.
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 and aerial imagery in the field.
5. Keeping an organized and complete field book.
6. Basic concepts and analytical tools used 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, geomorphic and other landforms/structures.
11. Survey of fundamental concepts in plate tectonics, geophysics, historical geology, structural geology, petrology, sedimentology, geomorphology and other 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 are subject to change** as the semester progresses. Please be flexible, and let the instructors know if you have any questions or concerns, **in particular scheduling conflicts with weekend field trips or with alternate scheduling of lab/lecture times on T and Th.**

Schedule Notes:

1. *There will be no class meetings (lab or lecture) on the following days: Nov. 26 (Thanksgiving).*
2. *Note that on some weeks, our normal lecture and lab schedule may be altered. Since we share/trade-off times with the mineralogy class, on some TTh you may meet exclusively with one class or the other all day.*
3. *Note the dates of field trips. Some field trips will occur during class/lab time. Sat. field trips will take most, if not all, of the day. We will leave UTEP by 8 am or so and return by 5 pm or so. During those weeks when there is a Sat. field trip (or no lab assignment at all), we will still use the TTh lab times for class, in addition to the normally scheduled lectures.*

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| <u>Week</u> | <u>Dates</u> | <u>Topics and Labs</u> |
|-------------|------------------|---|
| Week 1 | Aug. 25, 27 | Introduction; Earth Materials Lab 1 (T): The Campus Andesite (on campus field trip) Lab 2 (Th): Rocks and Minerals Exercises (w/ Dr. Goodell) <i>(All meet w/ mineralogy for lab both T and Th pm)</i> |
| Week 2 | Sept. 1, 3 | Basic Geologic Principles; Observational and Field Science Continue Lab 2 (normal lab times/sections; w/ Dr. Goodell) |
| Week 3 | Sept. 8, 10 | Geologic Time; Earth History Lab 3: Transmountain Road* <i>(Field trip w/ mineralogy all day T, all students – details TBA)</i> Lab 4: Stratigraphic Principles & Crosscutting Relationships (HW) |
| Week 4 | Sept. 15, 17 | Topographic Maps; Fieldwork Basics Lab 5: Indoor Mapping Exercise |
| Week 5 | Sept. 22, 24 | Geologic Maps; Fieldwork Basics Lab 6: Map and Compass Basics Exercises <i>(In-class/lab field trip T and Th pm)</i> |
| Week 6 | Sept. 29, Oct. 1 | Earth Structure; Geophysical Concepts Lab 7: Fitness Center Mapping <i>(In-class/lab field trip T and Th pm)</i> POSSIBLE TRIP TO SEE PALOESEISMIC TRENCH? (TBD) |
| Week 7 | Oct. 6, 8 | Plate Tectonics Midterm Examination (during lab times) |
| Week 8 | Oct. 13, 15 | Plate Tectonics; Structural Geology Lab 8: Mt. Cristo Rey Mapping I* <i>(Field trip w/ mineralogy all day T, all students – details TBA)</i> |
| Week 9 | Oct. 20, 22, 24 | Metamorphism Lab 9: Bishop’s Cap Mapping* <i>(Sat. trip w/ mineralogy, all students – details TBA)</i> |
| Week 10 | Oct. 27, 29 | Volcanism & Igneous Processes Lab 10: Structural Geology (HW) |
| Week 11 | Nov. 3, 5, 7 | Earthquakes, Active Tectonics, and Geologic Hazards Lab 11: Faults and Volcanoes in the Field in the Potrillo Mts.* <i>(Sat field trip, all students – details TBA)</i> |
| Week 12 | Nov. 10, 12, 14 | Sedimentary Processes Lab 12: Minerals in the Field at Orogrande* <i>(Sat. field trip w/ mineralogy, all students – details TBA)</i> |
| Week 13 | Nov. 17, 19 | Sedimentary Processes Lab 13: Cristo Rey Mapping II* <i>(In-class/lab field trip T and Th pm – details TBA)</i> |
| Week 14 | Nov. 24, 26 | Surface Processes & Geomorphology Lab 14: Orogenesis and Plate Tectonics with Google Earth (HW) |
| Week 15 | Dec. 1, 3 | Surface Processes & Geomorphology; Review Lab 15: Surface Processes with Google Earth (HW) |

Final Exam: due Tues., Dec. 8, starting at 10 am in Geology 123

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