

BIO 5540/7540: Landscape Ecology Winter Semester, 2020

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MEETING LOCATION/TIME

1177 Biological Sciences
Tuesday and Thursday 8:30 – 9:45 am

COURSE DESCRIPTION

Ecology is a broad scientific discipline that focuses on interactions, most typically involving organisms. Understanding how ecosystems work and what influences them at multiple spatial and temporal scales, however, is critical to understanding, how the world works. *Landscape ecology* focuses on the causes and consequences of spatial heterogeneity and patterns across a range of scales. Landscape ecology provides concepts, theory, and methods that emphasize the importance of spatial patterning on the dynamics of interacting ecosystems, how to characterize the patterning, and how it might change through time. In studying landscape ecology, we will synthesize the dominant themes of the field, familiarize students with its current research trends, and explore applications of the landscape approach. The course should be useful to students in ecology and natural resources as well as conservation biology, landscape architecture, geography, land use planning, and other fields.

COURSE OBJECTIVES AND LEARNING OUTCOMES

The main objective of this course is to develop students' in-depth understanding of landscape ecology. Landscape ecology is a young, integrative field, and is still developing, and thus students will explore an overview of the field with hands-on, applicable experience with its concepts and tools.

Upon successful completion of the course, students should be able to:

1. Understand the concepts and consequences of scale, scaling techniques, and spatial pattern;
2. Explain how ecological systems are dynamic in space and time;
3. Infer the abiotic and biotic processes that structure landscape mosaics and patterns of biodiversity at multiple spatial scales;
4. Use the tools specific to landscape ecology to answer questions about heterogeneity, scale, and ecosystems dynamics.
5. Review the theory, methodology, and application of landscape ecology to contemporary issues in conservation biology and resource management;

COURSE PREREQUISITES

Undergraduates should register for the course as BIO 5540. The prerequisites for this course for undergraduates (BIO 5540) are successful completion of BIO 1500 (Basic Life Diversity) and BIO 3500 (Ecology and the Environment). There are no prerequisites for grad students, but at least one undergraduate course in ecology, biodiversity, or organismal biology is recommended, as we assume a working knowledge of ecology in this course. Graduate students **MUST** register for the course as BIO 7540.

COURSE CREDITS

This is a 3-credit course.

FORMAT

Lecture and lab. This class is designed as an upper-level undergraduate and graduate level course. An implication of this is that you will not open up your head and fill it with facts two days each week. Instead, you are expected to study and complete the lab exercises outside of class, and to fully participate in your own learning and in the course itself while class is in session. Class meetings will generally include a lecture on Tuesdays and computational exercises on Thursday, designed to introduce students to the quantitative methods used in landscape ecology.

Landscape ecology is a hands-on field rather than something purely academic; many have described it as more of an approach and a set of tools rather than a subdiscipline in and of itself. As such, learning about the field is learning more than just the approach, but the tools used by landscape ecologists to help them answer questions about heterogeneity and multiple scales. As such, this course will have a heavy focus on hands-on computer laboratory exercises as well as lectures. Specifically, we focus on exercise-based, student-directed learning rather than regurgitating new material it on exams. In contrast to other courses you may have taken, the labs are the major emphasis for the course, and lectures are designed, at least in part, to support the lab projects, not vice versa.

Lab exercises. Laptops will be provided to work on the lab exercises in class on Thursdays, but students are welcome to use their own computers. Most labs will use either Microsoft Excel and/or small, specially-designed programs easily installed on any windows-compatible computer, but will also occasionally use ArcGIS, which may be less accessible for personal computers. We will be spending one class session (75 minutes) each week on a lab exercise, which is not always enough time to finish the material in class. Thus students should make sure always to read the lab exercise prior to coming to the class session. Labs consist of computer work and a short write-up; the lab write ups should be about 2 pages of prose (typed, single spaced, not including tables or figures), due the following week. Students are welcome to work in pairs if desired, but all students are responsible for the lab material, which will be needed for the take-home exam (see below).

