Course Syllabus

Landscape Ecology for Natural Resource Management

ENR 5374 (3 credits) – Spring 2022

Meeting Time: **Lecture –** Monday / Wednesday 1:50–2:45 KH245
Lab – Friday 1:00–3:00 KH231

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Description

This course will introduce students to the concepts and methods of landscape ecology and demonstrate the role of landscape ecology in applied management and conservation of natural resources. At its core, landscape ecology is the study of spatial heterogeneity and understanding its effect on ecological processes. The course will progress through the following:

1) *Critical concepts in landscape ecology*
2) *Drivers of landscape patterns*
3) *Characterization and description of landscape patterns*
4) *Effects of landscape patterns on populations, communities, and ecosystems*
5) *Management of landscapes*

Objectives

This course is heavily project-based and focused on student-directed learning. The primary objective of the course is for you to gain a practical working understanding of landscape ecology and its role in natural resource management and conservation. To achieve this goal, it will be necessary for you to:

1) *Understand how to define and detect landscape patterns, the causes of these patterns, the implications of these patterns on populations, communities, and ecosystems, as well as strategies to effectively manage human-dominated landscapes*
2) *Gain comfort with reading, interpreting, and discussing primary literature*
3) *Develop problem solving skills through collaboration with peers*
4) *Develop writing and oral presentation skills*
5) *Integrate and synthesize concepts across scientific disciplines*

Prerequisites

Graduate standing **OR** instructor permission. Moderate proficiency with geographic information systems (e.g., QGIS, ArcGIS) is expected.

Expectations

This is a 5000-level course that will be taught at the graduate level to all students enrolled. All undergraduates will be expected to meet these expectations. This course is designed for in-person attendance, but this semester is likely to be challenging on many fronts. I intend to lecture (and hopefully record) via Zoom on Monday and Wednesday. *Please make reasonable and safe efforts to attend in-person, when possible.*

ZOOM LINK

Text
PDFs for all readings will be made available on the course website on Carmen.

Labs
All files and directions needed for lab will be available **HERE**. We will also send a link to each lab through Carmen Announcements.

Course Format
This course will meet twice a week for lecture and once a week for lab. Course lectures will involve discussion of assigned readings. A 1–3 question quiz will be administered at the beginning of each lecture (see Student Evaluation below). Weekly labs will provide hands-on experience using a variety of landscape ecological tools to assess and quantify landscapes and landscape patterns. There will be a final independent project that will require application and synthesis of methods and concepts learned in lecture and lab.
Many of the lectures are borrowed or adapted from K. McGarigal's Landscape Ecology Course.

Lab Projects
Project 1 —Deriving and assessing landform indices from a DEM surface

Project 2 — Assessing landscape pattern

Project 3 — Independent Project

Student Evaluation
Student performance in this course will be based upon daily quizzes, a midterm lecture exam, a final lecture exam, and the participation and completion of lab exercises and projects. Daily quizzes will be 1–3 short questions covering material from the previous class or lab. These quizzes are meant to hold students accountable for the material covered in class and to encourage attendance.

Lab exercises (1–7) will be worth 25 points each, and Lab Projects with a written report (1–2) will be worth 50 points each. There will also be a final independent project. As part of this project, all students will prepare a project proposal (50 points). We will then have an NSF-style review of proposals (50 points) to select the 'best' projects. Everyone will present their projects at the end of the semester and will be evaluated by your peers based upon presentation and interpretation of results as well as synthesis of topics discussed in lecture (100 points). A final written project report will follow the presentation (100 points).

Task	Points	% of grade
Daily quizzes / participation	100	10%
Midterm Exam	100	10%
Lab Exercises 7 @ 25 points each	175	17.5%
Lab Project Written Report 2 @ 75 points each	150	15%
Lead Class Lecture	75	7.5%
Final Exam	100	10%
Final Project Proposal	50	5%
Peer Review of Proposal	50	5%
Final Independent Project: Report	100	10%
Final Independent Project: Presentation	100	10%
Total	**1000**	**100%**

Grading scale:

A 93–100%	B– 80–82	D+ 67–69
A– 90–92	C+ 77–79	D 60–66
B+ 87–89	C 73–76	E < 60
B 83–86	C– 70–72	

Academic misconduct

Academic misconduct will not be tolerated in this course. The Ohio State University's Code of Student Conduct (Section 3335-23-04) defines academic misconduct as: "Any activity that tends to compromise the academic integrity of the University, or subvert the educational process." Examples of academic misconduct include (but are not limited to) plagiarism, collusion (unauthorized collaboration), copying the work of another student, and possession of unauthorized materials during an examination. Ignorance of the University's Code of Student Conduct is never considered an "excuse" for academic misconduct, so I recommend that you review the Code of Student Conduct (http://studentaffairs.osu.edu/csc/) and, specifically, the sections dealing with academic misconduct. I am obligated by University Rules to report suspected academic misconduct in the course. Please see the Student Resource Guide if you have questions about this policy and as always please contact me if you have any questions.

