

Terrestrial Plant Ecology (BI500)

Fall 2003

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Office: Fisher 206A
Office hours: by appointment
Lecture: BH008/ T, TH 10-11:35
Lab: FSC/W 1-4

Course description/rationale:

Ecology is the study of interrelationships between organisms and their biotic and abiotic environments. As a basic science, ecology informs us about the processes governing the patterns we observe in nature. From an applied perspective, it is critical that we understand ecology as it provides insights and solutions to many of the environmental issues we are confronted with in our daily lives. In this course we will focus specifically on the ecology of plants. Within plant ecology there are many sub-disciplines; these sub-disciplines vary in the level of organization on which they are focused (e.g. physiological ecology, population biology, community and ecosystem ecology). We will touch on many of these areas over the course of the semester.

Course objectives:

Upon completion of this course, you should be able to *demonstrate an understanding of how biotic and abiotic factors affect the abundance and distribution of plants in natural communities*. Most importantly, you should leave this course better able to 1) synthesize information across levels of ecological organization, 2) critically evaluate work published in both the primary literature and popular press, 3) observe patterns and ask interesting ecological questions, 4) design and conduct sound ecological experiments, 5) analyze and interpret data generated from ecological experiments, and 6) communicate your findings in both written and oral format to your peers, and the larger scientific community.

Course structure:

We will use the lecture periods to become grounded in the conceptual and theoretical background that serves as a foundation for the current study of plant ecology. This will be accomplished in two ways: 1) I will introduce you to key areas in the field, elaborating on information in the textbook, and 2) you will be exposed to cutting edge research in the field through discussions of articles from the primary literature, as well as articles from the popular media that focus on relevant ecological issues.

Note: Because class size is very small, we will operate more like a seminar than a traditional lecture course. You will be responsible for contributing to class on a daily basis. In order to participate effectively, you will need to read all assignments before class.

In the lab, we will gain a more thorough understanding of plant ecology through personal observation and experimentation, primarily in field habitats. This will be your opportunity to experience what it is like to carry out real ecological experiments. The research you carry out in lab will not be “cookbook-style” exercises with predetermined “correct” answers. Instead labs will be centered on broad research questions and we will work together to develop testable hypotheses.

Note: You should come to labs dressed to do field work. This means you should be wearing sneakers or hiking boots, old clothes, etc. In the case of bad weather, we will most likely still be going in the field. Come prepared!

Course readings:*Textbook (required)-*

*Gurevitch, J., S.M. Scheiner, and G.A. Fox. 2002. *The Ecology of Plants*. Sinauer Associates, Inc. Sunderland, MA, U.S.A.

Additional readings-

*Pollan, M. *Botany of Desire*. 2002. Random House Trade Paperbacks. NY, NY, U.S.A.

*Weekly readings from the primary literature will be assigned in class.

Additional references (on reserve)-

*Ambrose, H.W. III and K.P. Ambrose. 2001. *A Handbook of Biological Investigation*. 5th ed. Hunter Textbooks Inc. Winston-Salem, NC, U.S.A.

*Crawley, M.J. 1996. *Plant Ecology*. 2nd ed. Blackwell Publishing. Malden, MA, U.S.A.

*Gotelli, N.J. 2001. *A Primer of Ecology*. 3rd ed. Sinauer Associates, Inc. Sunderland, MD, U.S.A.

Course evaluation: Grades on late assignments will be reduced by 10% for each day past the due date. Please speak to me in advance if you foresee a conflict that will require you to turn a paper in late.

Point distribution:Lecture-

- 60% Exams (3 exam@20%)
- 10% In-class assignments/quizzes (number to be determined)
- 10% Critique of *Botany of Desire*
- 10% Contribution to *Botany of Desire*
- 10% Class preparation/participation

Laboratory-

- 60% Lab reports (3 standard scientific papers@20%)
- 20% Independent project report
- 5% Exercise on generating hypotheses
- 5% Group research project presentation
- 5% Presentation of background information prior to lab exercises
- 5% *Botany of Desire* presentations

Attendance: You should notify me if you have a legitimate reason for missing a class. Attendance will be taken into account in your class preparation/participation points. If you have more than 1 unexcused absence you will not receive any points, therefore your final grade will drop by one letter grade. You will not be permitted to make up any assignments that were missed during an unexcused absence.

Make-up exams: Make-up lecture exams will be given only for legitimate reasons as outlined by university regulations. Excused absences must be accompanied with written confirmation from a doctor or the Dean of Students. Anyone who fails to comply with these procedures will receive a zero for missed exams.

Late assignments:

All assignments will be collected at the *beginning* of class on the due date (unless otherwise noted on the syllabus). Late assignments will be downgraded by 10% for each day late unless prior arrangements have been made.

