GEO 4510 – FIELD GEOLOGY (SUMMER FIELD CAMP), 2014

Wednesday, May 7 – Monday, June 9, 2014; 4 semester credits

Summer Field Geology is the capstone course of your undergraduate training in Earth Science. With Field Methods (GEO 4500), it is intended to provide you with field skills and technical report writing experience that will serve as a sound basis for either a professional career or graduate school. You will define a problem to be solved, design a strategy to solve it, collect stratigraphic, structural, and engineering data, and generate original maps, cross sections, and quantitative diagrams that tell the geologic character and history of a region recorded in its rocks, sediments, and landforms. Results will be presented in professional quality technical reports. To put it all together successfully, you will draw upon many of the geologic and engineering skills you’ve learned in the classroom, laboratory, and field exercises. Field camp is intellectually and physically demanding. Most students who enjoy solving real problems in geology, and living, working, and playing in the mountains, find the course exhilarating and rewarding. The food is pretty darned good too.

SCHEDULE (subject to change owing to weather or other unforeseen complications):

9:00 AM, Wednesday, May 7
Leave from FASB loading dock

May 7 – 17
Mapping Project 1 (Parowan area; southern Utah)

Sunday, May 18
Pack up camp; return to SLC

May 18 – 22
Write Project 1 report; due 6 PM, Thursday, May 22

9:00 AM, Friday, May 23
Leave from FASB loading dock

May 23 – June 2
Mapping Project 2 (Raft River Range; northern Utah)

Monday, June 2
Pack up camp; return to SLC

June 3 – 9
Write Project 2 report; due 6 PM, Monday, June 9

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PREREQUISITES: C grade or better in University of Utah courses GEO 3080 and 3090 (Earth Materials I and II), GEO 3060 (Structural Geology and Tectonics), GEO 5760 (Stratigraphy and Sedimentary Processes), and GEO 4500 (Field Methods), or equivalent courses at another school.

• **Strenuous physical effort** in a wide range of terrains and weather conditions is part and parcel of fieldwork. You need to be in good physical condition for this course. It’s a good idea to do some running or other aerobic exercise to prepare yourself for hiking every day. Get buff!

• **Health insurance** is required for all students. **No exceptions!** A signed statement showing your insurer and policy number must be submitted prior to departure.

• **Be sure to inform instructor (me!) of any special medical conditions prior to departure.**
CAMP LOGISTICS: We camp during the mapping components of each project, so you need to bring a sturdy waterproof tent, warm sleeping bag and pad, and other items to assure your comfort in the field. A suggested list of items is included below.

• **No whining clause.** We will be living together in close proximity for nearly a month, so a positive attitude and willingness to pitch in with camp chores are essential for **everyone**. The managers can’t take care of everything, so please be prepared to help whenever necessary. 10% of your grade (enough to raise or lower it by one full letter) will be awarded for **professionalism in the field** – including attitude, participation, doing your share of the work in camp, and being on time. One lazy, chronically late, or incessantly negative individual can undermine the course for everyone.

• **Cooking and cleanup** will be done by designated groups of 3-4 students under the direction of the camp managers. Each group will be responsible for preparing and cleaning up after dinner and breakfast the following morning. The next group in line will take over the following evening and so on. You will clean your own personal dishes after every meal. **Breakfast is at 7:15 A.M., and you will make a bag lunch during/after breakfast to eat in the field.** Instructors will pitch in with meals and cleanup as time allows; however, their primary responsibilities in the evening are to check maps, discuss progress and problems, and help students prepare for the next day’s fieldwork.

• **Evenings** after dinner are designated for office work, discussions, and recreational time. Please keep it firmly in mind that field camp is not a party! You are there to work and learn.

• **Personal vehicles** are allowed in camp and may be useful for occasional trips into town for showers at the truck stop, snacks, or phone calls. However, evening activities are integral to the course, so please do not get into a habit of disappearing every night. Also, loud music (e.g., from car stereos or boom boxes) is not welcome in camp. [Remember those professionalism points.]

• **Visitors** are welcome for short stays (no longer than 2 nights, please) provided that they do not in any way disrupt fieldwork or camp activities. Visitors who share our food will be asked to contribute $5.00 for each breakfast/lunch and $7.00 for each dinner they consume.