Reporting Incidents of Bias

To ensure a safe learning environment, please speak to the instructor immediately if you feel that you have experienced bias (whether based on race, ethnicity, gender identity or expression, sexual orientation, religion, national origin, age or sex) within the classroom. You can also anonymously report any incidents of bias experienced on campus to the Bias Assessment Response Team (BART).

Writing Assistance

Writing is a critical form of communication, and effective writing takes time, effort, and practice. The Center for the Study and Teaching of Writing (http://cstw.osu.edu/writing-center) *"offers free help with writing at any stage of the writing process for any member of the university community. During our sessions, consultants can work with you on anything from research papers to lab reports, from dissertations to résumés, from proposals to application materials."* Please take advantage of this resource to submit the best possible writing assignments in this course.

Special Needs

If you need an accommodation based on the impact of a disability, please contact me to discuss as soon as possible. We can discuss the course format, anticipate your needs and explore potential accommodations. I rely on the Office for Disability Services for assistance in verifying the need for accommodations and developing accommodation strategies. If you have not previously contacted the Office for Disability Services, I encourage you to do so (*http://www.ods.ohio-state.edu*, Phone: 614-292-3307)

Course Topics

Note: Syllabus is subject to change

Week	Date	Topics	Readings	Assignment Due
1	10-Jan	Introduction to Landscape Ecology	With Ch 1	
	12-Jan	Defining landscapes	T&G Ch 1	
	14-Jan	*Lab 1: (Re) Introduction to GIS*		
2	17-Jan	**No Class: Martin Luther King Day**		
	19-Jan	Defining landscapes & Scaling Issues	With Ch 2	
	21-Jan	*Lab 2: DEM Processing*		Lab 1
3	24-Jan	Scaling Issues in Landscape Ecology	Scholes 2017	
	26-Jan	Scaling Issues in Landscape Ecology	Wiens 1989	
	28-Jan	*Lab 3: GIS with R / RStudio*		Lab 2
4	31-Jan	Landscape Heterogeneity & Dynamics	T&G Ch 2	
	2-Feb	Landscape Heterogeneity & Dynamics	[2° – With Ch3]	
	4-Feb	*Project 1: DEM processing and analysis*		Lab 3
5	7-Feb	Landscape Pattern & Metrics	T&G Ch 4	
	9-Feb	Landscape Pattern & Metrics		
	11-Feb	*Lab 4: Landscape Metrics*	FRAGSTATS Manual	Project 1
6	14-Feb	Landscape Connectivity	With Ch 5	
	16-Feb	Landscape Connectivity		
	18-Feb	*Lab 5: Remote sensing*	Gergel & Turner Ch1	Lab 4
7	21-Feb	Fragmentation, Edge Effects	Fahrig 2017; Fletcher et al. 2018; Fahrig et al. 2018	
	23-Feb	Debate: Fragmentation, *per se*		
	25-Feb	*Lab 6: Google Earth Engine*		Lab 5
8	28-Feb	Landscape Effects: Individuals (Student Lecture?)	With Ch 6 [240–264]	
	2-Mar	Landscape Effects: Populations (Student Lecture?)	With Ch 7 [292–302]	
	4-Mar	*Project 2: Landscape pattern analysis*		Project 2
9	7-Mar	Landscape Effects: Organisms (Student Lecture?)	With Ch 8 [337–344]	
	9-Mar	Guest Lecture: Steve Matthews		Midterm [Take home]
	11-Mar	*Lab 7: Landscape resistance & connectivity*		Lab 6; Project Proposal
10	14-Mar	**SPRING BREAK**		
	16-Mar			
	18-Mar			

11	21-Mar	Proposal Review Panel		Proposal reviews
	23-Mar	Proposal Review Pane		
	25-Mar	Individual project work day / Lab 7: Landscape resistance & connectivity (cont)		Lab 7
12	28-Mar	**NO CLASS – IALE CONFERENCE**		
	30-Mar	**NO CLASS – IALE CONFERENCE**		
	1-Apr	Individual project work day / Lab 7: Landscape resistance & connectivity (cont)		Lab 7
13	4-Mar	Student Lectures		
	6-Apr	Student Lectures		
	8-Apr	Individual project work day		
14	11-Apr	Landscape Genetics	With Ch 9	
	13-Apr	Landscape Genetics	Balkenhol TBD	
	15-Apr	Individual project work day		
15	18-Apr	Student Lectures		
	20-Apr	Student Lectures		
	22-Apr	Project Presentations		
16	25-Apr	Project Presentations		

T&G = Turner, M. G., and R. H. Gardner. 2015. Landscape Ecology in Theory and Practice: Pattern and Process. 2nd edition. Springer New York, New York, NY.

With = With, Kimberly A. 2019. Essentials of Landscape Ecology. Oxford University Press.

Student Lecture Topics

- Animal movement / home range
- Species distributions and distribution models
- Metapopulation / source-sink dynamics
- Invasive species spread
- Disease spread
- Landscape corridors
- Species interactions
- Community composition / dynamics
- Ecosystem processes
- Landscape management and planning