

GEO. 420K - INTRODUCTION TO FIELD AND STRATIGRAPHIC METHODS
MONDAY/WEDNESDAY SECTIONS, SPRING 2022

LECTURE: Monday and Wednesday, 2:00 - 3:00 p.m.; WAG 420
LAB: Friday 2:00 - 5:00 p.m. in EPS 2.104 (#27400), EPS 2.136 (#27405), EPS 4.104 (#27410)

INSTRUCTORS: Dr. Mark Helper, JGB 4.112
helper@jsg.utexas.edu
Phone: Office: 512- 471-1009
Mobile: 512-924-2526

Dr. Matthew Malkowski, EPS 3.128
malkowski@jsg.utexas.edu
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Mobile: (231) 425-8916

TEACHING ASSISTANTS:

| | | |
|-----------|----------------|--|
| EPS 2.104 | Joshua Malone | joshua.malone@utexas.edu |
| EPS 2.136 | Cullen Kortyna | cdkortyna@utexas.edu |
| EPS 4.104 | Emily Hinshaw | erhinshaw@utexas.edu |

OFFICE HOURS: Helper: M, W, F 1-2 and whenever my door is open.
Malkowski: M, W 11-Noon and whenever my door is open.
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: 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.

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 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 Center in the McComb School of Business.

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. Please purchase the packet. – do not make substitutions.

GEO. 420K - INTRODUCTION TO FIELD AND STRATIGRAPHIC METHODS
TUESDAY/THURSDAY SECTIONS, SPRING 2022

LECTURE: Tuesday and Thursday, 2:00 - 3:00 p.m.; JGB 3.222
LAB: Friday 2:00 - 5:00 p.m. in JGB 2.310 (#27417), JGB 2.306 (#27418), JGB 3.116 (#27419)

INSTRUCTORS: Dr. Daniel Stockli, JGB 5.224 stockli@jsg.utexas.edu
Phone: Office -512-964-8771 Mobile -
Dr. Charles Kerans, JGB 6.106 ckeras@jsg.utexas.edu
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TEACHING ASSISTANTS:
JGB 2.310 Fernando Rey fernando.rey@utexas.edu
JGB 2.306 Juan Gutierrez jgutierrez@utexas.edu
JGB 3.116 Clauda Banks cbanks@utexas.edu

OFFICE HOURS: Stockli: T.B.A.
Kerans: T.B.A.
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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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 recognize or understand. Discovery is, in part, “...seeing what everybody has seen, and thinking what nobody has thought.” (A. Szent-Györgyi). From our vantage point, this requires a perspective acquired largely from field experiences.

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.

LEARNING OUTCOMES

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 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, however brief, provide that immersion.

GEO420K Intro. To Field and Stratigraphic Methods – Lab & Lecture Manual

It is often said “The best geologist is the one who has seen the most rocks” and there is much truth to it. Four 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.

TEACHING MODALITIES, PANDEMIC CONSIDERATIONS

As dictated by recent University policy, classes during the first two weeks of the semester this year (January 18-28) will be taught remotely through Zoom. A link for these lectures is provided in Canvas, and recordings of these and other MW lectures will be provided through the Canvas “Online Lectures” feature. ***This is otherwise an in-person class only, with required attendance for all labs, lectures and field trips.***

Disposable Nitril gloves, hand sanitizer and spray sanitizer will be available for use in all labs, some of which require handling shared rock specimens and equipment. All lab and lecture rooms are large enough to allow social distancing – please do so and wear a mask while indoors.

**GEO420K – FIELD TRIP DATES
SPRING 2022**

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

- Trip 1: February 12 OR 13 – Drs. Helper or Stockli
- Trip 2: March 5 OR 6 – Dr. Helper or Dr. Stockli
- Trip 3: April 9 OR 10– Dr. Malkowski or Dr. Kerans
- Trip 4: April 23 OR 24 – Dr. Malkowski or Dr. Kerans

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 48% 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, all contained in the **required** course packet available from the Co-Op Art Supply store, is attached.

