SYLLABUS

EAS 4350/6136 Paleoclimatology and Paleoceanography
Fall 2026

Instructor: Dr. Isaiah W. Bolden (he/him)

Course Description: The course will explore the history of the earth's climate and how paleoclimate studies can help us learn more about the workings of the climate system and associated biogeochemical cycles.

Course Learning Outcomes: By the end of the course, the student should understand the controls on the long-term climate evolution of the Earth and some of the main tools used in reconstructing past climate. Students will also improve their analytic and scientific writing skills.

Audience/Pre-requisites: This course is intended for advanced undergraduate and graduate students but is open to interested and motivated students from any undergraduate major or graduate field. One of EAS 1600 (Introduction to Environmental Science), EAS 4300 (Introduction to Oceanography), or EAS 4305 (Physical and Chemical Oceanography) is required for enrollment.

Format: The undergraduate section (EAS 4350) and the graduate section (EAS 6136) will meet for lecture together. Class periods will primarily be devoted to in-class lectures and discussion of weekly material. Each unit of course material will have assigned readings and accompanying study questions to be completed. A subset of the unit study questions will be used as quiz questions each week and graded for content mastery. All students will have additional opportunities to clarify concepts presented in the lectures, assigned readings, and study questions in optional "enrichment" session and/or at scheduled office hours. To supplement lecture material, some class meetings may be devoted to discussions of relevant published peer-reviewed articles and/or materials related to two class projects (see below).

Final Project: A final "Paleoclimate Data Synthesis" project will be assigned during the semester. A write-up of the project must be submitted in *Geophysical Research Letters* journal article format (instructions will be provided). Project details are different for EAS 4350 and EAS 6136.

Discussions: Discussion preparation questions must be submitted (uploaded to Canvas) by 10 AM on the morning of the discussion.

Exams: There will be a single, take-home midterm exam that will be assigned and due before Halloween 2026. The exam will cover material from Units 1 (Warm Climates of the Geologic Past) through 3 (The Last Glacial Maximum) and will feature quantitative and qualitative/expository free response questions that synthesizes your mastery of the

material and will be a useful reference for you and your ability to communicate climate science to others for the rest of your lives (and also may possibly be a ton of Type II fun).

Help: Outside of the optional = "enrichment" sessions, office hours are by appointment and can be virtual (Zoom) or in-person. Students should also feel free to submit any questions about the course content, assignments, and logistics to the appropriate Discussion section in Canvas – it's more likely than not a fellow classmate has a similar question (or even the answer)! Please email me with questions that are specific to you (excused absences, requests for office hours, etc.).

Required Texts:

Book Chapters and Review Papers as assigned. All readings will be supplied as pdf or web links on Canvas, no textbook purchase required.

Web Resources:

All assignments and class resources will be posted or linked from Canvas.

Grading:

25% Weekly quizzes over unit study questions covered in lecture. Lowest grade will be dropped.
25% Take-home Midterm (Units 1 – 3)
30% Final Project
10% Completion of unit study questions and integrative (synthesis) questions
10% Preparation and participation in scheduled discussions.

No late assignments will be accepted without prior arrangements. Your final grade, in accordance with GT policy, will be assigned as a letter grade according to the following scale:

A – 90-100%
B – 80-89%
C – 70-79%
D – 60-69%
F – 0-59%

Attendance: See catalog for institute policies for excused absences and make-up work: http://www.catalog.gatech.edu/rules/4/. Please attend remotely if you feel poorly for any reason.

AI Use Policy: In this class, we treat AI-based information (*e.g.* that produced by ChatGPT, Gemini, or other AI-based assistants) the same way we treat other forms of collaboration. You may talk about your ideas and assignments with other people as well as with AI-based assistants. However, all work you submit for a grade in this class must

be your own. All sources, including AI-based assistants, must be properly cited. Use of AI products beyond the accepted use case above will be treated as academic misconduct and reported to the Office of Student Integrity, who will investigate the incident and identify the appropriate penalty for violations.

Large Language Models (LLMs) are created by learning patterns and relationships in massive volumes of data, primarily from the internet. LLMs can demonstrate bias and provide inaccurate information. Part of your training as a scientist is learning how to validate information with cross-referencing and recognizing the limitations of tools and methods, including LLMs and AI.

Student-Faculty Expectations Agreement: Georgia Tech strives for an atmosphere of mutual respect, acknowledgement, and responsibility between faculty members and the student body. See http://www.catalog.gatech.edu/rules/22/ for an articulation of some basic expectations for both students and faculty.

