GEOLOGY 4375: Field Geology I
The University of Texas at El Paso
Department of Geological Sciences
Winter2020-2021

Instructors:

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NOTE: This syllabus is subject to change The current update was made December 8. Schedules and materials may be altered. However, notice will be provided at least 1 week in advance if possible.

IMPORTANT for Safe Social Distancing Fall 2020

This fall semester Field Geology will begin virtually, and when it is safe, we will change to a meet-in-the-field format, Similar to our Fridays in Sedimentology/Structure last fall. We'll update this syllabus with field safety instructions just before we start getting together, so it will be fresh in your head.

There are two major concerns with this kind of class. 1) DON'T TRY to keep a normal schedule while taking this class. If you do, you'll fall behind, and there isn't time in a compressed schedule for you to catch up. So, ask for time off from your work, tell your friends and family you are not going to always be available.

Second, things are a little crazy now, you may have issues that come up from this class. Maybe one of your will get ill with covid. Maybe your little sister will break your computer. The main thing is don't worry, we'll have your back, BUT, it is imperative that you stay in touch with us. Don't just disappear. Don't wait until a problem is really acute. Give Dr Pavlis or myself a call.

Course Objectives

This course is the first part of your "capstone" class in Geology. It is where you bring together everything you have learned in your time as a major and apply it to solving problems in the field. Observation, Data Collection, Problem solving and Report writing will all be key activities in your professional career and after completing this and GEOL 4376, you should be ready to work as a professional environmental scientist or geoscientist.

Our primary activities will be geologic field mapping, analysis of data and writing of professional reports. Geologic field mapping is the primary method used to collect data. However most important are your observations about the area and how you can use this data to solve geologic problems. We will conduct investigations useful to both environmental professionals and geological professionals. Your results will be used to explain how the rock record is used to evaluate geologic history and how it has shaped the landscape.

The skills that will be practiced are those that were developed in "Geoscience Processes", Mineralogy, Petrology, Structural Geology, and Sedimentology and Stratigraphy. Included

among the bodies of knowledge you will need (and should have already learned in your previous classes) are:

1   Use of a topographic map for navigation and recording of geologic data.
2   Construction and use of topographic maps, topographic profiles, stratigraphic columns, and geologic maps.
3   Use of a Brunton compass for navigation and for measuring geologic structures.
4   Use of (digital) maps 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 and interpretation of geologic data and relationships in three-dimensions.
8   Analysis of cross-cutting relationships.
9   Description of rocks and recognition of formational/structural geologic contacts.
10 Identification and description of common rocks, minerals, soils, and other geologic materials.
11 Identification and interpretation of tectonic, volcanic, geomorphic and other landforms/structures.

Because things are virtual this year, we will have some differences in what you can do and how we will interact. Normally you would work in groups for safety, however as we are virtual, you will be working on your own. By the nature of working virtually, you won't be able to see and feel like you normally would. Therefore, we will be your virtual field assistants. You can give us targets for us to investigate for you and we will collect that information on Strabospot, we will make the information public and the whole class will have access to our information.

Ideally (and most importantly), 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 and do your own mapping.**

Assignments:

Expect to be working on this class all day during each project period. We will typically start early in the morning and work until the late afternoon (times TBA). The course will be organized into 3 mapping projects.

The result of each field project will be a digital geologic map (shapefiles that you will prepare with QGIS software), a paper geologic map (produced from the digital files, printed out, and colored), interpretive cross-sections, and a report. **These are expected to be of professional quality.**

Of particular importance are the reports. This is a writing intensive class and is designated as such in the geo curriculum. These will be based on your observations and rock descriptions, your geologic map, and your interpretations of the geology made through constructing geologic cross sections. It will also contain appropriate (and properly cited) background material. These reports are critical because they will teach you how to write a technical paper and will focus your understanding of the geology and history of the mapping areas. The reports will be graded for their scientific merit and the style and clarity of the writing. The maps and cross-sections will be

graded on their scientific merit and their aesthetic quality (completeness, neatness, etc.). See the accompanying handout for more details on these deliverables.