Take home exam. This course will feature one take-home examination that will require students to use the methodology and techniques learned in the weekly lab exercises. The exam will ask students to address a series of real-world questions pertinent to landscape ecology using the approaches, computer programs, and information provided throughout the term. Students will have a bit more than two weeks to complete the exam. All students must turn in the exam based on their individual work.

Term paper and presentation. Graduate students (those registered for BIO 7540) are required to write a 10-page term paper and give a short, 15-minute, conference-style presentation to the class on **April 14th or April 16th, 2020** that highlights their paper. Term paper topics must be approved by the instructor prior to their undertaking, but can address virtually any topic that encompasses landscape ecology. Graduate students are encouraged (but not required) to apply these concepts as they pertain to their own research, but should not expect to simply present their research without regard to whether it has something to do with landscape ecology.

TEXTBOOKS

Two textbooks are required for the course and are available at campus bookstores:

Turner, M.G., and R.H. Gardner. 2015. Landscape ecology in theory and practice, 2nd edition. Springer, New York. 482 pp. \$99 new.

Gergel, S.E., and M.G. Turner (eds.). 2017. Learning Landscape Ecology, 2nd edition. Springer, New York. 347 pp. \$45 new.

I will also post Powerpoint slides for each lecture on Canvas. You are welcome to record lectures in class if it helps you; lectures *will not* be recorded for Echo.

OFFICE HOURS

I will be available for office hours by appointment. You are welcome to come see me whenever my door is open, but I cannot promise that I can spend time with you without an appointment. If my office door is closed, I am either not there or am unavailable. In general, most weeks I will be available the hour or so after class on Tuesdays and Thursdays.

EXAM DATES

The take home exam will be given out on **Friday, March 27th** and is due by **5 pm on Monday, April 13th**. I generally send the exam out by e-mail and it may be returned the same way (though hard copies are always safest). Your exam is not considered turned in until you hear from me that I have received it.

GRADING BREAKDOWN

<i>BIO 5540</i>		<i>BIO 7540</i>	
Lab exercises	55 pts	Lab exercises	45 pts
Take-home exam	35 pts	Take home exam	35 pts
Discussion/participation	10 pts	Discussion/participation	10 pts
		Term paper & presentation	10 pts
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	100 pts		100 pts

Students will be graded based on a soft-bottom scale. That is, students will receive at minimum (though potentially higher) the following grades:

A	> 89.9%	(\geq 89.9 points)
B	80-89.9%	(80-89.9 points)
C	70-79.9%	(70-79.9 points)
D	60-69.9%	(60-69.9 points)
F	< 60%	(< 60 points)

Note that grades less than a B- (< 80 points) are considered failing for graduate students.

ADD/DROP POLICY

In the first two weeks of the term, students can drop this class and receive 100% tuition and course fee cancellation. Students who wish to withdraw from the class can initiate a withdrawal request. After **Friday, January 17th, 2020** there is no tuition or fee cancellation, and you must obtain instructor approval to drop the course. This is also the last day to drop the class without it appearing on your academic transcript. After this date, you will receive a transcript notation of WP (passing), WF (failing), or WN (no graded work) at the time of withdrawal. No withdrawals can be initiated after **Sunday, March 22nd, 2020**. Students still enrolled after this date will receive a grade. Because withdrawing from courses may have negative academic and financial consequences, students considering course withdrawal should make sure they fully understand all the consequences before taking this step. More information on this can be found at: <https://wayne.edu/registrar/registration/calendar19-20>.

EXAM GRADE DISPUTES / CHALLENGE OPTION

Students will have one (1) week after the return of an exam or a written assignment to challenge a grade for any question. I am very willing to discuss grade challenges, but only during this period; failure to challenge the grade within this period indicates a willingness to accept the grade as is.

ACADEMIC CONDUCT

Academic misbehavior means any activity that tends to compromise the academic integrity of the institution or subvert the education process. All forms of academic misbehavior are prohibited at Wayne State University, as outlined in the Student Code of Conduct (<https://doso.wayne.edu/pdf/student-code-of-conduct.pdf>). Students who commit or assist in

committing dishonest acts are subject to downgrading (to a failing grade for the test, paper, or other course-related activity in question, or for the entire course) and/or additional sanctions as described in the Student Code of Conduct.