Copyright: All course material, including lectures and lecture slides, is protected by copyright. Distribution or upload to sites such as CourseHero is illegal.

Academic Integrity: Georgia Tech aims to cultivate a community based on trust, academic integrity, and honor. Students are expected to act according to the highest ethical standards. For information on Georgia Tech's Academic Honor Code, please visit http://www.catalog.gatech.edu/policies/honor-code/ or http://www.catalog.gatech.edu/rules/18/. Any student suspected of cheating or plagiarizing on a quiz, exam, or assignment will be reported to the Office of Student Integrity, who will investigate the incident and identify the appropriate penalty for violations.

Collaboration and Group Work: No collaboration or use of AI tools (such as chatGPT) is allowed on the midterm exam. Students are permitted to use their notes and references to the textbook / peer-reviewed literature for this assignment with the proper attribution/citations. Collaboration is allowed and encouraged on the study questions; however, each student must submit their own write-up in their own words and include the names of any peer partners at the top of the document.

Core IMPACTS: Not applicable.

Accommodations for Students with Disabilities: If you are a student with learning needs that require special accommodation, contact the Office of Disability Services at 404.894.2563 or http://disabilityservices.gatech.edu/, as soon as possible, to make an appointment to discuss your special needs and to obtain an accommodations letter. Please also e-mail me as soon as possible in order to set up a time to discuss your learning needs.

Statement of Intent for Inclusivity: As a member of the Georgia Tech community, I am committed to creating a learning environment in which all of my students feel safe and

included. Because we are individuals with varying needs, I am reliant on your feedback to achieve this goal. To that end, I invite you to enter into dialogue with me about the things I can stop, start, and continue doing to make my classroom an environment in which every student feels valued and can engage actively in our learning community.

Support Services and Resources: In your time at Georgia Tech, you may find yourself in need of support. Below you will find some resources to support you both as a student and as a person.

Academic Support

- Center for Academic Success
  - 1-to-1 tutoring
  - Peer-Led Undergraduate Study (PLUS)
  - Academic coaching
- Communication Center - Individualized help with writing and multimedia projects

Personal Support - Georgia Tech Resources

- Counseling Center | 404.894.2575 | Suite 102B Smithgall Student Services Building, 353 Ferst Dr NW Atlanta GA 30313
  - Services include short-term individual counseling, group counseling, couples counseling, testing and assessment, referral services, and crisis intervention. Their website also includes links to state and national resources.
  - *Students in crisis may walk in during business hours (8am-5pm, Monday through Friday) or contact the counselor on call after hours at 404.894.3498.*
- Students' Temporary Assistance and Resources (STAR)
  - Can assist with interview clothing, food, and housing needs.
- Stamps Health Services | 404.894.1420
  - Primary care, pharmacy, women's health, psychiatry, immunization and allergy, health promotion, and nutrition
- OMED Educational Services | 404.894.3959
- Women's Resource Center | 404.385.0230
- LGBTQIA Resource Center | 404.385.4780
- Veteran's Resource Center | 404.385.2067
- Georgia Tech Police | 404.894.2500

National Resources:

- The National Suicide Prevention Lifeline | call 988
  - Free and confidential support 24/7 to those in suicidal or emotional distress
- The Trevor Project
  - Crisis intervention and suicide prevention support to members of the LGBTQ+ community and their friends
  - Telephone | 1.866.488.7386 | 24 hrs/day, 7 days/week

- Online chat | 24 hrs/day, 7 days/week
- Text message | Text “START” to 678678 | 24 hrs/day, 7 days/week

Topic List (subject to modification)

- Warm Climates of the Geologic Past
  - Earth Climate System Overview
  - Phanerozoic CO_2 and Climate
  - Paleocene-Eocene Thermal Maximum (PETM)

- Orbitally-driven Quaternary Climate Change
  - Milankovitch Cycles & Monsoons
  - Glaciation, Ice Ages, and Glacial Cycles
  - Ice Core Records of Atmospheric Composition

- The Last Glacial Maximum (LGM)
  - Dating Deposits, Ice Sheets, and Sea Level
  - LGM Temperature and Precipitation
  - LGM Ocean Circulation and Impacts on Atmospheric and Oceanic CO_2 Inventory

- Abrupt Climate Change
  - Bølling–Allerød Interstadial
  - The Younger Dryas
  - Heinrich Events
  - Dansgaard-Oeschger Events

- Recent Climate Change
  - Holocene Climate
  - Climate of the Common Era