Course Syllabus

Landscape Ecology

Course numbers: 11:216:450 (undergraduate) / 16:215:520 (graduate)   *3 cr.*

Professor: Dr. Marci Meixler (meixler@sebs.rutgers.edu)

Meeting times/places

Wednesdays: 8:30-9:50am
ENR 237

Course Website: Login to canvas.rutgers.edu. If you are registered for this course, you should have access to the course website.

Description

Ecology is the scientific study of the interactions between organisms and their environment. Landscape ecology is a sub-discipline of ecology, focusing on spatial relationships and the interactions between patterns and processes. This course provides a comprehensive introduction to the field by coupling theoretical concepts with applications to provide hands-on practical experience with landscape analysis tools and ideas.

Learning goals

- you will be able to describe and differentiate available methods for detecting and characterizing landscape patterns and causes of landscape patterns
- you will explore and be able to explain the implications of landscape pattern on populations, communities and ecosystems
- you will be able to describe mechanisms by which patterns and processes change (i.e. landscape dynamics) and relate them to strategies by which humans manage landscapes

Textbook (Recommended)

Turner, M. G., Gardner, R. H. 2015. Landscape Ecology in Theory and Practice: Pattern and
    Process (edition 2). New York, Springer-Verlag. 482 pp. ISBN-13: 978-1493927937; ISBN-
    10: 9781493927937
You can access this book through the Reading List on Canvas

Academic Integrity Policy

Academic Integrity. You are responsible for understanding the <u>RU Academic Integrity Policy</u>. I will strongly enforce this Policy and pursue all violations. For all examinations and assignments, you will be required to uphold the RU Honor Pledge, which states, "On my honor, I have neither received nor given any unauthorized assistance on this examination or assignment." For all written assignments, we will screen your work through an automated plagiarism detection service that compares your work against a large database of past work.

AI STATEMENT: The use of generative AI tools or apps for assignments, projects or exams in this course, including tools like ChatGPT and other AI writing or coding assistants, is prohibited.

Grading System

The course is comprised of online lectures with embedded quizzes, labs, in-class reviews, attendance and a capstone project (for grads) / exam (for undergrads).

Readings: weekly readings can be found in our textbook.

Online lectures videos with embedded quizzes: you can find these videos on the course website. Quiz questions are embedded in the lecture videos. Your grade will be modified if it is apparent that not all lecture videos have been fully watched. You are expected to take notes while watching the videos. Undergrads: you will find these notes useful to study for and take the exams.

Labs: Labs will be completed each week with corresponding assignments to be turned in. Submit to the course website.

Student-led lecture review (grads only): each week for the first ~15 mins of class, we will review the material presented in the lecture video as a game that will be led by 1 or 2 grad students. The game format can be any style but more credit will be given for thoroughness of the review, originality, timeliness (starting on time, ending on time), interactiveness with classmates, and degree of fun (note: generally games that get people actively talking in class work best). The review should cover all the main points in the lecture video of the week. You will have use of the instructor lab computer if needed. Topic sign up will be first come, first served on the course website. Extra credit will be given for winning individuals or teams each week.

Project (grads only): the project is designed to help you become familiar with: 1) the process of determining the correct scale and extent, 2) model design and creation, 3) interpretation of results, 4) exploring management implications, and 5) experiencing a landscape ecology project from start (idea conception) to finish (presentation of results in written and oral form). You can work on this in a group or individually.   You will work closely with the professor on this and will be given feedback consistently throughout the semester.

Exam (undergrads only): undergrads will take midterm and final exams (T/F, multiple choice, short answer). The final exam is non-cumulative. Both exams are open notes. Questions will be pulled from a pool so each of you will be given a unique version of the exam.

Attendance: attendance aligns with participation which improves the quality of the course for everyone. Lateness counts against this part of your grade. Absences will only be excused in the event of an emergency (with documentation) and submission of absence to the student absence reporting system.

Extra credit: See course home for details on extra credit. More detail on extra credit opportunities will be sent through announcements.

Late submission policy for labs: 10% deduction per day; down to 60% (so it is still worthwhile submitting very late assignments).

