GEL 2530 - Introduction to Geologic Field Work

FIELD DAY 2 (100 pts)

LOCATION:	Rabbit Mountain Open Space 15140 N 55th St, Longmont, CO 80503	GPS: 40.246506248993704, -105.22415927292987
TIME:	Start 9:30 AM: Meet at Picnic Shelter *(Leave "home" at appropriate time to arrive BEFORE start time)*	

"IV Strike & Dip Lecture and Field Instructions" Video Lecture (click here)

GENERAL INFO

- ☐ This is a County OPEN SPACE. **- NO ROCK COLLECTING ALLOWED -**
- ☐ No congregating of large groups in one location on the trail. Please disperse and break up into smaller groups for field work.
- ☐ STAY ON TRAIL
- ☐ Bring a Sack Lunch
- ☐ Bring ALL your Course Equipment including writing utensils
- ☐ Bring any personal item you deem necessary for the day (e.g. sunscreen, hat, jacket, etc.)
- ☐ Total day hike distance about 1.5 miles one-way dispersed with measuring activities
- ☐ Vault "facilities" are available at picnic shelter. You will have to hike back down from exercise location(s)

FIELD OBJECTIVES:	1. Multiple direct Strike & Dip measurements 2. Detailed rock field notebook description 3. One "distant" Strike & Dip measurement 4. Path Pace Mapping

GRADING:	- All exercises to be answered / documented in Field Notebook - **Field Notebook Due on CANVAS by 6:00 PM** ***Use your cell phone (PDF creator app?) to make quality copies of today's notebook entries & exercises for upload*** ***You will lose 5% per hour late with a minimum of 50% score after that*** You may work in groups of up to 3 people. However, each individual must turn in their individual notebook with ALL notes and data by the end of the day

General Grading Rubric: Generally my grading is pretty much straight forward. I will deduct points from each exercise below for errors, falsehoods, idiosyncrasies, omissions, non-legibilities, computation discrepancies, missing data, calculation mistakes, etc. etc. Percentages of total points may be deducted for repeated errors or larger omissions. This includes missing (forgotten) essential field equipment.

Field Notebook Entries	4 detailed rock descriptions @ 5 points each	20 points
10 Direct Strike & Dip Measurements @ 5 points each - see below -		50 points
1 Distant Strike & Dip Measurement Exercise - see below		10 points
Mapped path(s) - see below		20 points

Field Reconnaissance Exercises

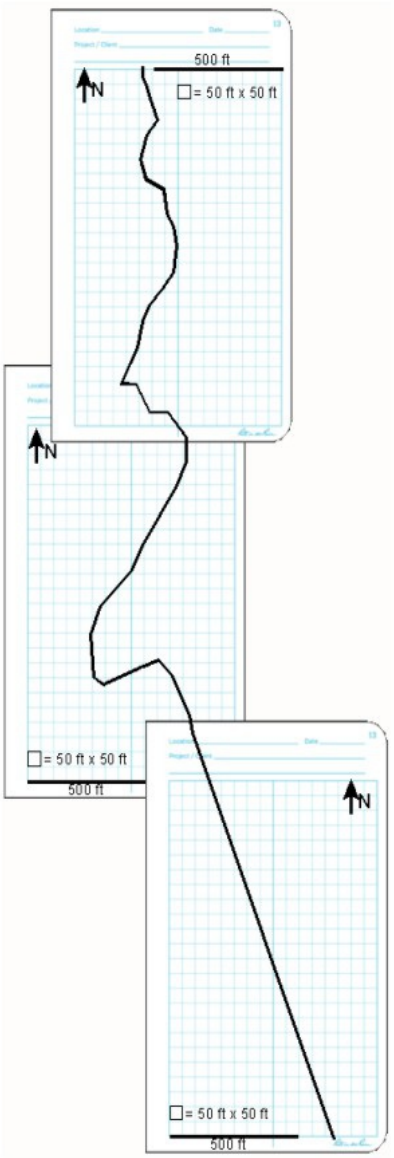
Path Mapping Exercise	Drawing a line map or path in your field notebook is a useful tool for orienteering and to position yourself in relation to measurements. It is also the first step when crafting a "base map" in your field notes. This exercise is combined with the Strike & Dip exercise below.

