

**BIOS 959 Advanced Community Ecology
Spring 2008**

Syllabus and Course Information

- Instructor:** Sabrina E. Russo
208 Manter Hall, 472-8387, srusso2@unl.edu
- Office hours:** Fridays, 11:00 - 12:30, or by appointment
- Course website:** Blackboard
- Lectures:** Mondays and Wednesdays, 1:00 - 2:20 pm in 203 Manter Hall
- Required text:** Morin, Peter J. 1999 Community Ecology. Blackwell Science. (in the course reserves at Love Library)

What is Community Ecology?

Community ecology studies the properties of and patterns in assemblages of species, such as in diversity or function, and what processes or mechanisms give rise to those patterns, such as predation or dispersal. Studying ecological communities not only can give us insight into how natural communities arise or are assembled, but also how humanity's modifications to the earth may shift the community structure and ecosystem function.

Community ecology is at an exciting frontier largely because of advances in the tools ecologists use to study communities: Computational and analytical advances allow us to model communities in ways never before possible, allowing stronger linkages between empirical and theoretical approaches. Genomic techniques allow us to investigate the genetic components of communities, as well as ecological interactions and responses on scales that were heretofore intractable. The future holds much promise and opportunity for groundbreaking work by creative thinkers and motivated students! Perhaps for these reasons, there is no modern, definitive textbook in Community Ecology and no standard curriculum. Morin (1999) is listed as a required text primarily because the material in it is foundational to much of what will be covered in greater depth or from a different angle in lectures and discussions. The "other useful texts" listed will also contain required readings for some lectures, but can also serve as supplemental information for lecture material. Much of what you learn will be from readings in primary literature, which we will cover in in-class discussions.

Goals of this course:

- (1) To introduce you to some of the main ideas, concepts, and approaches in Community Ecology and to demonstrate the integrative, multidisciplinary nature of this field.
- (2) To engage you in critical thinking and active scientific discussion and interaction.
- (3) To practice scientific writing both to justify or solidify your ideas and to learn to write and publish scientific papers.

Prerequisites and requirements of this course:

I expect that you will attend all course meetings, complete assignments, prepare for and participate in discussions, and ask questions in lecture. The material in this course assumes knowledge of general biology and ecology, with some familiarity with population ecology and basic calculus.

Course structure: The schedule of activities and readings for course meetings will be updated on Blackboard. Course meetings will be divided between lectures, group discussions based on readings from the primary literature that cover a concept from a previous set of topics from lecture, and one analytical assignment (see *Research paper*). In the readings for discussion (generally 2-4 papers) one or two students will be in charge of leading the discussion, in a rotating schedule. In discussion, we will dissect the readings in light of what was presented in lecture to understand what is the larger context of the study (what is the “big picture”?), what innovations does it contribute, what are its major findings, what are its flaws and strengths, and what would be the next research steps.

Research paper: In the 6-7th weeks, students will work together in class on an analytical assignment addressing how phylogenetic information can be incorporated into testing hypotheses of species diversity in ecological communities. Data for this assignment will be provided, and we will have a preliminary discussion in class with required readings to identify hypotheses to test and methods to use. Analyses may be done by all students together if they choose, but each student will individually write-up the results as a short manuscript as if for publication. The manuscript should be formatted as a “letter” for the journal *Ecology Letters*, but with less than 3000 words of text (instead of the usual 5000 word-limit; <http://www.blackwellpublishing.com/submit.asp?ref=1461-023X&site=1>). Each student’s manuscript will be reviewed by two people, myself and one of your fellow students, in a mock version of the peer-review process for *Ecology Letters*. Students will receive one of their classmates’ manuscripts to critique in the capacity of a mock-peer reviewer, and I will return both reviews of your manuscript (mine and a classmate’s), along with your grade for the assignment. The grade will depend on your participation in analyses in class, your manuscript, and your peer-review. The manuscript will be due on 31 March 2008, and students’ reviews will be due on 9 April 2008.

Review paper: You will have the opportunity to explore a topic in community ecology that interests you by writing a 10-page manuscript, written as a synthetic review as if for publication in the style of *Trends In Ecology and Evolution* (*TREE*; <http://www.trends.com/tree/about.htm#authors>). This manuscript will be submitted to me (the mock “subject editor” for *TREE*), and I will send it out for mock “peer review” to your fellow class-mates. A proposal for your manuscript, in the form of a provisional title and a 500-word Abstract outlining the specific topics your review will cover and justifying why it is of interest to the readers of *TREE*, will be due on 18 February 2008. As the mock-subject editor, I will return comments on your proposed article, along with a grade. The final draft of the term paper will be due on 14 April 2008. Students will then receive two of their classmates’ manuscripts to critique in the capacity of a mock-reviewer for *TREE*. I will grade the students’ peer reviews, which will be due on 30 April 2008. I will then write to each of you again as mock-subject editor, sending you the anonymous peer reviews of your manuscript and notifying you whether or not your manuscript was accepted for publication (along with your grade).

