GEO. 420K - INTRODUCTION TO FIELD AND STRATIGRAPHIC METHODS
***MONDAY/WEDNESDAY SECTIONS*, SPRING 2018**

***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 (#26335), EPS 2.136 (#26340), EPS 4.104 (#26345), JGB 2.308 (#26350)

INSTRUCTORS:

Dr. Mark Helper, JGB 4.112
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Dr. David Mohrig
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***TEACHING ASSISTANTS*:**

EPS 2.104	Kristina Butler	kristina.butler@utexas.edu
EPS 4.104	Max Daniller–Varghese	maxdv@utexas.edu
EPS 2.136	Benjamin Cardenas	benjamin.cardenas@utexas.edu
JGB 2.308	Zachary Foster-Baril	zfosterbaril@utexas.edu

OFFICE HOURS: Helper: M, W, F 1-2 and whenever my door is open.
Mohrig: M 3-4 PM, W 1-2 PM and whenever my door is open.

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 following pages for the field trip dates. 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.

Geo420K 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 Art Supply store.

GEO. 420K - INTRODUCTION TO FIELD AND STRATIGRAPHIC METHODS
***TUESDAY/THURSDAY SECTIONS*, SPRING 2018**

***LECTURE*:** **Tuesday** and **Thursday**, 2:00 - 3:00 p.m.; JGB 3.120

LAB: Friday 2:00 - 5:00 p.m. in JGB 3.116 (#26355), JGB 3.120 (#26360)

INSTRUCTORS:

Dr. Daniel Stockli, JGB 5.224
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Phone: Office: 512-475-6037
Mobile:

Dr. Brian Horton, JGB 5.220
horton@jsg.utexas.edu
Phone: 512-470-0796

***TEACHING ASSISTANTS*:**

JGB 3.116	Cullen Kortyna	mcdkortyna@utexas.edu
JGB 3.120	Eunsil Jung	eunsil.jung@utexas.edu

OFFICE HOURS:
Stockli: T.B.A.
Horton: 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 following pages for the field trip dates. In addition, some Friday labs may 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.

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REQUIRED TEXT: Coe, A. L., Geological Field Techniques. Wiley-Blackwell, 323 pp.
Geo420K 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 Art Supply store.

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.

GEO420K – FIELD TRIP DATES
SPRING 2018

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

Trip 1: January 27 <u>AND</u> 28 OR February 3 <u>AND</u> 4 – Drs. Helper & Stockli
Trip 2: February 17 OR 18– Dr. Helper or Dr. Stockli
Trip 3: March 3 OR 4 – Dr. Helper or Dr. Stockli
Trip 4: March 24 OR 25 – Dr. Horton
Trip 5: April 14 OR 15 – Dr. Mohrig
Trip 6: April 28 OR 29 – Dr. Mohrig or Dr. Horton

These dates are provided now so that you can plan your 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 <u>all</u> field exercises are required for a passing grade, <u>without exceptions</u>.** 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, all contained in the **required** course packet available from the Co-Op Art Supply store, is attached.

GEO 420K - EQUIPMENT LIST

THESE MATERIALS ARE REQUIRED and most are available in a single course packet for sale at the UT Co-Op Art Supply store. This packet contains the least expensive versions of the items that YOU WILL NEED for the class. **PLEASE PURCHASE THE COURSE PACKET** and *don't shop for alternatives*.

REQUIRED MATERIALS

Protractor Ruler 6"
Metric Protractor Ruler 6"
Field notebook
Hand Lens
Estwing Rock Hammer
Covered clipboard
12ct. Coloring Pencil crayola
0.5mm Mechanical Pencil
F Lead (12ct.)
Pentel Pen .3
Pentel Pen .6
Sharpie Fine pt (2)
Compass, Silva Ranger and bull's eye level to glue on
Sharpie Ultra Fine pt.
1oz. Bottle
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

