

GLY 3074
The Oceans and Global Climate Change
Spring 2022

Dr. Ellen E. Martin (email: eemartin@ufl.edu)
Office Hours: 362 Williamson Hall- Mon. 4:00-5:00 and Thurs. 2:30-3:30 or
<https://ufl.zoom.us/my/eemartin.ufl> (you will need to set up a zoom meeting in advance)
or by appointment

TA: Paloma Olarte Caceres (pmarina.olarteca@ufl.edu),
Office Hours: Williamson HallTBA at <https://ufl.zoom.us/j/9619417662>
or by appointment

Lectures: M,W,F, Period 4, 10:40-11:30, Williamson Hall 202

This course is set up as a face-to-face class and there will be numerous in-class activities including ~daily Team Based Learning (TBL) activities. Recognizing that COVID may introduce complications, I will provide synchronous online lectures and breakout rooms for people who cannot attend in person. The link for the class is:

<https://ufl.zoom.us/j/94455508410?pwd=dm5laVJ0aTU3a3dqVmRMOXoxYkRHZz09>
Password: Ocean!

Objectives: The oceans store and redistribute heat, moisture and carbon dioxide. As such, they profoundly influence climate and modulate natural and anthropogenic climate change. The goal of this course is for you to understand the role the oceans play in determining climate and regulating global climate change. We will start with an introduction to the climate system, then cover atmospheric and ocean circulation, the relationship between the oceans and the global carbon system, and finally discuss the current record of short-term global change and the long-term record of global climate preserved in the oceans.

By the end of the course you should understand:

- the basics of how the atmosphere and ocean circulate
- the processes that drive climate change
- the reservoirs and fluxes of carbon on earth
- how to evaluate the evidence for modern climate change and predictions of future climate change
- what the long-term history of global climate change can teach us about modern climate and climate change
- potential ways to combat climate change

Textbook (highly recommended):

Kump, Kasting and Crane, 3rd edition, 2010, The Earth System, Pearson.

There is no perfect textbook for this course. The Kump, Kasting and Crane book covers a lot of the important material, but we will jump around some rather than reading it straight through. There are several chapters that will not be assigned and I may post additional reading material on canvas.

Grading:	Individual and TBL Assignments and Peer evaluations	15%
	2 Lab exercises (5% each)	10%
	3 Exams (15% each)	45%
	2 Written Assignments (Up-goer 5 and Overview)	20%
	Team Presentation and evaluations	10%

Assignments handed in late without prior permission will only receive 50% of their original value.

Final grading scheme:

Percentage earned	93%-100%	90%-92%	87%-89%	83%-86%	80%-82%	77%-79%	73%-76%	70%-72%	etc. <60%
Letter Grade	A	A-	B+	B	B-	C+	C	C-	F

Individual Assignments:

There will be a number of short take home assignments throughout the semester. These are designed to let you think about some of the concepts independently or to give you hands-on experience manipulating data. Most of these assignments are listed on the syllabus. I may add more during the semester.

Team Based Learning (TBL):

This course will be taught in part using Team Based Learning Techniques (TBL). This means that I will divide the class into teams of ~5 students and we will frequently break from lectures to work on problems or projects that you will complete as a team. Most of the TBL activities will occur during class time, thus attendance is critical to your participation in your team. Three times during the semester you will be asked to submit assessments of your peers' contributions.

As part of the TBL activities, the team will also play **The Stabilization Triangle: A Concept and Game (April 13 and 15)**. This is a game put together by a group at Princeton to evaluate potential solutions to greenhouse gas emissions. The goal is to determine a strategy to keep atmospheric CO₂ emissions flat over the next 50 years. Your participation for the two days dedicated to this game is factored into your grade.

(15% of your grade will be based on your score on Individual Assignments, TBL Assignments, TBL Peer evaluations, and participation in TBL Peer evaluations.)

Team Presentation:

Near the end of the semester (**April 19 and 20**) each will give a presentation on either an alternative energy source or a carbon sequestration technique. Each team will have ~13 minutes on to present their findings to the class. I will provide more information about what you need to cover and how topics will be chosen. Your participation in preparing the presentation will be assessed by your team members. Everyone in the class will also be asked to **evaluate and critique** the quality of the science and the presentations by other teams.

(10% of your grade will be based on your Team's presentation and your contribution to evaluations or other Team's presentations.)

