

# PRINCIPLES OF LANDSCAPE ECOLOGY

Forest and Wildlife Ecology 565  
Spring 2013 (cross-listed with Zoology, Landscape Architecture)

## Instructor

David J. Mladenoff, Professor, Dept. of Forest & Wildlife Ecology, A131  
Russell Labs, 262-1992, email: [djmladen@wisc.edu](mailto:djmladen@wisc.edu).

## Course Details

**Format:** Lecture/discussion. 2/week. 2 credits. T, R 9:55-10:45.

**Prerequisites:** Junior standing, and an ecology lab course beyond the introductory level, such as Botany/Zoology 460 *General Ecology*, or Forestry 550 *Forest Ecosystems*, and a statistics course. Note: This course, or similar experience, is recommended as a prerequisite for ZOOLOGY/FOREST 879, *Advanced Landscape Ecology*.

**Description:** The intent of the course is to explore the principles of landscape ecology as a framework for landscape research, analysis and management. The course will first develop definitions and concepts of landscape ecology as a framework for understanding and managing landscapes. Landscape ecology provides new approaches to fundamental research questions in ecology, as well as new approaches to forest and resource management that consider ecosystem processes at larger spatial and temporal scales. The course is expected to be useful to graduate students and senior undergraduates in natural resources, ecology, conservation biology, landscape architecture, geography, land use planning, and other fields.

Students will explore the concepts, methods, and applications of landscape ecology with 1) class lectures by the instructor and recognized experts in particular subject areas, 2) reading and discussion of literature representative of research in the field, and 3) completion of hands-on exercises designed to provide experience with some of the quantitative tools of landscape ecology.

The texts for the course are **Landscape Ecology in Theory and Practice**, M. Turner, R. Gardner, & R. O'Neill; Springer-Verlag 2001. **Learning Landscape Ecology**, S. Gergel & M. Turner, eds.; Springer, 2003. Recommended: **Foundation Papers in Landscape Ecology**, J. Wiens, M. Moss, M. Turner, D. Mladenoff; Columbia, 2006. They will be available at the University Bookstore and Textbook Underground. The Foundations book is strongly recommended

since it contains several readings not available elsewhere. We will probably use only 2-3 exercises from the lab book, Learning Landscape Ecology, but isn't required.

**Evaluation:** Grades will be based on two group lab exercises and presentations (20%), two exams (50%); and participation in class (30%).

Full participation in class, attendance, and timely arrival are expected. Class participation means both during regular classes as well as discussion days that are spaced over the semester. *For these discussion classes, you should come with three discussion questions to offer and lead from the material covered in class from that section, both lecture and readings. Send them to me the day before the class. These questions should show that you are thinking about and integrating the lectures and readings. These should be typed, double-spaced. Time will not allow us to cover all of them. Always come to class prepared by having completed the readings. I will periodically call on people both in regular classes and discussion days, as well as ask for questions or volunteers for discussion.*

Few excuses are considered an adequate reason for missing or delaying an exam. One letter grade reduction per day in the exam grade will result from delayed or missed exams that are not pre-approved.

**Draft 24 Jan 2013**  
**PRINCIPLES OF LANDSCAPE ECOLOGY**

Forest and Wildlife Ecology 565  
 Spring 2013

(cross-listed with Zoology, Landscape Architecture)

<b>Week</b>	<b>Date day</b>	<b>Class no.</b>	<b>Topic</b>	<b>Readings</b>
<i>January</i>				
1	1/22 T	1	<b>Course organization &amp; logistics</b> <b>Introduction to landscape ecology</b> -Historical development -Definitions	<b>TGO Chapter 1</b> <b>WMTM Intro pp. 1-10</b> <i>Forman &amp; Godron 1981</i> <i>WMTM</i>

	1/24 R	2	<b>Concepts and terminology in landscape ecology</b> -Pattern, heterogeneity, patches	<b>Turner 2005</b>
2	1/29 T	3	<b>Scale and hierarchy on landscapes</b> -Spatial and temporal scales	<b>TGO Chapter 2</b> <i>Urban, O'Neill, &amp; Shugart 1987 WMTM</i>
	1/31 R	4	<b>Causes of pattern-abiotic template and broad-scale constraints</b> -Climate and continental physiography -Landform and landscape position	<b>TGO Chapter 4</b> <i>Swanson et al. 1988</i> <i>Phillips 2007</i>

