BI 476/576: Terrestrial Ecosystem Ecology (W 2015)

Instructor: *Scott Bridgham*
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Office hours by appointment.

Text: *Principals of Terrestrial Ecosystem Ecology*, second edition, 2011, F. Stuart Chapin III, Pamela A. Matson, and Peter Vitousek, Springer.

Prerequisites: BI 370, Ecology

More fundamentally, I expect students going into this course to have a basic understanding of ecology, chemistry, geology, and physics.

Objectives and Class Mechanics

The objective of this class is to teach students the fundamentals of terrestrial ecosystem ecology, with an emphasis on the flux of nutrients, carbon, water, and energy in the environment and its interactions and consequences for organisms. The scale will range from the microbial to the global. My focus is on teaching the fundamentals of ecosystem ecology, the concepts of which can be easily transferred to any ecosystem, terrestrial or aquatic. However, these fundamentals are prerequisites for understanding the consequences and potential solutions of many of society's most pressing environmental problems. Thus, I will attempt to relate the concepts that we are discussing in class to current environmental problems as often as I can. There is a heavy emphasis in this class on how climate change has and will affect ecosystem function.

As opposed to most of ecology with its focus on relatively fuzzy theory, the basics of ecosystem ecology depends heavily on well-proven principles of chemistry, geology, hydrology, and physics. Thus, a significant component of ecosystem ecology is more aptly termed ***biogeochemistry***. Consequently, there is sizeable body of facts and details that must be learned to have a working knowledge of ecosystem ecology. Thus, the mechanics of the course will emphasize classroom lectures of often dense material delivered at a rapid pace via PowerPoint. It will require you to learn the details of the basic biogeochemical cycles. What you gain for this considerable effort, however, is a knowledge base that can be translated into any ecosystem and a multitude of environmental problems.

Detailed PowerPoint slides will be put on Blackboard at least 24 hours before lecture. I will also print them and give them as handouts before every lecture.

What this course is NOT

This course is not a natural history course of Northwestern terrestrial ecosystems. If you were expecting this (and still want it), you should drop the course now.

Learning Outcomes

- Become familiar with the cycles for water, energy, carbon, and nitrogen
- Know the basics of climate change, specifically what it is; the evidence for it in the past, present, and future; and how it may affect ecosystems
- Gain increased ability to critically read primary and secondary scientific articles

Grading Criteria

Students will be evaluated based upon a midterm, a final, summaries/questions pertaining to readings from the primary literature, a research proposal, and reviews of research proposals. The final exam is comprehensive but will emphasize material since the mid-term.

The best way to get a good grade in this course is come to class every day and take good notes, as tests are based solely on my lectures. While I will not ask questions on the tests from the text, it is excellent and will improve your understanding of the lectures (and hence grade on the tests).

All late assignments will be docked by one third letter grade per day they are late.

Attendance is mandatory and will be taken at the beginning of every class. After the third unexcused absence within a term, your grade will be reduced by one-third letter grade for each additional unexcused absence.

Grade Distribution

Midterm	30%
Final	30%
Reading Summaries/Questions	20%
Proposal	15%
Proposal Reviews	5%
	100%

The final is at 8 am on the Thursday of finals week. It is against university policy for me to give it before finals week. I will not allow students to take it earlier in finals week, so you need to plan your spring vacation accordingly.

Discussion of Primary Literature

An ability to read and comprehend the primary literature is a necessary skill for any scientist. The last ~ 45 minutes of most Thursday classes will be devoted to discussing a paper that will be assigned the previous week. Electronic copies of the papers will be put on Blackboard (http://blackboard.uoregon.edu). All students are required to read every assigned paper before the class in which it will be discussed and to hand in a 1-2 page, typed synopsis of the paper at the beginning of class. These should consist of (1) its main objectives/hypotheses, (2) major findings, (3) how well it met those objectives/hypotheses, (4) other considerations (methodological limitations, etc.), and (5) your personal reactions to it. Additionally, students must submit two questions on the paper(s) to the Discussion Board link within Blackboard ***by 8 a.m. the day of class***. You may substitute for questions about recent lectures or the tests. These questions will be used to guide the discussion of the papers.

Research Proposal and Proposal Reviews

Most graduate students (and many undergraduates) end up in professional positions where they need to write proposals for funding for some aspect of their job. Graduate students often also need to write proposal to fund their dissertation research.

This exercise is meant to give students experience in writing proposals and exposure to the typical manner in which proposals are evaluated.

Graduate students will write their proposal individually, while undergraduates will do it in teams of 3. If undergraduates have a preferred team, you need to have those names to me by Jan. 13th, after which I will randomly assign teams. The only limitation on the topic is that it must be ecosystem ecology. For graduate students who may have written previous proposals, this must be an original proposal but it may be on a topic related to your dissertation research. ***The proposals are due on March 3*** as a pdf document and will be placed on Blackboard so all class members can access them. The format will be similar to a proposal that is submitted to the National Science Foundation, if considerably briefer. See the accompanying document with specific requirements.

