ECOL 620
Applications in Landscape Ecology
Spring 2020

Instructor:
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Office Hours: Tuesdays 9-11am; other times by appointment

Course Meetings:

Lecture:	M, W, 2-2:50 pm, Natural Resources 243
Lab:	Th, 9-10:50 am, Natural Resources 250
Recitation:	W, 3-3:50 pm, Natural Resources 243

Course Description:
This course is designed to explore the principles and procedures of landscape ecology and their application to contemporary ecological issues. We will apply the tools of geographic and spatial analysis, GIS, and distribution models to explore how spatial and temporal variation in landscape structure and composition impact ecological processes and the distribution and abundance of organisms. Topics to be addressed include: methods for estimating spatial pattern, the effects of varying spatial and temporal scales of analysis on ecological inference, conservation management, biodiversity protection, species distribution models, and climate change. The focus of the course is on methods to solve ecological problems in a spatial context and to develop models to forecast the ecological effects of changes in landscape pattern and composition. I hope the tools we explore will be useful throughout your own research and career paths.

The course structure is two 50-minute lectures, one 50-minute recitation, and a two-hour lab (per week). The lectures are intended to cover the theoretical and conceptual foundations of landscape ecology and to provide a context for weekly lab exercises. I expect regular attendance at all lecture, recitations, and lab sessions.

Course Objectives:
The objectives of this course are to allow the student to move from a conceptual or theoretical understanding of landscape ecology to become a practitioner. This will occur by illustrating the conceptual components of landscape ecology (developed in lectures, recitations, and readings) with real data sets created and explored by the student in a

laboratory setting. The goal is to move beyond a conceptual "understanding" to the "practice" of landscape ecology.

Readings:
For the most part, readings will be drawn from journal articles and book chapters. Readings will be available in electronic form, accessed via Canvas. These will be supplemented with additional readings as specific topics arise in the conduct of the course. The course syllabus which lists our initial thoughts on appropriate readings is a "living document" subject to change as the course progresses.

Labs:
The philosophy is for the labs to be interactive and exploratory. My role is to provide guidance in exploring a wide range of concepts in landscape ecology.

There will be ~10 labs and thus ~10 lab write-ups. The final 2-3 weeks of lab will focus on a project that is defined and solved by each individual. Various project options will be offered as well as the ability for each student to define their own unique problem to solve. Labs are due prior before the following week's lab meeting.

Note: Late lab assignments will be penalized 10% for each day they are late.

Recitations:
Recitation will be used for a general discussion of the assigned readings and lecture topics. Each week a different pair of students will lead the discussion. This requires the students to prepare a set of questions to be addressed by the rest of the class.

Grading Distribution:

Lab assignments (~10):	30 %
Recitation participation:	15 %
Recitation lead:	5 %
Midterm exam:	20 %
Final paper:	30 %

Grades:

A	100% to 90%
B	<90% to 80%
C	<80% to 70%
D	<70% to 60%
F	<60%

Week	Lecture/Recitation Topics	Lab Topic	Recitation Readings	Textbook Reading
January 21 (week 1)	M: No class W: Course Introduction and Questionnaire; Defining Landscape Ecology	R: Lab 1: Introduction to R software	W: No reading	With Chapter 1
January 27 (week 2)	M: Defining scale W: Defining scale	R: Lab 2: Quantifying Spatial Pattern in Ecological Data: Scale (Fletcher 2)	W: Turner 2005 Sherry and Holmes 1988	With Chapter 2
February 3 (week 3)	M: Causes of Landscape Patterns W: Causes of Landscape Patterns	R: Lab 3 Spatial Dispersion and Point Data (Fletcher 4)	W: Wiens 1989 Wright 1974	With Chapter 3
February 10 (week 4)	M: Quantifying Landscape Pattern *Class exercise* W: Quantifying Landscape Pattern	R: Lab 4 Quantifying Land-Cover Pattern (Fletcher 3)	W: Costanza et al. 2019 Gustafson 2019	With Chapter 4
February 17 (week 5)	M: Quantifying Landscape Pattern W: Quantifying Landscape Pattern	R: Lab 5 Spatial Dependence and Autocorrelation (Fletcher 5)	W: Pickett and Cadenasso 1995 Ewers and Raphael 2008	With Chapter 4
February 24 (week 6)	M: Landscape Connectivity W: Landscape Connectivity	R: Lab 6 Connectivity (Fletcher 9)	W: Rabinowitz and Zeller 2010 Taylor et al. 1993	With Chapter 5

Week	Lecture/Recitation Topics	Lab Topic	Recitation Readings	Textbook Reading
March 2 (week 7)	M: Landscape Effects on Individual Movement and Dispersal W: Landscape Effects on Individual Movement and Dispersal	R: Lab 7 Space Use and Resource Selection (Fletcher 8)	W: Willems and Hill 2009	With Chapter 6
March 9 (week 8)	M: Landscape Effects on Individual Movement and Dispersal W: MIDTERM EXAM	R: Project Proposal due	W: MIDTERM EXAM	With Chapter 6
March 16 (week 9)	M: Spring break W: Spring break	R: Spring break	W: Spring break	None
March 23 (week 10)	M: Landscape Effects on Population Distributions and Dynamics W: Landscape Effects on Population Distributions and Dynamics	R: Lab 8 Species distribution models (Fletcher 7)	W: Fink et al. 2010 Fink et al. 2020	With Chapter 7
March 30 (week 11)	M: Landscape Effects on Population Spatial Spread W: Landscape Effects on Population Spatial Spread	R: Lab 9 Population Dynamics in Space (Fletcher 10)	W: Mundt et al. 2009	With Chapter 8
April 6 (week 12)	M: Landscape Genetics W: Landscape Genetics	R: Lab 10 Accounting for Spatial Dependence in Ecological Data (Fletcher 6)	W: Cameron et al. 2019	With Chapter 9
April 13 (week 13)	M: Landscape Effects on Community Structure and Dynamics W: Landscape Effects on Ecosystem Structure and Function	R: Mapping in ggplot2 and Rayshedder	W: Geremia et al. 2019	With Chapter 10 & 11

Week	Lecture/Recitation Topics	Lab Topic	Recitation Readings	Textbook Reading
April 20 (week 14)	M: Landscape Effects on Ecosystem Structure and Function W: Student Presentation	R: Free lab to work on projects	W: TBD	With Chapter 10 & 11
April 27 (week 15)	M: Student Presentation W: Student Presentation	R: Free lab to work on projects	W: TBD	None
May 4 (week 16)	M: Student Presentation W: Student Presentation	R: **Final paper due**	W: Flex day, if needed	None