PANDEMIC CONSIDERATIONS

Your health and safety are our first and foremost concerns. We ask, out of respect for your fellow classmates, TAs and faculty, whether fully vaccinated or not, that you please take a COVID test the Thursday or Friday prior to each weekend field trip and let the faculty lead for the trip know ahead of the trip if you test positive or have been recently (within 5 days) exposed to someone who has. For the same reasons, we ask that you please wear a mask while traveling to and from the field sites, and while gathered in close proximity in the field. After 3.5 semesters, you should now be well aware of the University resources and recommendations for mitigating COVID spread; the Protect Texas Now App provides a gateway to most, including routine [Proactive Community Testing \(PCT\)](#). The UT [COVID-19 Exposure Action Chart](#) is an important new addition resource that can help you decide how to proceed with 1) Asymptomatic Close Contact Exposure, 2) Symptoms, or 3) a positive COVID test.

LECTURE AND LAB SCHEDULE - GEO. 420K, MW Sections, 2022

| <u>Date</u> | <u>Lecture</u> | <u>Lab</u> |
|--------------------------|--|------------------------------|
| 1/19 | Overview and Introduction (M.H.) | No Lab |
| 1/24 | Base Maps, Grids and Location Methods (M. H.) | 1. Topographic Maps & GPS* |
| 1/26 | The Global Positioning System (M. H.) | |
| 1/31 | Geologic Map Patterns; Strike Lines, Dip & Unit Thickness (M. H.) | 2. Compass/Pace and |
| 2/2 | The Geologic Compass – Strike/Dip, Bearing/Plunge (M. H.) | Compass Map* |
| 2/7 | Cenozoic & Paleozoic Geology of Central Texas (M.H.) | 3. Geologic Maps I |
| 2/9 | Field Trip 1 Prep. (M. H.) | |
| | Field Trip 1: Mapping Project 1 (2/12 or 2/13) | |
| 2/14 | Introduction to Faults and Folds (M. H.) | 4. Geologic Maps II |
| 2/16 | Down Plunge Viewing/Geologic Maps as Cross Sections (M. H.) | |
| 2/21 | Metamorphic Rocks: Textures and Fabrics in Tectonites (M. H.) | 5. Geologic Maps III/ |
| 2/23 | Field Trip 1 Debrief; Precambrian Geology of the Llano Uplift (M.H.) | Folds and Faults |
| 2/28 | Cross Section Construction (M. H.) | 6. Using FieldMove Clino* |
| 3/2 | Field Trip 2 Prep. sketching and measuring (M. H.) | |
| | Field Trip 2: Sketching and Measuring in pC Rocks (3/05 or 3/06) | |
| 3/7 | Digital Mapping Tools and Techniques (M. H.) | 7. Cross Sections |
| 3/9 | Field Trip 2 Debrief (M. H.) | |
| 3/12 - 3/20 SPRING BREAK | | |
| 3/21 | Sedimentary Rock Descriptions: Essential Elements (M.M.) | 8. Rock and Rock Unit |
| 3/23 | Clastic Successions: Depositional Systems (M.M.) | Descriptions |
| 3/28 | Stratigraphy & Subsurface Analysis (M.M.) | 9. Net Sand Isopach |
| 3/30 | Cenozoic GOM History and Tertiary Regional Context (M.M.) | Mapping |
| 4/4 | Cyclicality & Stratigraphic Sequences (M.M.) | 10. Sequence Strat./ |
| 4/6 | Trip 3 Prep. (M.M.) | Correlation |
| | Field Trip 3: Tertiary Clastics (4/09 or 4/10) | |
| 4/11 | Logging Carbonates: Descriptions & Depositional Systems (M.M.) | 11. Unconformities: |
| 4/13 | Biostratigraphy, Trace Fossils, Fauna (M.M.) | x-sections & map reading |
| 4/18 | Cretaceous Stratigraphy of Central Texas (M.M.) | 12. Maps, time-stratigraphic |
| 4/20 | Trip 3 Debrief & Trip 4 Prep. (M.M.) | relations & geologic |
| | Field Trip 4: Cretaceous Carbonate Section Correlation (4/23 or 4/24) | reconstructions |
| 4/25 | Biostratigraphy, Lithostratigraphy, Chronostratigraphy (M.M.) | |
| 4/27 | Sedimentary Basin Analysis, Tectonics, Sediment Provenance (M.M.) | 13. Exam Review |
| 5/2 | Trip 4 Debrief (M.M.) | 14. Lab Final |
| 5/4 | Course Evaluation and Review (M.M.) | |
| TBA | Final Exam | |

* Lab conducted outdoors, prepare accordingly.

