

**GEO. 420K - INTRODUCTION TO FIELD & STRATIGRAPHIC METHODS**  
**MON/WED SECTIONS, SPRING 2023**

**LECTURE:** Monday and Wednesday, 2:00 - 3:00 p.m.; JGB 3.222

**LAB:** Friday 2:00 - 5:00 p.m. in EPS 2.104 (#27590), EPS 2.136 (#27595), EPS 4.104 (#27600)

**INSTRUCTORS:** Dr. Brian Horton, JGB 5.220ab                      Dr. Daniel Stockli, JGB 5.224  
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Phone: Office: 512- 471-1869                              Phone: Office: 512-964-8771

**TEACHING ASSISTANTS:**

JGB 3.328	Maximilan Ehrenfels	<a href="mailto:max.ehrenfels@utexas.edu">max.ehrenfels@utexas.edu</a>	#27590
EPS 3.124D	Nicholas Regier	<a href="mailto:nregier@my.utexas.edu">nregier@my.utexas.edu</a>	#27595
EPS 3.124C	Madison Preece	<a href="mailto:mbp2242@my.utexas.edu">mbp2242@my.utexas.edu</a>	#27600

**OFFICE HOURS:** Horton: M, W 1-2, or by appointment  
Stockli: M, W 11-12, or by appointment  
T.A.s: See lab syllabus

**GRADING:**

Field Projects .....	48%	There will be no makeup exams or projects.
Labs .....	22%	
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:** ***This is an in-person class only, with required attendance for all labs, lectures and field trips.*** By registering for Geo. 420K, students agree to be available for field trips on at least **4** 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.

**Field trip and lab announcements will be posted on the 420K Canvas site. Check it often for information and 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:** Coe, A. L., Geological Field Techniques. Wiley-Blackwell, 323 pp.

Geo420K Lecture, Lab and Field Trip Manual, available from UT Copy Services, Graduate School of Business, GSB 3.136 (M-F 9am-4pm).

**WEB SITE:** UT Canvas site for Geo420K

**REQUIRED ITEMS:** See list below. The items are available in a supply packet at the University Co-op (2246 Guadalupe St.). Please purchase the packet – do not make substitutions.

**GEO. 420K - INTRODUCTION TO FIELD & STRATIGRAPHIC METHODS**  
**TUE/THU SECTIONS, SPRING 2023**

**LECTURE:** Tuesday and Thursday, 2:00 - 3:00 p.m.; JGB 3.222

**LAB:** Friday 2:00 - 5:00 p.m. in JGB 2.306 (#27575), JGB 2.310 (#27580)

**INSTRUCTORS:** Dr. Charles Kerans, JGB 6.106                      Dr. Zachary Foster-Baril, JGB 6.116B  
[ckerans@jsg.utexas.edu](mailto:ckerans@jsg.utexas.edu)                                      [zfosterbaril@utexas.edu](mailto:zfosterbaril@utexas.edu)  
Phone: Office - 512-471-4282                                      Phone: Office - 512-471-5172

**TEACHING ASSISTANTS:**

JGB 2.104B	Kyle Fouke	<a href="mailto:kwfouke@utexas.edu">kwfouke@utexas.edu</a>	#27575
JGB 5.332	Addison Savage	<a href="mailto:addisonsavage@utexas.edu">addisonsavage@utexas.edu</a>	#27580

**OFFICE HOURS:** Kerans: Tu, Th 3-4, or by appointment  
Foster-Baril: Tu, Th 3-4, or by appointment  
T.A.s: See lab syllabus

**GRADING:**

Field Projects .....	48%	There will be no makeup exams or projects.
Labs .....	22%	
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.

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**WEB SITE:** UT Canvas site for Geo420K

**REQUIRED ITEMS:** See list below. The items are available in a supply packet at the University Co-op (2246 Guadalupe St.). Please purchase the packet – do not make substitutions.

## **COURSE OBJECTIVES**

Geology is a field science. Field geology and field geologists provide the ground truth for concepts and theories of how Earth works. *The degree to which we, as geologists, are successful observers (collecting data/information) and interpreters depends on what we are prepared to find in the field.* We explore. We discover. Unfortunately, without sufficient experience and preparation we can't attach meaning to what we do not recognize or understand. From our vantage point, this approach requires perspectives largely acquired from field experiences.

Paradoxically, *we must also learn what to ignore.* There is rarely sufficient time for exhaustive field data collecting. We typically focus on the key aspects at a field site, paying less attention to the rest. This ability to recognize and sort the significant from the insignificant constitutes our "professional vision". It is a crucial field skill that comes from practical experience. You will begin to develop your professional vision in this course.

