GEO 416S: EARTH AND PLANETARY PROCESSES THROUGH TIME

Fall 2024 Syllabus

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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)
   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/