Method

Field Work Handbook, p.15 - 17, Reading and Plotting Compass Bearings

Mapped Path(s) along the "Little Thompson Overlook Trail" starting from GPS 40.25105937196396, -105.2176792729297 to the end of the trail

- ☐ To make this exercise a little easier, the ACTUAL trail is shown in the example. Your map(s) should look very similar in your field notebooks once completed.
- ☐ You should be able to plot the entire hiking trail over three notebook pages as shown in the example, but you may use more pages and a different scale if desired.
- ☐ To do so, get a straight compass bearing in the direction of the path. Then pace in the direction of this bearing. Transfer the path distance in the compass bearing direction TO SCALE into your field notebook as indicated.
- ☐ You can do this is segments as you may want to complete the strike and dip measurements along the way.
- ☐ A new compass bearing and pace direction is needed as the path curves or changes directions.
- ☐ Once your path is at the edge of your notebook page, continue on another page as indicated. Reference the page number in your field notebook where the map (path) continues
- ☐ It is essential that a North arrow and a map scale is shown on EACH of the map pages.
- ☐ Any notes or observation can now be placed in relation to the map. While you may not have enough room to write directly on the map, you can reference points of interest on the map and then add data or descriptions on other pages referring to your map or labels on the map.



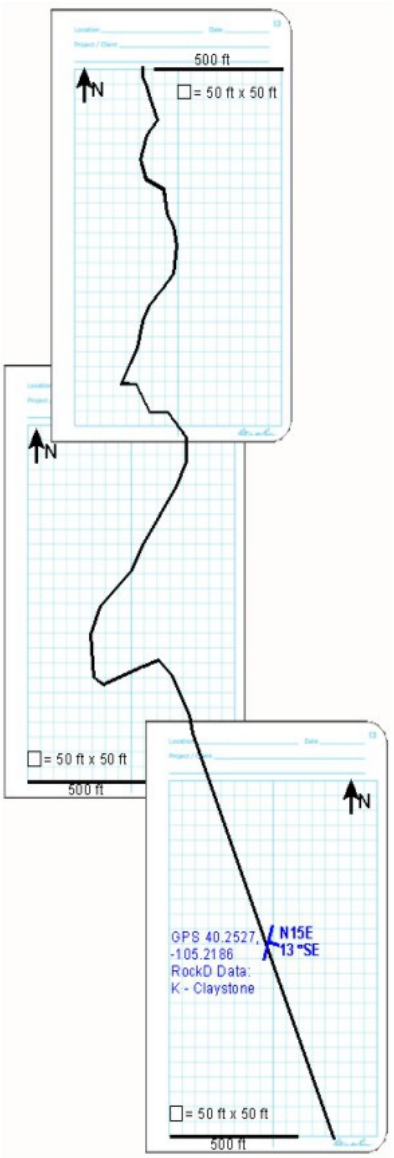
Direct Strike & Dip Measurements	Strike & Dip measurements are the “essential” data in any structural geologic and mapping assessment. During this exercise you should start becoming proficient in this task. While your first measurements might be slow, as the day progresses you should become more expedient in any subsequent measurement under various conditions. In the end, it should take you no longer than 5 minutes for measurement and field notebook entry.

