

BIOL450 Advanced Topics in Biology – Global Change Biology

Haverford College, Fall 2018

Dr. Jay Lunden

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Office: Sharpless 310

Office Hours: By appointment (or if my door is open, come by anytime)

Class Meeting Time & Location:

Tues Thurs 2:30-4:00p; Room TBA

Course Summary: This is a 7-week seminar course intended to introduce students to the study of the biological consequences of global climate change, from the individual to the ecosystem level. The course begins with a basic overview of key concepts that every member of society should understand with respect to the physical basis of climate change, and transitions to student-led presentations on primary literature within the field of global change biology. Throughout the course, students will be expected to engage in group discussions and be able to understand (sometimes) rather complex topics from the primary literature. This course depends on strong faculty-student interaction.

Learning Objectives

1. To identify [*and understand the basis of*] signatures of global change on Earth across multiple levels of biological organization
2. To understand connections between human activities and the structure and function of biological systems
3. To become acquainted with the methods and tools used for observing and predicting species' responses to global change
4. To become proficient with reading and discussing primary scientific articles within a new and growing field of research
5. To enhance your ability to effectively communicate issues related to climate change to other members of society

Readings: Class readings will primarily come from the primary literature – more information will be provided in the first class meeting. All course readings will be available through Moodle.

Assessment Methods: Your performance in the class will be based on the following assessment items:

- **Presentation & Discussion:** you will choose from a list of course topics to present on and lead a relevant, informed presentation and interactive discussion. Following background research on your topic with reference to published works, conduct a 25-minute minimum (time limit = 25-30 min) presentation outlining the major points of the topic with particular focus on the assigned readings

(including significant methodology, key results, and implications of the study to the field). The key to success for this component is to *synthesize* several ideas together within the topic at hand, and to then distill the information in a clear, cohesive, and digestible presentation. Following the presentation, you will lead a discussion of the topic using questions submitted by other students in the class. **It is your responsibility to engage members of the class and to bring them into the discussion; a good discussion leader doesn't necessarily need to be an expert on the topic, but does need to be able to ask questions, call on people to offer input, and facilitate dialogue between the participants.**

- **Discussion Questions:** for each student presentation (except the class session that you present in), write **two** discussion questions to help the presenter lead their discussion. Your discussion questions should be posted to the course Moodle site in the appropriate forum by 5pm the day before the class presentation (for example, questions for the Th Sept 13th presentation should be submitted by 5pm W Sept 12th).
 - **You do not have to submit discussion questions for the class session that you are presenting**
- **Debate:** This probably sounds more intimidating than it is meant to be – we will discuss positions surrounding major questions within the field of global change biology. We will have two teams for each question: a team to defend the position and a team to refute the position. Teams will consist of 2 students each. More information will be provided in Week 3 of the class.
 - **As part of this assignment, you will *independently* prepare a short write-up of your position of no more than 2 pages. This will be assessed independently from your partner. More information will be provided on the breakdown of this assignment in Week 3 of the course.**
- **Participation:** This one is the easiest grading metrics – have fun! Come to class prepared to interact and engage with the material and your classmates. Ask questions! Contribute to discussions and ask/answer questions from your peers. I am a very engaging professor, and I love a good discussion with positive vibes and intellectual exchange. Thus, there is a huge benefit to coming to class prepared, being engaged, and actively contributing to the class dynamic.

Evaluation: points are earned out of 500 total

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|--------------------------------|------------|
| Discussion Questions on Moodle | 50 points |
| Presentation | 200 points |
| Debate + write-up | 200 points |
| Engagement/Participation | 50 points |

Late assignment/exam policy: The penalty for turning a paper or assignment in late will be 10% of that particular assignment for missing the deadline and an additional 5% for each extra day that it is late.

Accommodations: Haverford College is committed to supporting the learning process for all students. Please contact me as soon as possible if you are having difficulties in the course. There are also many resources on campus available to you as a student, including the Office of Academic Resources (<https://www.haverford.edu/oar/>) and the Office of Access and Disabilities Services (<https://www.haverford.edu/ads/>). If you think you may need accommodations because of a disability, please contact Sherrie Borowsky, Coordinator of Accommodations, Office of Access and Disability Services at hc-ads@haverford.edu. If you have already been approved to receive academic accommodations and would like to request accommodations in this course because of a disability, please contact me privately at the beginning of the course (within the first two weeks if possible) and provide me with a copy of your verification letter.

Resources: For this class, I encourage you to use the resources of the College, including the science librarian (Carol Howe) and the OAR. Please see me if you have specific questions.

Cell phones, laptops, etc.: Please feel free to use a laptop to *take notes in class*. Please do not use your laptop to check e-mail, iMessages, Facebook, etc. except during breaks. **Furthermore, PLEASE put all cell phones/texting devices on silent AND AWAY during class (except for break times).** I expect that we all will be mutually respectful and present (mentally and physically); cell phones are a major distraction and ultimately both distract and detract from an open, academic environment.

Honor Code: The Haverford College Honor Code, as outlined in the Catalog and administered by the Honor Council, applies to all submitted work in this class. Students are encouraged to work together and discuss class material where appropriate. It is a requirement of the Honor Code for this course that you note the full name of working partners on each assignment. It is also a requirement that all submitted material is your own. You must acknowledge in writing any assistance you receive from the literature, other students, textbooks, internet, or any source but your professor. Any material presented in this course is the intellectual property of the professor (or identified sources) and cannot be reproduced or transmitted without explicit permission.

E-mail Policy: Electronic communication is an essential tool in today's world. Please be respectful while communicating via e-mail (these practices will serve you well as a working professional!).

Schedule

| Date | Topic | Reading | Biology Subfield* |
|------------|---------------------------------------|--|----------------------|
| T Sept 4 | NO CLASS – complete survey on Moodle | IPCC Summary for Policymakers 2013 | |
| Th Sept 6 | Intro to Course | | |
| T Sept 11 | Key Concepts in Global Change Biology | Buckley & Kingsolver 2012 ^φ | |
| Th Sept 13 | Biodiversity & Ecosystem Functioning | Fetzer et al. 2015 | Microbiology |
| T Sept 18 | Conservation paleobiology | Dietl & Flessa 2011 | Conservation biology |
| Th Sept 20 | Mass Extinction | Wake & Vredenburg 2008 | Zoology; mycology |
| T Sept 25 | Disease | Colon-Gonzalez et al. 2018 | Medicine/Health |
| Th Sept 27 | Phenology | Kearney et al. 2010 | Ethology/Behavior |
| T Oct 2 | Range Shifts | Verges et al. 2014 | Ecology |
| Th Oct 4 | Acclimatization I | Kenkel et al. 2017 | Physiology/Genomics |
| T Oct 9 | Acclimatization II | Ashander et al. 2016 | Computation/Genetics |
| Th Oct 11 | Adaptation | Hoffman & Sgro 2011 | Evolution |
| T Oct 23 | Debates I | | |
| Th Oct 25 | Debates II | | |

*In order to accommodate the diverse array of interests represented by the course participants, I've attempted to find a selection of papers that touches on various subfields within biology under a global change context. I've highlighted the particular subfield in this separate column for your reference. It is my hope that these papers show you that the study of climate change and its impacts on Earth's biota requires (and benefits from!) interdisciplinary effort.

^φThis is a long paper; keep in mind that there are no exams in this course so don't try to commit the paper to memory – rather, read in a manner that allows you to appreciate the different concepts presented in the paper; the topics will come up again throughout the course, so don't panic if there is a concept that you find challenging here.