Grading

Your grade will be based on your performance on the field projects. There will be three major projects.

The grade for each of the projects will be earned based on a rubric similar to the following breakdown (total of ~140 points or so per project; see accompanying handout for more example details):

- Geologic map (printed out; graded for content, correctness, neatness, etc.): 40 points

- Map details (e.g. explanation, north arrow, scale, legend, etc.): 10 points

- Digital data (e.g. shapefiles, etc.; graded for completeness, effective use of technology, etc.): 25 points

- Cross-section(s): 25 points

- Report: 40 points

In addition to the example rubric, attached is an assessment tool that illustrates the abilities that we think are: (1) exemplary, (2) acceptable, (3) developing and (4) unacceptable. We will consider these criteria in assigning grades.

Schedule

NOTE this schedule is subject to change due to COVID, weather and other factors.

Monday December 28 – Introduction to class and Software. Expect to spend 3-5 hours learning how to use software and collect data to start your project.
Tuesday December 29 – Day 1 Exploring your area virtually and beginning to map. How to use background reading and resources. Begin writing your paper. Plagiarism Review
Wednesday December 30 – Mapping in your area. Introduction to Geomorphic Elements. Writing descriptions of your observations.
Thursday December 31 – Continued work in your area, Sequences of Events, Describing Geomorphic and Geologic History.
Friday January 1 -- Finish mapping and Continue Writing report.
First Report Due Sunday January 3rd at 5 PM.

Wednesday January 6 -- Begin Second Project, Review of QGIS and cloud compare to collect Structural Data.
Thursday January 7 -- Continuing mapping, Interpreting folds.
Friday January 8 -- Continuing mapping, Interpreting faults.
Saturday January 9 -- Continuing mapping, Reconstructing Structural History.
Sunday January 10 – Finish Mapping and have most of the report written
Wed January 12 – Report Due at 5 PM

Project 3, Dates TBA

Academic Honesty Policy

Academic dishonesty 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. Note that a large part of this course will require you to work in groups. Although **reasonable collaboration is allowed** (even encouraged), **all work you turn in is expected to be your own!** You MUST learn to trust your own observations and NOT rely on the interpretations of others, otherwise you are wasting your time. These three weeks are your opportunity to hone your field skills, so don't cheat yourself by copying the mapping of others. Copying of other's work WILL be noticed and WILL NOT be tolerated.

Other Issues

Civility: This class requires group interactions with your fellow students, both in the field and onlines. Think about your colleagues and your role in this environment. Collegiality will make this class a wonderful experience, but if you devolve into factions with infighting, bullying, or other nasty social issues, the class can become unpleasant. The instructors will be exercising important leadership skills with you throughout the course, emphasizing good expedition behavior and team dynamics.

Disability: If you have or suspect you have a disability and need an accommodation, you should contact the Disabled Student Services Office (DSSO) at 747-5148 or at dss@utep.edu or go to Room 106 Union East Building. You are responsible for presenting the instructors any DSS accommodation letters and instructions IN ADVANCE OF GOING TO THE FIELD.

Military Service: If you are a military student 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(s) as soon as possible.

UTEP and Course Policies

Technology Requirements

Course content is delivered via the Internet through the Blackboard learning management system. Ensure your UTEP e-mail account is working and that you have access to the Web and a stable web browser. Google Chrome and Mozilla Firefox are the best browsers for Blackboard; other browsers may cause complications. If you have technical problems, 1) update your browser, 2) make sure it is blackboard compatible (most are), 3) clear your cache, finally 4) try switching to another browser.

You will need to have access to a computer/laptop, and a cellular phone. You will need to download or update the following software: a **word processing software** like Microsoft Office, **Adobe Acrobat Reader, a Media Player, QuickTime, Excel, and Powerpoint, and Google Earth**. Check that your computer hardware and software are up-to-date and able to access all parts of the course. We will also use some specialized software for this course that is free and open source. Install QGIS 3.10 or newer and make sure it works on your computer. You might also install Strabospot on your phone.