(M.H.) - Dr. Mark Heper

(M.M.) – Dr. Matthew Malkowski

LECTURE AND LAB SCHEDULE - GEO. 420K, TTH Sections, 2022

| <u>Date</u> | <u>Lecture</u> | <u>Lab</u> |
|--------------------------|--|---|
| 1/18 | Overview and Introduction (M.H.) | No Lab |
| 1/20 | Base Maps, Grids and Location Methods (M.H.) | |
| 1/25 | The Global Positioning System (M.H.) | 1. Topographic Maps & GPS* |
| 1/27 | Geologic Map Patterns; Strike Lines, Dip & Unit Thickness (D.S.) | |
| 2/1 | The Geologic Compass – Strike/Dip, Bearing/Plunge (D.S.) | 2. Compass/Pace and Compass Map* |
| 2/3 | Introduction to Faults (D.S.) | |
| 2/8 | Cenozoic & Paleozoic Geology of Central Texas (D.S.) | 3. Geologic Maps I |
| 2/10 | Field Trip 1 Prep. (D.S.) Field Trip 1: Mapping Project 1 (2/12 or 2/13) | |
| 2/15 | Introduction to Folds (D.S.) | 4. Geologic Maps II |
| 2/17 | Down Plunge Viewing/Geologic Maps as Cross Sections (D.S.) | |
| 2/22 | Metamorphic Rocks: Textures and Fabrics in Tectonites (D.S.) | 5. Geologic Maps III/ Folds and Faults |
| 2/24 | Field Trip 1 Debrief; Precambrian Geology of the Llano Uplift (D.S.) | |
| 3/1 | Cross Section Construction (D.S.) | 6. Using FieldMove Clino* |
| 3/3 | Field Trip 2 Prep. – sketching and measuring (D.S.) Field Trip 2: Sketching and Measuring in pC Rocks (3/05 or 3/06) | |
| 3/8 | Digital Mapping Tools and Techniques (D.S.) | 7. Cross Sections |
| 3/10 | Field Trip 2 Debrief (D.S.) | |
| 3/12 - 3/20 SPRING BREAK | | |
| 3/22 | Sedimentary Rock Descriptions: Essential Elements (C.K.) | 8. Rock and Rock Unit Descriptions |
| 3/24 | Clastic Successions: Depositional Systems (C.K.) | |
| 3/29 | Stratigraphy & Subsurface Analysis (C.K.) | 9. Net Sand Isopach Mapping |
| 3/31 | Cenozoic GOM History and Tertiary Regional Context (C.K.) | |
| 4/5 | Cyclicality & Stratigraphic Sequences (C.K.) | 10. Sequence Strat./ Correlation |
| 4/7 | Trip 3 Prep. (C.K.) Field Trip 3: Tertiary Clastics (4/09 or 4/10) | |
| 4/12 | Logging Carbonates: Descriptions & Depositional Systems (C.K.) | 11. Unconformities: x-sections & map reading |
| 4/14 | Biostratigraphy, Trace Fossils, Fauna (C.K.) | |
| 4/19 | Cretaceous Stratigraphy of Central Texas (M.M.) (C.K.) | 12. Maps, time-stratigraphic relations & geologic reconstructions |
| 4/21 | Trip 3 Debrief & Trip 4 Prep. (C.K.) Field Trip 4: Cretaceous Carbonate Section Correlation (4/23 or 4/24) | |
| 4/25 | Biostratigraphy, Lithostratigraphy, Chronostratigraphy (C.K.) | |
| 4/27 | Sedimentary Basin Analysis, Tectonics, Sediment Provenance (C.K.) | 13. Exam Review |
| 5/3 | Trip 4 Debrief (C.K.) | 14. Lab Final |
| 5/5 | Course Evaluation and Review (C.K.) | |
| TBA | Final Exam | |

* Lab conducted outdoors, prepare accordingly.

(D. S.) – Dr. Daniel Stockli

(C. K.) – Dr. Charles Kerans

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)

Masks and personal hand sanitizer

*Protractor Ruler 6"

*Metric Protractor Ruler 6"

*Field notebook

*Hand Lens

Compass – please install the FieldMove Clino App on your smart phone; see Dr. Helper if you don't have one

Estwing Rock Hammer - optional

Covered clipboard – will construct during Lab 1 or 2

*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

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, chapstick, bandaids, sunscreen or tanning lotion, insect repellent, etc.

Toilet paper

PROHIBITED ITEMS:

Firearms

Alcoholic beverages in University vehicles

Controlled substances and narcotics