**MAPPING LOGISTICS:** The first full day of each project will be devoted to a reconnaissance hike through the map area to introduce the rock units and aspects of the structural style. Mapping will subsequently be done by groups of 3-4 students, intermittently accompanied by an instructor. **We will leave camp promptly by 8:00 each morning and return by about 6:00 PM.** You can and should divide chores in the field, but it is critical that you rotate tasks so that everyone gains experience with, for instance, locating stations and contacts on the topographic map, measuring sedimentary and structural planes and lineations, and describing rock units and field relationships.

• Working professionally in a team means including everyone in the effort. Just like in real life, your team will include members of widely varying abilities, personalities, and physical stamina, but everybody has something to contribute and the right to learn. **No ditching your field partners!**

• You will be given handouts (1) introducing the stratigraphy and regional geology of each map area, (2) providing information on depositional and deformational structures present in each area, and (3) summarizing the essential elements of a professional geologic report in standard format. A small reference library will be available both in the office and in the field.

**FIELD REPORTS:** Professional reports will be the primary products of your efforts in the field, and will accordingly form the primary basis for assigning your grade. You will have ample time back in Salt Lake City to prepare your reports. However, **you should have most of your report outlined already by the time you leave the field!** Every evening you should devote time to writing descriptions of the rock units, structures, and geologic relationships you observed that day. That
way you will recognize what information is missing or incomplete or needs to be rechecked while you’re still in the field and can do something about it! You should also draft trial cross sections in the field to be sure that your map makes geologic sense. Each of your two reports will include a:

- **Geologic map** redrafted from your field map, with all necessary rock units, contacts, bedding attitudes, structural data, proper symbols, lat/long marks, and a complete legend showing all rock units, symbols, and the map scale,

- Standard **location map** showing position of your map area within the region and within Utah,

- **Stratigraphic column(s)** showing thickness, lithologies, and descriptions of all map units,

- **Cross section** consistent with geologic map and showing correct unit thicknesses and reasonable structural interpretations, and a complete

- **Geologic report** in standard professional format, including:

  - **Illustrations** (line drawings, photographs, maps, etc.) showing key geologic relationships, and

  - **Stereonets, rose diagrams, and other graphs or tables** as necessary to illustrate structural and paleocurrent measurements, etc.

Your final report for each project will **absolutely be due at 6:00 PM on a designated day after we return** (see schedule above). A paramount aspect of professionalism in any field is to meet deadlines! I was pretty lenient in Field Methods because everybody had other courses to worry about too, but in this course, **your grade will be reduced by 10% per day for lateness**. Please do not undermine your own hard work by turning in projects late.

**Grading:**
- Project 1 report 45%
- Project 2 report 45%
- Professionalism in the field 10%

**Equipment List:**

**Required field and office equipment**

- Brunton compass and case (provided by the GEO department, if you don’t have your own).
- Field notebook; bound and preferably waterproof (same as you used for Field Methods)
- Hand lens (10x or 14x) on a strong cord. Hastings triplet is best, but cheaper ones work fine.
- Rock hammer (with belt carrier case if you wish)
- Covered nonmagnetic clipboard, for carrying and protecting your maps in all weather from dirt and moisture. Best to have an extra-wide (wider than 9 inches if you can find one) clipboard and make a hinged, waterproof cover out of plastic or heavy cardboard using duct tape, mylar, etc.
- Several alligator (binder) clips for holding maps to board
- Acid bottle and acid (provided by department)
- Field belt (for carrying Brunton, hammer, other gizmos)
- Protractor (Bring spares; you cannot map without one!) Clear, flexible plastic ones are best.
- Six-inch clear plastic ruler (and a spare) with both inches and tenths and centimeter gradations
- 5-6 pencils, erasers, and a pencil sharpener. 0.5-mm mechanical pencils with plenty of 2H-4H leads are handy for map work.
- 2-3 “Sharpie” or other permanent black magic marker-type pens for marking samples
- Sample bags (usually plastic freezer ziplocks; a limited number will be supplied by department)
- 5-6 pens for taking field notes (unless you prefer to use pencils for this purpose)
- .35 and 1.00 or equivalent drafting pens for inking maps (Rapidographs are not necessary.)
- Set of 24 colored pencils for coloring maps and cross sections. “Colerase” work best.
- Camera (field photos are standard in professional geologic reports).
• Watch. You will need to know when to meet back at the truck. A waterproof watch or travel clock with an alarm (to get you up in time for breakfast) is best. There is no cell service in the Parowan camp, so phone alarms rarely work there.
• Day pack (a large, sturdy one for rock samples, lunch, rain gear, water bottles, etc.)
• Field hat; preferably brimmed and securable by a chin strap on windy days. Do not underestimate your need for protection from the sun during a long field day in the Great Basin.
• Rain gear; jacket and pants. Poncho if you wish. Carry these in your field pack every day.
• At least two 1-liter water bottles. Dehydration is a real danger in the desert.
• Sunglasses, sunscreen, insect lotion, chapstick, aspirin, band-aids, toilet paper, etc.
• Any special personal medical supplies; e.g., asthma inhalers, injectable antihistamine for bee stings if you are allergic, any prescription drugs required for personal medical conditions.

