LANDSCAPE ECOLOGY SYLLABUS

FRWS 6710-7710

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All materials and information for this class can be found on the class website, arranged as labeled modules, and accessed through the USU library class reserve site. Reading assignments and all other information will be given on the web site Discussion Board. Please do not post anything on the Discussion Board. That is reserved for Assignments. New information can be posted at any time so you must check this daily for updates on assignments. You can access the electronic reserves by bookmarking http://eres.usu.edu. The password is “Bis7710”. If you are a MS student you should be enrolled for call number 23282 FRWS 6710, if you are a Ph.D student enroll for call number 23283 FRWS 7710. Starting on page 17 is information about student rights and responsibilities that you should read. The information can be found on the USU URL:

http://www.usu.edu/aia/ACADEMIC/syllabusres.cfm

GRADING:

Grading is based on total accumulation of points, and will depend upon three in-class tests, a final exam, the exercises and problem sets assigned, short spot quizzes, and participation in class during discussion.

Sentient participation in class discussion is required. You will be expected to come to class having read the assignments and prepared to discuss the issues. At the beginning of class I will often ask you to write a brief, 5 minute answer to a question that we either have discussed previously or that comes from the reading. What I am expecting here is that as you read you will come across questions or ideas that are not fully answered or are not clear. Make a note of these questions and bring to class. Questions that probe the concepts we are discussing and show that you are thinking of the material will be reflected in your grade. At times, you will also be expected to lead class discussion focusing on specific readings. Please prepare an outline for the class when you lead the
discussion. If you get to me the night before class, I will make copies for the class. If not, then please bring 16 copies to class. **YOU WILL DO WELL IF YOU READ THE ASSIGNMENTS, THINK ABOUT THE ISSUES & ARE PREPARED TO DISCUSS THE ISSUES IN CLASS**

**COURSE SYNOPSIS:**

This course will explore the concepts and precepts that underlie landscape ecology and are arranged into modules of different length and difficulty. The modules each include an introduction, usually in the form of a PowerPoint presentation, required readings that will give you the necessary background to understand the material, optional readings that will enhance your knowledge of the subject matter, a discussion period to clarify important points that you may have questions about, and usually one or two written exercises that illustrate specific concepts related to the material. Our focus will be on learning appropriate theory, making distinctions between important concepts, and trying to understand how the respective roles of equilibrium concepts, such as competition, predation, and parasitism vs. the stochastic forces of anthropogenic and 'natural' disturbance regimes structure landscapes and animal communities. We will try to do this in a spatially and temporally sensitive way.

Required reading for this class will include chapters from two books. Only one is required. A good basic text, but not required, is *Landscape Ecology in Theory and Practice: Pattern and Process*. The second book is required and is called *Learning Landscape Ecology*. It contains most of the exercises that we will do in the course. Both are available in the University bookstore. There are other books that address aspects of the subject; see the end of the syllabus for a partial list of other relevant books. I have also put manuscripts in PDF format on electronic course reserve for you. Not all will be assigned reading. Many are for additional information on subjects specific to the class that you may wish to look at.

**REQUIRED CLASS TEXTS (you will use them as background and for take home exercises)**

NOT REQUIRED, BUT EXCELLENT READING SOURCE


MODULES

A note on these modules: These modules reflect my best guess at what we will cover. The readings will vary. The Landscape Ecology class is always a diverse group with very different backgrounds. My objective is to proceed at a reasonably fast pace, but with enough short reviews to cover baseline material that some of you have had but forgotten and that some of you may never have had formally. I have found that if I do not do some review of concepts that students need as background, your ability to grasp the concepts and put them into a workable framework is much more difficult. The basic concepts come from the reading. If you do not know something, look it up. I will often ask in class if you understand various concepts. If no one knows, then I know that I need to do a brief review. Your job is to be prepared; my job is to see that you understand. If we both work at it, the class should be worth your time.

1) Why Landscape Ecology? Module: Objectives are to learn about the status of knowledge of students, to provide a context for what landscape ecology is, and to establish a conceptual basis for understanding 'causality' in ecology.
   a. Introductions, Questionnaire
   b. 5 minute written exercise: what is landscape ecology and why has it developed as a distinct discipline.
   c. PowerPoint presentation: Context for Landscape Ecology
   d. Reading:


e. Discussion
f. Important Landscape Ecology Definitions

g. PowerPoint presentation: Causality in Ecology

h. Handout: Causality in Ecology

i. Reading:

j. Discussion
k. Optional Reading

2) Context for Ecology module: Objectives are to explain the human tendencies that influence how scientists do science, and to address the issue of how scientific 'rigor' is defined for smaller scale studies and what problems arise when one tries to do larger, landscape scale studies.

a. Exercise /class participation on sharpening and leveling using the 4 sentences from Mowat’s "Lost in the Barrens" (attached)

b. PowerPoint presentation: Things are not what they seem

c. Discussion of implications of "sharpening and leveling"

d. Discussion of the concept of 'Observation Set'

e. Discussion: What is rigor in ecology?

