

## Global Climate Change GLY 6075- Fall 2012

Ellen Martin [emartin@ufl.edu](mailto:emartin@ufl.edu)  
362 Williamson Hall; Office Hours- MW 3-4

**Objectives:** The goal of this course is to develop a historical perspective of the evolution of the Earth's climate system through geologic time, with a particular focus on the oceans. The oceans are a critical driver in the climate system. In addition, much of our understanding of past climate conditions is derived from marine materials. Initially we will study the processes that determine climate and the oceanographic tools (proxies) used to interpret past climates. Then we will study the geologic history of global change, with an emphasis on the development of the cryosphere in the Cenozoic, but covering the Precambrian to today. This is a huge field, and I am certainly not an expert on many aspects of the topics. I am hoping that others will share their expertise as we go along!

**Texts:**

Ruddiman, W.F. *Earth's Climate*, Freeman Press, second edition, 388p.  
Papers from the literature (available on e-learning)

**Course Plan:** The course will be made up of a mixture of standard lectures, group learning, literature discussions, and student presentations. I believe that we all learn material best when we are responsible for some of the learning and when we teach it to others. Therefore, for the proxies portion of the class we will break up into small groups and each group will be responsible for teaching the class about a particular proxy.

**Discussions:** We will have discussions on current literature throughout the semester to highlight specific topics. One student will be responsible for coordinating and leading each discussion. We typically cover ~2 papers per discussion. I have chosen the papers, but am open to suggestions if the leader has other ideas. All of the papers are available under 'resources' on the class website. The leader are responsible for introducing two thought-provoking questions one class prior to the discussion, and meeting with me the day before the discussion. Everyone else will be responsible for emailing me two additional questions about the papers by noon the day before the discussion; I will compile them and post them on the website. I will hand out additional information about leading discussions, but a few points to keep in mind are that the leader will be the expert on the papers (not me), but their role is to *lead* the discussion, which means everyone else must participate. The discussion leader will be evaluated by all of the participants in the class. I will also keep track of who participates in the discussion and that will be a component of your grade. This is a small class, so everyone needs to be involved. *Everyone is expected to do the reading, participate in the discussion, and evaluate the leader.*

**Exam:** Exams are useful tools for forcing people to review and synthesize material presented in class. The exams are generally composed of short essay questions. There will be a midterm exam (Oct. 8<sup>th</sup>) and a final exam (Dec. 3<sup>rd</sup>). Students in the past studied as a group and found that it really helped them pull together the concepts.

**Written Assignment:** The role of CO<sub>2</sub> in driving climate change is a major question in paleoclimatology. We will discuss this aspect of climate numerous times throughout the course. In order to encourage you to think about the role CO<sub>2</sub> plays, I will provide some papers and we will discuss possible coupling and decoupling mechanisms. You will then write a short paper on the topic supporting your opinion (1-2 page, double spaced paper,

due Oct. 29<sup>th</sup>). Please bring a printed version of the paper to class on the day it is due. I will not accept electronic versions.

**Proposals/Presentations:** Each student will write and present a proposal to do research on some aspect of global climate change. The format for the proposal will be similar to a standard NSF submission with a 10 pg limit (1.5 spacing) including figures, plus additional pages for references. The research proposals need to investigate a specific question or series of related questions. Each proposal will include a project summary, an introduction, the scientific background, the research plan, and the significance/objectives. You will not be responsible for budgetary or logistical constraints (for example, at this point it will not be important that your project would require 1 year of ship time and will involve drilling in the international waters of Liberia). The last few class periods will be set aside for 10 min. presentations of these proposals.

Research topics can come from class notes, journal articles, or your research interests. I would be happy to help you define a topic, but would suggest that you have some ideas before you come talk to me. I have no objection to topics that are closely related to your planned thesis research, but many thesis topics are developed by the advisor. I want you to present an idea that is your own. Therefore, it can be related to your thesis, but it must be distinct.

