

Global Change Ecology
Biology 494
Spring 2011

P. Kemp – ST 433 (x4074)
Office Hours: T, Th 11:30 – 1:30
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Prerequisites: Biol 190 or Biol 112

Course Overview

The purpose of this course is to provide a general introduction to important aspects of the changing global environment, and how these changes may directly or indirectly impact Earth's ecosystems and the organisms in them. Global change ecology encompasses an enormous range of scales, from processes that operate at, and bring about changes to the biosphere, to those that affect the behavior and responses of individual organisms. Global change ecology involves expanding our breadth of thinking and scientific approaches for dealing with the ecological problems associated with the large-scale human impacts. It often involves the integration of large data sets, building of complex models, accounting for uncertainties in assessments and predictions, and extrapolation beyond our historical observations. There is a consideration of the human dimensions of global change, not only as causal agents of environmental alteration, but as populations and societies affected by these changes.

Course Organization

We will first examine some of the basic principles and mechanisms that are most important in governing ecological processes at relatively large scales. These include examining how structure and function of ecological *communities* respond to changing environments. We also consider how *ecosystem*-level processes, such as biogeochemical cycles and ecological productivity, are disrupted by human activities. Next we will focus on some specific aspects/areas of global environmental change, including: 1) atmospheric changes resulting from various kinds of pollution, 2) global warming and other potential climate changes, 3) habitat destruction and degradation that leads to loss of biodiversity and sustainability of ecosystems and their critical ecological services, and 4) global change issues related to aquatic and marine ecosystems. In each of these focus areas, we examine the specific causes of global ecological change and some specific consequences of these changes. As part of our exploration of global change research, we will read and discuss current papers dealing with specific case studies. Finally, each student will pick a topic of interest and develop a 10-15 minute presentation that provides background for a specific global change case study and a brief overview of its ecological aspects.

Course Objectives & Learning Outcomes

- 1) Increase student understanding of **Ecology** of organisms, populations, communities, and ecosystems in response to environmental change; examine larger-scale ecological processes operating at the level of landscapes, seascapes, and the biosphere.
- 2) Provide case-study examples of global change processes that demonstrate the role of **experimentation** and **modeling** in making **science-based predictions**.
- 3) Provide a series of guided discussions of current literature to enable students to critically **evaluate scientific issues and evidence** associated with ecological processes and large-scale ecological change.
- 4) Foster individualized student understanding and communication of the **science** of global change through having them create a powerpoint/poster presentation to address specific global change ecology issue.
- 5) Identify, and differentiate between, the **science** aspects of global change processes and the **non-science** implications of these changes – i.e., the potential impacts upon human goods and services provided by the biosphere, and the political, economic, and management considerations that govern the human responses to these impacts.
- 6) Finally, the class will provide a forum for discussion of **implications** of the science of human driven global change upon human communities (including indigenous & impoverished peoples), and mechanisms by which we in the wealthy countries might attain appropriate responses and solutions to these global changes.

Course Schedule

<u>Date</u>	<u>Topic</u>	<u>*Readings</u>
Foundations		
Jan 26	Introduction to Global Change Ecology	National Geographic
Feb 2	Communities Structure & Dynamics	Chapter 16, 18
Feb 9	Human Impacts on Communities	Chapter 19
Feb 16	Ecosystem Productivity	Chapter 20
Feb 23	Ecosystem Biogeochemical Cycles	Chapter 21, 22
Mar 2	Human Intrusions in Biogeochem. Cycles	Chapter 2, 23
Mar 9	Exam 1	
<i>Mar 16</i>	<i>Spring Break</i>	
Focus on Global Change Issues		
Mar 23	Impacts of Atm./Climate Change	Papers for Discussion
Mar 30	Focus of Terrestrial Issues/Problems	Papers for Discussion
Apr 6	Impacts of Terrestrial Global Change	Papers for Discussion
Apr 13	Focus on Aquatic/Marine Issues/Problems	Papers for Discussion
Apr 20	Exam 2	
Student Presentations / Discussion		
Apr 27	Student Presentations & Discussion	
May 4	Student Presentations & Discussion	
<i>May 19</i>	<i>Final Exam (8:00 pm)</i>	

*Chapters are from the text *Elements of Ecology* by Robert and Thomas Smith (posted to the Class Web-CT).

Course Grading

We will have two mid-term exams (30% ea.) and a final exam (10%). These will constitute about 70% of your grade. The remaining 30% of your grade will be based on a presentation on the topic of your choice (20%), and participation in class discussions during the second half of the course (10%).

Medical emergencies that result in missing exams or discussion summaries will be dealt with on a case-by-case basis.