

SYLLABUS FOR GENERAL ECOLOGY - BOTANY/ZOOLOGY/FOREST & WILDLIFE ECOLOGY 460 Spring 2008

The intention of this course is to get you up to speed on what ecologists do, and why they do it. There are two major sets of ideas in this course and they pertain to the three main reading assignments. First it is important that you know how ecology started as a self-conscious discipline, and where it has been to arrive in its modern state. Therefore, we will have you read a large part of Real and Brown, "*Foundations of Ecology*." Second, you need to see where is the cutting edge of new ideas in ecology, and so you will read Allen and Hoekstra, "*Toward a Unified Ecology*."

Real and Brown (R&B) is a collection of 40 classic papers from the 1870s to 1970s. If I were choosing 40 classic papers, I would have chosen about half of the ones in this book anyway. About half the others I would probably have put in once someone reminded me they should be in there. There are about 10 papers that I think are missing from R&B. Given my approval of the inclusions stated above, it may be surprising that I do not particularly care for the way these papers have been arranged, and the rationale that this arrangement implies. While you will benefit from getting on top of my point of view, you clearly also need some moderating ideas that correspond to conventional wisdom. From Real and Brown, you will get a middle-of-the-road view of how the mainstream leaders in the field view ecology. In my opinion, the population viewpoint is taken to the exclusion of other profitable perspectives, and animal biologists are not only ignorant of the plant scientist's viewpoint, but they do not even know they are ignorant. Les Real and Jim Brown (Jim is a personal friend of mine) are animal population biologists, and it shows.

The next set of ideas comes from Henry Shugart's "*How the Earthquake Bird Got Its Name and other tales of an unbalanced nature*." This book is an engaging collection of essays that emphasizes the lack of equilibrium in ecological systems. Shugart weaves together many ecological principles as he explores the demise of the ivory-billed woodpecker and the success of the European rabbits that overtook Australia. This book is not fluff, as it is rich in principles of theoretical ecology. He shows us how to put together the ideas you will encounter in this class to describe and explain the dynamics of ecological systems.

The third set of ideas comes from Tim Allen, the Professor teaching this course. You will read, and the lectures will come from, his book: Allen and Hoekstra, "*Toward a Unified Ecology*" (plus papers in the course reader). This is a fairly new book with cutting-edge ideas in it (even my 1982 book is still cutting edge, so Allen and Hoekstra is definitely ahead of the curve). Ed Rykiel, a leading systems ecologist, told me he thought it was the most important book in ecology for the last 50 years; that seems a bit extreme, but it is synthetic in a powerful new way. As the name suggests, it covers ecology across the discipline. Ecologists are knowledgeable and clever, but in my experience they are not very thoughtful. My book is very thoughtful, and takes a hard look at how we know what we know. The book is very theoretical, but not particularly mathematical. While students normally resent lectures coming straight out of a book, my book is so challenging that you need the lectures to get on top of the abstractions. Read the chapter for the next day's class. Don't panic. Then the lecture will make sense in the light of the chapter, and the chapter makes sense in the light of the lecture.

The Professor:

Tim Allen is Professor of Botany. He has many teaching awards and deserves them (he is also a bit pompous and self-possessed). He is a theorist, but not particularly mathematical. He is known for his contributions to the theory of complex systems using hierarchy theory. His views in ecology used to be controversial, but they are now accepted as important, if peculiar, as a result of his three books on issues of scaling in ecology.

He was trained in the 1960's by John Harper (the Darwinian Approach .. article R&B) at University College North Wales, Bangor, when that was one of the powerhouses of ecology in Europe. His presentations are always packed at the Ecological Society of America meetings. Many people would give a lot to get the series of lectures you are about to have. In more conventional terms, he is a community ecologist turned systems ecologist, and has papers on algae, forests, prairies, simulations, data analysis and ecological management. He has worked with scientists at Oak Ridge National Lab, the International Joint Commission (they address the US/Canada border), and the United States Forest Service.

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There is nothing, and I mean **NOTHING**, so important for you to call me at home for administrative reasons or points of ecological information (a social call to Sunday brunch might be something else, except I have three active children, and refuse most invitations).

The Teaching Assistants: Both TAs are experienced at teaching, really enjoy teaching ecology, and are enthusiastic about the unique point of view presented by this course.

Nissa Enos is a graduate student of Professor Allen in the Department of Botany. She is interested in developing theory about systems complexity and more specifically hierarchy theory. She is also keeping an eye out for botanical field/lab research endeavors, such as prairie restoration, to illustrate how addressing complexity is critical for understanding material biological systems.

