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Principles of Ecology (BIOS 805)

Spring 2011
Instructor: Chad Brassil (cbrassil2@unl.edu, 419-0076, Manter 416)
Lectures: Manter Rm 203, TR 8:30 AM – 10:20 AM, March 3 – April 28, 2011
Credits: 2

Objectives

The objective of this course is to train participants to think like an Ecologist at the graduate level. This includes skills such as 1) searching out **background material** to understand current research topics, 2) critically reading the **current literature**, 3) developing and testing **hypotheses** from an understanding of the theoretical and empirical literature in ecology. These skills rely on tools such as textbook chapters in foundational ecology, papers published in top-tier journals, and the programming tool Mathematica. Students will not attain mastery of any of these skills or tools through this course alone, but the course will set students on the path toward self-mastery.

The course is designed for those graduate students both whose research is in ecology, narrowly defined, and for those whose research is in areas of ecology, evolution, and behavior broadly defined.

Prerequisites

There are no formal course prerequisites for this course. However, the course will utilize quantitative skills to examine the theoretical literature in ecology, which would be well-served by a background in basic calculus. Skills in computer programming would assist in the exploration of the theoretical literature; however, no prior computer programming skills are required. Similarly, an undergraduate level course in ecology would assist in transitioning participants toward the objectives of this course; however, no prior ecology course is required.

Disability Assistance

Students with disabilities are encouraged to contact the instructor for a confidential discussion of their individual needs for academic accommodation. It is the policy of the University of Nebraska-Lincoln to provide flexible and individualized accommodation to students with documented disabilities that may affect their ability to fully participate in course activities or to meet course requirements. To receive accommodation services, students must be registered with the Services for Students with Disabilities (SSD) office, 132 Canfield Administration, 472-3787 voice or TTY.

Texts

Text 1 (required)

Karban, Richad, and Mikaela Huntzinger. 2006. How to Do Ecology. Princeton University Press, Princeton. ISBN 0-691-12577-5.

Computer Program (required access, purchase is recommended)

Mathematica 7. Mathematic for Students: Semester Edition ($45), or Mathematica for Students Standard Edition ($140). <http://www.wolfram.com/products/student/mathforstudents/licenses.html>.

Available text in my lab (417 Manter)

Hoste, Jim. 2009. Mathematica Demystified. McGraw Hill, New York.

Reprints

We will read 3 chapters from textbooks and 7 or more papers recently published in major ecological journals. Electronic copies will be made available to participants.

Lectures

Lecture is a bit of misnomer in that classes will consist of primarily of discussion. The instructor will guide participants through an understanding of the material primarily by asking questions. This structure will facilitate participants in accomplishing the main objectives of this course.

Day	Date	Area	Activity	Topic	Readings	Due
Thu	3-Mar		Lecture & Workshop	Introduction to Mathematica		
Tue	8-Mar		Discuss Book	How to Do Ecology	Karban and Huntzinger, 1-132	
Thu	10-Mar	Population	Discuss Chapter & Review Paper	Population Growth Rate & Alee Effects	Ricklefs and Miller. 2000. Ecology, 4th. 298-301,314-328. Taylor and Hastings. 2005. Ecology Letters. 8:895-908.	
Tue	15-Mar	Population	Discuss Empirical Paper & Classic Paper	Allee Effects	Kramer el al. 2008 Ecology. 89:2760-2769. Odum and Allee. 1954. Ecology. 35:95-97.	Paper Critique on Kramer
Thu	17-Mar	Population	Discuss Theoretical Paper	Derivation of mating Allee Effect	Calabrese and Fagan. 2004. Am Nat. 164:25-37.	

Tue	22-Mar			NO CLASS		
Thu	24-Mar			NO CLASS		
Tue	29-Mar	Population	Theory Workshop			Theory Summary
Thu	31-Mar	Community	Discuss Chapter & Review Paper	Competition, Niches, Diversity & Invasibility	Morin. 1999. Community Ecology. 29-66. Fridley et al. 2007. Ecology. 88:3-17.	
Tue	5-Apr	Community	Discuss Empirical Paper & Classic Paper	Diversity & Invasibility	Gilbert et al. 2009. Am Nat. 174:850-862. Elton. 1958. The Ecology of Invasions. 143-153.	Paper Critique on Gilbert
Thu	7-Apr	Community	Discuss Theoretical Paper	Diversity & Invasibility	Byers and Noonburg. 2003. Ecology. 84:1428-1433.	
Tue	12-Apr	Community	Theory Workshop	Diversity & Invasibility		Theory Summary
Thu	14-Apr	Ecosystem	Discuss Chapter & Review Paper	Ecosystem Turnover & Regulation	Ricklefs and Miller. 2000. Ecology, 4th. 214-217,251-268. Schmitz. 2008. Annu Rev Eco Evol Syst. 39:133-152	
Tue	19-Apr	Ecosystem	Discuss Empirical Paper & Classic Paper	Herbivory & nutrient fluxes	Stadler et al. 2006. Ecology. 87:1792-1804. Vitousek. 1990. Oikos. 57:7-13.	Paper Critique on Stadler
Thu	21-Apr	Ecosystem	Discuss Theoretical Paper	Consumers' role in producer/ decomp. webs	Loreau. 1995. AmNat. 145: 22-42.	
Tue	26-Apr	Ecosystem	Theory Workshop	Consumers' role in producer/ decomp. webs		Theory Summary
Thu	28-Apr			Topic chosen by students	Paper TBA	

Assignments

In each major area, i.e. population, community, and ecosystem ecology, participants will submit a one-page written assignment analyzing, or critiquing, the objectives and contributions of a published paper. Also in the each major area, participants will submit a one-page summary assessing your progress in understanding the theory of a published paper (partially through replicating that theory). In total, this amounts to 6 short writing assignments.

Exams

At the end of each major area, i.e. population, community, and ecosystem ecology, there will be a take-home, open-book exam. Students will have 24 hours to complete the exam and return it the instructor—primarily to budget student time spent on the exam. The exact dates of the 3 exams will be determined in consultation with the current students.

Example questions from past exams will be provided prior to the first exam to give students a sense of the type of questions typically asked and the style of answer expected.

Grades

Grades will be based on the following criteria:

25%	Appropriate preparation prior to each class period, which includes completing all readings before class, thoughtful analysis in the written assignments, and work on the theoretical exercises.
25%	Active participation in class discussion which should reflect appropriate preparation.
50%	Demonstration of understanding concepts in the exams.

Letter grades will be determined by the standard scale A:90%; B: 80%; C: 70%, etc, with each letter grade divided in thirds to determine +/- divisions.