Method

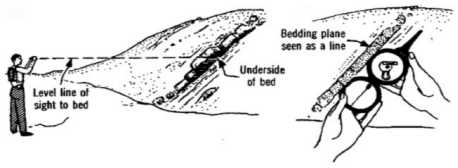
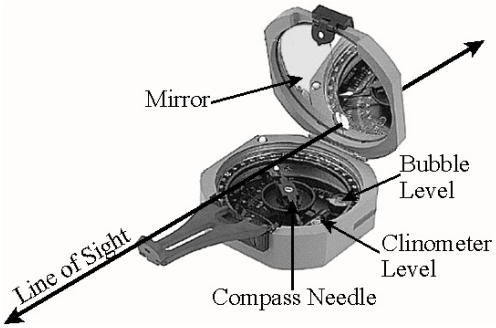
Field Work Handbook, p.32, Strike & Dip Direct Measurements

<u>10 Strike and Dip measurements along the Mapped Path(s) of the “Little Thompson Overlook Trail” starting from GPS 40.25105937196396, -105.2176792729297 to the end of the trail</u>

- ☐ Select measurement points along the trail where large rock slabs indicate an original formation out crop, rather than erosional mass wasting float. In other words, the rock slab outcrop you use for strike and dip measurements should not have moved and should be part of the solid rock formation.
- ☐ Your selected measurement points should be represented through the whole length of the trail. It might be best to hike to the end of the trail first (about 4300 ft from starting GPS) to select the measuring points and then do the actual measurements as you return. Several measuring points can be clustered with a minimum of 50 ft separation, which is approximately one notebook grid square (depending on the brand and type of field notebook used)
- ☐ Each strike and dip measurement should be noted as a correctly oriented strike & dip symbol drawing on the map. The alphanumeric transcription of the strike and dip measurement should also be indicated. GPS coordinates and quick geologic formation reference as given by the RockD app would also be included on the map as shown.
- ☐ As you transfer your strike and dip measurements into your field notebook make sure it is oriented correctly. An example is shown for the first page of the map path.



Distant Strike & Dip Measurements	Sometimes direct strike and dip measurements are not possible, because the rock outcrop of interest is inaccessible. In this case a distant measurement method has to be employed. Please note, that distant measurements are less accurate then direct measurements.

Method	
Field Work Handbook, p.21, Incline by Eye Sight Field Work Handbook, p. 14,15, Azimuth by Eye Sight <u>1 Distant Strike and Dip measurements of a distant hogback along the "Little Thompson Overlook Trail"</u> ☐ You can measure the strike and dip direction of a distant hogback outcrop if you are exactly perpendicular to the dip and therefore parallel to the strike. ☐ This is approximately the case with a hogback at trail's end, roughly looking toward N10W direction .... You will need to measure the exact bearing (strike direction) yourself. There might be better viewpoints during the last 500 ft of the trail or so toward the "Little Thompson Overlook". ☐ The dip angle can be estimated by lining up the Brunton Compass with the tilted slope of the hogback as pictured. ☐ It is best to take the measurement three times from three different viewpoints along the trail, then take an average. ☐ Strike direction is facing the hogback straight on, perpendicular to the dip. Take an azimuth reading for your strike. ☐ Note the procedure and data in your fieldnotes, including position for taken the readings.	 

4 Detailed Rock Descriptions	At 4 of your direct Strike & Dip measurements sites, describe the exposed rock in detail. You will need your handlense and acid bottle to do so. Descriptions in field notes are essential and should be accurate. Whenever possibly give numeric data (e.g. instead of saying "smll rx fragments" say "rx fragments ranging 0.2 to 1.8 cm in size")
Observations to address in your fieldnotes:	☐ Assumed rock type / age (any RockD data marked as such) ☐ Weathering patterns (Cliff former? Dissolution cavities? Etc.) ☐ Color (fresh & weathered) ☐ Assessment of cement and / or any observable mineralogy ☐ Grain size (numeric if at all possible) ☐ Roundness / Sorting observation for sedimentary rocks ☐ Porosity (Does your acid drop soak in?) Size of drop soak analogous to porosity ☐ Trace fossils (e.g. ripple marks, cross bedding, bioturbation?) Be detailed, give trace fossil sizes and density of occurrence