

# Global Climate Change

**GLY 6075 - Spring 2025**

**Class Time:** 10:40 am-12:35 pm, T&R

**Location:** Williamson Hall 214

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**Instructor:** Oana Dumitru

**E-mail:** [odumitru@ufl.edu](mailto:odumitru@ufl.edu)

**Office hours:** T&R: 2:30-3:30 pm, or by appointment, 362 Williamson Hall

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**Course description:** The course is based on the excellent book *Earth's Climate: Past and Future* by William F. Ruddiman. In the first part of the semester, we will follow the book's framework, examining the processes that shape Earth's climate, beginning with long-term influences and progressively moving to shorter-term processes, culminating in current human-induced climate change. Additionally, the course will include dedicated lectures on sea-level changes and discussions on selected chapters from the most recent report of Intergovernmental Panel on Climate Change (IPCC).

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**Course objectives:** This course aims to provide a historical perspective of the evolution of the Earth's climate system through geologic time, emphasizing the mechanisms driving climate change and sea-level variability across different timescales. By integrating geological, oceanographic, and atmospheric perspectives, the course explores how insights from past climates can help predict future climate and sea-level changes. Specific objectives include:

- Introducing Earth's climate system and the primary drivers of climate change.
  - Reviewing geological archives, climate proxies, and dating techniques.
  - Examining key reference periods in Earth's climate history.
  - Summarizing historical and future climate trends.
  - Discussing key findings from the latest IPCC assessment report.
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**Learning outcomes:** Upon completion of the course, you should better understand the issues of modern climate change within the context of the Earth's climate history and evaluate our current understanding of future climate challenges. You should:

- Understand the evolution of the Earth's climate system and the mechanisms driving climate and sea-level changes.
  - Acquire knowledge of geological archives and proxies, and analytical techniques.
  - Recognize the strengths and limitations of paleoclimatic interpretations and their relevance to future climate predictions.
  - Understand the relationships between atmospheric CO<sub>2</sub>, global temperatures, and sea-level changes over different timescales.
  - Develop skills in using and interpreting climate and sea-level proxy data and modeling results and become familiar with key IPCC content.
  - Improve your ability to read, evaluate, and discuss scientific literature, and your oral and written communications skills
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**Recommended text:** Lecture material will largely come from the following textbooks, along with other journal articles that we will discuss in class.

- Ruddiman, WF (2014) *Earth's Climate. Past and Future*, 3<sup>rd</sup> ed.
- Lowe, JJ, Walker, MJC (2015) *Reconstructing Quaternary Environments*, 3<sup>rd</sup> ed.
- Papers from the literature (available on class Canvas site)

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**Course plan:** The class format consists of lectures and student-led discussions of research papers. Students will also choose a climate proxy and a sea-level indicator to present during the semester and will write a research paper focusing on regional climate and/or sea-level changes in a location that we select together.

- **Discussions:** Throughout the course, we will discuss several peer-reviewed papers during class. These discussions will be student-led and require active participation from everyone. To ensure balanced engagement, I will assign specific roles for each paper, such as presenting the introduction and hypotheses, analyzing the results, summarizing key takeaways, and more. **NOTE:** Active participation in discussions is a significant component of your grade.
- **Presentations:** Each student will select a climate proxy (week 3) and a sea-level indicator (week 11) to present in class. Students will also prepare and distribute handouts summarizing their presentations for their classmates.
- **Research paper:** We will select together a specific region for each student to focus on for the final research paper. This project involves analyzing modern climate data and synthesizing paleoclimate information for the chosen region, offering hands-on experience in locating, plotting, and interpreting climate data to create regional climate and/or sea-level reconstructions. The paper has a 10-page limit (1.5 spacing, 12 pt font, Times New Roman) for the main text, excluding figures and references. Additional details will be provided throughout the semester. Papers will be presented in class during the final week of the semester. Assignments must be submitted via Canvas by the specified deadlines below. **NOTE:** Five points will be subtracted from your assignment grade if the submission is late!

