EFB 445 / 645 Plant Ecology — Spring 2009

State University of New York, College of Environmental Science & Forestry, Syracuse, New York

Professor: Dr. Martin Dovčiak

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Class meeting times

Lecture: MW 10:35 – 11:30 am, Marshall 212
Laboratory:

- Section 1: Tu 12:30 – 3:20 pm, Baker 310
- Section 2: W 1:50 – 4:50 pm, Baker 310

Do not switch lab sections without getting permission from the TA at least a week in advance!

Link to class website on Blackboard: http://www.esf.edu/efb/dovciak/Teaching.htm

Learning objectives

The main goal of this course is to familiarize students with the major topics, concepts, and methods in plant ecology as they relate to plant community assembly and community dynamics in space and time. We will discuss and analyze how plant communities are structured by multiple ecological processes that operate at various spatial and temporal scales — ranging from the scale of individual plants to global vegetation patterns. Specific learning objectives are:

- to become well versed in concepts and theories of plant ecology,
- to learn to use important quantitative methods common in plant ecology,
- to learn to construct hypotheses and test them,
- to develop critical thinking and analytical skills,
- to learn to effectively communicate and discuss scientific findings,
- to learn how to develop a fundable research proposal (EFB 645), and
- to gain global awareness for understanding contemporary environmental challenges.

Instructional strategy

The course consists of an integrated set of teaching methods that include lectures, hands-on computer-based exercises, group discussions and exercises, class website and other internet resources, student presentations, and field trips. A set of questions and exercises will be provided to students every week to guide their preparation of assignments.

Learning strategy

This is a challenging course and it is essential that you keep up to date with readings and lab assignments, and frequently review lecture slides, notes, and handouts. I encourage you to ask questions and initiate discussion both during class and during office hours.

Course readings

Textbook (required)

- Gurevitch J, Scheiner SM, Fox GA. 2006. The Ecology of Plants. 2nd Edition. Sinauer Associates, Inc.

Complementary books (not required but provide good alternative points of view)

- Keddy PA. 2007. Plants and Vegetation: Origins, Processes, Consequences. Cambridge University Press.
- Schulze E-D, Beck E, Muller-Hohenstein K. 2005. Plant Ecology. Springer-Verlag.
- van der Maarel E. 2005. Vegetation Ecology. Blackwell.
- Barbour MG, Burk JH, Pitts WD, Gilliam FS, Schwartz MW. 1999. Terrestrial Plant Ecology. 3rd Edition. Benjamin/Cummings.
- Crawley M. 1997. Plant Ecology. Blackwell.

Laboratory Reference Materials on Reserve in Moon Library.

- McCune B, Grace JB. 2002. Analysis of Ecological Communities. MjM Software Design, Gleneden Beach, Oregon.
- Alstad D. 2001. Basic Populus Models of Ecology. Pearson. Benjamin Cummings.

Course hand-outs & online materials (required)
These will present additional material pertaining to lectures or labs and will be made available during lectures or labs as necessary.

Primary research papers (required)
Several papers will be selected to supplement the course textbook and will be announced during lectures.

Grading

- Exams (60%): There are three exams covering *lectures, assigned readings,* AND *laboratories.* Exams will be cumulative.
- Laboratories (28%): Students will summarize their laboratory exercises and results in lab reports. Each report is due at the beginning of the following lab.
- Literature critiques (12%; EFB 445 only): Three papers discussed in class will be selected and their critiques will be due on the day of their scheduled discussion.
- Research Proposal (12%; EFB 645 only): Students will select a topic covered during the course and write and critique research proposal for funding.

EFB 445	Percent
Exam 1	15
Exam 2	20
Final Exam	25
Laboratories	28
Literature Critiques (3)	12
Total	**100**

EFB 645	Percent
Exam 1	15
Exam 2	20
Final Exam	25
Laboratories	28
Research Proposal	12
Total	**100**

Extra credit opportunities

- Bonus questions on exams
- One additional literature critique of another paper read in class (ask in advance!)
- Points for contributions toward discussion during lecture (up to 5 % of total grade)

Late Policy

Late assignments will be accepted at a penalty of 20% per day (i.e., the assignment will lose all of its value if it is 5 days late). If you contact me at least 48 hours BEFORE an assignment is due, I will be happy to set up a meeting to discuss a reasonable extension without penalty.