The plan is that you will submit your initial proposal midway through the semester, then you will revise it based on feedback from me and other students in the class and resubmit a few weeks later. Your final grade for the proposal will be based 50% on your initial grade and 50% on the grade for your revised version.

#### **Proposal/Research paper deadlines**

**Fri. Sept.7-** written statement of topic (1 paragraph)

**Fri. Sept. 21-** brief outline and list of at least 5 references

**Fri. Oct. 22-** first submission due, *bring 3 copies to class*- one for me and 2 for student reviewers

**Wed. Nov. 7-** Proposal reviews due

**Mon. Nov. 16-** Proposals returned

**Mon./Wed. Nov. 28/30-** Proposal presentations

**Fri. Nov. 30-** revised proposals due (submit one copy only)

**Critiques:** As a scientist, it is important that you learn to critically evaluate scientific ideas and presentations. Therefore, everyone will contribute to the evaluation process. This means you will be asked to fill out *constructive* evaluations for every discussion and presentation. In addition, each of you will be assigned to read and critique two proposals. As in standard proposal reviews, you will remain anonymous, but your comments will be passed on to the author of the proposal.

**Grading:**

Midterm	20%
CO <sub>2</sub> assignment	10%
Leading literature discussion	10%
Participating in discussions	5%
Final Exam	20%
Proposal/Presentation	25% (20/5%)
Evaluations	10%

(on discussions, presentations, proposals)

*Discussion and presentation evaluations will be due in my mailbox by 5:00 the day of the presentation.*

**Credit for each assignment will be reduced by 5% for each day the assignment is overdue.**

**Website:** The schedule I have presented for the class is only a tentative schedule. As interests and time dictate we may well digress. Revised schedules will be updated on the e-learning website for the course. My PowerPoint presentations from lectures, announcements about assignment, proposal and review information, and all of the lecture and discussion papers are also available on the sakai site.

**Additional Due Dates:**

Aug. 24	Choice of discussion topic
Sept. 24, 28/Oct. 1	Proxy presentations
Oct. 29	CO <sub>2</sub> written assignment due

**Grading Scale:**

<b>Percentage earned</b>	<b>93%-100%</b>	<b>90%-92%</b>	<b>87%-89%</b>	<b>83%-86%</b>	<b>80%-82%</b>	<b>77%-79%</b>	<b>73%-76%</b>	<b>70%-72%</b>	
<b>Letter Grade</b>	A	A-	B+	B	B-	C+	C	C-	Etc.
<b>GPA</b>	4.0	3.67	3.33	3.0	2.67	2.33	2.0	1.67	
<b>Equip</b>									

Below 60% = F (0 GPA)

**Conduct in Class**

- Please be courteous and do not talk during lecture. This can be distracting to other students and the instructor.
- Only approved electronic devices may be used in class. Approved electronic devices are laptop computers (when used to take notes or otherwise participate in classroom activities) and voice recording devices. Unapproved electronic devices include cell phones, video recorders, digital cameras and MP3 players.

**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, 392-1575, psychological and psychiatric services.
- Career Resource Center, Reitz Union, 392-1601, career and job search services.

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/>.