You will learn as much from reviewing another's proposal as from writing your own. It is also a valuable experience to see how proposal review panels actually work, so we are going to run a mock review panel that includes the entire class. ***All student will be required to write a one half to one page review of each proposal and grade it as excellent, very good, good, fair, or poor based upon the dual criteria of intellectual merit and broader impacts (see accompanying instructions)***. In the second half of the last two classes, we will form four or five review panels that include all students in the class. The author(s) of the proposal will be asked to leave the room while his/her proposal is being evaluated. Panels are very fast moving in reality and in this case, so the panels have about 10 minutes on average to evaluate a proposal. The panels must come to a consensus score for each proposal, and each proposal will be assigned a lead panel member from each panel who will lead the discussion of the proposal and write a summary (< 1 page) of the panel's evaluation of the proposal. Each student will be responsible for 1-2 of these summaries, and ***they must be sent via e-mail to me by the end of the next day***.

You should evaluate the proposals in a constructive and polite manner, but you also need to be honest . Base your scores about 75% on intellectual merit and 25% on broader impacts, which based on my experience is about how NSF panels and program managers actually weigh these two criteria. ***I will grade all students based upon the quality of their proposal reviews and the prompt return of the panel summaries. I will use my own judgment of the actual letter grade to give the proposals, but based upon past experience my judgment is usually reasonably close to the panel scores.***

Disabilities and Unexpected Crises

It is my goal to create an inclusive learning environment. Please notify me if there are aspects of this course that result in barriers to your participation. You may also wish to contact Disability Services in 164 Oregon Hall at 346-1155 or disabsrv@uoregon.edu.

In a more general sense, I realize that personal crises sometimes happen. If you are having problems that are interfering with your ability to do the work in this class, please let me know promptly. I am willing to make special arrangements when the need is real ***and*** when you have done your best to deal with the situation in a timely manner.

Classroom Conduct

You are expected to follow University rules and guidelines for behavior. ***Academic dishonesty***, which includes cheating and plagiarism, is a serious offense and will be treated according to the guidelines in the Student Conduct Code (see Office of Student Life website).

Plagiarism is the inclusion of someone else's product, words, ideas, or data as one's own work. When a student submits work for credit that includes the product, words, ideas, or data of others, the source must be acknowledged by the use of complete, accurate, and specific references, such as footnotes. Expectations may vary slightly among disciplines. By placing one's name on work submitted for credit, the student certifies the originality of all work not otherwise identified by appropriate acknowledgements. On written assignments, if verbatim statements are included, the statements must be enclosed by quotation marks or set off from regular text as indented extracts.

A student will avoid being charged with plagiarism if there is an acknowledgement of indebtedness. Indebtedness must be acknowledged whenever:

1. *one quotes another person's actual words or replicates all or part of another's product;*
2. *one uses another person's ideas, opinions, work, data, or theories, even if they are completely paraphrased in one's own words;*
3. *one borrows facts, statistics, or other illustrative materials--unless the information is common knowledge.* (UO Policy on Academic Dishonesty, http://tep.uoregon.edu/workshops/teachertraining/learnercentered/syllabus/academicdishonesty.html)

Date	Topic	Text
6 Jan.	Course Mechanics, The Ecosystem Concept	Ch. 1
8 Jan.	Energy Flux and Climate I	Ch. 2, Ch. 4
13 Jan.	Energy Flux and Climate II (members of proposal groups due to me)	
15 Jan.	Energy Flux and Climate III, *Discussion 1*	
20 Jan.	Soils	Ch. 3
22 Jan.	Water Flux I, *Discussion 2*	Ch. 4, pp. 403-407
27 Jan.	Water Flux II	
29 Jan.	Carbon Cycling--Global to Local, *Discussion 3*	pp. 407-415
3 Feb.	Photosynthesis I	Ch. 5
5 Feb.	Photosynthesis II, *Discussion 4*	
10 Feb.	**Mid-Term**	
12 Feb.	Ecosystem Production	Ch. 6
17 Feb.	Ecosystem Production	
19 Feb.	Decomposition I, *Discussion 5*	Ch. 7
24 Feb.	Decomposition II	
26 Feb.	Redox Chemistry and Nutrient/C Cycling I, *Discussion 6*	pp. 86-89, Chapter 9
3 Mar.	Redox Chemistry and Nutrient/C Cycling II (*Proposals due*)	
5 Mar.	Nitrogen Cycle I	pp. 414-417
10 Mar.	*Proposal Panel*	
12 Mar.	*Proposal Panel*	
19 Mar.	**FINAL EXAM, 8:00 AM**	