Lab Attendance

Attendance is mandatory at all lab meetings, during the section that you are registered for. Please arrive on time and be prepared for each lab. Late arrivals will receive "late" points which will be subtracted from the points scored for the lab reports at the end of the semester. There are no make-ups for missed labs without prior approval. If for unforeseen circumstances you need to switch lab sections for a week, the instructor must approve it one week in advance. Lab field trips will be conducted off campus and we will meet at the bus pickup point behind Lawrinson Hall on Stadium Place. The bus will depart promptly at the beginning of the lab, so please arrive on time. Field trips occur rain or shine so be sure to check the weather and dress appropriately.

Make-up exams & assignments

These will only be given if the student has a valid excuse such as:
Illness – requires a note from SU Student Health Center (be sure to read SU note policy),
Hospitalization – requires a hospital or personal physician's note,
Death in the Family – requires an Obituary or Mass card,
Traumatic personal issues – requires ESF Student Life notification to course instructors.

E-mail & Syracuse University NetID

E-mail is required for this course. I will send e-mails to you at your 'syr.edu' address. Go to http://cms.syr.edu/email/aliasing/ to have mail forwarded from your 'syr.edu' account to your primary account. A valid SU NetID is required to use any ESF Computing Center resource, including lab computers in 310 Baker.

Honor code

All students are bound by ESF's Code of Student Conduct. I expect that you follow this code, and all instances of academic dishonesty (including but not limited to plagiarism and cheating) will result in failing the assignment and/or the course. For more information, please review the ESF Student Handbook at http://www.esf.edu/students/handbook/.

If you are struggling academically or missing classes due to personal or family problems, the ESF Office of Career and Counseling Services (110 Bray Hall) is available to provide academic and counseling services. Confidentiality is assured.

Lecture & Lab Schedule (Jan. 12, 2009)

Month	Day	Topic, and corresponding textbook reading assignment	Assignments due (details on next page), and non-textbook readings
Jan	12	Course Introduction	
	13/14	*No Labs*	
	14	Climate & Distribution of Plants (Ch17-18: 391-443)	
	19	**No class- Martin Luther King Jr. Day**	
	20/21	*Lab 1: Data Analysis Introduction*	
	21	Plants & Light Environment (Ch2: 17-41)	Critique 1: Rothstein & Zak (2001)
	26	Water Relations & Energy Balance (Ch3: 43-69)	
	27/28	*Lab 2: Plant Ecophysiology*	Lab Report 1
	28	Soil & Mineral Nutrition of Plants (Ch4: 71-92)	
Feb	2	Global Climate Change & Plants (Ch21: 485-502)	TBA
	3/4	*Lab 3: Global Climate Change*	Lab Report 2
	4	Plant Population Structure & Growth (Ch5: 101-127)	
	9	Plant Evolution (Ch6: 129-153)	
	10/11	*Lab 4: Simple Population Growth Models*	Lab Report 3
	11	Growth, Reproduction, & Dispersal (Ch7: 155-184)	**Draft Research Proposal (RP)**
	16	**Exam 1**	
	17/18	*Lab 5: Species spread / Range expansion*	Lab Report 4
	18	Life History Strategies (Ch8: 185-202)	Craine (2005)
	23	Community Properties (Ch9: 205-223; + 477-484)	
	24/25	*Lab 6: Life Tables & Stage Structured Models*	Lab Report 5
	25	Competition & Coexistence (Ch10: 225-244	Critique 2: TBA
Mar	2	Models of Community Dynamics (Ch10: 244-256)	TBA
	3/4	*Lab 7: Models of Community Dynamics*	Lab Report 6
	4	Interactions (Ch11: 257-280; 92-96;165-172; 342-3)	
	9	**Spring Break**	
	11	**Spring Break**	
	16	Describing Community Composition (Ch15 353-367)	TBA
	17/18	*Lab 8: Ordination of Plant Communities 1*	Lab Report 7
	18	Disturbance (Ch12: 285-293)	TBA
	23	Succession (Ch12: 283-285, 293-305)	Chapin *et al*. (1994)
	24/25	*Lab 9: Ordination of Plant Communities 2*	Lab Report 8
	25	Mycorrhizae & Plant Succession (Dr. Tom Horton)	Ashkannejhad & Horton (2006)
	30	**Exam 2**	
Apr	*31/1*	*Lab 10: TBA*	Lab Report 9
	1	Plant Invasions (Dr. Jason Fridley) (Ch13: 313-317)	Fridley et al. (2007)
	6	Diversity vs. Productivity & Stability (Ch13: 317-324)	Tilman (1999)
	7/8	*Lab 11: Effects of Plant Diversity on Productivity*	Lab Report 10
	8	Plant Commonness & Rarity (Ch13: 307-313)	Critique 3: TBA ; **Full RP**
	13	Sampling Plant Communities	Barbour *et al*. (1999; p. 210-239)
	14/15	*Lab 12: Field Trip 1- Sampling Plant Communities*	Lab Report 11
	15	Plants & Ecosystem Processes (Ch14: 327-351)	
	20	Community Spatial Patterns (Ch16: 369-388)	
	21/22	*Lab 13: Field Trip 2- Sampling Plant Communities*	Lab Report 12
	22	Patterns of Plant Diversity (Ch19: 445-467)	
	27	Global Change: Beyond Warming (Ch21: 502-513)	Vitousek (1994); **RP Reviews**
May	**TBA**	**Final Exam**	