<i>February</i>				
3	2/05 T	5	<b>Quantifying landscape pattern</b> -Why, how to quantify pattern -Interpreting landscape metrics	<b>TGO Chap. 5, pp 93-125</b> <b>Li &amp; Reynolds 1995</b> <i>Mladenoff et al. 1993</i> <i>Wagner and Fortin 2005</i>  <b>GIS in landscape ecology</b> <b>Review as needed on GIS:</b> <i>Bernhardsen, Chapter 1 and 3</i> <i>Burrough and McDonnell, Chap. 9, pp. 220-240.</i> <i>Lecture Slides on GIS in Handouts:</i> -Sources of error -Uncertainty
	2/07 R	6	<b>Discussion Session I</b>	<b>Send me 3 typed questions by 6pm Wed. Bring to class to raise and discuss</b>
4	2/12 T	7	<b>Biodiversity and Conservation Biology I : Population models and landscapes</b>	<b>TGO Chapter 8</b> <b>Franklin &amp; Lindenmayer 2009</b> <i>Laurance 2008</i>
	2/14 R	8	<b>Remote Sensing in Landscape Ecology</b>	<b>Fassnacht et al. 2006</b> <i>Cohen et al. BioScience 2004</i> <i>Groom et al. Landscape Ecology 2004</i>
5	2/19 T	9	<b>Biodiversity and Conservation Biology II: Landscape structure</b>	<b>Fahrig 2003</b> <b>Haddad et al. 2003</b> <i>Murphy and Lovett-Doust 2004</i> <i>Brudvig et al. 2009</i> <i>Debinski &amp; Holt 2000</i> <i>Harrison &amp; Bruna 1999</i> <i>WMTM:</i> <i>Pulliam 1988, Wiens 1976</i>
	2/21 R	10	<b>Social and cultural aspects of landscape ecology</b>	<b>McDonald 2006</b>  <i>Hersberger et al. 2010</i> <i>Burgi &amp; Turner 2002</i>
6	2/26 T	11	<b>Lab I: Collecting landscape data</b>	Lab 1 Notes Lab 1 Summary Table Lab 1 Image Use Google Earth

	2/28 R	12	<b>Biodiversity and Conservation Biology III: Landscape management</b>	Prugh et al. 2008 Gillies and St. Clair 2008
<i>March</i>				
7	3/05 T	13	<i>Discussion Session II</i>	<i>Send me 3 typed questions by 6pm Mon. Bring to class to raise and discuss</i>
	3/07 R	14	<i>Lab I Presentations I</i>	
8	3/12 T	15	<i>Lab I Presentations II</i>	
	3/14 R	16	<b>Historical Ecology and Paleo-landscapes</b>	Davis et al. 1998 Brubaker 1975 Graumlich and Davis 1993 Hotchkiss et al. 2007 Umbanhowar 2004
9	3/19 T	17	<b>LAB II: Quantifying Landscape Fragmentation: IAN</b>	Gustafson 1998 Required Images Instructions IAN website
	3/21 R	18	<b>MID-TERM EXAM</b>	Open book, open notes
10	3/26 T	19	<b>SPRING BREAK</b>	
	3/28 R	20	<b>SPRING BREAK</b>	

			<i>April</i>	
11	4/02 T	21	<b>Disturbance and equilibrium</b>	<b>TGO Chapter 7</b> <i>Perry 2002</i> <i>Allen 2007</i> <i>Schoennagel et al 2004</i> <i>Schulte and Mladenoff 2005</i>
	4/04 R	22	<b>Review Exam I</b>	
12	4/09 T	23	<b>Land/water interactions</b> -Hydrology and landscapes -Landscape controls on surface water quality	<b>Bosch and Hewlett 1982</b> <b>Galloway et al.</b> <b>Strayer 2003</b> <i>Lovett et al. 2000</i>  <i>Sahin and Hall 1996</i> <i>Hornbeck and Swank 1992</i>
	4/11 R	24	<b>Forest disturbance: Insect defoliation</b>	<b>Cooke et al. 2006 p. 487 - 507</b> <b>Hunter and Elkinton 2000</b> <i>Roland and Taylor 1997</i>
13	4/16 T	25	<b>Lab II presentations I</b> <i>US IALE MTG</i>	<b>(US IALE Mtg)</b>
	4/18 R	26	<b>Lab II presentations II</b>	
14	4/23 T	27	<b>Models in landscape ecology I</b> -Landscape change models -Individual-based models -Management	<b>TGO Chapter 3</b> <b>Scheller and Mladenoff 2007</b> <i>TGO Chapter 6</i>
	4/25 R	28	<b>Biodiversity and Conservation biology IV: Organisms at broad scales</b> -Wolves and Butterflies	<b>Mladenoff et al.</b> <b>2 articles at GROW website, video Mladenoff et al. 1995</b> <b>Mladenoff et al. 1999</b> <i>Mladenoff and Sickley 1998</i> <i>Mladenoff et al. 1997</i>
15	4/30 T	29	<b>Landscape Models II</b>	<b>Syphard et al. 2006</b> <i>Scheller and Mladenoff 2008</i> <i>Couclelis 2005</i> <i>Scheller et al. 2005</i>

			<i>May</i>	
	5/02 R	30	<b>Exam II</b>	Open book, open notes
16	5/07 T	31	<b>Global change, Land Use Change, and landscapes</b> -Carbon, bioenergy -biodiversity  <i>Landscape Management (Optional) Sustainability, Uncertainty, Ecosystem Services</i>	<b>Ellis &amp; Ramankutty 2008</b> <b>Foley et al. 2005</b> <i>Wayburn et al. 2007</i> <i>Solomon et al. 2009</i> <i>Summary of Hill et al. 2006</i> <i>Schulte et al. 2007</i> <i>PNAS Special Section 2008</i> <i>Brown et al. 2005</i> <i>Grau et al. 2003</i> <i>Hemmel et al. 2009</i>  <i>Landscape Management Armitage et al. 2009</i> <i>Holling et al. 1996</i> <i>Ludwig et al. 1993</i> <i>Ostrom et al. 1999</i>
	5/09 R	32	<i>Discussion Session III</i>  <b>LAST CLASS</b>	<i>Send me 3 typed questions by 6pm Wed. Bring to class to raise and discuss</i>