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Kate Forbes is a graduate student of Professor Ives in the Department of Zoology. She is a population biologist, primarily focused on studies of insects. In addition to writing a thesis on the natural history of lady beetles in Wisconsin, she has also studied the dispersal of spiny seeds, the spread of chronic wasting disease, and the way in which dispersal structures zooplankton communities. In the future, she hopes to use computer models and population studies to understand the control of mosquitos and other insects of medical concern.

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The Laboratory Coordinator

Susan Will-Wolf is a Faculty Associate and Senior Scientist in the department of Botany. She is a community ecologist specializing in forest communities, lichen ecology, and biomonitoring methods, with forays into prairie and savanna ecology. She uses lichens to monitor forest ecosystem "health" across the USA (US Forest Service). Her favorite research spots are the Big Badlands of South Dakota and the Baraboo Hills of Wisconsin. She received her Ph.D. in Botany and Zoology from UW-Madison with Edward W. Beals, one of the professors who originated this course. She has taught and organized labs in Ecology 460 for several years; now most of her work is behind the scenes. She'll be attending lectures, is the person to ask for administrative help, and loves to talk ecology. She's participated regularly in Professor Allen's weekly "sandbox" lunch discussions over the years.

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Office: 317 Birge Hall. Office hours: 1:30-2:30 W, or by appointment.

Making Contact:

The best way to contact the TAs or inform the staff of something important is by email. In a pinch call and leave a message on an office answering machine. None of us wants to be called at home for course-related business.

Class web sites: The course public web site is <<http://botit.botany.wisc.edu/courses/460/>> click on Allen or Current Semester. For day-to-day course-related postings during the semester, visit the course site [Learn@UW](#).

Course grade is: the 100% sum of all the following parts:

- a) Final Exam = 25%
- b) The better midterm = 25%. The weaker midterm = 10%.
- c) **Lab/discussion** (participation 35%, lead paper discussion 5%, 2 essay sets each 30% of lab grade) vs. **term paper:** better grade = 20% / weaker = 15%.
- d) Classic paper review = 5%

See. We are nice guys, letting your best performance count most on b) and c)

Lab/Discussion Meets: 1:20 - 5:25 in **Birge 101**. Timing of the 1-hour discussion varies by week.

Course Requirements: 3 lecture exams, 1 term paper, 1 classic paper review, lead 1 paper discussion, 2 laboratory take-home essay sets, attendance and participation in laboratory and discussion section.

- 1) There are three lecture exams. They are cumulative, but focused on material since the last test. We have learned over the years that exams in class, not in the evening, get the 100% attendance that we require. You have scheduled to be in this class, so you must be there.

There are no make-up exams for you to take. The only excuse that works after the fact is: "I was in a coma." In one of my courses recently someone really did have encephalitis. This class fills up and we have turned away students, so if you cannot make one of the scheduled exams, make room for someone who can. This goes for the final as well. Excuses that are inadequate are: "My sister's wedding is ..." or "My father bought me a non-refundable airline ticket" - Sorry, but tough luck, Dad.

The first two exams will include about 20 multiple choice questions and two mini-essays. The third (final) exam will have more multiple choice questions and two, more integrative essay questions. There is much foolish snobbery against multiple choice tests, but they actually do give a good measure of your understanding. The challenge is writing good questions, and we do.

- 2) A seven-page term paper is required. See Learn@UW 460 web site for detailed instructions.
- 3) Pick one of the classic papers in R&B, and write a 2-4 page essay critiquing it - see below.
- 4) The lab/discussion grade is based on attendance, discussion participation (see item 5), and preparation of two laboratory take-home essay sets. While we do not want to grade on personality, your TA will assess your contribution to discussion. We generally do not grade on effort alone, but the discussion grade is based importantly on effort. Lab and discussion participation are graded as either: minus, zero, or plus. Your turn at leading a paper discussion will be graded on a 20-point scale. The two lab take-home essay sets will each be graded on a 100-point scale. A combined letter grade will be assigned for lab and discussion based on up to 220 points. The combined grade is then adjusted based on lab and discussion participation: down half a grade for minus, up half a grade for plus, and is left alone for zero. This generates your final lab/discussion grade.
- 5) In Discussion, students will sign up to discuss selected R&B papers (10-15 min. each) and how they relate to A&H's organization. In addition, students will be asked at random to relate all the papers of the week to R&B's and A&H's organizational schemes. This will be part of your discussion grade, so be prepared each week to do this. You get one "I pass" on a paper for the whole semester. When on number two you don't know enough to comment, we hold that against you.
- 6) Type or word-process all written assignments.
- 7) Lab/Discussion attendance is mandatory. TAs will take attendance.