Anonymity: Students' anonymity (except to me) will be maintained for reviews and manuscripts. Therefore, please DO NOT write your name on any written assignments. Instead, each student will be assigned a number that s/he should use to identify her/himself to me on all written assignments.

Grading:

Discussion participation:	20%
Research paper (including participation):	30%
Review Paper (including proposal):	30%
Peer Reviews of Review Papers:	20%

In the 8th week of the course, I will present each of you with a report of your grade thus far. You are invited to discuss it with me confidentially by making an appointment.

Other important information:

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.

Other useful texts (most of these are in the course reserves at Love Library):

- Brown, James. H. and Geoffrey B. West. 2000. *Scaling in Biology*. Oxford University Press.
- Case, Ted J. 2000. *An illustrated guide to theoretical ecology*. Oxford University Press.
- Chase, Jonathan M. and Mathew A. Liebold. 2003. *Ecological Niches: Linking classical and contemporary approaches*. University of Chicago Press.
- Cody, Martin L. and Jared M. Diamond. 1975. *Ecology and evolution of communities*. Belknap Press.
- Diamond, Jared and Case, Ted J. 1986. *Community ecology*, Harper & Row.
- Gotelli, Nicholas J. 2001. *A Primer of Ecology*, 3rd ed, Sinauer Press.
- Gotelli, Nicholas J. and Aaron M. Ellison. 2004. *A Primer of Ecological Statistics*. Sinauer Press.
- Grace, James B. and David Tilman. 1990. *Perspectives on plant competition*. Academic Press.
- Holyoak, Marcel, Mathew A. Leibold, and Robert D. Holt. 2005. *Metacommunities : spatial dynamics and ecological communities*, University of Chicago Press.
- Hubbell, Stephen. 2001. *The Unified Neutral Theory of Biodiversity and Biogeography*. Princeton University Press.
- Huston, Michael A. 1994. *Biological Diversity*. Cambridge University Press.
- Kinzig, A. P., S. W. Pacala, and D. Tilman. 2001. *The Functional Consequences of Biodiversity: Empirical Progress and Theoretical Extensions*. Princeton University Press.
- MacArthur, Robert H. and Edward O. Wilson. 1967. *The theory of island biogeography*, Princeton University Press.
- Magurran, A. E. 2004. *Measuring Biological Diversity*. Blackwell Science, Inc.
- Real, Leslie A. and James H. Brown. 1991. *Foundations of Ecology: Classic papers with commentaries*. University of Chicago Press.

- Resetarits, W. J., Jr. and Bernardo. 1998. *Experimental Ecology: Issues and Perspectives*. Oxford University Press.
- Ricklefs, R.E. and Dolph Shluter. 1993. *Species Diversity in Ecological Communities*. University of Chicago Press.
- Rosenzweig, Michael L. 1995. *Species Diversity in Space and Time*. Cambridge University Press.
- Scheiner, S. M. and J. Gurevitch. 1993. *Design and Analysis of Ecological Experiments*. 1 edition. Chapman and Hall.
- Strong, Donald R. *et al.* 1984. *Ecological communities: conceptual issues and the evidence*. Princeton University Press.

Course Schedule (may change slightly)

See reading list updated on Blackboard for required and suggested text readings for each week, as well as the literature cited for each lecture for additional readings

Week:	Topics:
1	Course introduction What is a community? Historical and contemporary conceptions Spatial & temporal scales
1, 2, 3	Basic organizing concepts: <ul style="list-style-type: none">- Equilibrium, non-equilibrium, deterministic, and neutral dynamics- Species coexistence: Stable, unstable & transient states- Importance of population dynamics, stochasticity, & variance- Neutral theory
3, 4, 5	Key questions & concepts in community ecology: <ul style="list-style-type: none">- Diversity: definitions, measures, and patterns- Functional and genetic diversity- Species-area relationships, species-abundance distributions- Island biogeography- Latitudinal gradients in diversity
6, 7, 8, 9, 10	Phylogenetic comparative methods in Community Ecology Analytical assignment in class
10, 11, 12	Biotic interactions: <ul style="list-style-type: none">- Introduction: Local processes – regional patterns- Community ecology and historical controversies, null models- Herbivory- Competition theory- Niches: Fundamental & realized; character displacement- Plant competition: Grime, Tilman, neighborhood models Multi-trophic interactions: <ul style="list-style-type: none">- Food webs, indirect effects, & apparent competition
13, 14, 15	Species diversity maintenance and multispecies coexistence: <ul style="list-style-type: none">- Stabilizing vs. equalizing mechanisms- Spatial and temporal storage effects, nonlinear averaging- Density dependence, intermediate disturbance, niche-packing- Life history trade-offs

Anticipated due dates for written assignments (to be turned in at the class meeting):

Detailed instructions for assignments will be posted on Blackboard.

Review Article Proposal	18 February 2008
Research Paper	31 March 2008
Review Paper	14 April 2008
Peer Reviews of Review Paper	30 April 2008