Exams: There are 3 exams that will be administered during regular class times (*each is worth 15% of your grade*). Each exam will cover the material from the previous third of the course, but may build on material from previous sections. Exams will consist of a mixture of fill-in-the-blank/multiple choice, short answer, and essay questions. Exams are scheduled for **Feb. 2nd**, **Mar 2nd**, and **Apr. 11th**. *There is no final exam.*

Lab exercises:

There will be two exercises about ocean circulation (*each is worth 5% of your grade*). One day of class has been set aside for you to start the surface ocean circulation exercise with your team. The deep ocean circulation exercise requires some computer work and will be completed outside of class time. The purpose of these exercises is to give you an opportunity to work with data on these topics. There are questions to be handed in for each exercise. (**due Feb.11th and Feb. 23rd**).

Written Assignments:

There will be two, ~1-page, graded writing assignments for the course. These assignments will to be submitted online through canvas and run through a plagiarism checker (see information below about plagiarism). The TA and I will grade and comment on each assignment.

- 1) Up-goer 5 challenge - (due Jan. 26th). Randall Munroe, the creator of xkcd, challenged scientists to explain complex topics using simple vocabulary. You will be challenged to explain the Earth's greenhouse effect using only the 1000 most common words in the English language. The paper will be graded on a score of 1-10 based on your ability to present a coherent and accurate explanation following the rules of the challenge. (*10% of grade*)
- 2) Overview paper – Oceans and Climate Change - This writing assignment is essentially a final essay question (due Apr. 8th); however, in this format you will have more time and resources to answer the question. You will be graded on a score of 1-10 based on the scientific content and thoroughness as well as the quality of the written presentation. (*10% of grade*)

Course Logistics:

e-learning site There is canvas site for the course that you should already have access to. Contact me if you have any trouble. The site includes abbreviated versions of the PowerPoint presentations from lectures, announcements about assignments and activities, study guides for exams, and grade information (warning- the final grade calculated by canvas does not accurately reflect your grade, which is composed of many parts).

Class Conduct: Please be considerate of your fellow students and me during the class period. Please try to get to class on time, stay until the end and pay attention to the class rather than your phone or computer. These are basic, common courtesies that prevent distractions during class. If you do have to participate online, please keep your video on if possible. It can be a challenge to stay engaged remotely and it helps if you do not feel like an anonymous black box. This is also important if you have to join your Team online. When people have their screens and sound on, they participate more. *Please email me or talk to me before or after class if there is some reason you cannot comply with that request.* We will have a discussion as a group about whether I will record and post the lectures after class.

Academic Integrity: 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 Student Honor Code (UF Reg. 4.040). <https://regulations.ufl.edu/wp-content/uploads/2018/06/4.040-1.pdf>

Because you will be turning in assignments and giving presentations on material that is readily available on the web, I want to stress that taking sentences verbatim from the web is **plagiarism** as is taking sentences or paragraphs from any source, even if you cite the source. It is also plagiarism if you intersperse extracted sentences from different websites. These forms of plagiarism are relatively easy to detect. I have had problems with plagiarism in the past, therefore I run the written assignments through a plagiarism checker. My policy is that you will receive an F in the course if I detect plagiarism on any assignment or if I detect any other type of cheating. The web can be a great resource, but remember that you must properly credit websites that you use for information. Also remember that anyone can post anything on the web. Make sure you use sites that have some validity.

Mental Health and Well-being

Life offers numerous challenges and being a student can be one of them, particularly during a pandemic. If you are mentally or emotionally struggling for any reason, you can contact the [Counseling and Wellness Center \(https://counseling.ufl.edu/\)](https://counseling.ufl.edu/). They have one-click access to people who can help you connect to the right resources for your situation. If these struggles are negatively impacting your performance in your courses, I encourage you to contact the [Dean of Students Care Area \(https://care.dso.ufl.edu/\)](https://care.dso.ufl.edu/) to connect with a support team that can help with temporary accommodations, authorization to make up missing course work, etc. Additionally, if you are comfortable doing so, please reach out to me and I will provide any accommodations in this course that I can.

Accommodation for Students with Disabilities

Students with disabilities who experience learning barriers and would like to request academic accommodations should connect with the [Disability Resource Center \(https://disability.ufl.edu/get-started/\)](https://disability.ufl.edu/get-started/). It is important for students to share their accommodation letter with their instructor and discuss their access needs, as early as possible in the semester.

Athletes and Other Students with Extensive Extracurricular Activities- I make an effort to work with *all students'* schedules, but communication is critical to make the process work. You need to talk to me in person if you will be missing classes and turning in late assignments. I consider a note from the Athletic Association as verification only, you need to talk to me directly to make arrangements for late assignments.