Cheating: Intentionally using or attempting to use, or intentionally providing or attempting to provide, unauthorized materials, information or assistance in any academic exercise. Examples include: (a) copying from another student's test paper; (b) allowing another student to copy from a test paper; (c) using unauthorized material such as a "cheat sheet" during an exam.

A strict zero-tolerance policy for cheating will be enforced. Anyone caught cheating on an exam or a quiz will receive a score of zero for that portion of the grade. Students found to be cheating during an exam will receive a zero for that test or quiz with no opportunity to drop or replace that score. A second episode of cheating will result in a grade of "F" for the course and may also result in initiation of university disciplinary action.

Fabrication: Intentional and unauthorized falsification of any information or citation. Examples include: (a) citation of information not taken from the source indicated; (b) listing sources in a bibliography not used in a research paper.

Plagiarism: To take and use another's words or ideas as one's own. Examples include: (a) failure to use appropriate referencing when using the words or ideas of other persons; (b) altering the language, paraphrasing, omitting, rearranging, or forming new combinations of words in an attempt to make the thoughts of another appear as your own.

Other forms of academic misbehavior include, but are not limited to: (a) unauthorized use of resources, or any attempt to limit another student's access to educational resources, or any attempt to alter equipment so as to lead to an incorrect answer for subsequent users; (b) enlisting the assistance of a substitute in the taking of examinations; (c) violating course rules as defined in the course syllabus or other written information provided to the student; (d) selling, buying or stealing all or part of an un-administered test or answers to the test; (e) changing or altering a grade on a test or other academic grade records.

SPECIAL CONSIDERATIONS FOR INDIVIDUALS WITH DISABILITIES

If you have a documented disability that requires accommodations, you will need to register with Student Disability Services for coordination of your academic accommodations. The Student Disability Services (SDS) office is located in the Adamany Undergraduate Library. The SDS telephone number is 313-577-1851 or 313-202-4216 (Videophone use only). Once your accommodation is in place, someone can meet with you privately to discuss your special needs. Student Disability Services' mission is to assist the university in creating an accessible community where students with disabilities have an equal opportunity to fully participate in their educational experience at Wayne State University.

Students who are registered with Student Disability Services and who are eligible for alternate testing accommodations such as extended test time and/or a distraction-reduced environment should present the required test permit to the professor at least one week in advance of the exam. Federal law requires that a student registered with SDS is entitled to the reasonable

accommodations specified in the student's accommodation letter, which might include allowing the student to take the final exam on a day different than the rest of the class.

RELIGIOUS HOLIDAY CONFLICTS

Because of the extraordinary variety of religious affiliations of the University student body and staff, the Academic Calendar makes no provisions for religious holidays. However, it is University policy to respect the faith and religious obligations of the individual. Students with classes or examinations that conflict with their religious observances are expected to notify me (Dan Kashian) in writing by class time on **Tuesday, January 21st, 2020** so that mutually agreeable alternatives may be worked out.

UNEXPECTED UNIVERSITY CLOSURES

Closure of the University is announced by the following mechanisms:

1. the University Newsline (313) 577-5345 *
2. WSU Homepage (www.wayne.edu) *
3. WDET-FM (Public Radio 101.9)
4. by other local radio and television stations

* Note: The information on closures and class cancellations is likely to be found at these locations before it is broadcast by local radio and television stations.

WHAT I EXPECT FROM STUDENTS

As with every course I teach, this course is designed to provide you with every opportunity to succeed, but I also expect you to participate in your own potential for success. Here is a general (not exhaustive) list of what I expect from you:

- 1) Except for extenuating circumstances, attend all scheduled course meetings. It's difficult not to make certain assumptions about folks who regularly miss class.
- 2) Be actively engaged in all parts of this course, including both lecture and lab. You should be at ease to ask questions or lend comments at any time over the course of the semester. Active learning in the course requires that you attend class, interact with your classmates and instructors, and think critically about the material being presented.
- 3) Work to complete assignments on time and with your best effort. As in most places in your academic life, in this course I will return hard work and perseverance by any given student in kind. I am very willing to help out a struggling student who is obviously working hard.
- 4) Be respectful of your instructors and fellow classmates. This includes arriving to class on time, minimizing talking out of turn during lectures, and allowing others to participate without interrupting them.