f. Readings:


g. Discussion
h. Optional Readings:
   iii. W. Roush: When Rigor meets Reality (Science 1995(269:313-315

3) Hierarchy module: Objectives are to explain the underlying basis for ecological organization
   a. PowerPoint presentation: Why are the doomsday predictions wrong?
   b. Discussion
      Readings:
   c. Discussion
   d. Exercise: Learning Landscape Ecology Chapter 1: Scale and Hierarchy Theory, R. V. O'Neill and M. A. Smith
   e. Take-home exercise instructions
   f. Powerpoint for Exercise 1 (after completion)
   g. Optional Reading:

ii. Moon, D. C., and P. Stiling. 2002. Top-down, bottom-up, or side to side? Within-trophic-level interactions modify trophic dynamics or a salt marsh herbivore. Oikos 98(3) 479-489.

4) **Scaling Concepts module**: Objectives are to explain the critical concept of scale, present pertinent definitions and terminology, illustrate scale problems, and relate to hierarchy theory.
   a. PowerPoint presentation: Critical Concept of Scale
   b. Reading:
   c. Discussion
   d. Reading:
   e. Discussion
   g. Optional Reading:
Fractal Dimensions module: Objectives are to introduce the idea of dimensions (especially fractal dimensions) as power scaling laws that allow one to understand the concept of scaling organisms to their environment, and as a new way of viewing the natural world.

- "kangaroo in Denmark' word game
- PowerPoint presentation: Dimensions and Fractals
- Discussion
- Readings:
- Discussion
- Readings:
- Problem set: Calculating the coastline (fn:coast-prob-set#1-03)
- Coastline explanation (fn:coastline-explan-03)
- Discussion
6) Understanding Fragmentation Metrics module: Objectives are to introduce the students to methods of quantifying properties of fragmented landscapes.
   a. PowerPoint presentation: Introduction to Metrics (from FRAGTSTATS)
   b. Handouts: Fragmentation Metrics Table
   c. Exercise: LE-book chapter 7, chapter 8
   d. Reading:
   e. Discussion
   f. Optional readings:
   g. Optional problem set with FRAGSTATS and computer generated maps

7) Landscape Elements and Pattern module: Objectives are to illustrate the fundamental elements in a landscape, to address the idea of landscape pattern, and to encourage students to think about when and whether landscape heterogeneity has effects on animal populations.
   a. PowerPoint presentation: Landscape Elements
   b. Discussion
   c. PowerPoint presentation: Are Patterns Real?
   d. Reading:


e. Discussion

f. Handouts: Geologic Time Scale

g. Readings:


i. Optional reading:


ii. Harrison, S. and L. Fahrig 1995. Landscape pattern and population conservation


8) Habitat Fragmentation module: Objectives are to illustrate that the concept of habitat fragmentation is broader than originally conceived, to put into perspective the question of what aspect of pattern (habitat area or spatial configuration) is most important in structuring animal populations, and to illustrate the idea of 'landscape connectivity' from an organism standpoint.

a. PowerPoint presentation: Definition of Fragmentation


d. Discussion

e. Readings:

f. PowerPoint presentation: Contribution of spatial configuration vs. habitat amount.

g. Readings:

h. Exercise: Learning Landscape Ecology Chapter 5: Simulating changes in Landscape Pattern. Eric Gustafson

i. Optional readings:

9) Disturbance Regimes module: Objectives are to place into perspective the small and large scale causes that structure populations and
influence vital statistics, such as birth and death rates, and survivorship.

a. Powerpoint presentation: Multiple causes structure animal populations and Communities
b. Discussion
c. Readings:
d. Exercise: Learning Landscape Ecology Chapter 11: Landscape disturbance: Location, pattern, and dynamics, Turner, M. F., D. S. E. Gergel, and F. S. Chapin III.
e. Optional Readings:
10) Landscape Pattern and Metapopulations module: Objectives are to illustrate and probe the relationship between landscape pattern and metapopulation dynamics.
   a. PowerPoint presentation: Patterned landscapes and Complicated Population Dynamics
   b. Discussion
   c. Reading:
   d. Reading:
   e. Discussion
   g. Optional readings:
11) Biodiversity module
   a. PowerPoint presentation: to do
   b. Discussion
   c. Reading:

   e. Discussion

ADDITIONAL READING

There is a "must-read" book that I believe every serious graduate student should have on her/his shelf. HOW TO READ A BOOK by M. J. Adler & C. Van Doren (1972 Simon & Shuster - ISBN 0-671-21209-5 Pbk.) details the levels of reading (elementary, inspectional, analytical, and
syntopical) and the characteristics of each. Graduate students should be reading at least at the third level, and striving for the fourth. This is not required but most highly recommended.

Class material will be taken from many sources including the following. You may wish to search for these in the Library and consult them for background material.


