Integrative Biology 153: Population and Community Ecology, Fall 2014
Location TBA

Instructors: Mary Power, Office: VLSB 4184
Office hours: Tuesday, 3:30-4:30, Thursday 3:30-4, or by appointment.
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Text: Cain, Bowman and Hacker (2014) *Ecology, 3rd edition*
Times: Lecture Tu Th 2-3:30 pm
Location: 20 Barrows Hall
Sections: TBA

Web sites: course web site on bspace (available to all enrolled and waitlisted students) textbook website: http://www.sinauer.com/ecology/index.html
Objectives: This class provides a general introduction to the scientific study of Ecology. The primary objective of this class is to teach you how ecologists learn about the world, and how to pose questions, interpret the results of ecological research, and use evidence to debate ecological issues confronting society.
Ecology is the study of factors that determine the distribution and abundance of organisms on Earth. These factors include the traits of individual organisms that determine, in various environments, their performances and therefore the structure, dynamics, distributions and abundances of their populations. Ecological performances (rates of growth, feeding, movement, survival, reproduction) are constrained diverse environmental factors, but also by interactions with other organisms of the same or different species. Interactions of organisms and their environments strongly influence larger ecosystem patterns of energy flow and material cycling, transfer, transformation, and storage over the face of the Earth. We will consider all of these levels of organization, over scales that range from individual organisms through landscapes to the entire planet Earth. In each section, we will cover fundamental principles, illustrate them with many empirical examples, and discuss applications of ecological science to problems in agriculture, medicine and public health, forestry, fisheries, conservation, and global change biology. Topics will include quantitative approaches relying on algebra, graphical analysis, and elementary calculus. Discussion sections will review primary research as well as key synthesis papers in ecology.
Requirements: Attendance at lecture; participation in a section (including reading and developing three questions for one reading per week); one problem set; participation in a class debate; one midterm and a final exam, which will cover material from the whole course.

Assignments, Due Dates and Grading

1) There will be one quantitative problem set on life tables and population growth. It will be assigned on Sept. 18, and due Sept. 30, in class.

2) Participation in a class debate on a topic of ecological importance. This will require researching and formulating arguments, pro and con, for an issue in ecology. Some discussion sections will be devoted to debate preparation. Detailed instructions will be provided after the midterm.

3) The midterm will be held in class, Tuesday Oct. 21. It will consist of three sections: 1. Brief definitions or compare/contrast of terms; 2. Short answer questions; 3. Solving a quantitative problem, involving performing a simple calculation; and 4) interpreting graphs.

4) The final (Tuesday, December 16, 2014 8-11 am) will be similar in format to the midterm, but will also require a short essay written to answer a choice among 3-4 longer, synthesis questions. It will be comprehensive, but will emphasize material since the midterm.

5) Emily and Hiromi will discuss section requirements further. For some sections, you will read a paper and prepare three questions in advance of section about the paper. These questions can scrutinize the authors' conclusions, data, or methods, or go beyond the paper to inquire about implications of the findings or how to advance further research on the topic. Other sections will help you prepare to debate an issue in ecology that you will help to choose.

Date	**Topic**	**Readings in Cain, Bowman and Hacker***
		*Entire chapter, unless specific pages are listed.
Aug 28	Introduction, overview and approaches to ecology	Ch 1
Sept 2	Biophysical and eco-physiological controls	Ch 2,4
Sept 4	Controls of distribution and abundance	Ch 3,4,9
Sept 9	Energy sources for organisms	Ch 5
Spider D&A hypotheses (HU, EO)		
Sept 11	Foraging and resource tracking	Ch 8
Sept 16	Population structure and regulation	Ch 9,10
Spider natural history paper and tests of hypotheses (HU)		
Sept 18	Population dynamics	Ch 10,11
Sept 23	Life histories, dispersal and migration (HU)	Ch 7,9
Demography exercise (EO)		
Sept 25	Interspecific competition	Ch 12
Sept 30	Herbivory and predation	Ch 13
Paper on interactions—disease papers (EO)		
Oct 2	Parasitism and disease	Ch 14
Oct 7	Mutualisms, detritivory and commensalism	Ch 15
Paper on interactions-facilitations, interaction strength (HU)		
Oct 9	Community structure and dynamics	Ch 16
Oct 14	Interaction strengths, context dependence	Ch 16
Review of material (EO, HU)		
Oct 16	Disturbance, succession	Ch 17
Oct 21	**MIDTERM** (up to and including Oct. 16)	
Oct 23	Alternative (stable?) states	Ch 17
Oct 28	Biogeography and invasions	Ch 18, 23
Prepare for debate (EO)		
Oct 30	Controls and consequences of species diversity	Ch 19

Nov 4	Debate (Monday sections)	
Prepare for debate (HU)		
Nov 6	Debate (Wed sections)	
Nov 11	Holiday	
Energy policy paper (EO)		
Nov 13	Energy flow	Ch 20,21
Nov 18	Material cycling	Ch 21,22
Zimov and Chapin (EO)		
Nov 20	Evolution, extinction and macro-ecology (EO)	Ch 6, 23
Nov 25	Landscape ecology	Ch 24
No sections		
Nov 27	Thanksgiving Holiday	
Dec 2	Ecology of global change	Ch 25
(Review HU, EO)		
Dec 4	Review (MP, HU, EO)	

Course requirements:

Demography problem set: 5 points (due Sep 30)
Midterm: 20 points (Oct 21)
Debate participation: 20 points
General section participation: 25 points
Final: 30 points