WHAT YOU CAN EXPECT FROM ME

Just as professors have certain expectations of students, it makes sense that students have certain expectations of their instructors. You can expect the following in this course:

- 1) I will be prepared and equipped to develop your understanding of ecological principles in an informal setting that encourages your input and questions.
- 2) I will provide whatever access and assistance is appropriate and necessary to help you succeed in this course. If you need help in succeeding despite your best efforts, I will do my best to get you on the right track.
- 3) I will provide a learning environment that is informal and which makes it easy to participate fully.
- 4) At all times in evaluating your performance in this class, I will be fair and open about examinations, the material I expect you to know, and your overall evaluation in the course. This does *NOT* mean I will provide you with an “easy A”, but it does mean you will get the grade you deserve based on a combination of performance and effort.

OTHER

Any specific issue not covered by this syllabus will be resolved using University policies. Disputes which cannot be resolved following the guidelines present in this syllabus will be resolved by following the guidelines of the University “Student Due Process”.

BIO 5540/7540: Ecosystem and Landscape Ecology

Tentative Course Schedule, Winter 2020

<u>Week</u>	<u>Date</u>	<u>Topic</u>	<u>Reading</u>
1	Tue, Jan. 7 Thu, Jan. 9	Course introduction Scope of landscape ecology: Definitions and Scale	TG Chap 1
2	Tue, Jan. 14 Thu, Jan. 16	<i>Lab 1: Intro to GIS</i> <i>Lab 1, cont.</i>	Handout LLE Chap 2
3	Tue, Jan. 21 Thu, Jan. 23	What creates landscape pattern? <i>Lab 2: Creating landscape pattern</i>	TG Chap 2 LLE Chap 8
4	Tue, Jan. 28 Thu, Jan. 30	How can we quantify landscape pattern? <i>Lab 3: Understanding landscape metrics</i>	TG Chap 4 LLE Chap 4
5	Tue, Feb. 4 Thu, Feb. 6	Quantifying landscape pattern II <i>Lab 3, continued</i>	TG Chap 4 LLE Chap 4
6	Tue, Feb. 11 Thu, Feb. 13	Spatial statistics in landscape ecology <i>Lab 4: Scale detection using spatial stats</i>	TG Chap 5 LLE Chap 5
7	Tue, Feb. 18 Thu, Feb. 20	Modeling landscapes: neutral and spatial models <i>Lab 5: Using neutral landscape models</i>	TG Chap 3 LLE Chap 6
8	Tue, Feb. 25 Thu, Feb. 27	Landscape disturbance I <i>Lab 6: Comparing disturbance mosaics</i>	TG Chap 6 LLE Chap 11
9	Tue, Mar. 3 Thu, Mar. 5	Landscape disturbance II <i>Lab 6, cont.</i>	TG Chap 6 LLE Chap 11
10	Tue, Mar. 10 Thu, Mar. 12	SPRING BREAK – NO CLASS SPRING BREAK – NO CLASS	
11	Tue, Mar. 17 Thu, Mar. 19	Organisms and landscape pattern <i>Lab 7: Assessing multi-scale landscape connectivity</i>	TG Chap 7 LLE Chap 12
12	Tue, Mar. 24 Thu, Mar. 26	Ecosystems processes on landscapes <i>Lab 8: Spatial dynamics of ecosystem processes</i>	TG Chap 8 LLE Chap 16
13	Tue, Mar. 31 Thu, Apr. 2	Land use planning and conservation Urban landscape ecology	TG Chap 9 TBD
14	Tue, Apr. 7 Thu, Apr. 9	TBD TBD	
15	Tue, Apr. 14 Thu, Apr. 16	Grad student presentations Grad student presentations/Wrap up	