If you do not have a word-processing software, you can download Word and other Microsoft Office programs (including Excel, PowerPoint, Outlook and more) for free via UTEP's Microsoft Office Portal. Click the following link for more information about Microsoft Office 365 and follow the instructions.

IMPORTANT: If you encounter technical difficulties beyond your scope of troubleshooting with standard sorfware, please contact the UTEP Help Desk as they are trained in assisting with technological needs of students. If you need help with Strabospot or QGIS, please contact me for help.

Online Etiquette
As we know, sometimes communication online can be challenging. It's possible to miscommunicate what we mean or to misunderstand what our classmates mean given the lack of body language and immediate feedback. Therefore, please keep these netiquette (network etiquette) guidelines in mind. Failure to observe them may result in disciplinary action.
- o Always consider audience. This is a college-level course; therefore, all communication should reflect polite consideration of other's ideas.
- o Respect and courtesy must be provided to classmates and to the instructor at all times. No harassment or inappropriate postings will be tolerated.
- o When reacting to someone else's message, address the ideas, not the person. Post only what anyone would comfortably state in a face-to-face situation.
- o Blackboard is not a public internet venue; all postings to it should be considered private and confidential. Whatever is posted on in these online spaces is intended for classmates and professor only. Please do not copy documents and paste them to a publicly accessible website, blog, or other space.

Safety is most important: It is our number one concern.

Please be prepared when we go outdoors! <u>Wear a hat, use sunscreen, wear proper clothing, and drink lots of water.</u> A water bladder (Camelbak or similar system) helps keep you hydrated and is very convenient compared to water bottles. Use sunscreen with an SPF of at least 50. Appropriate sun-protective clothing includes long sleeves and long pants and a hat with a brim. You are expected to have appropriate footwear, i.e. proper hiking shoes, preferably boots with ankle support. Open toe shoes, sandals, and most athletic shoes are not acceptable. Always be prepared for inclement weather and extremes in temperature, so dress in layers and bring jackets and rain gear!

When in the field, always be cognizant of your limits and potential dangers and **do not get yourself into situations where you can injure yourself or others.** For safety, you will typically be working with at least one other person and every group will carry a radio. In addition, (optional, but recommended) field trip insurance will be available at the Department's expense. **NOTE: Any safety violations (e.g. failure to communicate, abandonment of field partners, careless/dangerous actions, etc.) will be dealt with seriously.**

Safety hazards present during Camp include but are not limited to:

- **Weather:** As you all know, winter weather around El Paso is wildly variable. It can be a beautiful, spring-like day in the morning and be snowing by afternoon. So bring plenty of warm weather as well as cold weather gear. Dressing in layers is crucial in the winter because all morning will cold, but you will need to shed layers as the day goes on. We know it rarely rains in winter in this area, but if you get caught out in the rain with no protection in the winter it is very dangerous because **hypothermia is a real possibility**. So bring rain gear and keep it in your pack every day.

- **Terrain:** Maintain situational awareness of where you are walking and be aware if someone might be downslope from you in the path of rocks you may cause to fall. Be careful around steep and/or unstable slopes where there is a danger of falling. Do not go somewhere if you are not comfortable with the terrain. Never roll or throw rocks downhill or do anything else that can cause a danger to yourself others while in the field**. If you are caught doing something egregiously stupid and dangerous, you will be immediately and automatically excused from the course with an F and sent home.**

- **Vegetation and Critters:** There are many spiky, prickly plants out there. Otherwise, it is unlikely that you will have many wildlife encounters. Snakes exist in the desert, but in winter you are unlikely to see them except in the afternoon when they might be soaking up the sunshine. Some poisonous arthropods, including scorpions are out there, too. So, always be careful of where you put your hands and feet! If you encounter a snake, stay calm, move away from it carefully, and alert others in the area. If you are bitten by something that might be poisonous, call for help immediately. Bees are present in numbers in some places, so be careful if you are allergic to stings (inform the instructors if this is the case and always carry any needed medication). Other animals you might see include javelina and coyotes. Be very careful if you encounter either of these – avoid interacting with them and move away

from the area where you see them and communicate with the rest of the group to make them aware of the animals.

