

Biology 5460 Plant Ecology in a Changing World

<http://ehleringer.net/bio5460.html>

Fall 2011

10:45 a.m. – 12:05 p.m.

Tuesdays and Thursdays

AEB 320

This lecture course is offered to undergraduate students interested in learning more about how climate systems, soils, biotic interactions, and humans impact plant species and plant communities. Like it or not, the world is changing. This course provides the foundation for understanding those changes and how plants will respond. All topics are considered from an evolutionary, functional, and global-change perspective. Lectures will span from molecules to ecosystems. Students will have downloadable PDFs of all lecture materials available before a lecture.

Instructor

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TA

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Office Hours

Mark Blonquist (ASB 440)

12:10-2:00 p.m. Tuesday, 9:00-11:00 a.m. Wednesday, or by appointment

Suzy Khachaturyan

By appointment

Course Objectives

The world is changing and so is the distribution of vegetation. Plants, plant communities, and ecosystems impact our lives in many ways. The objectives of this lecture are (a) to introduce you to basic concepts in ecology and plant distribution, (b) to teach you the basic mechanisms of plant adaptation to contrasting environmental conditions, and (c) to familiarize you with how humans impact vegetation at the landscape and regional scales. These objectives will be accomplished through lectures, discussions, reading assignments, slide presentations, and collaborative research assignments.

Your assignments require that you are familiar with computer programs for data analysis, word processing, and graphics preparation. You can access all of the course information through the home page (<http://ehleringer.net/bio5460.html>). Our objective here is to ensure that you are familiar with how to package, present store, and transfer information in this electronic age.

Course Texts

Ecoregions, Robert G. Bailey (chapters 1-7 are available on the course webpage)

Plant Physiological Ecology, Hans Lambers, F. Stuart Chapin III, and Thijs L. Pons

Both texts are recommended. There are no required texts for this class. These can be purchased through Amazon.com (direct links are found on course website) or checked out at the reserve desk at the Marriott Library, but are not available in the Bookstore.

Course Schedule

Date	#	Lecture (10:45-11:35)	#	Discussion (11:35-12:05)
I. Biomes and Climates of the World				
8/23	1.	Ecology, biodiversity, adaptation, and the environment	27.	Rio Mesa slide show
8/25	2.	Climate constrains plant distributions	28.	Library searches
8/30	3.	Biomes and climate relationships	29.	What is expected in your papers
9/1	4.	Desert and steppe ecosystems	30.	Desert vegetation slide show
9/6	5.	Grassland, savannah, and shrub ecosystems	31.	Grassland vegetation slide show
9/8	6.	Forest ecosystems	32.	Forest vegetation slide show
9/13	7.	Alpine and tundra ecosystems	33.	Tundra vegetation slide show
9/15		Examination 1		
II. Environment and Resource Capture				
9/20	8.	Microclimate – the biophysical environment	34.	Microclimate and energy computer models
9/22	9.	Microclimate – the biophysical environment	35.	Hanging gardens of Southern Utah slide show
9/27	10.	Plants exchange energy with their environment	36.	El Niño and La Niña patterns
9/29	11.	Water moves through the plant-soil atmosphere continuum	37.	Cheatgrass and the modern fire cycle
10/4	12.	Plants acquire nutrients via roots and microbes	38.	Natural wildfires should not be suppressed*
10/6	13.	Plants acquire carbon and energy through photosynthesis	39.	We should remove the dam at Glen Canyon*
10/11		Fall Break		
10/13		Fall Break		
10/18	14.	Photosynthesis adaptations and adjustments to changes in light and temperature	40.	Wolves should not be allowed to expand throughout the West*
10/20	15.	Environmental stresses limit resource capture and use	41.	SLC residents should be required to xeriscape*
III. Resource Utilization				
10/25	16.	Canopy and scaling processes integrate plant activities		
10/27	17.	Plant phenology and resource allocation to enhance performance	42.	We should constrain human atmospheric and waste inputs into the Great Salt Lake*