Academic dishonesty of any kind will not be tolerated. The University policy on cheating, plagiarism and all other forms of academic dishonesty can be found at www.susqu.edu/campus_center/handbook/academic_honesty.pdf. All violations of will be dealt with as outlined by University procedure.

| LECTURE SCHEDULE | | | | |
|-------------------------|-------------------------------------------|-------------------------|-----------------------|---------------------------------------------|
| Date | Topic | Textbook Reading | Assignment Due | Other Reading |
| 9/2-T | Introduction to plant ecology | | | Intro to experimental ecology: A case study |
| 9/4-TH | | Ch. 1 | | Weiner, J. Ecology, 1995 |
| 9/9-T | Global patterns of vegetation | Ch. 18 & 19 | | Allen & Breshears, Science, 1995 |
| 9/11-TH | Natural selection and evolution | Ch. 5 | | Howe & Smallwood 3-15 |
| 9/16-T | Plant adaptations to the environment | Ch. 6 | | Antonovics, 1971, Adv. Ecol. Res |
| 9/18-TH | Light and temperature relations | Ch. 2 | | Galen, 1999, Natural History |
| 9/23-T | Water relations | Ch. 3 | | |
| 9/25-TH | Nutrient acquisition | Ch. 4 | | Hutchings, 1988, TREE |
| 9/30-T | Wrap up and review | | | |
| 10/2-TH | EXAM I | | EXAM I | |
| 10/7-T | Growth and reproduction | Ch. 8 | | |
| 10/9-TH | Population structure and growth | Ch. 7 | | |
| 10/14-T | Ecology of pollination and seed dispersal | Ch. 8 | | |
| 10/16-TH | Life history strategies | Ch. 9 | | Janzen, Bamboos |
| 10/21-T | NO CLASS | | | |

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|----------|--------------------------------------------|--------|-------------------------------------------|--------------------------------------------------------------------------|
| 10/23-TH | Species interactions: Mutualisms | | | Tilman, 1978, Ecology & Janzen, ant acacias |
| 10/28-T | | | Botany of Desire questions | |
| 10/30-TH | Species interactions: Competition | Ch. 10 | | |
| 11/4-T | Species interactions: Herbivory/Disease | Ch. 11 | | Coley et al., 1985, Science |
| 11/6-TH | | | | Packer & Clay, Nature, 2000 Van der Putten et al., Nature, 1993 |
| 11/11-T | Wrap up and review | | | |
| 11/13-TH | EXAM II | | EXAM II | |
| 11/18-T | Community structure | Ch. 14 | | |
| 11/20-TH | Species diversity and coexistence | | | Connell, 1978, Science |
| 11/25-T | Disturbance and succession | Ch. 13 | | |
| 11/27-TH | NO CLASS | | | |
| 12/2-T | Invasive species | | | |
| 12/4-TH | Ecosystem services | Ch. 15 | Botany of Desire chapter | Post et al., 1990, American Scientist |
| 12/9-T | Global change and plant ecology | Ch. 20 | | Caldwell et al., 1995, Ambio OR Bazzaz & Fajer, 1992 Sci. Am. |
| 12/11-TH | Wrap up and review | | | Root et al., 2003, Nature |
| 12/16 | FINAL EXAM- 3-5pm | | | |

| LABORATORY SCHEDULE | | | | |
|----------------------------|-------------------------------------------------|-----------------------------------------|------------------|-----------------------------------------------|
| Date | Lab Exercise | Reading | Intro by: | Assignment |
| 9/3 | Generating hypotheses | | | Arrange time to plant biodiversity experiment |
| 9/10 | Natural history at R.B. Winter State Park | Bartholomew, 1986, BioScience | ** | Hypotheses due |
| 9/17 | Abiotic influences on forest composition | Zawadzka and Abrahamson, 2003, Castanea | ** ** | |
| 9/24 | ↓ | | | |
| 10/1 | ↓ | Tyrell and Crow, 1994, Ecology | | |
| 10/8 | Independent projects- due date depends on expt. | Krebs, Ch. 1 Ecological Data | | Forest composition paper due |
| 10/15 | ↓ | | | |
| 10/22 | Factors affecting seed predation | Janzen's descrip. Silander article | ** | |
| 10/29 | ↓ | | | |
| 11/5 | ↓ | | | |
| 11/12 | Biodiversity and resistance to invasion | Rudgers and Koslow, manus. | ** | Seed predation paper due |
| 11/19 | ↓ | | | |
| 11/26 | Thanksgiving break- NO CLASS | | | |
| 12/3 | Biodiversity expt. continued | | | |
| 12/10 | Present indep. projects & Botany paper | | | Biodiversity paper due Oral presentations |