**Jan 21:** Submit your study region (1 paragraph outlining the justification for your choice and general approach).

**Mar 25:** Submit your preliminary figures (e.g., map, diagrams, plots).

**April 17 & 22:** Deliver a timed presentation in class, followed by a Q&A session.

**April 22:** Final research paper due.

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**Canvas site:** The class schedule provided is tentative and may be adjusted based on interests and time constraints. Any revisions or announcements will be posted on Canvas. Additionally, my PowerPoint presentations, lecture content, and discussion papers will all be accessible on Canvas.

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**Evaluation of grades:**

40% Research paper

35% Paper presentations and discussions during classes

15% Climate proxy and sea-level indicator presentations

10% Attendance

**Grading Policy:** A =  $\geq 93\%$ , A- = 90-92.99, B+ = 87-89.99, B = 83-86.99, B- = 80-82.99, C+ = 77-79.99, C = 73-76.99, C- = 70-72.99, D+ = 67-69.99, D = 63-66.99, D- = 60-62.99, E < 60 <https://catalog.ufl.edu/UGRD/academic-regulations/grades-grading-policies/>

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**Tentative course schedule**

Date	General Topic	Readings and due dates
<b>Week 1</b>	<b>Framework of climate science</b>	
Jan 14	Introduction, Logistics and Planning. Overview of the climate system.	Rud–Ch.1 (8-18) <i>Assign climate proxies</i>
Jan 16	Earth’s Climate System today	Rud–Ch. 2 (19-36) IPCC Ch. 7
<b>Week 2</b>		
Jan 21	Ocean Circulation (Dr. Cassie Stirpe - invited lecturer)	Rud–Ch.2 (40-45) <i>Project – submit study region</i>
Jan 23	Climate archives and dating methods	Rud–Ch.3 LW–Ch. 3
<b>Week 3</b>		
Jan 28	<i>Climate proxies I (student PPT)</i>	LW–Ch. 5
Jan 30	<i>Climate proxies II (student PPT)</i>	
<b>Week 4</b>	<b>Tectonic-Scale Climate Change</b>	
Feb 4	Long-term climate overview	Rud–Ch. 4 & 5
Feb 6	Discussion – Snowball Earth	Hoffman & Schrag (2002); Allen, P. (2015)
<b>Week 5</b>	<b>Orbital-Scale Climate Change</b>	
Feb 11	Orbital cycles and ODP	Rud–Ch. 6 & 7 Lisiecki & Raymo (2005)
Feb 13	Insolation control of the monsoon and of the ice sheets	Rud–Ch. 9 & 10 Imbrie (1982)
<b>Week 6</b>		
Feb 18	Pliocene: Earth's Climate 3 Ma	Haywood et al. (2016) Salzmann et al (2011)

Feb 20	Discussion – Pliocene warmth	Federov et al. (2013) Pagani et al. (2010)
<b>Week 7</b>		
Feb 25	Pleistocene climate changes	Rud–Ch.13; Kukla et al. (1997) <i>Assign sea-level indicators</i>
Feb 27	Discussion – Last Glacial Maximum	Hughes & Gibbard (2015) Tierney et al. (2020)
<b>Week 8</b>		
Mar 4	Millennial oscillations of climate	Rud–Ch.15, LW–Ch.7.4
Mar 6	Discussion –Younger Dryas	Dansgaard, W. (1989) Broecker, W.S. (2006)
<b>Week 9</b>	<b>Historical &amp; future climate changes</b>	
Mar 11	Climatic Changes Over the Last Millennium and the Industrial Era	Rud–Ch. 17 & 18
Mar 13	Discussion – Climate lessons from the Common Era	Büntgen et al. (2020) Mann M.E. (2021)
<b>Week 10</b>	<b>Spring break</b>	
<b>Week 11</b>	<b>Sea-level changes</b>	
Mar 25	Causes of sea-level changes across different time scales	MW–Ch. 2; Austermann et al. (2017); <i>Project –send figures</i>
Mar 27	<a href="#">Paleo-sea level indicators (student PPT)</a>	
<b>Week 12</b>		
April 1	Discussion – Last interglacial sea level	Polyak et al. (2018) Clark et al. (2020)
April 3	Discussion – Contemporary sea-level changes	Rud – Ch. 20; Siegert et al. (2020); Cazenave & Moreira (2022)
<b>Week 13</b>	<b>IPCC report</b>	
April 8	IPCC: Climate trends and projections	IPCC Ch. 3 & 4 (selected sections)
April 10	IPCC: Ocean, cryosphere and sea level change	IPCC Ch. 9 (selected sections)
<b>Week 14</b>		
April 15	Review	
April 17	<a href="#">Project presentations I</a>	
<b>Week 15</b>		
April 22	<a href="#">Project presentations II</a>	<i>Projects Due by 5:00 pm</i>