Talk to the instructors if you have any concerns about field equipment or working in the field, especially in terms of safety. In particular the instructors need to know about any physical disability or condition that may affect your ability to work outside. At our first official meeting (training session) we will hand out a series of forms and questionnaires related to insurance and medical issues.

Course Drop Policy – According to UTEP Curriculum and Classroom Policies, "When, in the judgment of the instructor, a student has been absent to such a degree as to impair his or her status relative to credit for the course, the instructor may drop the student from the class with a grade of "W" before the course drop deadline and with a grade of "F" after the course drop deadline." **If you are not active in the first five weeks of the class and in my judgement you are unable to complete the course with a passing grade, I will drop you from the course. However, otherwise I will not drop you from the course.** However, if you feel that you are unable to complete the course successfully, please let me know and then contact the Registrar's Office to initiate the drop process. If you do not, you are at risk of receiving an "F" for the course. I will do my best to make sure that you have a good understanding of your progress and grade in the class..

Copyright Statement for Course Materials
All materials used in this course are protected by copyright law. The course materials are only for the use of students currently enrolled in this course and only for the purpose of this course. They may not be further disseminated.

Equipment

Among the items you will need for your field assignments (IF we have one) are: **a hand-lens (loupe), a field notebook, a clipboard (if you want to carry a paper map), 0.1 inch grid graph paper (for cross-sections), sharp mechanical pencils, fine-tipped ink pens, an engineer's scale (10-60 scales), a protractor, colored pencils, and a calculator**. Rock hammers may be useful, but are optional. Coordinate amongst yourselves if you wish to share some of these resources. Also consider coordinating for bringing any reference books. They will be useful, but it is not necessary for everyone to bring a copy when one or two will suffice for everyone to share. The instructors will bring a limited amount of materials and references as well.

VERY IMPORTANT: INSTEAD OF A TEXTBOOK, IN THIS CLASS YOU WILL NEED TO HAVE ACCESS TO A FIELD COMPUTER!

In previous years (prior to 2017) we had been providing field computers to students for this class. However, the prices of these devices has now gotten low enough they cost about the same as (or even less than) a textbook, and they will provide you a lot of other functionality beyond the field classes. In addition, with your own equipment we are confident you will take better care of the equipment and that you will know how to use it. For these reasons, we are requiring that each student buy their own device. Note that if you break your device or it quits working, we do have a few aging tablets that we can loan out, but not enough for everyone. We will provide some recommendations for computers here, but one thing we learned over the years is that for a field computer it is critical that you buy the best protective case you can get. Many are custom built for a specific device, so consider this when you are purchasing your machine, if a good case is appropriate. For example, a company called Gumdrop makes some excellent cases for tablets, but there are many others out there. Also, at the very least, you should buy a screen protector to cover your tablet's screen and protect it from scratches.

In addition to your own computer (see below for more details), radios and Brunton compasses will be issued to each of you at the beginning of the class. **You are entirely responsible for the equipment issued to you for the duration of the course.** This includes maintaining them operational (ask for assistance with troubleshooting, though!), keeping batteries charged, having spare batteries, and especially management of your own data (see below). **The instructors will not do any of this for you, and failure to maintain your equipment will likely result in lost productivity in the field and lost data, which will lead to a bad grade.** You must turn in all of the equipment issued to you (including all media, cables, and chargers) at the completion of the course or you will not receive a grade. Depending on severity, loss or damage may be your financial responsibility. **Note that you are each expected to keep an archive of your digital field data on a daily basis. You will turn in all of your digital data as part of your project deliverables, and part of your grade will depend on the completeness of this archive and the day-to-day progress it documents.**

Recommended Mapping Computers

You will need have a functioning Windows computer, Linux computer, or Mac that will operate for a full day of field work and that can run the QGIS software we are using. Windows 8 or 10 tablets are ideal, but a laptop with sufficient battery life will also work, provided you can keep it protected.