Non-textbook readings from primary literature (Jan. 12, 2009)

Ashkannejhad S, Horton TR (2006). Ectomycorrhizal ecology under primary succession on coastal sand dunes: interactions involving *Pinus contorta*, suilloid fungi and deer. New Phytologist **169**, 345-354.

Barbour MG, Burk JH, Pitts WD, Gilliam FS, Schwartz MW (1999). Terrestrial Plant Ecology. 3rd Edition. Benjamin/Cummings. Pages 210-239 (Chapter 9).

Chapin FS, Walker LR, Fastie CL, Sharman LC (1994). Mechanisms of primary succession following deglaciation at Glacier Bay, Alaska. Ecological Monographs 64, 149-175.

Craine J (2005). Reconciling plant strategy theories of Grime and Tilman. Journal of Ecology 93: 1041-1052.

Fridley JD, Stachowicz JJ, Naeem S, Sax DF, Seabloom EW, Smith MD, Stohlgren TJ, Tilman D, von Holle B (2007). The invasion paradox: reconciling pattern and process in species invasions. Ecology 88, 3–17.

†Rothstein DE, Zak DR (2001). Photosynthetic adaptation and acclimation to exploit seasonal periods of direct irradiance in three temperate, deciduous-forest herbs. Functional Ecology 15, 722–731.

Tilman D (1999). The ecological consequences of changes in biodiversity: a search for general principles. Ecology **80**, 1455–1474.

Vitousek PM (1994). Beyond Global Warming: Ecology and Global Change. Ecology **75**, 1861-1876.

†Literature Critique 1

Note: TBA = additional reading assignment “To Be Announced” during lecture.

Instructions for Preparing Literature Critiques for EFB 445

Literature critiques are due at the beginning of the lecture in the Lecture and Lab Schedule (above) with the planned discussion.

- Each critique should consist of two paragraphs and should not exceed *2 pages* (double-spaced text, 12 pt. Times New Roman, 1" margins).

- The first paragraph should *summarize* the journal article in your own words. Include a description of the main questions/hypotheses addressed by the author(s); methods used; critical results and conclusions.

- The second paragraph should be a *discussion* and *critique* of the article. The following questions can be used as guidance for writing this section:
    - What is the significance of this work in the discipline of plant ecology?
    - Does this research have any practical application or societal importance (e.g., for conservation, restoration, management, or economics). If so, describe it.
    - Can you offer any suggestions for improving or expanding upon this research (i.e., did this paper provoke you to ask any future research questions? How might you answer these questions)?
    - Did you find the results or methods interesting or innovative? Why?

- Please take note of the following general guidelines:
    - Summaries must be written in your own words. Do not use phrases or wording directly from the paper. Do not use direct quotations.
    - Be sure to use specific examples to back up the ideas you express in the discussion/critique section.
    - Your critique should be in the form of scientific writing and should have a *professional* (as opposed to conversational) tone. Avoid colloquialisms, slang, contractions, and abbreviations.
    - Your writing should be *clear* and *concise*, so use no more words than necessary to make a factual statement. Be simple and direct in your writing.

- Grading: Each assignment will be worth 4 points (2 pts each section).