LECTURE AND LAB SCHEDULE - GEO. 420K, MW Sections, 2018

Date	Lecture	Lab
1/17	Overview and Introduction (M.H.)	1. Compass/Pace and
	The Geologic Compass – Strike/Dip, Bearing/Plunge (M. H.)	Compass Map*
1/22	Base Maps, Grids and Location Methods (M. H.)	2. Topographic Maps & GPS*
1/24	Field Trip 1 Prep. & Cenozoic Geology of Central Texas (M.H.)	
	Field Trip 1: Mapping Project 1 (1/27 AND 1/28)	
1/29	The Global Positioning System (M. H.)	3. Geologic Maps I
1/31	Geologic Map Patterns; Strike Lines, Dip & Unit Thickness (M. H.)	
2/5	Introduction to Faults (M. H.)	4. Geologic Maps II
2/7	Introduction to Folds (M. H.)	
2/12	Down Plunge Viewing/Geologic Maps as Cross Sections (M. H.)	5. Geologic Maps III/
2/14	Field Trip 1 Debrief; Trip 2 Prep.; Paleozoic of Llano Uplift (M. H.)	Folds and Faults
	Field Trip 2: Mapping Project 2 (2/17 or 2/18)	
2/19	Cross Section Construction (M. H.)	6. Cross Sections
2/21	Metamorphic Rocks: Textures and Fabrics in Tectonites (M. H.)	
2/26	Precambrian Geology of the Llano Uplift (M. H.)	7. Describing Metamorphic
2/28	Field Trip 2 Debrief; Trip 3 Preparation (M.H.)	Rocks
	Field Trip 3: Sketching and Measuring in pC Rocks (3/3 or 3/4)	
3/5	Digital Mapping Tools and Techniques (M. H.)	8. No Lab
3/7	Field Trip 3 Debrief (M. H.)	
	3/10 - 3/20 SPRING BREAK	
3/19	Sedimentary Rock Description: Essential Elements (D.M.)	9. Rock and Rock Unit
3/21	Texas GOM history and Tertiary Regional Context, Trip 4 Prep. (D.M.)	Descriptions
	Field Trip 4: Tertiary Clastics (3/24 or 3/25)	
3/26	Vertical Successions in Clastic Strata (D.M.)	10. Net Sand Isopach
3/28	Basic Stratigraphy and Approaches to Subsurface Mapping (D.M.)	Mapping
4/2	Scales of Cyclicity and Correlation of Sedimentary Rocks (D.M.)	11. Cyclicity/
4/4	Cretaceous Stratigraphy of Central Texas (D.M.)	Fisher Plots
4/9	Logging Carbonate Strata (D.M.)	12. Sedimentary structures
4/11	Trip 4 Debrief & Trip 5 Prep. (D.M.)	& paleocurrents*
	Field Trip 5: Cretaceous Carbonate Section Correlation (4/14 or 4/15)	
4/16	Biostratigraphy, Sed. Structures, Trace Fossils, Fauna (D.M.)	13. Maps, time-stratigraphic
4/18	Chronostratigraphy and Age Dating of Sedimentary Rocks (D.M.)	reconstructions
		relations & geologic
4/23	Lithostratigrapy, Chronostratigraphy, and Tools for Correlation (D.M.)	
4/25	Trip 5 Debrief & Trip 6 Prep. (D.M.)	14. Exam Review
	Field Trip 6: Measuring Features in Sedimentary Rocks (4/28 or 4/29)	
4/30	Trip 6 Debrief (D.M.)	15. Lab Final
5/2	Course Evaluation and Review (D.M.)	
TBA	**Final Exam**	

***** Lab conducted outdoors, prepare accordingly.
(M. H.) - Dr. Mark Heper
(D.M.) – Dr. David Mohrig

LECTURE AND LAB SCHEDULE - GEO. 420K, TTH Sections, 2018

Date	Lecture	Lab
1/16	Overview and Introduction (M. H. & others)	1. Compass/Pace and
1/18	The Geologic Compass – Strike/Dip, Bearing/Plunge (D. S.)	Compass Map*
1/23	Base Maps, Grids and Location Methods (D. S.)	2. Topographic Maps & GPS*
1/25	The Global Positioning System (D. S.)	
1/30	Geologic Map Patterns; Strike Lines, Dip & Unit Thickness (D. S.)	3. Geologic Maps I
2/1	Field Trip 1 Prep. & Cenozoic Geology, Central Texas (D.S.)	
	Field Trip 1: Mapping Project 1 (2/3 AND 2/4)	
2/6	Introduction to Faults (D. S.)	4. Geologic Maps II
2/8	Introduction to Folds (D. S.)	
2/13	Down Plunge Viewing/Geologic Maps as Cross Sections (D. S.)	5. Geologic Maps III/
2/15	Field Trip 1 Debrief; Trip 2 Prep.; Paleozoic of Llano Uplift (D. S.)	Folds and Faults
	Field Trip 2: Mapping Project 2 (2/17 or 2/18)	
2/20	Cross Section Construction (D. S.)	6. Cross Sections
2/22	Metamorphic Rocks: Textures and Fabrics in Tectonites (D. S.)	
2/27	Precambrian Geology of the Llano Uplift (D. S.)	7. Describing Metamorphic
3/1	Field Trip 2 Debrief; Trip 3 Prep.;	Rocks
	Field Trip 3: Sketching and Measuring in pC Rocks (3/3 or 3/4)	
3/6	Digital Mapping Tools and Techniques (D. S.)	8. No Lab
3/8	Field Trip 3 Debrief (D. S.)	
	3/10 - 3/18 SPRING BREAK	
3/20	Sedimentary Rock Description: Essential Elements (B.H.)	9. Rock and Rock Unit
3/22	Texas GOM history and Tertiary Regional Context, Trip 4 Prep. (B.H.)	Descriptions
	Field Trip 4: Tertiary Clastics (3/24 or 3/25)	
3/27	Vertical Successions in Clastic Strata (B.H.)	10. Net Sand Isopach
3/29	Basic Stratigraphy and Approaches to Subsurface Mapping (B.H.)	Mapping
4/3	Scales of Cyclicity and Correlation of Sedimentary Rocks (B.H.)	11. Cyclicity/
4/5	Cretaceous Stratigraphy of Central Texas (B.H.)	Fisher Plots
4/10	Logging Carbonate Strata (B.H.)	12. Sedimentary structures
4/12	Trip 4 Debrief & Trip 5 Prep. (B.H.)	&paleocurrents*
	Field Trip 5: Cretaceous Carbonate Section Correlation (4/14 or 4/15)	
4/17	Biostratigraphy; Sed. Structures, Trace Fossils, Fauna (B.H.)	13. Maps, time-stratigraphic
4/19	Chronostratigraphy and Age Dating of Sedimentary Rocks (B.H.)	relations & geologic reconstructions
4/24	Lithostratigrapy, Chronostratigraphy, and Tools for Correlation (B.H.)	
4/26	Trip 5 Debrief & Trip 6 Prep. (B.H.)	14. Exam Review
	Field Trip 6: Measuring Features in Sedimentary Rocks (4/28 or 4/29)	
5/1	Trip 6 Debrief (B.H.)	15. Lab Final
5/3	Course Evaluation and Review (B.H.)	
TBD	**Final Exam**	

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

D. S. – Dr. Daniel Stockli

B. H. – Dr. Brian Horton