Option 1: Buy a Windows tablet or convertible
Windows tablets are the ideal field computers, in our opinion, because they offer the widest software options and most have excellent battery life. In particular, they seamlessly run our QGIS field system, which is our preferred mapping system because it uses entirely public domain, open source software. Most also offer a stylus which is a huge advantage for fieldwork. Shop carefully, though, since quality will vary and you may get what you pay for! Your primary considerations should be that the tablet runs Windows 10, has a good quality screen (bright in direct sunlight, 8-10 inches in size), and has ample built-in memory/storage (at least 6 GB is ideal, you might get by with 4 GB). Other good-to-have features are a built-in GPS and a Wacom-style or other "active" stylus (not the same as the "soft" touchscreen stylus that nearly all tablets and smartphones can use these days). You will also want to invest in a (micro) SD card to add more storage to your device. A good-quality screen protector and carrying case (preferably a protective dust-/water-proof case) are also essential. If your device does not have built-in GPS, you can borrow one from UTEP (only a limited number are available) or use your phone linked to the device (we will show you how to do this if you opt for this).

Option 2: Use a laptop (Mac, Linux, or Windows will work)
The viability of this option will depend on two critical questions you have to ask yourself: (1) do I really want to carry a full laptop in the field (considering issues like weight and durability); and (2) is the laptop up to the task (look at your display in bright sunlight, and look at battery life). Our experience is many new laptops do have the battery life to operate in the field for a full day when properly used, but many do not. There are workarounds like carrying a supplementary power source, but this adds weight. Thus, the critical question is: do you want to carry around a boat anchor all day? If you don't care, no worries, but if you do care, think about weight in deciding if your laptop works for you. Finally, if you opt to bring your own laptop into the field, definitely buy a very good protective case (e.g. hard shell sleeve) that can protect the device while you are carrying it around. You can use a procedure like keeping the computer in a case and pulling it out of the case every time you stop. This field workflow is not ideal because it is a little slow, but will work.

You can also borrow a Field computer from the University or Department, howver you must make these arrangements well in advance.

GPS ISSUES

GPS is an essential tool in modern digital mapping, but computers are not all built the same in terms of GPS capabilities. Most recent tablets have a built in GPS and can readily access them, and if you have a smart phone it probably has a GPS that can be used for positioning. Nonetheless, you should ideally have a live GPS display on your field computer.

Windows 8 devices that we have used have an annoying problem with GPS. Microsoft in all it brilliance did not provide support for internal GPS devices in Windows 8 or early versions of Windows 10. Thus, although many tablets have a GPS hardwired onto the motherboard of the computer (e.g. our Asus tablets), Windows 8 and 10 cannot recognize their existence without additional software. There are three solutions to this problem. (1) If the computer has a built in GPS, you can purchase a third party software package. A known software solution we have used is called "Localizer" and it costs less than $20. There may be other better solutions out there that we are unaware of, you can check. (2) The most recent version of Windows 10 seems to have solved this problem, so check your computer to see if it has a GPS built in and that QGIS can access it. (3) You can use one of our external Bluetooth GPS device (or buy one of your own).

Resources for Students

If you have with any facet of this class, you can always come to me, or you can try some of the many resources that UTEP provides .
Technology Resources
- [Help Desk](): Students experiencing technological challenges (email, Blackboard, software, etc.) can submit a ticket to the UTEP Helpdesk for assistance. Contact the Helpdesk via phone, email, chat, website, or in person if on campus.

Academic Resources
- [UTEP Library](): Access a wide range of resources including online, full-text access to thousands of journals and eBooks plus reference service and librarian assistance for enrolled students.
- [University Writing Center (UWC)](): Submit papers here for assistance with writing style and formatting, ask a tutor for help and explore other writing resources.
- [Math Tutoring Center (MaRCS)](): Ask a tutor for help and explore other available math resources.
- [History Tutoring Center (HTC)](): Receive assistance with writing history papers, get help from a tutor and explore other history resources.
- [RefWorks](): A bibliographic citation tool; check out the RefWorks tutorial and Fact Sheet and Quick-Start Guide.
- Zotero is a free equivalent you can download.