### **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>.

### **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.

### **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.

**Global Climate Change  
GLY 6075- Fall 2012  
Syllabus**

<b>Date</b>	<b>General Topic</b>	<b>Readings</b>
Aug. 22	Introduction and Logistics	
Aug. 24	The Climate System	R-Ch.1 (R1-Ch1) <b>Discussion requests</b>
Aug. 27	The Climate System	
Aug. 29	Earth's Energy Budget	R-online (R1-Ch2) www.whfreeman.com/ruddiman2e
Aug. 31	Atmosphere and Ocean Circulation	Intro Oceanography texts
Sept. 3	<b>LABOR DAY</b> - no class	
Sept. 5	Ocean Circulation	Visbeck, 2007; <b>Hand out proposal info</b>
Sept. 7	Ocean Circulation	<b>Proposal topics due</b>
Sept. 10	Climate modeling	R-Ch.2 (R1-Ch3) <a href="#">Hewitt et al., 2003</a>
Sept. 12	<i><b>Discussion-</b> Ocean conveyor and climate</i>	
Sept. 14	Carbon Cycle	R-Ch.3 and pp. 71-80 of Ch.4 (R1-Ch4 and 116-128 of Ch 5) <a href="#">Berner, 1999</a> ; <a href="#">Walker et al., 1981</a>
Sept. 17	Carbon Cycle	<b>Proxy choices</b>
Sept. 19	Proxies ( $\delta^{18}\text{O}$ and $\delta^{13}\text{C}$ )	R- Appendices 1 and 2 (R1- box 7-1, 11-1, but less info) <a href="#">Henderson, 2002</a>
Sept. 21	Proxy presentation preparation	<b>Proposal outline and refs due</b>
Sept. 24	Proxy presentations (temp)	
Sept. 26	Long term paleoclimate overview	R- pgs. 64-71 (R1 109-115)
Sept. 28	Proxy presentations (circ and weathering)	
Oct. 1	Proxy presentations (PCO <sub>2</sub> )	
Oct. 3	<i><b>Discussion-</b> Snowball Earth</i>	
Oct. 5	The Greenhouse World- Cretaceous	R- Ch5 (R1-Ch6) <a href="#">Friedrich et al., '11</a>
Oct. 8	MIDTERM	
Oct. 10	Cenozoic Climate History	R- Ch.6 (R1-Ch7, but modified) <a href="#">Zachos et al., '01</a>
Oct. 12	Orbital theory	R- Ch.7 (R1-Ch8) <a href="#">Raymo and Huybers, 2008</a>

Oct. 15	Paleogene Climate	Zachos et al., 2008
Oct. 17	Paleogene/Neogene Climate	Coxall et al., 2005
Oct. 19	<b>Discussion- PETM</b>	
Oct. 22	Neogene Climate	Raymo and Ruddiman, 1992; <b>Proposals due</b>
Oct. 24	Neogene Climate	
Oct. 26	<b>Discussion- Onset of NHG</b>	
Oct. 29	Pliocene Climate	CO <sub>2</sub> Assignment due
Oct. 31	Orbital Climate (Pleistocene)	R (9, 10) (R1- Ch.10 and 11)
Nov. 2	Orbital Climate (Pleistocene)	R (11) (R1-Ch12, but missing info) Sigman and Boyle, 2000
Nov. 5	Last Glacial Maximum	R- Ch. 12 (R1- Ch13)
Nov. 7	<b>Discussion- Orbital Variations</b>	<b>Proposal reviews due</b>
Nov. 9	<b>HOME COMING- no class</b>	
Nov. 12	<b>VETERAN'S DAY- no class</b>	
Nov. 14	Deglacial/Abrupt Climate Change	R- Ch. 13 (R1-Ch14) Rahmstorf, '02
Nov. 16	Abrupt Climate Change	R- Ch. 14 (R1-Ch15) Broecker, 2006 <b>Proposals returned</b>
Nov. 19	<b>Discussion- Glacial Terminations</b>	
Nov.21/23	<b>Thanksgiving</b>	
Nov. 26	Summary-Review	
Nov. 28	Presentations	
Nov. 30	Presentations	<b>Revised proposals due</b>
Dec. 3	EXAM	
Dec. 5	<b>No class</b>	

R- Ch. 1 = Ruddiman (2<sup>nd</sup> edition), Chapter 1; (R1-Ch1 = Ruddiman first edition, Ch. 1)  
 Online Energy chapter:  
[http://bcs.whfreeman.com/ruddiman2e/content/cat\\_010/EarthsClimate\\_Web\\_Chapter.pdf](http://bcs.whfreeman.com/ruddiman2e/content/cat_010/EarthsClimate_Web_Chapter.pdf)