Global Change Biology

PCB 6938-0001 – 3 credit hours

Monday, Wednesday 9:30-10:50
Health and Public Affairs 1 (HPA1) Rm. 207

Instructor: Dr. Lisa Chambers
Rm 439, Biological Sciences Bldg. (BIO)
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Office Hours: by appointment

Course Description: This 3 credit hour graduate-level course will examine the current knowledge of global climate change science- beginning with the physical basis, understanding uncertainty, and relationship between current trends and paleoclimate. Once a firm foundation is established in understanding the physical and chemical changes associate with climate change, the influence on biological systems will be discussed in detail with the help of primary-source literature. Enrolled students will determine the topics covered in the later part of the class based on relevance to their research interests, but anticipated topics include: physiological and evolutionary responses of organisms, shifts in range distributions of populations, impacts to carbon and nutrient cycling, changing disturbance regimes, impacts to biodiversity, future scenarios, and more. The course will conclude with a short section on effective communication climate change science to colleagues, the general public, and decision makers (managers/politicians).

Course Goals:

1. Develop a strong foundational knowledge in what global climate change is, what scientists know and don't know about climate change, and the role of modeling and uncertainty in climate predictions.
2. Understand the linkages between changes in the physical and chemical environment to changes in biological systems.
3. Become proficient in reading, interpreting, critiquing, and communicating original research related to climate change science.
4. Learn to apply knowledge about climate change to personal research interests, and be able to evaluate the potential role of climate change in observations, experiments, and models.
5. Practice effective communication of climate change science to diverse audiences.

Course Prerequisites: Graduate student standing in Department of Biology, Chemistry, Physics, Engineering, or related disciplines.

Required Text: No required text. The first half of the course will rely on the IPCC reports, select text book chapters, and journal article readings assigned by the instructor. The second

half of the course will involve reading peer-reviewed journal articles chosen by students in the class on topics of interest.

Webcourses: Copies of all required readings will be posted on Webcourses (PCB6938-17Spring 0001) at least 5 days in advance under 'Files.' Announcements and updates to the syllabus will also be visible on webcourses, as well as announced in class.

Performance Evaluation:

Midterm Exam	25%
Class presentation	30%
Final term paper (and assoc. milestones)	35%
Discussion & participation	10%
	Total = 100%

- The **Midterms Exam** will be an in-class or take-home essay exam after the completion of the first half of the class and will focus on testing the comprehension of the physical science basis of climate change.
- During the second half of the semester, each student will chose a topic of interest related to the biological impacts of global change. Each student will be responsible for giving an individual oral **class presentation** on that subject, as well as choosing 2 related scientific journal articles of the subject. The entire class will read the articles and the presenting student will provide an overview lecture on the topic (25-30 min) and lead a discussion on the articles.
- At the end of the semester, each student will submit a **final term paper** related to the subject chosen for the class presentation formatted like a journal article. The term paper will be 10+ pages in length, will include a minimum of 12 journal article references, as well as 1 original figure (map or graph) and 1 original table.
    - The topic of your individual project must be submitted by Jan. 25th
    - An annotated bibliography with at least 8 papers related to your topic is due Feb. 13th
- This course will rely heavily on in-class **discussion and participation**. Attendance is mandatory and students will be graded on their contribution to class discussions.

Grading Scale:

A	94-100%	B-	80-83%	D+	67-69%
A-	90-93%	C+	77-79%	D	64-66%
B+	87-89%	C	74-76%	D-	60-63%
B	84-86%	C-	70-73%	F	<60%

Class schedule (*tentative and subject to change*):

Week	Dates	Topic	Readings
1	Jan 9 & 11	Intro to climate change science	▪ IPCC Chapter 1 (Introduction)
2	Jan. 16 & 18	**No class Mon**; paleoclimate	▪ Climate Change Biology, Chapter 1 (The Paleorecord and Climate Reconstructions)
3	Jan 23 & 25	Greenhouse gases, temperature & extremes	▪ IPCC Chapter 2 (Atmosphere) ▪ Petit et al., 1999 ▪ Huber and Gulledge, 2011 ▪ **Project topic due Jan 25th**
4	Jan 30 & Feb 1	Carbon cycle; other biogeochemical cycles	▪ Biogeochemistry Chapter 11 (Global C Cycle) ▪ Ramanathan and Carmichael, 2008 ▪ Biogeochemistry Chapter 12 (Global N and P Cycle) ▪ Galloway et al., 2004
5	Feb 6 & 8	Oceans; Cryosphere	▪ IPCC Chapter 3 (Oceans) ▪ Orr et al., 2005 ▪ IPCC Chapter 4 (Cryosphere) ▪ Overpeck et al., 2006
6	Feb 13 & 15	Projections & uncertainty; Studying climate change	▪ **Annotated Bib. due Feb 13th** ▪ Climate Change Biology, Chapter 2 (Projecting Future Climates) ▪ IPCC Chapter 11 (Near-term projections) ▪ Climate Change Biology, Chapter 3 (Methods for Studying)
7	Feb 20 & 22	Review, catch-up, and **Midterm Exam Feb 22** (covers weeks 1-6)	
8	Feb 27 & Mar 1	Student presentations	Journal articles (chosen by presenters)
9	Mar 6 & 8	Student presentations	Journal articles (chosen by presenters)
10	Mar 13 & 15	**No class- spring break**	Journal articles (chosen by presenters)
11	Mar 20 & 22	Student presentations	Journal articles (chosen by presenters)
12	Mar 27 & 29	Student presentations	Journal articles (chosen by presenters)

13	Apr 3 & 5	Student presentations	Journal articles (chosen by presenters)
14	Apr 10 & 12	Student presentations; Communicating climate change science	▪ Lomborg, B. "The Skeptical Environmentalist" Ch. 2 (Why do we hear so much bad news?) ▪ Weber and Stern, 2011
15	Apr 17 & 19	Communicating climate change science; semester wrap-up	▪ **Term paper due April 19**