6. O’Neill, R.V., D.L. De Angelis, J.B. Waide, and T.F.H. Allen. 1986. A hierarchical concept of ecosystems. Monogr. in Pop. Biol. #23. Princeton Univ. Press. 253 pp. (presents a fundamental view that unifies the nutrient cycling and energy flow view of ecology with the population dynamics approach; emphasizes rate-structured hierarchies as the framework; must read this one)

nicest works emphasizing the temporal dynamics and their importance in understanding landscape dynamics; written by an historian)

8 Kuhn, T. S. 1962 (1970 ed) The structure of scientific revolutions. Univ. Chicago Press, Chicago, IL. 210 pp. (several zerox copies of this will be available (provides a nice explanation of how paradigms change in science)


best written books on the topic; highly recommended for every serious ecology graduate student)


ACADEMIC RESPONSIBILITIES

For more information, please contact:

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Academic Freedom and Professional Responsibilities (Faculty Code)

Academic freedom is the right to teach, study, discuss, investigate, discover, create, and publish freely. Academic freedom protects the rights of faculty members in teaching and of students in learning. Freedom in research is fundamental to the advancement of truth. Faculty members are entitled to full freedom in teaching, research, and creative activities, subject to the limitations imposed by professional responsibility. Faculty Code Policy #403 further defines academic freedom and professional responsibilities: http://personnel.usu.edu/policies/403.htm.

Academic Integrity - "The Honor System"

Each student has the right and duty to pursue his or her academic experience free of dishonesty. The Honor System is designed to establish the higher level of conduct expected and required of all Utah State University students.

The Honor Pledge: To enhance the learning environment at Utah State University and to develop student academic integrity, each student agrees to the following Honor Pledge: "I pledge, on my honor, to conduct myself with the foremost level of academic integrity." A student who lives by the Honor Pledge is a student who does more than not cheat, falsify, or plagiarize. A student who lives by the Honor Pledge:

- Espouses academic integrity as an underlying and essential principle of the Utah State University community;
- Understands that each act of academic dishonesty devalues every degree that is awarded by this institution; and
- Is a welcomed and valued member of Utah State University.
Course Fees

Courses that utilize course fees are required to identify the amount of the course fee and explain the purpose of the course fee on the syllabus given to students. Course fee information not included on the syllabus will result in the course fee automatically being deleted.

Grievance Process (Student Code)

Students who feel they have been unfairly treated [in matters other than (i) discipline or (ii) admission, residency, employment, traffic, and parking - which are addressed by procedures separate and independent from the Student Code] may file a grievance through the channels and procedures described in the Student Code: http://studentlife.tsc.usu.edu/stuserv/pdf/student_code.pdf (Article VII. Grievances, pages 25-30).

Plagiarism

Plagiarism includes knowingly "representing, by paraphrase or direct quotation, the published or unpublished work of another person as one's own in any academic exercise or activity without full and clear acknowledgment. It also includes the unacknowledged used of materials prepared by another person or agency engaged in the selling of term papers or other academic materials." The penalties for plagiarism are severe. They include warning or reprimand, grade adjustment, probation, suspension, expulsion, withholding of transcripts, denial or revocation of degrees, and referral to psychological counseling.

Sexual Harassment

Sexual harassment is defined by the Affirmative Action/Equal Employment Opportunity Commission as any "unwelcome sexual advances, requests for sexual favors, and other verbal or physical conduct of a sexual nature." If you feel you are a victim of sexual harassment, you may talk to or file a complaint with the Affirmative Action/Equal Employment Opportunity Office located in Old Main, Room 161, or call the AA/EEO Office at 797-1266.
Students with Disabilities

The Americans with Disabilities Act states: "Reasonable accommodation will be provided for all persons with disabilities in order to ensure equal participation within the program. If a student has a disability that will likely require some accommodation by the instructor, the student must contact the instructor and document the disability through the Disability Resource Center (797-2444), preferably during the first week of the course. Any request for special consideration relating to attendance, pedagogy, taking of examinations, etc., must be discussed with and approved by the instructor. In cooperation with the Disability Resource Center, course materials can be provided in alternative format, large print, audio, diskette, or Braille."

University Grading Scale

- A  100-93%
- A-  92-90%
- B+  89-87%
- B   86-83%
- B-  82-80%
- C+  79-77%
- C   76-73%
- C-  72-70%
- D   69-60%
- F   Below 60%

Withdrawal Policy and "I" Grade Policy

Students are required to complete all courses for which they are registered by the end of the semester. In some cases, a student may be unable to complete all of the coursework because of extenuating circumstances, but not due to poor performance or to retain financial aid. The term 'extenuating' circumstances includes: (1) incapacitating illness which prevents a student from attending classes for a minimum period of two weeks, (2) a death in the immediate family, (3) financial responsibilities requiring a student to alter a work schedule to secure employment, (4) change in work schedule as required by an employer, or (5) other emergencies deemed appropriate by the instructor.