GEOLOGY 3312/3112: "Geoscience Processes"

The University of Texas at El Paso Department of Geological Sciences

Fall Semester 2019

Instructor:

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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 320
Lab: T 1:30-4:20 pm in Geology 320 and **some required Saturday trips**
Office Hours:
Dr. Hurtado: MW 1-2 pm in Geology 301a (or by appointment)
TA: Tony, W 9-11 am in Geology 320; Victor, TBD
Department Seminar: M 3:30-4:30 pm in Geology 123
In addition, see Department student club/association officers for information on meetings.

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)

Copies of these books can be made 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 on the class website as PDF readings, PPT files, etc. for discussion and for your general reference throughout the semester.

Grading:

~20 lab/field trip/homework assignments (60%); 1 midterm examination (10%); 1 final examination (20%); lecture/lab/trip participation (10%)

Your participation/attendance will, in part, be evaluated based on a number of in-class quizzes. Some extra credit points from assignments, quizzes, etc. may be made available.

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 Dr. 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 all need to fill out insurance and release forms in class before our trips. **Please consult Dr. Hurtado 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), hand lens (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 Dr. Hurtado if you have any concerns about field equipment.**

Policies:

Show up, show up on time, and show up prepared! Do reading and other assignments ahead of time and come to class meetings with questions about what you read and about material from the previous class meeting. **Everyone** is expected to contribute to class discussions and to be fully engaged in lab and in the field.

Attendance and class participation in both lecture and (especially) labs (particularly field trips!) are required. **You may be dropped from the course if you have excessive absences.** Please **contact Dr. Hurtado about any concerns, schedule conflicts, missed work, etc. ASAP and, whenever possible, in advance.** *Valid excuses include illness, absence with the instructor's prior approval, official University business, etc., but all require documentation.* Otherwise, unless other arrangements are made, **late work will lose up to 50% of its value for each day it is late, and work will not be accepted more than one week late**. In general, **make-up exams and assignments will not be given**.

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, **everyone is expected to turn in work that is their own**! *You MUST learn to trust your own observations and reasoning (especially in the field) 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 Dr. Hurtado 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 experiment with online activities this semester, so the syllabus may change as the class evolves. All students will be expected to have access to Microsoft Office (Word, Excel, and PowerPoint) to complete class assignments. Work prepared on a computer may be expected to be handed in as a hardcopy, so access to a printer will be required. Some work will be expected to be handed in electronically, so internet access to email will be required. Again, also remember to regularly check the class website.

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 previously taken both "Physical Geology" and "Historical Geology". **Also note that you should be taking both "Geoscience Processes" and Mineralogy together during the same semester!** Both courses are co-requisite to one another and are only offered once per year. 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. Talk to Dr. Hurtado and your advisor if you have questions!

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, we will cover the following topics and skills, most of which relate to field geology as a forensic science:

1. Use of a topographic map and aerial imagery for navigation and recording of spatial data in the field.
2. Construction, use, and analysis of topographic maps, topographic profiles, stratigraphic columns, and geologic maps in the field and the laboratory.
3. Use of a Brunton compass for navigation and for measuring geologic features in the field.
4. Keeping an organized and complete field book to record field data.
5. Basic concepts and analytical tools (structural, stratigraphic, geomorphic, etc.) used in field geology.
6. Visualization of geologic data and relationships in 3-D.
7. Analysis of crosscutting relationships and 4-D thinking.
8. Thinking of the Earth in terms of processes and the application of the concept of "process from product".
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. An important 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 Dr. Hurtado 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 Tuesday and/or Thursday**.

Schedule Notes:

1. *There will be no class meetings (lab or lecture) on the following days: November 23 (Thanksgiving). In addition, Dr. Hurtado may be called out of town for fields work or other business on certain days to be determined. This, however, DOES NOT imply that class will be cancelled on those days! Unless you are otherwise notified, always assume class will meet, regardless of whether Dr. Hurtado is out of town or not!*
2. *Note that on some weeks, our normal lecture and lab schedule may be altered somewhat. For example, you may meet exclusively with Dr. Hurtado or Dr. Goodell all day (i.e. ~9am -~4:30 pm) on some Tuesdays for field trips.*
3. *Note the dates of field trips. Some field trips will occur during class/lab time on Tuesdays (see above). Saturday field trips will take most, if not all, of the day. We will typically leave UTEP by ~8 am or so and return by ~5 pm or so. During those weeks when there is a Saturday field trip (or no lab assignment at all), we may still use the Tuesday lab time for class, in addition to the normally scheduled lectures.*

Week	**Dates**	**Topics and Labs**
Week 1	Aug. 27, 29	Introduction; Earth Materials ***Lab 1 (T): The Campus Andesite*** ***(On-campus field trip w/ mineralogy, T afternoon, all students)*** ***Lab 2 (Th): Rocks & Minerals (ALL students meet w/ Dr. Goodell)***
Week 2	Sept. 3, 5	Basic Geologic Principles; Observational and Field Science ***Lab 3 (T): Transmountain Road**** ***(Off-campus field trip, all day T, all students – details TBA)***
Week 3	Sept. *10, 12*	Geologic Time; Earth History ***Lab 4 (T): Stratigraphic Principles & Crosscutting Relationships***
Week 4	Sept. *17, 19*	Topographic and Geologic Maps; Fieldwork Basics ***Lab 5 (T): Indoor Mapping Exercise***
Week 5	Sept. 24, *26*	Earth Structure; Geophysical Concepts ***Lab 6 (T): Map and Compass Basics Exercises*** ***(In-class, on campus field trip, T pm)***
Week 6	Oct. 1, 3	Earth Structure; Geophysical Concepts; Plate Tectonics ***Lab 7 (T): Fitness Center Mapping*** ***(In-class, on campus field trip, T pm)***
Week 7	Oct. *8, 10*	Plate Tectonics ***Lab 8 (T): Virtual Reality Sandbox*** **Midterm Examination (in class on Th)**
Week 8	Oct. 15, 17	Structural Geology; Metamorphism ***Lab 9 (T): Mt. Cristo Rey Mapping I**** ***(Off-campus field trip, all day T, all students – details TBA)***
Week 9	Oct. 22, 24	Structural Geology; Metamorphism ***Lab 10 (T): Structural Geology***
Week 10	Oct. 29 31, Nov. 2	Earthquakes, Active Tectonics, and Geologic Hazards ***Lab 11: Bishop's Cap Mapping**** ***(Sat., all-day, off-campus field trip, all students – details TBA)***
Week 11	Nov. 5, 7	Volcanism & Igneous Processes ***Lab 12 (T): Orogenesis & Plate Tectonics;*** ***Surface Processes (Google Earth)***
Week 12	Nov. 12, 14, 16	Sedimentary Processes; Hydrology ***Lab 13: Hydrology, Faults, Volcanoes, and Planetary Field Geology in the Potrillo Volcanic Field*** ***(Sat., all-day, off-campus field trip, all students – details TBA)***
Week 13	Nov. 19, 21, 23	Sedimentary Processes; Aeolian Processes ***Lab 14: Minerals in the Field at Orogrande**** ***(Sat., all-day, off-campus field trip, all students – details TBA)***
Week 14	Nov. 26	Surface Processes & Geomorphology
Week 15	Dec. 3, 5	Surface Processes & Geomorphology ***Lab 15 (T): Cristo Rey Mapping II**** ***(Off-campus field trip, all day T, all students – details TBA)***

Final Exam (scheduled by UTEP): Tues., Dec. 10, 10 am – 12:45 pm in Geology 123

Your continued enrollment in this course implies your acceptance of the policies set by the instructor!