

BIOL 0630: Climate Change Effects of Climate Change on Biological Systems

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Virtual Office Hours: TBD – by appointment

Course Description

This course will review current research topics in the area of biological responses to climate change. Students will read, analyze, and discuss primary literature regarding how climate change affects various natural communities (e.g. tropical forests, coral reefs, fisheries, estuaries). Students will analyze raw data from the WDC for Paleoclimatology website (<http://www.ncdc.noaa.gov/paleo/data.html>) for the purposes of reviewing how past climate change has affected biological systems. Those data can be used to predict future global climate change implications. Students will be assessed on their contributions to class discussions and activities, summaries of primary literature, and a final paper.

Required Textbook

Lovejoy, T.E. and Hannah, L. 2005. Climate Change and Biodiversity. Yale University Press, 418 p.

Martin, M. et al. 2011. I'm With the Bears: Short stories from a damaged planet. Verso Publishers. 208 p.

Additional readings will be provided.

Course Objectives

After completing this course, the student will be able to:

- Describe the foundations of paleoecology as a science.
- Evaluate research in the field of paleoclimatology.
- Compare and contrast the effects of climate change on biological systems.
- Formulate ideas about the future of this science.

This course addresses criteria in NSTA Standard 1: Content and NSTA Standard 2: Nature of Science.

Course Requirements

1. Weekly Readings, Activities, and Discussions (60%)

Readings will be assigned in the course book as well as separate readings that will be posted online. Most readings are in the form of primary and secondary literature and therefore will take some time for interpretation. I encourage all students to spend time reading the articles and writing notes on each. Some readings will be given in part (e.g. interpreting a graph, reading the methods). In some cases, a half-page summary will be required.

Each week we will have an online discussion. Topics may be related to issues in the popular media, new scientific discoveries, or your readings.

Students should watch and critique the documentary, "An Inconvenient Truth". The online discussion will occur **during Week 5**, but your critique may be submitted at any time prior. In your critique, please comment on the following: (1) why was this film produced? (2) your expectations for the documentary and if they were fulfilled, (3) the scientific facts presented, (4) any misconceptions that are fostered in this film, and (5) your personal opinion on the effectiveness of the film. Be concise...quality not quantity!

2. Lesson Plan (15%)

As many of the students registered in this course are teachers, this assignment is included to make this course connect directly with your classroom. Students are required to write a full lesson plan using climate change as the over-arching theme. You should connect this lesson to the Next Generation Science Standards and the Common Core. You may write the lesson plan to fit the grade level you are currently teaching (or plan to teach). While outside sources may be used in this development, you should adapt those sources and cite them within your work.

Lesson plan should include the following sections (minimum): Title, Grade level, Objectives, Standards, Materials and Resources, Teacher Background, Procedures, Assessments

If you are not a teacher, please contact the instructor for an alternative assignment.

4. Cli-Fi module components (25%)

Cli-Fi describes the representation of climate science in fictional literature. We will be exposed to a variety of literature types in this course, including scientific literature, popular science, newspapers, and documentaries. We will investigate the representation of climate change science in short stories and rhetorically analyze those stories. Assignments related to this section of the course are worth 20% of the total course grade.

Policies and Procedures

Attendance online is mandatory and your grade will reflect the level of discussion that you provide each week. As with most courses, you should budget enough time for the “in class” credit hours as a 3-credit course, as well as at least that amount of time doing your assignments each week. Assignments are given on Day 1 (e.g. September 7) and due by the end of Day 7 (e.g. September 13). While this provides flexibility to your schedule, do not forget to budget the appropriate time to complete the work. University and DGCE grading procedures will be followed for all assignments.

Academic conduct policies can be found in your student handbook. All college policies and procedures will be strictly enforced. Please review the student requirements, especially those on plagiarism.

Any student enrolled in this course who has a disability should contact me as soon as possible so that we can arrange for the appropriate accommodations.

Date	Topic/Readings**
Week 0: September 2-6	Introduction to the course, online set-up, syllabus
Week 1: Sept. 7	<ul style="list-style-type: none"> • Data collection: SERC project (Sept. 8-10 ONLY) • Geological time scales and plate tectonics • What is climate change? Reading due: Ch.1-2
Week 2: Sept. 14	<ul style="list-style-type: none"> • Recent trends and modern evidence • Species changing their ranges Reading due: Ch. 3-5
Week 3: Sept. 21	<ul style="list-style-type: none"> • Paleorecords and proxies for climate change • Temperate Responses Reading due: Ch. 7-8
Week 4: Sept. 28	<ul style="list-style-type: none"> • The vulnerable tropics • Marine responses Reading due: Ch. 9,16
Week 5: Oct. 5	Inconvenient Truth...truth or hype?
Week 6: Oct. 12	<ul style="list-style-type: none"> • Range shifts • Dynamic models Reading due: Ch. 14-15
Week 7 Oct. 19	Freshwater ecosystems Reading due: Ch. 17
Week 8: Oct. 26	Evolutionary impacts of climate change Reading due: Ch. 12
Week 9: Nov. 2	<ul style="list-style-type: none"> • Lessons learned from the high Andes • Ice core records
Week 10: Nov.9	Cli-Fi – making your own climate graphs, connecting to data Reading due: TBD
Week 11: Nov.16	Cli-FI – Communicating Climate Change Reading due: TBD
Week 12: Nov.23	Cli-Fi – Read and analyze a short story Reading due: TBD
Week 13: Nov.30	Class presentations online Reading due: Ch. 19-20, 22, 24 (in part)
Week 14: Dec. 7	Lesson plans due; Course survey

**This schedule is tentative and may be changed at the instructor's discretion. Any changes will be announced during class or via email.*

***Readings in this course schedule refer to the Lovejoy and Hannah (2005) book. Other readings will also be provided.*