*Field proficiency is 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. Field geology is not merely collecting data and samples; it is about making sense of the geologic relationships around you, about making interpretations of past events. Landscapes and rocks provide the histories of past geologic processes, with time and events marked by rocks, rock boundaries, and their interrelationships. A geologic map or a measured stratigraphic section is the articulation of that history, with each contact marking a significant moment, with a history before and after that moment. Through our maps and graphic logs, we represent time as space. *The ability to create, read, and interpret such products is best developed from training and practice in a field setting.* It all starts with making observations and recording data. An accurate record in the form of a map, measured section, photograph, sketch, documented sample, field notes, etc. provides a permanent sound basis upon which to develop testable ideas and interpretations. Without such evidence, interpretations may be pure fantasy, with no scientific basis to objectively evaluate them.

*Successful field work depends 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, and vital aspect of our profession—one best taught and practiced in the field.

## **LEARNING OUTCOMES**

This course contains two main components. 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 and learn how to apply 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 provide that immersion.

It is often said "The best geologist is the one who has seen the most rocks." Four weekend field trips and a series of weekly labs will provide an introduction, and a mental catalog of rocks and field relationships that provide a framework to build upon in future classes, later field work, and a future professional career in the geosciences.

**GEO420K FIELD TRIPS – SPRING 2023**

By registering for GEO 420K, you agree to be available for 4 one-day field trips:

- Trip 1: January 28 or 29 – Drs. Horton & Kerans
- Trip 2: February 18 or 19 – Drs. Horton & Kerans
- Trip 3: March 25 or 26 – Drs. Stockli & Foster-Baril
- Trip 4: April 15 or 16 – Drs. Stockli & Foster-Baril

These dates are provided in advance so that you can plan your schedules accordingly. Unlike other courses, the field trips are not supplementary. **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 (Sat or Sun)* will be posted on the class Canvas site.

**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 (\* denotes in course packet)**

- \*Protractor Ruler 6"
- \*Metric Protractor Ruler 6"
- \*Field notebook
- \*Hand Lens
- \*12ct. Crayola Coloring Pencils
- \*0.5mm Mechanical Pencil
- \*F Lead (12ct.)
- \*Pentel Pen .3
- \*Pentel Pen .6
- \*Sharpie Fine pt (2)
- \*Sharpie Ultra Fine pt.
- \* 1oz. Dropper Bottle (for HCl)
- Compass – install FieldMove Clino App on your phone
- Estwing Rock Hammer - optional
- Covered clipboard – will construct during Lab 1 or 2
- Erasers/liquid paper
- Water bottles (1-2 one-quart bottles)
- Watch
- Backpack
- Grain size scale card – available in the JSG undergraduate office

**DESIRABLE MATERIALS:**

- Rainwear
- Aspirin, chapstick, bandaids, sunscreen, insect repellent, toilet paper, etc.
- Hat, sunglasses

**PROHIBITED ITEMS:**

- Firearms
- Alcoholic beverages in university vehicles
- Illicit drugs, narcotics, controlled substances

**LECTURE AND LAB SCHEDULE - GEO. 420K, MW Sections, 2023**

<u>Date</u>	<u>Lecture</u>	<u>Lab</u>
1/9	Intro; Sedimentary Rock Descriptions; Clastic Successions (B.H.)	No Lab
1/11	Depositional Systems; Stratigraphy & Subsurface Analysis (B.H.)	
1/16	Martin Luther King Jr. Day (no class)	1/20. Sed Rock Descriptions
1/18	Cyclicity & Stratigraphic Sequences (B.H.)	Unit/Facies Descriptions
1/23	Cenozoic GOM History and Tertiary Regional Context (B.H.)	1/27. Net Sand Isopach Maps
1/25	Field Trip 1 Prep. (B.H.)	
*****	<b>Trip 1: Cenozoic Siliciclastic Successions (1/28 or 1/29)</b>	
1/30	Sedimentary Basin Analysis, Tectonics, Sediment Provenance (B.H.)	2/3. Sequence Stratigraphy
2/1	Biostratigraphy, Trace Fossils, Fauna (B.H.)	and Correlations
2/6	Cretaceous Stratigraphy of Central Texas (B.H.)	2/10. Unconformities in Map
2/8	Trip 1 Debrief; Bio-, Chemo-, & Litho-stratigraphy (B.H.)	View & Cross Sections
2/13	Logging Carbonates: Descriptions & Depositional Systems (B.H.)	2/17. Maps, Time-Strat
2/15	Field Trip 2 Prep.; high-resolution outcrop photos (B.H.)	Relationships
*****	<b>Trip 2: Cretaceous Carbonate Section Correlation (2/18 or 2/19)</b>	
2/20	Review and Trip 2 Q&A/discussion (B.H.)	2/24. Lab Review
2/22	Midterm Exam	
2/27	Base Maps, Grids, and Location Methods (D.S.)	3/3. Lab Midterm
3/1	The Global Positioning System (D.S.)	
3/6	Geologic Map Patterns; Strike Lines, Dip & Unit Thickness (D.S.)	3/10. Topographic
3/8	The Geologic Compass – Strike/Dip, Bearing/Plunge (D.S.)	Maps & GPS*
3/11 - 3/19 SPRING BREAK		
3/20	Cenozoic & Paleozoic Geology of Central Texas (D.S.)	3/24. Compass/Pace and
3/22	Field Trip 3 Prep. (D.S.)	Compass Map*
*****	<b>Trip 3: Mapping Project (3/25 or 3/26)</b>	
3/27	Introduction to Faults and Folds (D.S.)	3/31. Geologic Maps 1
3/29	Down Plunge Viewing/Geologic Maps as Cross Sections (D.S.)	
4/3	Trip 3 Debrief; Precambrian Geology of Llano Uplift (D.S.)	4/7. Geologic Maps 2
4/5	Metamorphic Rocks: Textures and Fabrics in Tectonites (D.S.)	
4/10	Cross Section Construction (D.S.)	4/14. Field Move Clino
4/12	Field Trip 4 Prep. – sketching and measuring (D.S.)	or Cross Sections
*****	<b>Trip 4: Sketching and Measuring in pC Rocks (4/15 or 4/16)</b>	
4/17	Digital Mapping Tools and Techniques (D.S.)	
4/19	Trip 4 Debrief (D.S.)	4/21. Lab Final
4/24	Course Evaluation and Review (D.S.)	
4/29	<b>Final Exam (Saturday, April 29, 1:00 – 3:00 pm)</b>	

