SYLLABUS

TRANSITIONS IN THE HISTORY OF LIFE (GEO 397L/322J)

TIME & PLACE: Fall Semester 2023: Tuesday 9-12 am, JGB 3.204

INSTRUCTOR: Dr. Rowan Martindale (she/her) Martindale@utexas.edu
Office: JSG 3.216A (Gun Free Office)

OFFICE HOURS: TBD, you can also schedule a meeting outside of these hours (via email). My door is usually open for quick questions, but I will ask you to schedule a meeting if I am busy.

ABOUT THE COURSE:
This course is designed to introduce students to major perturbations in the history of life, specifically, mass extinctions and carbon-cycle perturbations (e.g. ocean anoxic events, hyperthermals, and acidification events). This class will not simply focus on the “Big 5” mass extinctions but will address kill mechanisms (e.g. glaciations, impacts, large igneous provinces) and the subsequent environmental perturbations and ecological ramifications. We will also focus on several events, the mass extinctions and C-cycle perturbations, and discuss the environmental and paleobiological response to these events. For example, do the terrestrial and marine records agree? What data refutes the current kill-mechanism hypothesis? Ideally, the class will bring together a diverse group of students and researchers.

The skills developed in this class include (but are certainly not limited to):
- How to read and evaluate a scientific paper (i.e., the content, data analysis, paper structure, and writing style)
- How lead and participate in a scientific discussion (effectively)
- How to give a good scientific presentation
- How to give and receive constructive criticism
- Synthesizing data from different (and often disparate) fields to understand major perturbations in Earth Systems
- Data analysis
- How to write a scientific paper (depending on level of interest/experience this may scaffold with a thesis/dissertation project)

The topics covered are largely determined by the interests of the students in the class. These may include (but are certainly not limited to):
- The features that define an extinction event and separates mass extinctions from background events.
- Other major environmental perturbations that influenced the history of life
  - e.g. ocean anoxic events, hyperthermals, acidification events, glaciations
- Environmental/ecological ramifications of continental configurations (and geologically sudden changes)
  - Climate, niches, etc.
• Environmental/ecological ramifications of a bolide impact
  o Size, target, fallout, etc.
• Environmental/ecological ramifications of large igneous province eruptions
  o Size, rate of change, volatiles, etc.
• Environmental/ecological ramifications of methane release
  o Size, rate of change, etc.
• The hypothesized causes of mass extinction events
  o What is the data?
  o What happens to the Earth and the biosphere?
  o Do the proxies and biotic patterns match the kill mechanisms?
• Common causes/Event Individuality
• Human-induced transitions (e.g. the Anthropocene, the 6th mass extinction)

PREREQUISITES:
Upper-division or graduate standing; at least GEOL 405 (Life Through Time) or consent of the instructor. This course is designed for upper level geology majors and graduate students who have a background in Geology or Biology. Participants will require a working knowledge of basic geological concepts such as the geological time scale, earth system processes, evolution, and paleontology.

LOGISTICS:
The course will be a mixed graduate and undergraduate level GEO class (3 credit hours), with an even mix of group discussions of papers chosen to address specific topics and student presentations of seminal and new research papers. During discussion weeks, the whole class will read 4-5 papers and discuss these papers as well as the general topics they address. During presentation weeks, a subset of students will select a paper, read it, and prepare a short (10 minute) presentation for the class. In addition, the entire class is expected to read 2-3 papers for class on presentation weeks. Each presentation class will consist of several presentations followed by a summary/discussion period in the last hour. There will be a final class project, which will differ between the undergraduate and graduate group.

ATTENDANCE AND ABSENCE:
Attendance and participation are required and essential to understand the core material.

GRADING:
The grade for the class is based primarily on participation in discussions and presentations. If you do not participate in discussions, you will not pass the class. **Discussions (i.e. class participation) will count for 40% of your grade, in-class presentations will count for 30% of your grade, and the final project will count for 30% of your grade. NOTE: The final project is different for Undergraduate and Graduate Students.** A more detailed day-to-day grading scheme will be handed out in class and is available on Canvas. There is no final exam for this course. Plus and minus grading will be used.
CLASS PROJECT:

The class project is worth 30% of your final grade and the content of this project will depend on whether you are in GEO322J (Undergraduate) or GEO397L (Graduate). Your project topic MUST relate to extinctions or major environmental perturbations in some way. See the file on Canvas for example topics and come talk to me if you have questions or need help deciding what would be an appropriate topic. See the “Final Project” folder on Canvas for additional details and due dates.

GEO322J (Undergraduate): You will select a research topic and submit a 7-page paper addressing your chosen topic. The paper will be worth 30% of your final mark, late papers will lose 10% per day.

GEO397L (Graduate): Your project may consist of either an original research project (that relates to your own research) or a literature review focused on addressing a specific question. I try to keep the constraints on the project topic to a minimum so this project can further your own MSc/PhD projects. In the last week of class, the graduate students will present their project in a 15-minute oral presentation to your classmates (GSA/AGU style), with 15 minutes for questions/discussion. You will also submit a 12-page summary of your research project or literature review. The paper will be worth 20% of your final mark and the presentation will be worth 10% of your final mark, late papers will lose 10% per day.

