GEO. 420K - INTRODUCTION TO FIELD AND STRATIGRAPHIC METHODS
***MONDAY/WEDNESDAY SECTIONS*, SPRING 2015**

***LECTURE*:** **Monday** and **Wednesday**, 2:00 - 3:00 p.m.; JGB 2.218

LAB: Friday 2:00 - 5:00 p.m. in EPS 2.104 (#26835), EPS 2.136 (#26840), EPS 4.104 (#26845), JGB 2.308 (#26850)

INSTRUCTORS:

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TEACHING ASSISTANTS:

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OFFICE HOURS: Dr. Helper: M,W,F 1-2 and whenever my door is open.
Dr. Meckel: T.B.A.

GRADING:

Field Projects	55%
Labs	15%
Lab Exam(s)	15%
Class Exam(s)	15%

There will be no makeup exams or projects.

PREREQUISITES: A grade of C or better in Geo. 416K, 426P, and 416M (Geo. 426P may be taken concurrently with 420K) for B.S. Geology, or C or better in Geo. 416M and Geo. 416K for G.E.H., Geophysics, Hydrogeology and B.A. Geology. If you do not have these prerequisites and have not already done so, see one of us immediately.

OTHER ITEMS: By registering for Geo. 420K, students agree to be available for field trips on at least **6 (six)** weekends. See the attached schedule for the dates trips are planned. In addition some Friday labs will be conducted off campus, but during normally scheduled lab hours.

Announcements, information pertinent to field trips, labs, etc. will be posted on the 420K Canvas site. *Check it often* for information about materials for upcoming labs and field trips.

Academic dishonesty will not be tolerated. Anyone in violation of University policy (see Student Handbook) will receive a failing grade and is subject to additional punative measures, which may include expulsion from the University.

REQUIRED TEXT: Coe, A. L., Geological Field Techniques. Wiley-Blackwell, 323 pp.
Lisle, R.J., Brabham, P.J. and Barnes, J.W., Basic Geologic Mapping, 5th edition, Wiley-Blackwell, 216 pp.
420K Lecture, Lab and Field Trip Manual, available from UT Duplicating Center the 2nd week of class.

WEB SITE: UT Canvas site for Geo420K

REQUIRED ITEMS: See Attached list. These items are available in a supply packet at the University Coop.

GEO420K – FIELD TRIP DATES
***Monday/Wednesday Sections*, SPRING 2015**

By registering for GEO 420K, you agree to be available for field trips on at least 6 weekends. The field trip weekends this semester are:

Trip 1: January 31 or February 1 – Dr. Helper
Trip 2: February 14 AND 15– Drs. Helper & Marrett
Trip 3: February 28 or March 1 – Dr. Helper
Trip 4: April 4 or 5 – Dr. Meckel
Trip 5: April 18 or 19 – Dr. Meckel
Trip 6: May 2 or 3 – Dr. Meckel

These dates are provided to you now so that you can plan your Spring semester weekend activities accordingly. Unlike other courses, the field trips are not supplementary to the classroom work; *they are 55% of your grade*. **Your attendance and participation in all field exercises are required for a passing grade, without exceptions.** Specific information for each trip*, including which days you are expected to attend*, will be posted on the class Canvas site and can be found in the Lab/Field Trip Manual.

A list of materials needed for the field exercises is attached

LECTURE AND LAB SCHEDULE - GEO. 420K, MW Sections, 2015

Date	Lecture	Lab
1/21	Overview and Introduction The Geologic Compass – Strike/Dip, Bearing/Plunge (M. H.)	1. Compass/Pace and Compass Map*
1/26	Metamorphic Rocks: Textures and Fabrics in Tectonites (M. H.)	2. Describing Metamorphic Rocks*
1/28	Field Trip 1 Preparation – Precambrian Geology of the Llano Uplift **Field Trip 1: Precambrian Geology, Llano Co. (1/31 or 2/1)**	
2/2	Base Maps, Grids and Location Methods (M. H.)	3. Topographic Maps & GPS
2/4	The Global Positioning System (M. H.)	
2/9	Geologic Map Patterns; Strike Lines (M. H.)	4. Geologic Maps I
2/11	Field Trip 1 Debrief; Trip 2 Prep. (M. H.) **Field Trip 2: Mapping Project 1 (2/14 AND 2/15)**	
2/16	Dip Calculation and Unit Thicknesses from Maps (M. H.)	5. Geologic Maps II
2/18	Introduction to Faulting (R. M.)	
2/23	Introduction to Folding (R. M.)	6. Geologic Maps III/ Folds and Faults
2/25	Field Trip 2 Debrief; Trip 3 Preparation **Field Trip 3: Mapping Project 2 (2/28 or 3/1)**	
3/2	Cross Section Construction (R. M.)	7. Cross Sections
3/4	Down Plunge Viewing/Geologic Maps as Cross Sections (R. M.)	
3/9	Digital Mapping Tools and Techniques (M. H.)	8. No Lab
3/11	Field Trip 3 Debrief (M. H.)	
	3/14 - 3/21 SPRING BREAK	
3/23	Sedimentary Rock Description: Essential Elements	9. Rock and Rock Unit Descriptions
3/25	Vertical Successions in Clastic Strata	
3/30	Basic Stratigraphy and Approaches to Subsurface Mapping	10. Net Sand Isopach Mapping
4/1	Texas GOM history and Tertiary Regional Context & Trip 4 Prep. **Field Trip 4: Tertiary Clastics (4/4 or 4/5)**	
4/6	Scales of Cyclicity and Correlation of Sedimentary Rocks	11. Cyclicity/ Fisher Plots
4/8	Measuring and Logging Carbonate Strata	
4/13	Trip 4 Debrief & Cretaceous Stratigraphy of Central Texas	12. Unconformities, Correlation & Facies
4/15	Trip 5 prep. & Biostrat., Sed. Structures, Trace Fossils, Fauna **Field Trip 5: Cretaceous Carbonate Section Correlation (4/18 or 4/19)**	
4/20	Field Trip 5 Debrief	13. Pilot Knob Exercise 1*
4/22	Chronostratigraphy and Age Dating of SedimentaryRocks	
4/27	Basin Classification; Sediment Provenance, Paleocurrents; Late Paleozoic Ouachita Orogen and Associated Basin Fill	14. Pilot Knob Exercise 2*
4/29	Trip 6 Prep. & Lithostratigrapy, Chronostratigraphy, and Tools for Correlation **Field Trip 6: Measuring Features in Sedimentary Rocks (5/2 or 5/3)**	
5/4	Trip 6 Debrief	15. Lab Final
5/6	Course Evaluation and Review	