Optional field equipment
• Altimeter (reading in feet; an exclusively metric altimeter won’t be of much use)
• Binoculars (compact)
• Personal GPS receiver
• Field vest or field pouch for carrying pencils, pens, notebook, protractors, sunscreen, etc. Most experienced mappers use one or the other of these.
• Cold chisel (Serious rock samplers always carry one.)
• A loud whistle, for signaling if you find yourself in a predicament. I always carry one, and it saved a life once.
• Snake-bite kit. There are rattlesnakes in the Great Basin. You should never get bitten if you are careful, but I carry one for emergencies. (I have never had to use it in 30 years of mapping.)
• Personal first-aid kit. The department kit is well stocked, but you may want your own small kit for taking care of cuts and scrapes, bug bites, etc. in the field.

Essential camping equipment
• Tent; good quality and waterproof, with mosquito netting in good repair. This will be your home for the better part of a month and you could spend a lot of time in it if the weather gets bad, so you do not want it to be leaky, unstable in the wind, or too cramped.
• Groundcloth or “tent footprint”
• Warm, three-season sleeping bag. (It could well freeze overnight.)
• A pillow, if you want.
• Ample padding for beneath sleeping bag (inflatable backpack pads or compact foam, etc.)
• Travel alarm clock or watch with alarm. There is no wakeup call and you are personally responsible for showing up in time for breakfast, to cook on your cooking days, and to be in the van ready to leave on time. You will find yourself very unpopular if you keep others waiting.
• Personal eating items: Plate and bowl (preferably large and unbreakable), mug (a covered plastic or metal one is good), knife, fork, and spoon.

Apparel
• Hiking boots; sturdy, waterproof, and well broken-in
• Hiking socks; at least 4 pair
• Lighter shoes and/or sandals for camp
• Field pants (at least 2 pairs). Loose-fitting, sturdy tight-weave cotton are usually most comfortable. Jeans are OK for around camp, but get clammy for hiking on hot or wet days.
• Shorts (some people find these comfortable for mapping/hiking)
• Field shirts (2 or 3); at least one should be long-sleeved cotton (for sun protection); otherwise T-shirts are usually OK.
• Layers of warm clothing (better than one heavy parka); include enough fleece, sweaters, jackets, and/or thermal underwear to keep you warm in freezing temperatures on a wet, windy day.
• Rain gear (see above)
• Brimmed hat (for sun and rain; see above)
• Gloves, in case it gets cold at night
• Underwear, handkerchiefs, bandanna, etc.
• Bathing suit (We will camp by streams, in which you might want to douse yourself, or in which your field companions may insist you be doused.)
• Bath towel
• Personal toiletry items in a travel bag

Optional items you might find useful

• Folding camp chair for sitting/working outside your tent (we will have benches and long work/eating tables in the communal camp area; some campsites have picnic tables)
• Recreational reading material, musical instruments, frisbees, cards, etc.
• Your favorite stratigraphy, petrology, Utah geology, and structure texts and a stereonet
• Swiss Army-type pocket knife or Leatherman-type multi-tool
• Musical instruments – guitars, banjos, fiddles, didgeridoos
• iPod or other personal music device with headphones

BUT, NO BOOM BOXES OR SPEAKERS OF ANY KIND IN CAMP!
Listen instead to the birds and the bees, the babbling brook, and the wind in the trees.

• A small supply of your favorite snack items
• Fishing gear and license if you’re so inclined (no promises!)
• Solar shower
• Hammock or cot
• Compact umbrella (sometimes surprising useful in the field)
• Other reasonable creature comforts

Prohibited items (possession will result in immediate dismissal from course with an “E” grade):
• Illegal drugs
• Campers, camp trailers
• ATVs

Discouraged items:
• Firearms. There is nobody and nothing to shoot at in the places we’re going.
• Alcohol is a personal choice, but is not allowed in state vehicles under any circumstances. If you’re going to bring any, it has to travel with somebody who is driving a personal vehicle to camp.