Required Reading

- 1) Allen & Hoekstra - *Toward a Unified Ecology*. This is a central course text written by Allen and Hoekstra (labeled A&H in lecture schedule).
- 2) Real & Brown - *Foundations of Ecology*. On the lecture schedule, the numbers following "R&B" refer to the number given to the paper in their table of contents. Bring R&B to lab/discussion. Of course we do not expect you to read all 903 pages of all the classic papers in great detail, but at the very least, learn how to skim a paper for what matters (Abstract or Introduction, Conclusions, Figures, and Tables). But remember that these are classic papers and represent a great opportunity. No, you do not have to work through all the equations, although sometimes they really help, and may be the substance of it. Some papers, like Bray & Curtis, you read right through. Err on the side of reading more than you think we require, and understand the graphs. You are responsible for the readings as listed by number before the exam in the schedule.
- 3) Additional papers to read for Ecology 460. These additional papers relate to lecture or to lab. They are listed by authors in the "READ" column when they are needed. They are available online - through "My UW/Academics/Library Reserves/Botany."

- 4) Shugart - *How the Earthquake Bird Got Its Name*. You are required to complete reading this book by February 25. Examples from this book will recur in class and it is fair game for exam questions.
- 5) Laboratory manual for Ecology 460. Available for \$5.30 at ASM StudentPrint, B114 Memorial Union (near Hoofers, and the Rathskellar). Phone 262-6216, Hours Monday-Friday 9:30 am - 6:30 pm. It includes information for writing assignments, discussion aids, tree identification aids, and laboratory exercises. You should bring it to every lab/discussion session, and read in advance the lab exercise for that week.

Classic Paper Review

Due Monday, March 24 at the **beginning** of lecture. Minimum 2 pages and maximum 4 pages. We do not wish to have you miss lecture while finishing an assignment. Therefore, we fix it so that there is no point in you finishing your assignment in lecture, because we simply do not accept any work after I start lecturing. There is a box, and it get sealed as I start the lecture. If yours is not in there, it is late, and you might as well have skipped doing it. Please don't beg because, while we will be jerks, we don't like doing it. Late busses, doctor's appointment that went on too long, or traffic are not accepted as an excuse..

This should be basically a written version of what we are doing orally in lab/discussion. Choose one of the Real & Brown papers assigned as class reading. Summarize, but also be critical. Being critical may involve telling why a paper is particularly good or historic. What happened after it was published? When and why did it gain its reputation as a classic? Criticize weak points, or explain why the ideas may be dated now. It's most important to come up with your own analysis.

You may want to read interpretations by others and see if you agree. For example, (1) see the section essays in Real and Brown, (2) look in the authors cited section to see if Allen and Hoekstra discuss it, or (3) see how the classic work is interpreted in any other standard ecology textbook. Whichever of these or other strategies you follow, it's likely that you will need a brief list of "literature cited."

Laboratory Take-Home Essays (see laboratory manual)

First essay set due Friday, March 14 at the beginning of lecture.

Second essay set due Monday, April 21 at the beginning of lecture.

Term Paper

Due Monday, April 7 at the beginning of lecture. The class web site at Learn@UW has detailed instructions for the term paper.

Deadlines

We are very firm on deadlines. The real world out there does not listen to excuses, so we view it as part of your education to be absolutely firm on deadlines. There are two sorts of people — those with reasons, and those with results. Perhaps all of you are results people; certainly most of you are. Results people have family issues too, but I don't hear about them. People with bad reasons can be convinced that what they really need to do is get us a copy of the paper in whatever form it is available. People with good reasons are more of a problem than those with bad reasons, because people with real dead grannies have not yet got as far as bad reasons, so they are more stubborn. Your latest rough draft is a lot better than nothing. **Late assignments are not accepted.** "My word processor broke down," is no excuse. Therefore, it is smart to have a draft in your hand a week early that you could hand in if you must, because your computer broke and the dog ate your final draft (dogs really do things like that — my dog once ate my passport, and I felt like a naughty schoolboy when I had to get a new one). On the other hand we have no problem at all **accepting an assignment early**, if you know you will not be in lecture on the day the assignment is due. You can arrange with your TA or the lab coordinator (NOT Professor Allen) to check their Birge Hall mailbox before lecture to receive your assignment on time - but be sure to tell us it is coming. An assignment one of us finds in our mailbox after lecture counts as late.

