GLY 3074
The Oceans and Global Climate Change
Spring 2021

Dr. Ellen E. Martin (email: eemartin@ufl.edu); Office: 362 Williamson Hall
Office Hours: Tues: 2:30-3:30; Wed. 4:00-5:00 at https://ufl.zoom.us/my/eemartin.ufl
or by appointment

TA: Paloma Olarte Caceres (pmarina.olarteca@ufl.edu), Office: Williamson Hall
Office Hours: Mon: 12:30-1:30, Thurs. 10:00-11:00 at https://ufl.zoom.us/j/9619417662
or by appointment

Lectures: M,W,F, Period 4, 10:40-11:30, Online.
M-W in Rm 202 and online on Fri. for section 03GC
This will be a hybrid class with some students in the classroom and others online.
Lectures will be synchronous and there will be ~daily Team Based Learning activities.
https://ufl.zoom.us/j/97294321240?pwd=Nmd4Wmg0RzBSMU9uZmRQQUY3djNndz09
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 Assignments	5%
	Team Based Learning Assignments	15%
	Team Peer evaluations	5%
	2 Lab exercises (5% each)	10%
	3 Exams (10% each)	30%
	3 Written Assignments	25%
	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

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. Your participation in these activities and the score your team receives for them make up 15% of your grade.

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. Your score on the evaluation from your peers determines 5% of your grade.

As part of the TBL activities, the team will also play **The Stabilization Triangle: A Concept and Game**. 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 CO_2 emissions flat over the next 50 years. Your participation is required for the two days dedicated to this game (**April 14 and 16**).

Near the end of the semester there will also be a **team presentation** on either an alternative energy source or a carbon sequestration technique. Each team will have ~13 minutes on April **19th or 21st** 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. Part of your grade on the presentation (10% of your grade) will be based on your contributions to these evaluations.

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. (5% of your grade)

Exams: There are 3 exams that will be administered through Honorlock during regular class times. Each is worth 10% 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. 8th , Mar 12th**, and **Apr. 12th**. *All students will be online for the exams. There is no final exam.*

Lab exercises: There will be two exercises about ocean circulation (each 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.17th and Mar. 21st).**

Written Assignments:
There will be three, ~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 Feb. 1st). 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. (5% of grade) (Due Feb. 1)
2) Position Paper- (due Apr. 2nd)- For this assignment you will be asked to present an argument for or against anthropogenic climate change that you might use in a discussion with a climate denier. The goal is to use the scientific information you have learned in the class to convince someone that anthropogenic is or isn't a real and important issue. You will be graded on a score of 1-10 based on the strength of your argument, scientific rigor, and presentation of your argument. (10%) of grade) (Due Apr. 2)
3) Overview paper – Oceans and Climate Change - This writing assignment is essentially a final essay question (due Apr. 9th); 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) (Due Apr. 9)

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.

Class Conduct: Please be considerate of your fellow students and me during the class period. Most of you will be online and I know it can be a challenge to stay engaged. I think it is important for everyone to have their video on and be willing to unmute and contribute to discussions. Otherwise you are an anonymous black box to me and to the rest of the class. *Please email me or talk to me before or after class if there is some reason you cannot comply with that request.* Many of your interactions with classmates will occur in the breakout rooms and it helps everyone to feel they are engaged with a real person. 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 site 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.

UF Counseling Services
Resources are available on-campus for students having personal problems or lacking clear career and academic goals. The resources include:

- UF Counseling & Wellness Center, 3190 Radio Rd, 352-392-1575, psychological and psychiatric services. A nighttime and weekend crisis counselor is available.
- U Matter, We Care- 352-294-2273. Your well-being is important to the University of Florida. The U Matter, We Care initiative is committed to creating a culture of care on our campus by encouraging members of our community to look out for one another and to reach out for help if a member of our community is in need. If you or a friend is in distress, please contact umatter@ufl.edu so that the U Matter, We Care Team can reach out to the student in distress. The U Matter, We Care Team can help connect students to the many other helping resources available including, but not limited to, Victim Advocates, Housing staff, and the Counseling and Wellness Center. Please remember that asking for help is a sign of strength. In case of emergency, call 9-1-1.
- Dean of Students Office- 352-294-2273
- Student Health Care Center- 352-392-1161

A list of resources and additional information is available at:
https://resources.kognito.com/aruf/localResources/UniversityofFlorida/

Career and job search support is available at:

- Career Resource Center, Reitz Union, 392-1601

Many students experience test anxiety and other stress related problems. "A Self Help Guide for Students" is available through the Counseling Center (301 Peabody Hall, 392-1575) and at their web site: http://www.counsel.ufl.edu/.