In-Class Recording

Students are allowed to record video or audio of class lectures. However, the purposes for which these recordings may be used are strictly controlled. The only allowable purposes are (1) for personal educational use, (2) in connection with a complaint to the university, or (3) as evidence in, or in preparation for, a criminal or civil proceeding. All other purposes are prohibited. Specifically, students may not publish recorded lectures without the written consent of the instructor.

A "class lecture" is an educational presentation intended to inform or teach enrolled students about a particular subject, including any instructor-led discussions that form part of the

presentation, and delivered by any instructor hired or appointed by the University, or by a guest instructor, as part of a University of Florida course. A class lecture does not include lab sessions, student presentations, clinical presentations such as patient history, academic exercises involving solely student participation, assessments (quizzes, tests, exams), field trips, private conversations between students in the class or between a student and the faculty or lecturer during a class session.

Publication without permission of the instructor is prohibited. To “publish” means to share, transmit, circulate, distribute, or provide access to a recording, regardless of format or medium, to another person (or persons), including but not limited to another student within the same class section. Additionally, a recording, or transcript of a recording, is considered published if it is posted on or uploaded to, in whole or in part, any media platform, including but not limited to social media, book, magazine, newspaper, leaflet, or third party note/tutoring services. A student who publishes a recording without written consent may be subject to a civil cause of action instituted by a person injured by the publication and/or discipline under UF Regulation 4.040 Student

Week	Date	Topic	Assignments Due	Reading [#]
1	Jan. 5	Introduction		
	Jan. 7	Climate		Ch.1: pp. 1-3
2	Jan. 10	Climate System	GW Opinion	Ch. 2: pp. 21-26, skim pp. 26-33
	Jan. 12	Climate System	Systems HW	Ch. 3
	Jan. 14	Earth’s Energy Balance		Ch. 3
3	Jan. 17	MLK Day- no class		
	Jan. 19	Earth’s Energy Balance		
	Jan. 21	Earth’s Energy Balance And Greenhouse Effect	Black Body Problem	
4	Jan. 24	Forcing		Ch.1: pp. 3-19
	Jan. 26	Atmospheric Circulation	Up-goer 5 Challenge	Ch. 4
	Jan. 28	Atmospheric Circulation	Atm Circ Problem	
5	Jan. 31	Atmospheric Circulation	Presentation topics	
	Feb. 2	EXAM 1		
	Feb. 4	Surface Circ Lab	Pre lab	
6	Feb. 7	Surface Ocean Circulation		Ch.5: pp. 84-92
	Feb. 9	Surface Ocean Circulation	Team assessment 1	
	Feb. 11	Surface Ocean Circulation	Surface lab due	Ch. 5: pp. 96-106
7	Feb. 14	Surface/Deep Circulation		

	Feb. 16	Deep Ocean Circulation		
	Feb. 18	Deep Ocean Circulation	Follow up lab due	
8	Feb. 21	Deep Ocean Circulation		
	Feb. 23	Deep Ocean Circulation	Deep water lab due	
	Feb. 25	ENSO		Ch. 5: pp. 92-96
9	Feb. 28	ENSO/Oceanic Productivity		Ch.8: pp. 154-159
	Mar. 2	EXAM 2		
	Mar. 4	Oceanic Productivity		
10	Mar. 7	SPRING BREAK		
	Mar. 9	SPRING BREAK		
	Mar. 11	SPRING BREAK		
11	Mar. 14	Carbon Cycle		Ch. 8: pp. 149-154
	Mar. 16	Carbon Cycle		Ch. 8: pp. 159-173
	Mar. 18	Carbon Cycle		Ch.7: pp. 130-147 plate tectonics /rock cycle review
12	Mar. 21	Carbon Cycle	CO2 uptake	
	Mar. 23	Global Change		Ch. 15
	Mar. 25	Global Change	Team assessment 2	Ch. 16
13	Mar. 28	Global Change	Carbon calculator	
	Mar. 30	Global Change		
	Apr. 1	Global Change/Paleoclimate		Ch.12: 240-253
14	Apr. 4	Paleoclimate		Ch. 14
	Apr. 6	Paleoclimate		
	Apr. 8	Paleoclimate	Overview paper	
15	Apr. 11	EXAM 3		
	Apr. 13	Stabilization Triangle		You need to be in class both days
	Apr. 15	Stabilization Triangle		
15	Apr. 18	Alt Energy Presentations*		
	Apr. 20	Alt Energy Presentations*	Team assessment 3	

* Part of your grade is based on attending these presentations and filling out evaluation forms for each group.

#Readings from Kump, Kasting and Crane, 3rd edition