Graded item	%
Lecture videos with embedded quizzes	20%
Labs	50%
Exams (undergrads) / Project (grads)	25%
Attendance and class review leadership (grads)	5%
Extra credit (optional)	Up to 1%

Honor code

Classmates can discuss problems with labs together, but each student is expected to arrive at assignment solutions on their own. A cluster of students providing the same erroneous solution should therefore be a rare event.

CRSSA lab policies

No food or drink in the lab except for drinks in spill-proof containers
Please close the lab door if you are the last person to leave the lab
Please do not use the downstairs lab
Hours: the upstairs lab is scheduled to be unlocked Monday through Friday from 7:00AM to 7:00PM (the front door to the building is unlocked Monday through Friday 7:00AM to 9:00PM)

Graduate students

Graduate students will be expected to work at a higher level than undergraduates. As such, graduate students will have the unique responsibility to complete a project demonstrating understanding of landscape ecology principles as well as lead the in-class reviews (see grading system section for info on the reviews).

Project (grads only)

You will be asked to complete a project that applies some of the concepts and tools covered in lab to an unanswered question or issue relevant to the field of landscape ecology. The specific task is to use spatial data and spatial analyses to address a question or issue and to prepare a written paper and oral presentation. Intermediate deadlines will help keep you on track (see schedule at end of syllabus for tasks).

Overall project grading rubric

Group membership	--
Project title and objectives	5%
Project proposal	10%
Data sources	5%
Analysis reviews (4)	10%
Preliminary results	5%
Preliminary interpretation	5%
Presentation	10%
Paper	50%
Total	**100%**

Detail on what is expected for each project task

Group membership

Determine if you would like to work individually or in a group. If in a group, determine if there is a project idea that might be interesting to all of you collectively. Once you have determined your group, submit your name(s) to the course website.

Project title and Objectives

Start exploring possible project ideas by browsing data. Your project should use spatial data and spatial analyses that we are learning in class to address an unanswered question or issue relevant to landscape ecology.

Submit your project title and the objectives (or questions) you will attempt to answer by doing your project. Make sure the objectives are ones that can be answered using spatial analysis techniques in the time we have to work on projects this semester (i.e. try not to overreach).

Project proposal

Your project proposal should include the following: title of proposed project, names of group members or name of individual if not a group project, hypotheses, objectives (the ones you previously submitted), data you expect to use (and where you will get it from), analysis techniques (closely tied to your hypotheses and objectives), who will be responsible for each task, and citations of papers that you researched showing how your question fills a gap. You are being asked to do original research. Thus, to get full credit you MUST cite literature to show how the question you are answering addresses a previously unanswered question in landscape ecology. This is a living document - it is ok for it to change in coming weeks as you explore your data and analysis methodology more.

Important: Make sure the necessary data are available to answer your question.

Data sources

List the data name, data source organization (e.g. NOAA), data source location (e.g. website address, personal communication, etc), date data was created (year), extent of data (e.g. New Jersey, Morris County) and projection when downloaded (if you have changed the projection, that information can be added in a separate column). This can all be uploaded as an excel spreadsheet. You should already have this data in hand at this point in the project.

Analysis reviews (4 of them; in class)

This is an opportunity to show me your progress so far on the project and discuss any stumbling blocks you might have. This is also your opportunity to prove that you have done some significant work on the project so far. You should have all the data and have done some analysis of the data using techniques you learned in class (or any other techniques pre-approved with me). You should be able to show me some preliminary products (maps and results) each class. Following our meeting you should come up with a list of what you plan to accomplish in the remaining weeks. No submission is necessary to Canvas.

Preliminary results

Write up and turn in your preliminary results and create tables and figures. These items will form the results section of your final paper.

Preliminary interpretation

Write up and turn in your preliminary interpretation of your findings. This will form the basis of the discussion section of your final paper.

Presentation

All project teams are expected to provide a ~10-15 minute presentation in class showing their work. All members of the team should be present and speak during the presentation. The final presentations should include a brief and simple description of the unanswered question in landscape ecology that you addressed (background), an explanation of the analysis steps you performed (methods), your results and greater implications (conclusions).