READINGS:

There is no required text, we will be reading from new and classic literature. I regularly update the papers we will read so that students are exposed to the most recent literature on this topic. A preliminary reading list will be available on Canvas, while a final reading list for the following week will be posted on canvas prior to class. Canvas is a Web-based course management system in which a password-protected site is created for each course. Student enrollments in each course are updated each evening. You will be responsible for checking the course site regularly for class work and announcements as well as reading the assignments thoroughly. Canvas is available through UTDirect and support is provided by the ITS Help Desk at 512-475-9400 Monday through Friday 8 am to 6 pm, so plan accordingly.

EMAIL:

All students should become familiar with the University's official e-mail student notification policy. It is the student's responsibility to keep the University informed as to changes in their e-mail address. Students are expected to check e-mail on a frequent and regular basis in order to stay current with University-related communications, recognizing that certain communications may be time-critical. It is recommended that e-mail be checked daily. The complete text of this policy and instructions for updating your e-mail address are available at [http://www.utexas.edu/its/policies/emailnotify.html](http://www.utexas.edu/its/policies/emailnotify.html). In this course e-mail through the canvas system will be used as a means of communication. You will be responsible for checking your e-mail regularly for class work and announcements. I check email regularly, but please be respectful of my time commitments; I may not respond to your email at 3am. Note: if you are an employee of the University, your e-mail address in Canvas is your employee address.
**DIVERSITY AND INCLUSION:**

In an ideal world, science would be objective. Nevertheless, much of science is subjective and is historically built on a small subset of voices. In this class, we will make an effort to read papers from a diverse group of scientists, but limits still exist on this diversity. I acknowledge that it is possible that there may be both overt and covert biases in the material due to the lens with which it was written, even though the material is primarily of a scientific nature. Integrating a diverse set of experiences is important for a more comprehensive understanding of science. I would like to discuss issues of diversity in geoscience as part of the course from time to time. Please contact me (in person or electronically) or submit anonymous feedback if you have any suggestions to improve the quality of the course materials.

The Jackson School of Geosciences is dedicated to creating a positive, inclusive work environment that embraces diversity in all forms and rejects any form of hostile work place, discrimination, or bullying. We have a clear statement of behavioral expectations (as well as definitions of discrimination, (sexual) harassment, and bullying, which can be found here: [www.jsg.utexas.edu/people/jsg-community/workplace-issues/](http://www.jsg.utexas.edu/people/jsg-community/workplace-issues/). On this website, you can also find resources and contacts for reporting issues. Please note that as a faculty member I am a mandatory reporter for Title IX violations. You may find a map of Gender Inclusive Restrooms here: [http://diversity.utexas.edu/genderandsexuality/gender-inclusive-restrooms/](http://diversity.utexas.edu/genderandsexuality/gender-inclusive-restrooms/).

Beyond the Jackson School protocols, it is my goal to create a learning environment for my students that supports a diversity of thoughts, perspectives and experiences, and honors your identities (including race, gender, class, sexuality, religion, ability, etc.). To help accomplish this:

- Please let the class know your chosen name and pronouns (if you feel comfortable doing so). If these change during the course of the semester, please update us.
- If you feel like your performance in the class is being impacted by your experiences outside of class, please don’t hesitate to come and talk with me. I want to be a resource for you.
- Your classmates and instructors (like many people) are still in the process of learning about diverse perspectives and identities. If something was said in class (by anyone) that made you feel uncomfortable, please talk to me about it.
- As a participant in course discussions, you should also strive to honor the diversity of your classmates (e.g., use appropriate pronouns and names, make sure all voices are being heard, etc.).

**FIELD TRIP:** If there is sufficient interest, I will try to organize a field trip to Cretaceous-Paleogene sections in Texas.
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2023 TOPIC SCHEDULE

Week 1 – Introduction to the class, discussion of how to read a paper and give an effective presentation

Week 2 – Discussion: What defines a mass extinction? How is it identified?

Week 3 – Presentations: Databases, Signor-Lipps, dealing with an imperfect rock record

Week 4 – Discussion: Kill Mechanisms; environmental and ecological ramifications

Week 5 – Presentations: Glaciation, impacts, large igneous provinces, methane release

*PROJECT TOPICS ARE DUE!

Week 6 – Discussion: Overview of the end-Devonian and end-Permian mass extinctions

Week 7 – Presentations: Patterns and processes of the end-Devonian and end-Permian mass extinctions

Week 8 – Discussion: Overview of the end-Triassic and end-Cretaceous mass extinctions

Week 9 – No Class, GSA Annual Meeting, time to work on class projects

Week 10 – Presentations: Patterns and processes of the Patterns and processes of the end-Triassic and end-Cretaceous mass extinctions

Week 11 – Peer editing writing drafts

*MINI WRITING DRAFTS & PEER REVIEW ARE DUE!

Week 12 – Discussion: Overview of the Pleistocene, “Anthropocene”, and future extinctions

Week 13 – Presentations: Patterns and processes of the Pleistocene, “Anthropocene”, and future extinctions

Week 14 – No Class (Thanksgiving)

Week 15 – Graduate Student Project Presentations and final class discussion

*PROJECT PAPERS/PRESENTATION PDFs DUE AT 3pm!