

GEO 416S: EARTH AND PLANETARY PROCESSES THROUGH TIME

Fall 2024 Syllabus

Instructors: Matt Malkowski and Kyle Spikes

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Office Hours: M 2:30-3:30, T 3:30-4:30

Lectures: TTH 2:00-3:20 pm, JGB 2.218 (In person only)

Laboratory: MW 8:00 am-10:00 am, EPS 2.136 (In person only) 26795

TTH 10:00 am-12:00 pm, EPS 2.136 (In person only) 26800

TTH 12:00 pm-2:00 pm, EPS 2.136 (In person only) 26805

MW 3:00 pm-5:00 pm, EPS 2.136 (In person only) 26810

TTH 5:00 pm-7:00 pm, EPS 2.136 (In person only) 26815

MW 6:00 pm-8:00 pm, EPS 2.136 (In person only) 26820

TAs: TBD

TA Office Hours: TBD

Class Structure:

4 Modules

7 hours of contact time per week: 3 hours of lecture per week; 4 hours of breakout section to work on module concepts

2 field trips

Lectures will be only in person. Exceptions for illnesses will be considered. Laboratory sessions must be attended in person.

Website: <https://www.jsg.utexas.edu/flemings/geo-416s-earth-planetary-process-thru-time/>

Description: Students will learn about modern physical, chemical, and biological processes through the prism of Texas's changing rivers and coastlines. We will look at the dramatic changes that have occurred across the Texas continental shelf since the last Ice Age. We will then step into deep geological time through an exploration of the Permian of West Texas to explore how continental margins are constructed and how we use life to study changing environments over long timescales. Ultimately, we will illustrate how an understanding of geological processes on Earth may be used to interpret planetary systems. Along the way we emphasize underlying tenets of the history of life, geologic time, and surface processes. We will introduce quantitative methods to study both the Earth's surface and its subsurface. We will expose students to myriad directions they can learn more deeply about the evolving surface of the Earth and other planets.

Objectives of this course: The objectives of this course are to Introduce JSG undergrads to the basic concepts (tenets) of the geosciences in the subsurface, surface, and life of the past and present. The course seeks to accomplish this through a module-based pedagogy that includes the classroom, laboratory, and field observations. The course will provide a roadmap for students to further pursue topics/questions of interest.

Learning outcomes: Students who complete this course will acquire a basic understanding of the physical, chemical, and biological processes that shape the surface of the Earth today and through geologic time. Students will see the role that human impacts, changing climates, and sea level have on Texas's landscapes, coastal processes, and natural hazards more globally. Through problem-based exercises, students will develop their observational skills, explore underlying processes, and extrapolate these insights to an understanding of how our world is shaped. Finally, students will leave this course with a broad perspective

on the array of tools, techniques, and approaches that geoscientists use to investigate feedbacks between subsurface, surface, and life systems on Earth and other planets.

Tentative schedule for Fall 2024:

Module 1 - The Present & Human Interaction

Wk 1: Aug 26–30: Intro/Background/Framework (KS out)

Lab 1: Waller Creek

Wk 2: Sep 2–Sept 6: Sediment - erosion and transport

Lab 2: The Earth's mobile surface – grains

Wk 3: Sep 9–13: Sediment - transport and deposition

Lab 3: Field Trip (Sep 14–15)-Trinity River System and Shoreline erosion in Galveston

(FIELD TRIP IS REQUIRED)

Wk 4: Sep 16–20: Fluvial and Coastal processes

Lab 4: How solids flow I – Wind Tunnel

Wk 5: Sep 23–27: Fluvial and Coastal processes: Environments of Deposition

Lab 5: How solids flow II – Water Tank

Module 2 – Reconstructing Environments in ‘Deep Time’

Wk 6: Sep 30–Oct 4: Introduction to ‘Deep Time’

Lab 6: Carbonate margin profiles,

Wk 7: Oct 7–11: How biology and chemistry form rocks

Lab 7: The Earth's growing surface – chemical rocks

Wk 8: Oct 14–18: Permian of West Texas

Lab 8: Field Trip to Guads - Permian Reef: Thurs morning (Oct\ 17) to Sun evening (Oct 20)

Wk 9: Oct 21–25: Module 3 synthesis/recap: Reconstruction of the Permian.

Lab 9: How to keep your reef alive

Module 3 - Reconstructing the Pleistocene to Present

Wk 10: Oct 28–Nov 1: Seeing below the surface (subsurface data)

Lab 10: How do we take a picture of what we can't see (seismic reflection tank)

Wk 11: Nov 4–8: shelf margin/seismic data

Lab 11: Reconstructing the buried shorelines of the Pleistocene

Wk 12: Nov 11–15: climate, sea level, and carbon dating

Lab 12: Texas' Pleistocene ecosystem ('Manatees, tigers, and mammoths oh my!')

Wk 13: Nov 18–22: Module 3 capstone/synthesis: Reconstructing the Pleistocene to Present

Lab 13: Module 3 Capstone

Wk 14: Nov 25–29 (Fall Break, no class, no lab)

Module 4 - Reconstructing environments on Mars

Wk 15: Dec 2–Dec 6: Remote Sensing and surface processes on other planets

Lab 15: Mission to Mars

Grading

Lab Exercises/Deliverables (incl. Lab Notebooks): 60%

- **Lab Quizzes: 30%**
- **Lab Assignment (Notebooks): 30%**
(e.g., notes, observations, sketches, questions, reflections)

Attendance/Participation: 10%

Includes lab and lecture attendance and pre-module assessments

Pre Module Assessment (Cr/NC):

Post Module Assessments (Graded): 30% (10% each)

93 to 100 = A

90 to 93 = A-

83-90 = B

80-83 = B-

73-80 = C

70-73 = C-

63-70 = D

60-63 = D-

<60 = F

Standards of Conduct

The University of Texas at Austin holds our students to a high standard grounded in our Code of Conduct and Student Honor Code. Students are expected to abide by all state and federal laws, statutes, and all regulations of the University of Texas System.

Code of Conduct

The core values of The University of Texas at Austin are learning, discovery, freedom, leadership, individual opportunity, and responsibility. Each member of the university is expected to uphold these values through integrity, honesty, trust, fairness, and respect toward peers and community.

Student Honor Code

“As a student of The University of Texas at Austin, I shall abide by the core values of the university and uphold academic integrity.”

<https://deanofstudents.utexas.edu/conduct/standardsofconduct.php>

University Policies

Academic Integrity

Each student in the course is expected to abide by the University of Texas Honor Code: “As a student of The University of Texas at Austin, I shall abide by the core values of the University and uphold academic integrity.” **Plagiarism is taken very seriously at UT.** Therefore, if you use words or ideas that are not your own (or that you have used in previous class), you must cite your sources. Otherwise, you will be guilty of plagiarism and subject to

academic disciplinary action, including failure of the course. You are responsible for understanding UT's Academic Honesty and the University Honor Code which can be found at the following web address:
http://deanofstudents.utexas.edu/sjs/acint_student.php

Plagiarism will not be tolerated. See the University of Texas guidelines for plagiarism:
http://deanofstudents.utexas.edu/sjs/scholdis_plagiarism.php

An online module about plagiarism and the consequences of plagiarizing.
<http://www.lib.utexas.edu/services/instruction/learningmodules/plagiarism/>