5/14 or 5/16; 2-5 PM or 9-12 noon **Final Exam**

***** Lab conducted outdoors, prepare accordingly.

GEO 420K - EQUIPMENT LIST

- Most items are available in a single course packet for sale at the UT Co-Op

REQUIRED MATERIALS

Field notebook with waterproof paper (e.g. surveyor's field book)
Geologic hammer
Hand lens - 10X Mag. or better
Small squirt bottle for acid (acid will be provided)
Six-inch ruler with mm and inch scale (best if with a protractor)
Protractor, smaller is better
Mechanical Pencil: Pentel 0.5 mm or equivalent with F or 2H hardness lead
Colored pencil set - 6 colors minimum; hard lead, shouldn't smudge
2 technical (drafting) pens (#0 and #00)
Proper field clothes, particularly hat and shoes/boots
Clipboard with cover (standard 8 1/2 x 11" size, without a large metal clip)
Erasers/liquid paper
Canteen (1 or 2 one-quart canteens)
Watch
Knapsack or carrying bag
Grain size scale card – available in the JSG undergraduate office

DESIRABLE MATERIALS:

Rainwear
Aspirin, chap stick, bandaids, sunscreen or tanning lotion, insect repellent, etc.
Toilet paper

PROHIBITED ITEMS:

Firearms
Alcoholic beverages in University vehicles
Controlled substances and narcotics

Course Objectives

Why a class in geological field methods? Geology is first and foremost a field science. Field geology and field geologists provide literally the ground truth for geologic concepts and theories of how the earth works. *The degree to which we, as geologists, are successful observers and interpreters of rocks in the field depends in large measure on what we are prepared to see and record.* The old adage "I wouldn't have believed it if I hadn't seen it" is, in the case of field geology, more truthfully "I wouldn't have seen it if I hadn't believed it". We explore. We discover. Unfortunately, without sufficient experience and preparation we can't attach meaning to (and thus frequently ignore) what we don't recognized or understand.

Paradoxically, *we must also learn what to ignore*; "Wisdom is learning what to overlook..." (W. James). There is rarely, if ever, sufficient time for exhaustive field data collecting. As time permits, we thus typically focus on a relatively few key aspects at a field site, paying less or no attention to the rest. Anthropologists term this ability to recognize and sort the significant from the insignificant "professional vision". It is a crucial field skill that comes mostly from practical experience. You will begin to develop your professional vision in this class.

Field proficiency has long been a distinguishing characteristic of our science. As a geoscientist, you are expected to be a proficient scientific observer and recorder. Your unique skills and training in this area separate you from lawyers, engineers, chemists and other professionals with whom you might one day work. Without proper preparation, including a strong grounding in field methods, we would be little better than rock hounds out for a day of casual collecting. Field geology is not merely collecting data and samples; it is about making sense of the geology around you, about making geologic interpretations. Landscapes are histories, with time marked by boundaries in the rocks, soil and sediment. A geologic map or a measured section is the articulation of that history, with each line marking a before and after, a hiatus that might last a second or a billion years. Through our maps and graphical logs, we represent time as space. *The ability to create, read and interpret such product is best developed from training and practice in a field setting*. It all begins by making and recording observations. An accurate record in the form of a map, measured section, photograph, sketch, a carefully documented sample, field notes, etc. provides a permanent, solid basis upon which to develop testable ideas and interpretations – the plot of the story. Without such evidence, interpretations are fanciful fables; there is no scientific basis to objectively evaluate them.

Successful field work depends greatly on how well we can formulate and test ideas while in the field. Geology is rooted in the scientific method. The process of formulating and testing multiple working hypotheses during field work is a distinctive, unique, vital aspect of our profession, one that can only be taught and practiced while in the field.

As suggested by the course name, this class contains two main components. This semester our principal objectives are to: 1) learn and apply geologic field methods to *describe, measure*, *map, sample* and *report on* rocks in the field and in the laboratory; 2) acquire an understanding of the elements of stratigraphy (e.g. what is a Formation? what are lithostratigraphic, biostratigraphic

and chronostratigraphic units? what is a type section? how are rock units correlated?) and the field methods upon which they are based. Like all sciences, geology has its own vocabulary. There is no better way to learn a language than to be immersed in it, and field experiences, however brief, provide that immersion.

It is often said "The best geologist is the one who has seen the most rocks" and there is much truth to it. Six weekend field trips and a semester of labs will provide an introduction, the beginnings of a mental catalog of rocks and field relationships that can provide a framework to build upon in future classes, later field work and a future career in the geosciences.