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| 11/1 | 18. | It's all about timing and provisioning: competition, life, history, and offspring | 43. | We should change grazing policies in Utah* |
| 11/3 | | Examination 2 | | |
| IV. Plant Responses to a Changing World | | | | |
| 11/8 | 19. | Urban ecosystems and land-use changes | 44. | Dust emissions from Utah's deserts are related to ecosystem health and drought* |
| 11/10 | 20. | Whether you admit it or not, global changes are occurring | 45. | We should control the spread of invasive weeds on public lands* |
| 11/15 | 21. | Atmospheric changes impact plant performance and evolution | 46. | We should take steps to protect the Wasatch forests from human impacts* |
| 11/17 | 22. | What advantage is there to variations in photosynthetic pathways? | 47. | The current global warming is natural* |
| 11/22 | 23. | Global carbon balance and terrestrial subsidies to anthropogenic emissions | 48. | We should reduce CO ₂ emissions* |
| 11/24 | | Thanksgiving Holiday | | |
| 11/29 | 24. | What are the characteristics of a serious invasive species? | 49. | Aquatic plant and animal species should have access to stream water before irrigation* |
| 12/1 | 25. | Restoration ecology – how do we put the system back together again? | 50. | Invasive aquatic species are a management problem in Utah* |
| 12/6 | 26. | Envision Utah – what the pioneers saw, what we see, and what our children will see | | |
| 12/8 | | Examination 3 due no later than Dec. 16 th at 12:30 p.m. | | *indicates a student-led debate |

Attendance Policy

Class attendance is expected but not required. Information may be provided in lecture that does not appear in handouts.

Assignments Policy

Assignments not turned in on time via email to the TA will be accepted up to the time that assignments are returned, but with points deducted. Assignments that are up to 24 hours late will be deducted 10 points; later than 24 hours will be deducted 20 points.

Examinations and Grading

Tests will primarily focus on problem solving and evaluation of experimental data. However, there will also be a few multiple choice and fill-in-the-blank for those who feel most comfortable with those testing approaches. They will be based primarily on the lectures, but you must be familiar with the assigned reading. Previous examinations will be available at the course home page. Examination 3 will be a take-home examination. There will be no regularly scheduled final exam.

Grading for the course

- 100 pts. Examination 1 (September 15)
- 100 pts. Vegetation of the Intermountain West Project (due October 6)

- 100 pts. Examination 2 (November 3)
- 100 pts. Warming and Climate Change Analysis Project (due December 1)
- 100 pts. Examination 3; take-home exam to be made available December 9 and can be turned in at any time up to the hour that the scheduled final exam is to end (December 16, 12:30 p.m.)
- 50 pts. Point-counterpoint debates to the class OR participate in the Utah vegetation and ecosystems online manual project (due December 1)

Grading (Approximate)

90-100% = A, 80-89% = B, 70-79% = C, 60-69% = D, <60% = F

The lowest of your 100-point exams will be dropped for grade calculations; there are a possible 450 points for the course.

Regrade Request Policy

Questions regarding grading will be considered only if received in writing, within one week of the day on which exams or homework are returned in class. Don't wait until the semester ends.

Course Drop Policy

The withdrawal policy is the same as the University policy described in the Class Schedule. Students may drop without penalty or permission up through September 1. In addition, students may withdraw without permission up through October 22, but will receive a "W" grade. Course withdrawal after this date is possible with permission of the instructor, but requires a significant medical or personal situation in order for the withdrawal to be approved.

ADA Information

The University seeks to provide equal access to its programs, services, and activities for people with disabilities. If you will need accommodation in this class, reasonable prior notice needs to be given to the instructor and to the Center for Disability Services, 162 Olpin Union Building, 801-581-5020 (V/TDD) to make arrangements for these accommodations.

Faculty Responsibilities

All students are expected to maintain professional behavior in the classroom setting, according to the Student Code, spelled out in the Student Handbook. Students have specific rights in the classroom as detailed in Article III of the Code. The Code also specifies proscribed conduct (Article XI) that involves cheating on tests, plagiarism, and/or collusion, as well as fraud, theft, etc. Students should read the Code carefully and know they are responsible for the content. According to Faculty Rules and Regulations, it is the faculty responsibility to enforce responsible classroom behaviors, and I will do so, beginning with verbal warnings and progressing to dismissal from class and a failing grade. Students have the right to appeal such action to the Student Behavior Committee.

"Offensive Material" Statement

This instructor does not grant accommodations to course content. Please review the syllabus carefully to see if the course is one that you are committed to taking.