

GEO. 420K - INTRODUCTION TO FIELD AND STRATIGRAPHIC METHODS
MONDAY/WEDNESDAY SECTIONS, SPRING 2012

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

LAB: Friday 2:00 - 5:00 p.m. in EPS 1.102 (#27530), EPS 2.136 (#27535), JGB 3.202 (#27540)

INSTRUCTORS:

Dr. Mark Helper, JGB 4.112 helper@mail.utexas.edu Phone: Office - 471-1009 Cell – 512-924-2526	Dr. Charles Kerans, JGB 6.106 ckerans@mail.utexas.edu Phone: Office - 471-4282
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TEACHING ASSISTANTS:

EPS 1.102	Edgardo Pujols (#27530)	edgardopujols@gmail.com
EPS 2.136	Michael Prior (#27535)	mprior@utexas.edu
JGB 3.202	Paul Betka (#27540)	pmbetka@mail.utexas.edu

OFFICE HOURS: Helper: Tues. and Thurs. 9-11, and when my door is open.
Kerans: Mon. 10-12 and Wed. 3-5.

GRADING:

Field Projects.....	55%	There will be no makeup exams or projects.
Labs	15%	
Lab Exam(s)	15%	
Class Exam(s)	15%	

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 Blackboard page. 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 punitive measures, which may include expulsion from the University.

REQUIRED TEXT: Compton, R. R., 1985, Geology in the Field. John Wiley and Sons, 378 pp.

WEB SITE: <http://www.geo.utexas.edu/courses/420k/default.htm>

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

GEO. 420K – FIELD TRIP DATES
Monday/Wednesday Sections, SPRING 2012

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

- Trip 1: January 28 OR 29 – Dr. Kerans
- Trip 2: February 11 OR 12 – Dr. Kerans
- Trip 3: February 25 OR 26 – Dr. Kerans
- Trip 4: March 31 AND April 1 – Drs. Helper & Marrett
- Trip 5: April 14 OR 15 – Dr. Helper
- Trip 6: April 28 AND 29 – Drs. Helper & Marrett

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 web site/Blackboard 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, MW Sections, 2012

<u>Date</u>	<u>Lecture</u>	<u>Lab</u>
1/18	Overview and Introduction; the Brunton Compass	Compass/Pace and Compass Map*
1/23	Sedimentary Rock Description: Essential Elements	Rock and Rock Unit Descriptions
1/25	Measuring and Logging Clastic Rock Successions	
	Weekend Trip 1: Tertiary Clastics	
1/30	Texas GOM history and Tertiary Regional Context	Net Sand Isopach Mapping
2/1	Field Trip 1 Post-Mortem	
2/6	Measuring and Logging Carbonate Strata	Cyclicity/ Fisher Plots
2/8	Cretaceous Stratigraphic Evolution of Central Texas	
	Weekend Trip 2: Cretaceous Carbonate Section Correlation	
2/13	Scales of Cyclicity and Correlation of Sedimentary Rocks	Unconformities, Correlation & Facies
2/15	Field Trip 2 Post-Mortem	
2/20	Lithostratigraphy, Chronostratigraphy, and Tools for Correlation	Pilot Knob Exercise 1*
2/22	Basin Classification, Background Setting of Trip 3: Late Paleozoic Ouachita Orogen and Associated Foreland Basin Strata	
	Weekend Trip 3: Measuring Features in Sedimentary Rocks	
2/27	Modern Tools and Applications in Field-Based Strat. Modeling	Pilot Knob Exercise 2*
2/29	Field Trip 3 Post-Mortem	
3/5	Principles of GPS (Global Positioning Systems)	No Lab
3/7	Exam	
3/10 - 3/18 SPRING BREAK		
3/19	Mapping Techniques/Location Methods/GPS II	Topographic Maps
3/21	Geology of the Llano Uplift	
3/26	Interpreting Geologic Map Patterns	Geologic Maps I
3/28	Strike Lines, Dip Calculation and Unit Thicknesses from Maps	
4/2	Geologic Map Interpretation II	Geologic Maps II
4/4	Field Trip 4 Post-Mortem	
4/9	Cross Section Construction	Cross Sections
4/11	Down Plunge Viewing/Geologic Maps as Cross Sections	
4/16	Describing Fabrics in Tectonites	Describing Metamorphic Rocks/GPS*
4/18	Trip 5 Post-Mortem	
4/23	What is G.I.S.?	G.I.S. Base Map Preparation/GPS*
4/25	Mapping and Measuring Folds in the Field	
	Weekend Trip 6: Mapping a Paleozoic/pC Nonconformity	
4/30	Remote Sensing Resources	Lab Final
5/2	Evaluation and Review	
5/12 or 5/15; 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

POSSIBLE PERSONAL ITEM:

A good sighting compass with a clinometer is necessary for the course. The Department has a large supply of such compasses to check out to students taking GEO 420K. Many professional geologists own their own compasses, however, and a few students have purchased their own for use in the course. Prices for the new compasses of the best quality (similar to or better than the "Brunton Pocket Transits") can exceed \$450, but much cheaper substitutes (like the Silva Ranger with a clinometer, for less than \$100) are quite usable. Many compasses are not suitable for geologic use, so be careful if you buy; note that the compass must be useful for sighting and for measuring dips, and a clinometer is a necessary part.

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 recognized 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.