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### **Honesty Policy:**

All students registered at the University of Florida have agreed to comply with the following statement: “I understand that the University of Florida expects its students to be honest in all their academic work. I agree to adhere to this commitment to academic honesty and understand that my failure to comply with this commitment may result in disciplinary action up to and including expulsion from the University.” In addition, on all work submitted for credit the following pledge is either required or implied: “On my honor I have neither given nor received unauthorized aid in doing this assignment.” If you witness any instances of academic dishonesty in this class, please notify the instructor or contact the Student Honor Court (392-1631) or Cheating Hotline (392-6999). For additional information on Academic Honesty, please refer to the University of Florida Academic Honesty Guidelines at:

<http://www.dso.ufl.edu/judicial/procedures/academicguide.html>.

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### **Software Use**

All faculty, staff and student of the University are required and expected to obey the laws and legal agreements governing software use. Failure to do so can lead to monetary damages and/or criminal penalties for the individual violator. Because such violations are also against University policies and rules, disciplinary action will be taken as appropriate.

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### **Accommodation for Students with Disabilities**

Students who will require a classroom accommodation for a disability must contact the Dean of Students Office of Disability Resources, in Peabody 202 (phone: 352-392-1261). Please see the University of Florida Disability Resources website for more information at: <http://www.dso.ufl.edu/drp/services/>. It is the policy of the University of Florida that the student, not the instructor, is responsible for arranging accommodations when needed. Once notification is complete, the Dean of Students Office of Disability Resources will work with the instructor to accommodate the student.

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### **Instructor Evaluation:**

Students are expected to provide professional and respectful feedback on the quality of instruction in this course by completing course evaluations online via GatorEvals. Guidance on how to give feedback in a professional and respectful manner is available at <https://gatorevals.aa.ufl.edu/students/>. Students will be notified when the evaluation period opens, and can complete evaluations through the email they receive from GatorEvals, in their Canvas course menu under GatorEvals, or via <https://ufl.bluera.com/ufl/>. Summaries of course evaluation results are available to students at <https://gatorevals.aa.ufl.edu/public-results/>.

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### **Campus Resources:**

#### **Health and Wellness**

##### **U Matter, We Care:**

If you or a friend is in distress, please contact [umatter@ufl.edu](mailto:umatter@ufl.edu) or 352 392-1575 so that a team member can reach out to the student.

**Counseling and Wellness Center:** <http://www.counseling.ufl.edu/cwc>, and 392-1575; and the University Police Department: 392-1111 or 9-1-1 for emergencies.

**Sexual Assault Recovery Services (SARS)**  
Student Health Care Center, 392-1161.

**University Police Department** at 392-1111 (or 9-1-1 for emergencies), or <http://www.police.ufl.edu/>.

### **Academic Resources**

**E-learning technical support**, 352-392-4357 (select option 2) or e-mail to Learning-support@ufl.edu. <https://lss.at.ufl.edu/help.shtml>.

**Career Resource Center**, Reitz Union, 392-1601. Career assistance and counseling. <https://www.crc.ufl.edu/>.

**Library Support**, <http://cms.uflib.ufl.edu/ask>. Various ways to receive assistance with respect to using the libraries or finding resources.

**Teaching Center**, Broward Hall, 392-2010 or 392-6420. General study skills and tutoring. <https://teachingcenter.ufl.edu/>.

**Writing Studio, 302 Tigert Hall**, 846-1138. Help brainstorming, formatting, and writing papers. <https://writing.ufl.edu/writing-studio/>.

**Student Complaints Campus:**  
[https://www.dso.ufl.edu/documents/UF\\_Complaints\\_policy.pdf](https://www.dso.ufl.edu/documents/UF_Complaints_policy.pdf).

**On-Line Students Complaints:** <http://www.distance.ufl.edu/student-complaint-process>.