\* Lab conducted outdoors, prepare accordingly.

(B.H.) – Dr. Brian Horton

(D.S.) – Dr. Daniel Stockli

**LECTURE AND LAB SCHEDULE - GEO. 420K, TTh Sections, 2023**

<u>Date</u>	<u>Lecture</u>	<u>Lab</u>
1/10	Introduction; Sedimentary Rock Descriptions (C.K.)	No Lab
1/12	Clastic Successions: Depositional Systems (C.K.)	
1/17	Stratigraphy & Subsurface Analysis (C.K.)	1/20. Sed Rock Descriptions
1/19	Cyclicity & Stratigraphic Sequences (C.K.)	Unit/Facies Descriptions
1/24	Cenozoic GOM History and Tertiary Regional Context (C.K.)	1/27. Net Sand Isopach Maps
1/26	Field Trip 1 Prep. (C.K.)	
*****	<b>Trip 1: Cenozoic Siliciclastic Successions (1/28 or 1/29)</b>	
1/31	Sedimentary Basin Analysis, Tectonics, Sediment Provenance (C.K.)	2/3. Sequence Stratigraphy
2/2	Biostratigraphy, Trace Fossils, Fauna (C.K.)	and Correlations
2/7	Cretaceous Stratigraphy of Central Texas (C.K.)	2/10. Unconformities in Map
2/9	Trip 1 Debrief; Bio-, Chemo-, & Litho-stratigraphy (C.K.)	View & Cross Sections
2/14	Logging Carbonates: Descriptions & Depositional Systems (C.K.)	2/17. Maps, Time-Strat
2/16	Field Trip 2 Prep.; high-resolution outcrop photos (C.K.)	Relationships
*****	<b>Trip 2: Cretaceous Carbonate Section Correlation (2/18 or 2/19)</b>	
2/21	Review and Trip 2 Q&A/discussion (C.K.)	2/24. Lab Review
2/23	Midterm Exam	
2/28	Base Maps, Grids, and Location Methods (Z.F.B.)	3/3. Lab Midterm
3/2	The Global Positioning System (Z.F.B.)	
3/7	Geologic Map Patterns; Strike Lines, Dip & Unit Thickness (Z.F.B.)	3/10. Topographic
3/9	The Geologic Compass – Strike/Dip, Bearing/Plunge (Z.F.B.)	Maps & GPS*
3/11 - 3/19 SPRING BREAK		
3/21	Cenozoic & Paleozoic Geology of Central Texas (Z.F.B.)	3/24. Compass/Pace and
3/23	Field Trip 3 Prep. (Z.F.B.)	Compass Map*
*****	<b>Trip 3: Mapping Project (3/25 or 3/26)</b>	
3/28	Introduction to Faults and Folds (Z.F.B.)	3/31. Geologic Maps 1
3/30	Down Plunge Viewing/Geologic Maps as Cross Sections (Z.F.B.)	
4/4	Trip 3 Debrief; Precambrian Geology of Llano Uplift (Z.F.B.)	4/7. Geologic Maps 2
4/6	Metamorphic Rocks: Textures and Fabrics in Tectonites (Z.F.B.)	
4/11	Cross Section Construction (Z.F.B.)	4/14. Field Move Clino
4/13	Field Trip 4 Prep. – sketching and measuring (Z.F.B.)	or Cross Sections
*****	<b>Trip 4: Sketching and Measuring in pC Rocks (4/15 or 4/16)</b>	
4/18	Digital Mapping Tools and Techniques (Z.F.B.)	
4/20	Trip 4 Debrief, Course Evaluation and Review (Z.F.B.)	4/21. Lab Final
5/1	<b>Final Exam (Monday, May 1, 1:00 – 3:00 pm)</b>	

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\* Lab conducted outdoors, prepare accordingly.  
 (C.K.) – Dr. Charles Kerans  
 (Z.F.B.) – Dr. Zachary Foster-Baril