LANDSCAPE ECOLOGY

(NRC 621)

Course Syllabus

Course Objectives

The purpose of this course is to provide students with an introduction to the emerging discipline of landscape ecology: Landscape ecology might be defined best by its focus on the interplay between spatial pattern and process; specifically, how to characterize spatial pattern, where it comes from, why it matters, and how it changes through time. Thus, in this course, we will focus on the following:

- **Detecting and characterizing landscape patterns.** Finding the characteristic scale of spatial pattern; defining the elements of pattern; connectedness, fractal geometry, and percolating networks; and how these aspects of pattern are interrelated in landscapes, and how they vary.

- **How patterns develop on landscapes.** Including the three agents of pattern formation: the physical template of environmental constraints, biotic processes, and disturbance regimes.

- **Implications of landscape pattern.** This is the central set of questions in landscape ecology. We will focus on processes at three levels of organization: Populations and metapopulations, communities, and ecosystem processes.

- **Landscape dynamics.** How landscape patterns and processes change through time, including techniques for detecting, analyzing, or simulating landscape change; and modeling populations or communities in landscape mosaics (including spatially implemented metapopulation models).

- **Landscape management.** How humans approach the management of complex landscapes to achieve management objectives, including two themes central to ecology today: Conservation biology and ecosystem management.

Beyond these overall content goals, this course is intended to:

- Provide students with an opportunity to work and learn in an interdisciplinary environment; specifically, to provide students the opportunity to develop natural resource problem-solving skills in an interdisciplinary team environment.

- Provide students with an opportunity to engage in active, student-directed learning that will prepare them for professional life.

- Provide students with an opportunity to refine their written and oral communication skills.

Guiding Philosophy

The course objectives listed above largely dictate the teaching and learning method used in this course. Specifically, this course is strongly focused on project-based, student-directed learning. Consequently, learning new material from assigned readings and regurgitating it on exams is de-emphasized. Rather, the emphasis is on sharing knowledge and expertise (both pre-existing and newly acquired) with students from different disciplines (in a small group environment) to address contemporary issues in landscape ecology. The time and energy devoted to this course is largely in the form of interdisciplinary group analysis of data sets (via the use of computer models) and discussion of those results in reference to the concepts learned from lecture and assigned readings, not studying for exams. In addition, in contrast to most courses, the lab projects constitutes the major emphasis for the course. Indeed, lecture is designed, in part, to support the lab projects, not vice versa.

Course Format

The course is logically divided into lecture and lab. There will be two 75 minute lectures each week covering the material in the assigned readings, including a review and discussion of the most relevant material with illustrated examples. There will a be single 3-hour lab section each week. The purpose of the lab section is to provide students with hands-on experience analyzing real data sets using state-of-the-art landscape analysis software.

Student Responsibilities

Students are responsible for fully understanding all of the information presented in this syllabus. If you have any questions regarding this information, it is your responsibility to bring it to the instructor's attention before the first graded assignment. In addition, students are responsible for attending class, actively participating in class and group discussions, and completing all assignments. Students are expected to contribute equally to all group projects. In addition, students are required to meet outside of class with group members to complete lab projects. Students should be prepared to meet with your group outside of class for at least 3 hours per week. Failure to do any of these things may result in failure of the course (see Grading System below). Any assigned reading material is to be read before the appropriate class/lab session. Students are responsible for asking questions anytime they need clarification (remember, there is no such thing as a bad question). Finally, and most importantly, students are responsible for sharing their views, perspectives, opinions, and experiences with the class. Each student brings to the class a unique world view that has been shaped by their personal experiences and observations. By sharing this world view, each of us will develop a broader and more enlightened world view and, as a result, develop a better understanding of how to apply the principles of landscape ecology to the management of real landscapes.

Attendance Policies

Students are expected to attend all lectures and labs. Although attendance in lectures will not be recorded directly, students will be graded on lecture attendance as described below (see Grading System-class attendance & participation). Similarly, although lab attendance will not be recorded directly, students will be graded on their participation in the lab projects by their peers (see Grading System-lab project).

Academic Dishonesty Policy

Academic dishonesty (e.g., plagiarism, cheating, fabrication) is a violation of the regulations of the University and will not be tolerated. In fairness to students who put in an honest effort, academic dishonesty will be harshly treated. Any form of cheating whatsoever will result in a score of zero on that grading item. A second violation will result in an F for the course. Consult the bulletin "Undergraduate Rights & Responsibilities" for further information. To further eliminate any potential for cheating, you will be graded in part by your peers as described below (see Grading System).

How to get Help

The instructor is available to help students in all aspects of the course. In the true spirit of interdisciplinary teamwork, it is recommended that students seek information and assistance first from their teammates on a particular assignment or lab project. If this is unsatisfactory, students can contact the instructor during the regularly scheduled office hours. If students are unable to meet during that time period, they can arrange to meet the instructor individually by appointment.

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Office Hours: Tues/Thurs 10:45-12:00 noon
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Grading System

This course utilizes *project-based* learning and *student-directed* learning as the primary means of instruction and student evaluation. Consequently, grading is based largely on student participation and performance in student-directed projects. Grading will be based on several items; each item is described in detail below.

Grading Item	Points	Percentage of course grade
Daily quizes	100	20%

Project 1	100	20%
Project 2	100	20%
Project 3	100	20%
Project 4	100	20%

Based on the cumulative score earned on all grading items, the overall course grade will be determined as follows:

Cumulative Score	Grade
461-500	A
446-460	AB
411-445	B
396-410	BC
361-395	C
<361	F

1. Daily Quizes.–Class attendance and participation will be gauged by daily, in-class quizzes. These will be short one- or two-question quizzes to be completed in class and will cover material from the preceding class discussions. These will be graded on a pass/fail basis. The proportion of questions answered correctly will be multiplied by 100 to determine the total number of points earned for this grading item.

2. Project 1.–*Neutral landscape analysis*. In this assignment, groups will learn to use the program RULE to generate and analyze neutral landscapes.

3. Project 2.–*Quantifying landscape pattern*. In this assignment, groups will learn to use the program FRAGSTATS to quantify the structure of several local landscapes.

4. Project 3.–*Landscape Dynamics*. In this assignment, groups will use the software RMLANDS to investigate the dynamics of a landscape under various disturbance regimes.

5. Project 4.–*Metapopulations*. In this assignment, groups will learn to use the software METAPOP to analyze the metapopulation dynamics of a local vertebrate species.

NOTE: The details of each assignment, including specific guidelines will be handed out prior to each lab.

General Guidelines for Assignments

For each of the assignments, students will be organized into interdisciplinary groups. Each group will prepare a single oral report. Every member is responsible for contributing equally to the content of the report. The report should be well organized and presented in a clear and concise manner.

Assignments will be graded according to the following procedure. First, the entire group will receive a score (out of a maximum of 100 points) based on information content (75 points) and presentation (25 points) by the course instructor and teaching assistant. MOST IMPORTANTLY, reports should effectively demonstrate that an interdisciplinary approach was used. In other words, I want a single integrated presentation that effectively demonstrates that the entire group discussed the model results and reached some kind of consensus over the interpretation of those results. The report should not consist of several separate efforts combined at the end for purposes of the presentation. Moreover, the concepts discussed in lecture should be integrated into the discussion of the results to the extent possible. These are your major challenges and will largely determine the grade you receive for the assignment.

Second, each member of the group will be evaluated by their peers within the group. Upon completion of the assignment, each member will rate the contribution of each individual to the group effort and assign a score (out of a maximum of 100 points) to each individual.

The final score for each individual will be the average of the instructor and peer scores.