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

***LECTURE*:** **Tuesday** and **Thursday**, 2:00 - 3:00 p.m.; JGB 2.218

LAB: Friday 2:00 - 5:00 p.m. in JGB 3.116 (#26855), JGB 3.120 (#26860), JGB 3.204 (#26865), JGB 3.222 (#26870)

INSTRUCTORS:

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TEACHING ASSISTANTS:
JGB 3.116
JGB 3.125
JGB 3.204
JGB 3.222

OFFICE HOURS: Horton: T.B.A.
Marrett: 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.

WEB SITE: UT Canvas site for Geo420K

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

GEO. 420K – FIELD TRIP DATES
***Tuesday/Thursday 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: February 7 or 8 – Dr. Marrett
Trip 2: February 21 AND 22– Drs. Marrett & Helper
Trip 3: March 7 or 8 – Dr. Marrett
Trip 4: March 28 or 29 – Dr. Horton
Trip 5: April 11 or 12 – Dr. Horton
Trip 6: April 25 or 26 – Dr. Horton

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 "Trips" pages of the class Canvas site and can be found in the Lab/Lecture Manual.

A list of materials needed for the field exercises is attached.

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

Date	Lecture	Lab
1/20	Overview and Introduction (R. M.)	Compass/Pace and
1/22	The Geologic Compass – Strike/Dip, Bearing/Plunge (R. M.)	Compass Map*
1/27	Base Maps, Grids and Location Methods (M. H.)	Topographic Maps & GPS
1/29	The Global Positioning System (M. H.)	
2/3	Metamorphic Rocks: Textures and Fabrics in Tectonites (M. H.)	Describing Metamorphic
2/5	Field Trip 1 Preparation – Precambrian Geology of the Llano Uplift	Rocks
	Weekend Trip 1: Precambrian Geology, Llano Co. (2/7 or 2/8)	
2/10	Interpreting Geologic Map Patterns; Strike Lines (R. M.)	Geologic Maps I
2/12	Field Trip 1 Debrief; Map Interpretation, Continued (R. M.)	
2/17	Dip Calculation and Unit Thicknesses from Maps (R. M.)	Geologic Maps II
2/19	Trip 2 Prep. (R. M.)	
	Weekend Trip 2: Mapping Project 1 (2/21 AND 2/22),	
2/24	Introduction to Faulting (R. M.)	Geologic Maps III/
2/26	Introduction to Folding (R. M.)	Folds and Faults
3/3	Field Trip 2 Debrief; Cross Section Construction (R. M.)	Cross Sections
3/5	Down Plunge Viewing/Geologic Maps as Cross Sections, Trip 3 Prep.	
	Weekend Trip 3: Mapping Project 2 (3/7 or 3/8)	
3/10	Digital Mapping Tools and Techniques (M. H.)	No Lab
3/12	Field Trip 3 Debrief (R. M.)	
	3/14 - 3/21 SPRING BREAK	
3/24	Sedimentary Rock Description: Essential Elements	Rock and Rock Unit
3/26	Vertical Successions in Clastic Strata; Trip 4 Prep.	Descriptions
	Weekend Trip 4: Tertiary Clastics (3/28 or 3/29)	
3/31	Basic Stratigraphy and Approaches to Subsurface Mapping	Net Sand Isopach
4/2	Texas GOM history and Tertiary Regional Context	Mapping
4/7	Trip 4 Debrief; Scales of Cyclicity and Correlation of Sed. Rocks	Cyclicity/
4/9	Measuring and Logging Carbonate Strata; Trip 5 prep.	Fisher Plots
	Weekend Trip 5: Cretaceous Carbonate Section Correlation (4/11 or 4/12)	
4/14	Cretaceous Stratigraphy of Central Texas	Unconformities,
4/16	Biostratigraphy; Sedimentary Structures, Trace Fossils, Fauna	Correlation & Facies
4/21	Field Trip 5 Debrief	Pilot Knob Exercise 1*
4/23	Chronostratigraphy and Age Dating of SedimentaryRocks	
	Weekend Trip 6: Measuring Features in Sedimentary Rocks (4/25 or 4/26)	
4/28	Basin Classification; Sediment Provenance, Paleocurrents; Late Paleozoic Ouachita Orogen and Associated Basin Fill	Pilot Knob Exercise 2*
4/30	Lithostratigrapy, Chronostratigraphy, and Tools for Correlation	
5/5	Trip 6 Debrief	Lab Final
5/7	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 also frequently ignore what we don't recognize or understand. Developing what anthropologists have called "professional vision" – the ability to quickly recognize and sort the significant from insignificant – is one of the most important skills a field geologist possesses. You will begin honing that skill in this class.

Successful field work also depends greatly on how well we can formulate and test ideas while in the field. Without proper preparation, including a strong grounding in field methods, we are 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.

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. Geology is rooted in the scientific method, so the process of formulating hypotheses and testing those hypotheses through careful data collection are fundamental skills to a geologist.

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.

Some of you may find this an uncomfortable experience. Unlike most subjects, field work can not be mastered by studying hard, nor is there a set formula for successfully interpreting the rocks you will study. You will learn largely by doing and making mistakes. Get comfortable with this idea now and you'll be less anxious in the long run.

Finally, 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.