Project paper

Your paper should include the following sections:
Title page
Abstract
Introduction
Methods
Results
Discussion
Acknowledgments
Literature cited
Tables
Figures
Appendices (if necessary)

Grading rubrics for each project task

1) Project title and objectives – 10 pts

____	(2)	Descriptive title
____	(4)	Objectives in line with project idea
____	(4)	Objectives concise enough to be accomplished this semester

2) Project proposal – 20 pts

____	(5)	Novel idea that is well thought out
____	(5)	Clear presentation of expected techniques to be used to answer question
____	(5)	Clear linkages to the field of Landscape Ecology
____	(5)	Literature cited

3) Data sources – 10 pts

        10 points given for just turning in data source information on time

4) Analysis reviews (4 of them) – 5 pts each (total of 20 pts)

        5 points given for showing clear progress on project analysis

5) Preliminary results – 10 pts

      ____ (5)   Result text is descriptive and thorough

      ____ (5)   Tables and figures created

6) Preliminary interpretation – 10 pts

      ____ (5)   Discussion text is descriptive and thorough and includes citations

      ____ (5)   Interpretations are consistent with results

7) Presentation - 20 points

10-15-minute presentation. All group members must be present and speak in the presentation.

      _____ (2)   Background and additional knowledge about why your question was important to LE

      _____ (4)   Description of study design and data used

      _____ (4)   Description and justification for your methods and data analysis

      _____ (4)   Explanation for results found

      _____ (4)   Implications of your results for LE

      _____ (1)   Limitations/things you would do differently

      _____ (1)   Presentation quality, use of graphics to illustrate point, and appropriate citations

8) Paper- 100 points

Writing and format (15 points)

      _____(2)   Spelling, scientific names underlined or italicized, grammar, syntax

      _____(8)   Writing clear and concise

      _____(5)   Formatted following guidelines given (including all sections)

Background, Methods, Results, and Conclusions (written content) (65 points)

      _____ (10) Background and justification of research question (with appropriate citations)

      _____ (10) Description and justification of methods and analysis

      _____ (10) Explanation of results

      _____ (10) Putting results in context (conclusions)

      _____ (5)   Limitations/changes you would make if you were to do this again

      _____ (10) Use and understanding of relevant primary literature and ecological theory to support your methods and findings

      _____ (10) Difficulty of the project

Additional content (20 points)

      _____ (10) Tables and figures appropriately support text

      _____ (10) Sources appropriately cited

See course website for due dates

Topics for lecture/lab, readings, and student specific tasks

Week	Lecture topic (with quiz)	Lab	Chapter reading	Graduate student specific	Undergraduate student specific
1	1) Intro & 2) Scale	1) Software access & 2) Intro to ArcGIS	1		
2	Models	Models	3	Project group formation	
3	Causes of landscape patterns	Image classification	2	Project title and objectives	
4	Quantifying landscape patterns	Quantifying landscape patterns	4	Project proposals	
5	Machine learning	Machine learning		Project data sources	
6	Spatial statistics	Spatial statistics	5	Project analysis day 1	
7	Landscape limnology	Landscape limnology	8 (p.308-322)	Project analysis day 2	
8	Landscape change in NJ	Landscape change in NJ	Landscape change in NJ report (on Canvas under modules/readings)	Project preliminary results and figures	MIDTERM EXAM
9	Disturbances	Disturbances	6	Project analysis day 3	
10	Organisms and landscape pattern	Species prediction	7	Project analysis day 4	
11	Landscape genetics	Habitat suitability and wildlife corridors	7 (p.277-280) & article (on Canvas under modules/readings)	Project preliminary interpretation	
12	Ecosystem processes	Ecosystem services	8	Project presentation slides due	
13			Thanksgiving		
14	Applied landscape ecology	Trend analysis	9 & 10	Project paper	
15				Project presentations in class	FINAL EXAM
	Extra credit & outstanding work due				

Course schedule

See Canvas Calendar for due dates. Items due by midnight on due date unless otherwise noted.