Being a student can be a very stressful time and that has been magnified during social distancing and the pandemic. Please feel free to reach out to me, a friend or any of the resources listed above if you are struggling. I can also try to work with students suffering from test anxiety.

From Spillane- after posting
WELLNESS
These are stressful times. If you feel the need for support, please consider these resources.

- The group counseling and workshops offered through the Counseling and Wellness Center. They are quite good, and you can learn more by starting here: https://counseling.ufl.edu/

- UF Gatorwell virtual services include wellness coaching, goal setting workshops, sleep consultations, and more. The full range of virtual offerings are described here: https://gatorwell.ufsa.ufl.edu/

Accommodation for Students with Disabilities
Students with disabilities requesting accommodations should first register with the Disability Resource Center (https://disability.ufl.edu/) by providing appropriate documentation. Once registered, students will receive an accommodation letter which must be presented to the instructor when requesting accommodations. Students with disabilities should follow this procedure 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.

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Schedule- Spring 2021

Week	Date	Topic	Assignments Due	Reading
1	Jan. 11	Introduction		
	Jan.13	Climate		Ch.1: pp. 1-3
	Jan. 15	Climate System -online	GW Opinion	Ch. 2: pp. 21-26, skim pp. 26-33
2	**Jan. 18**	MLK Day- no class		
	Jan. 20	Climate System	Systems	Ch. 3
	Jan. 22	Earth's Energy Balance- online		
3	Jan. 25	Earth's Energy Balance		
	Jan. 27	Earth's Energy Balance And Greenhouse Effect	Black Body Problem	
	Jan. 29	Forcing- online	Presentation topics	Ch.1: pp. 3-19
4	Feb. 1	Forcing/Atmospheric Circ	Up-goer 5 Challenge	Ch. 4
	Feb. 3	Atmospheric Circ	Atm Circ Problem	
	Feb. 5	Atmospheric Circ - online		
5	Feb. 8	EXAM 1 – online		
	Feb. 10	Surface Circ Lab	Pre lab	
	Feb. 12	Surface Ocean Circ-online		Ch.5: pp. 84-92
6	Feb. 15	Surface Ocean Circ	Team assessment due	
	Feb. 17	Surface/Deep Circ	Surface lab due	Ch. 5: pp. 96-106
	Feb. 19	Deep Ocean Circ - online		
7	Feb. 22	Deep Ocean Circ	Follow up	
	Feb. 24	Deep Ocean Circ		
	Feb. 26	Deep Ocean Circ - online		
8	Mar. 1	ENSO	Deep water lab due	Ch. 5: pp. 92-96
	Mar. 3	ENSO		
	Mar. 5	Oceanic Productivity - online		Ch.8: pp. 154-159
9	Mar. 8	Oceanic Productivity		
	Mar. 10	Carbon Cycle		Ch. 8: pp. 149-154
	Mar. 12	EXAM 2 – online		

10	Mar. 15	Carbon Cycle	Team assessment due	Ch. 8: pp. 159-173
	Mar. 17	Carbon Cycle		Ch.7: pp. 130-147 plate tectonics /rock cycle review
	Mar. 19	Carbon Cycle - online	CO2 uptake	
11	Mar. 22	Global Change		Ch. 15
	Mar. 24	RECHARGE DAY- no class		
	Mar. 26	Global Change - online		Ch. 16
12	Mar. 29	Global Change	Carbon calculator	
	Mar. 31	Global Change		
	Apr. 2	Paleoclimate - online	Position paper	Ch.12: 240-253
13	Apr. 5	Paleoclimate		Ch. 14
	Apr. 7	Paleoclimate		
	Apr. 9	Paleoclimate - online	Overview paper	
14	Apr. 12	EXAM 3 – online		
	Apr. 14	Stabilization Triangle - online		You need to be in class both days
	Apr. 16	Stabilization Triangle - online		Group presentation and worksheet
15	Apr. 19	Alt Energy Presentations* - online		
	Apr. 21	Alt Energy Presentations* - online	Team assessment due	

* 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

"online" indicates days the entire class will be online including the F2F section

Zoom link
https://ufl.zoom.us/j/97294321240?pwd=Nmd4Wmg0RzBSMU9uZmRQQUY3djNndz09
Password: Ocean!