BOTANY/ZOOLOGY/FOREST & WILDLIFE ECOLOGY 460 - SPRING 2008

Lecture: 11:00 am MWF in B302 Birge

Lab/discussion: 1:20-5:25 pm M, T, W or R in 101 Birge

DATE	LECTURE TITLE	READ	DISCUSSION/LAB	WRITING ASSIGNMENTS
W Jan 23	Introduction	A&H Intro	No lab this week; pay \$20 lab fee in 132 Birge by March 14.	
F Jan 25	Observation	A&H Ch. 1 Allen, Tainter, Pires, Hoekstra		
M Jan 28	Ecological Narratives	A&H Ch. 2	Orientation #Set up experiments: microcosms seed boxes	
W Jan 30	Scale	R&B 1,2 Allen, Havlicek, Norman		
F Feb 1	Historical Setting			
M Feb 4	Landscape	R&B 15,31,36,39 Shugart - read by EXAM 1	#Sampling I Theory	
W Feb 6	Landscape			
F Feb 8	Landscape	Greig-Smith	Observe Microcosms	
M Feb 11	Landscape	A&H Ch. 3 R&B 7,27 Gardner et.al. (1987, 1989)	#Landscape ecology: Landscape pattern Animal movement	
W Feb 13	Landscape			
F Feb 15	Ecosystem			
M Feb 18	Ecosystem	R&B 38,40 Van Voris et.al. Schneider & Kay	Sampling II * Field	Declare term paper topic; submit outline before Ex1 if not on posted list.
W Feb 20	Ecosystem			
F Feb 22	Ecosystem	Curtis & McIntosh	Observe Microcosms	
M Feb 25	EXAM 1	A&H Ch. 4 R&B 3,4,16 Allen	Winter Birds I Observation *~Field-Picnic Point	
W Feb 27	Community			
F Feb 29	Community			
M Mar 3	Community	R&B 9,17,26,32 Allen, Mitman & Hoekstra	#Winter Birds II Analysis	Lab take-home essay set 1 handed out in lecture March 7.
W Mar 5	Community			
F Mar 7	Community			
M Mar 10	Organisms	A&H Ch. 5 R&B 19, 20,25,34	#Ordination	Lab take-home essay set 1 due in lecture Mar 14.
W Mar 12	Organisms			
F Mar 14	Organisms			

M Mar 17	SPRING BREAK			
W Mar 19	SPRING BREAK			
F Mar 21	SPRING BREAK			
M Mar 24	Organisms	R&B 6,13	#Optimal Foraging Models	Classic paper review due in lecture Mar 24
W Mar 26	Organisms		Observe Microcosms	
F Mar 28	Organisms			
M Mar 31	EXAM 2	A&H Ch. 6 R&B 11,19,28	#Seed box analysis	
W Apr 2	Population	Harper et.al.	Observe Microcosms	
F Apr 4	Population	Harper & Benton		
M Apr 7	Population	A&H Ch. 7 R&B 24,35	#Population models & demography	Term paper due in lecture Apr 7
W Apr 9	Population		Evaluate microcosms	
F Apr 11	Population			
M Apr 14	Biomes	R&B 18,30	#Leaf litter Invertebrates *Field	Lab take-home essay set 2 handed out in lecture Apr 14
W Apr 16	Biomes			
F Apr 18	Global Ecology			
M Apr 21	Applied vs. Basic	A&H Ch. 8, 9	Arboretum *~Field Trip	Lab take-home essay set 2 due in lecture Apr 21
W Apr 23	Resources			
F Apr 25	Resources			
M Apr 28	Resources		Abrahams Woods *Field Trip	
W Apr 30	Resources			
F May 2	Restoration Ecology			
M May 5	Soft Systems Management		Hemlock Draw *Field Trip	
W May 7	Stability & Discontinuity			
F May 9	Conclusion			

FINAL EXAM: Sunday, May 11, 2008 12:25PM

#Bring a calculator to this lab.

*Outdoors lab: dress appropriately in layers including hat, gloves, windbreaker layer, and snow boots for early labs; long pants, rain gear if predicted, and closed-toe walking shoes/boots for labs at end of semester. Bring insect repellent for later labs if you want it.

~YOU ARE RESPONSIBLE FOR GETTING YOURSELF TO PICNIC POINT OR TO THE ARBORETUM FOR THESE LABS.