BIOS 4090/4090G
M-Th 12:40-3:35 pm
Biology Rm 216

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ECOLOGY FOR TEACHERS

Course overview

The course will briefly review basic concepts of ecology and will introduce course participants to simple exercises to illustrate concepts at the functional, population, community, and ecosystem levels of organization. Participants will learn to implement simple methods for ecological studies in the metro area in workshop format in the laboratory, and on regular field trips to several sites on the south shore. The course will concentrate on developing expertise among the participants in ecological ideas, generating and testing hypotheses, and analyzing and communicating information, rather than presenting exercises that may be directly implemented in a particular grade. Each participant should plan to bring a calculator to class capable of generating logs and functions, if available.

The course will focus on activities that emphasize participation and discussion, rather than passive listening. We will emphasize exercises that are inexpensive, easily implemented, and do not require traveling long distances to pristine habitats. Whenever possible we will utilize local insects and plants, or those easily acquired from biological suppliers.

List of anticipated exercises, by ecological topic:

Functional ecology:
Mealworm growth - nutritional ecology, RGR
Plant functional morphology
Foraging for macaroni
Insect adaptations

Population ecology:
Insect populations - dispersion and density of ant colonies
Cemetery demography
Elodea population growth

Community ecology:
Species interactions - herbivory
Insect community sampling - identification, biodiversity, life history
Plant community sampling - quadrats, succession
Plant communities - species-area curves

Ecosystem ecology:
Ecological efficiency of mealworms

Class Schedule

Each exercise will be prefaced by a brief presentation on the ecological concepts underlying the topic, followed by the activity, analysis, and discussion. Rather than follow a strict sequence of topics (e.g., functional ecology, population ecology...), the course will begin by setting up exercises that require time to develop. Exercises that can be accomplished in one day will then be carried out. Participants may find it useful to keep a notebook in which they can record methods, data collected, and analyses. On field days, course participants should expect to spend an hour or more outside on summer afternoons, and dress accordingly. Bring water and a hat. Sturdy shoes should be sufficient for all field trips; rubber boots are unlikely to be necessary but may be helpful. However, we may attempt to carry out field exercises even in the rain.

Please Note: Ecology is fundamentally an activity carried out outside the classroom. Participants must be in good physical condition and prepared to walk significant distances and climb hills as necessary to carry out exercises. In addition, participants must accept heat, rain, mud, and biting insects as companions on field exercises. We will undertake exercises regardless of the weather, so long as it is physically possible to carry out class activities. Our activities may require the sacrifice of animals for scientific purposes. If your ethics or religious beliefs preclude this, please drop the course immediately. No alternative exercises are available. The schedule below is tentative; the success of field exercises will be dependent on the weather.

Schedule of Activities:

Date		Topic	Location	Reading
Thu	June 2	Organization of ecology resources for ecology overview of exercises	Lab	Handout
Mon	June 6	Review of statistics; math concepts in ecology	Lab	Handout
Tue	June 7	Insect community sampling, *Lemna* collection	City Park	Rickleffs, pp. 513-16
Wed	June 8	*Lemna* setup, mealworm setup, insect ID	Lab	Rickleffs, pp. 327-9, 340-3 (*Lemna*), 136-8 (ecol. effic.), Batschelet pp 4-5 (rgr)

Thu	June 9	Dispersion, density of ant colonies	Campus	Rickleffs, pp. 312-15
Mon	June 13	Plant functional morphology	BSNWR	Rickleffs, pp. 220-2
Tue	June 14	Foraging	Campus	Alcock, pp. 321-4
Wed	June 15	Insect adaptations, *Elodea* and mealworm check	Lab	Selected handouts from entomology texts
Thu	June 16	Cemetery demography	Esplanade Av. cemeteries	Rickleffs, pp. 333-36
Mon	June 20	Plant community sampling	Campus	Rickleffs, pp. 516-17
Tue	June 21	Herbivory	City Park	Rickleffs, pp. 400-3, 410-14
Wed	June 22	*Elodea* remeasure, mealworm remeasure	Lab	
Thu	June 23	Succession	BSNWR	Rickleffs, pp. 521-31
Fri	June 24	Hand in all reports, grade-appropriate exercise, wrap-up discussion		

Locations:
"Lab" indicates inside activities
"Campus" indicates activities outside on the UNO campus
"City Park" indicates a visit by van to the arboretum on Harrison Ave. in City Park
"Esplanade Av. Cemeteries" indicates a visit by van to the cemeteries opposite Cabrini High on Esplanade Avenue
"**BSNWR"** indicates a visit by van to Bayou Sauvage National Wildlife Refuge in New Orleans East.

Recommended Text: Robert Rickleffs, 1997, *The Economy of Nature*, 4th ed., W. H. Freeman, New York

This book is a good basic resource for ecology and is written at a level that is comprehensible to college freshmen. It will serve as a resource for concepts and generating ideas for the classroom for many years.

Other Readings: These are taken from a variety of sources including:

John Alcock, 1993, *Animal Behavior: An Evolutionary Approach*. Sinauer

Associates, Sunderland, MA
Edward Batschelet, 1976, *Introduction to Mathematics for Life Scientists*, 2nd ed. Springer-Verlag, New York, NY
R. J. Elzinga, 2004, *Fundamentals of Entomology*, 6th ed. Pearson/Prentice Hall, Upper Saddle River, NJ.
P. J. Gullan and P. J. Cranston, 2000, *The Insects: An Outline of Entomology*, 2nd ed., Blackwell Science, London.
W. S. Romoser and J. G. Stoffalano, 1998, *The Science of Entomology*, 4th ed., WCB/McGraw Hill, Boston, MA

Grading:

Grading will be based in part on attendance and participation. Active participation in the discussion and execution of each exercise are expected of all participants, and this will count for 20% of the final grade. Due to the compressed time schedule of the mini-session format, undergraduate participants who have not yet taught in the classroom will write reports on ***four*** exercises for grading. Reports will follow a conventional format of Introduction, Materials and Methods, Results, and Discussion/Conclusions, as described separately. Graduate participants must demonstrate mastery of the course material at an advanced level required to instruct others. Each graduate participant will write reports on ***three*** exercises. In place of a fourth report, graduate participants must prepare a lesson plan for a ***grade-appropriate*** exercise implementing some topic in ecology for classroom use (not limited to those covered in class) and link the exercise to content standards appropriate to the grade for which it is intended..

Attendance/Participation:	20%
Three lab reports:	60%
Fourth lab report (4090)/Grade-appropriate classroom exercise (4090G)	20%

Student Learning Objectives:

After competing this course, participants will be able to:

- Explain the nature of science as an active process for studying the world around us.
- Explain the relationship between the activity of science and the facts generated by science.
- Explain the context of ecology within modern science, and the subjects and questions studied by ecologists.
- Explain, in language understandable by middle or high school students, key ecological concepts.
- Devise activities that teach key ecological concepts at a level appropriate to middle or high school students.