



Landscape Ecology Course Description

Geography 506	Instructor: Dr. Li An
Landscape Ecology	Office hours: Wed. 10:30 am to 12:30 pm & by appt.
Class meet at SH 325 (A few times at SAL SH 324—see the calendar)	Office: Storm Hall 308B
	Phone: 619-594-5932
Time to meet: MW 9:00 -10:15 am	Email: lan@mail.sdsu.edu
Teaching assistant: Jeanne Patton	SH 303A, 619-577-9762, patton1@rohan.sdsu.edu

Learning objectives: This course is designed for students (1) to obtain knowledge of basic concepts, methods, and applications in landscape ecology, (2) to examine and understand the ways in which spatial patterns and spatial processes operate in an ecological context, (3) to learn and become familiar with the techniques used by landscape ecologists in their work, (4) to understand the relevance of landscape ecology to human society, and (5) to apply the concepts, models, and techniques in landscape ecology in natural resources management.

Textbooks: (1) *Landscape Ecology in Theory and Practice*, by Turner, Gardner and O’Neill (TGO), Springer, 2001. Available at SDSU Aztec Bookstore or www.amazon.com. Note: Our home assignments will be partially based on *Learning Landscape Ecology*, edited by Gergel and Turner (GT), Springer, 2001. Copies of the corresponding chapters will be posted online.

Prerequisites: No prerequisites, but Geography 370 or 385 recommended; or by approval of the instructor.

Participation (150 points): Attendance and pop quizzes: Attendance will be taken through pop quiz completion. A set of 3 to 6 questions will be asked from the readings at the beginning of certain classes (6 pts/quiz x 18 quizzes; 108 points).

Daily reading questions/comments: Each student will be expected to prepare and turn in 2 questions, comments, or critiques (print-out) for each of the 13 required articles (optional articles not included—see the reading list at the end of syllabus) and participate fully in the discussions and lectures (26 points).

Class discussion and participation: 16 points.

Home assignments (250 points): The five assignments, 50 points each, are scheduled on Mondays (due the following Monday). Undergraduate students are required to complete only four of them, and the median score among the four assignments will be assigned to the one s/he does not work on; if all five are completed, the lowest score will be replaced by the median of the top four scores.

Exams (200 points): We have one midterm (80 points) exam and a final exam (120 points). These exams are mostly in true/false choice, multiple choice, simple calculation (bring your own calculator), short answer and short essay format, covering the topics in the textbook, required readings, home assignments, and discussions.

Extra credit (30 points): An optional extra credit assignment will be made available in week 3 for one-time credit, to be completed prior to April 5 by those students wishing to receive extra credit.

Grading: Grades are based on exams (33.33%), home assignments (41.67%), and participation (25%). Grades will be posted on Blackboard. This is a secure, password protected system. At the end of the course grades will be assigned according to the standard grading scale:

93-100% = A 90-92% = A- 86-89% = B+ 82-85% = B 79-81% = B- 76-78% = C+
 73-75% = C 69-72% = C- 66-68% = D+ 63-65% = D 60-62% = D- below 60% = F

The lower bounds for undergraduates are 2 percent lower than graduate students, e.g., 91-100% (A) for undergraduate students and 93-100% (A) for graduate students. The same rule applies to all other grades.

Related policy: All the assignments should be turned in on time. Late assignments will be docked 10% per day, beginning effective on the due date, unless prior permission is granted from the instructor for special reasons such as sickness. You are responsible for knowing the elements of, and penalties for academic misconduct, including dishonesty, plagiarism, cheating, etc. Please go to <http://www.sa.sdsu.edu/srr/index.html> for more information. Here is a useful link concerning citation and plagiarism: <http://writing.yalecollege.yale.edu/using-sources> (When to Cite and How). Credible sources only (NOT wikipedia). The penalty for violating these SDSU policies in this class is an “F” for the exam or assignment where the violation occurs. Students with disabilities should talk to me for assistance, and visit <http://www.sa.sdsu.edu/sds/index.html> for more details. By the end of the second week of classes, students, if any, should notify the instructor of planned absences in this class for religious observances.

Course Calendar (tentative class calendar, subject to change with notice)

Week	Date	Tasks	Due	Readings
1	Jan. 20	<u>0.Course introduction*</u>		
2	Jan. 25	<u>1.What is landscape ecology?</u>		Ch 1 (TGO); 1**
	Jan. 27	<u>2.Scale</u>		Ch 2 (TGO); 3 (2 optional)
3	Feb. 1	Homework 1: Scale detection (SAL)***		Ch 10 (GT)
	Feb. 3	<u>3.Models</u>		Ch 3 (TGO); 4
4	Feb. 8	<u>4.Causes of patterns</u>	H1	Ch 4 (TGO)
	Feb. 10	<u>5.Quantifying patterns (I)</u>		Ch 5 (TGO) 5 (Due Feb 11)

5	Feb. 15	<u>6.Quantifying patterns (II) ;</u>		
	Feb. 17	<u>6.Quantifying patterns (II)-continued</u>		17
6	Feb. 22	Homework 2: Fragstats & landscape metrics ***		Ch 7 (GT) (6,7 optional)
	Feb. 24	<u>14.Road ecology</u> (Guest lecture by Dr. H.L. Chen)		18
7	Feb. 29	<u>7.Neutral models</u>	H2	Ch 6 (TGO)
	Mar. 2	<u>8.Disturbance</u>		Ch 7 (TGO); 9 (8 optional)
8	Mar. 7	<u>9.Ecosystem processes (I)</u>		Ch 9 (TGO) 10
	Mar. 9	<u>10.Ecosystem processes (II)</u>		11
9	Mar. 14	Homework 3: Creating landscape pattern***		Ch 6 (GT)
	Mar. 16	Midterm exam		
10	Mar. 21	<u>11. Detecting landscape patterns and processes--remote sensing and GIS perspective (I)</u>	H3	13 (12 optional)
	Mar. 23	<u>11. Detecting landscape patterns and processes--remote sensing and GIS perspective (I)--cont'd</u>		(12 optional)
Spring Break				
11	Apr. 4	<u>12. Detecting landscape patterns and processes--remote sensing and GIS perspective (II)</u>		(14 optional)
	Apr. 6	<u>12. Detecting landscape patterns and processes--remote sensing and GIS perspective (II)--cont'd</u>		
12	Apr. 11	Homework 4: Remote sensing & GIS***		19
	Apr. 13	<u>13.Metapopulations</u>		Ch 8 (TGO) (15-16 optional)
13	Apr. 18	<u>15.Applied landscape ecology</u>	H4	Ch 10 (TGO)
	Apr. 20	<u>16.Restoration</u>		21 (20 optional)
14	Apr. 25	Homework 5: Landscape connectivity***		Ch 15 (GT)
	Apr. 27	<u>17. Reserve design and landscape conservation</u>		25 (22-24 optional)
15	May 2	<u>18.Conclusion and new directions</u>		(26-27 optional)
	May 4	Review for the final exam	H5	(28 optional)
	May 9	Final exam (8:00-10:00; SH 325)		

*Titles with an underline implies lectures

** Refers to Article #1 in the list below (similar hereafter)

*** Classes to take place in SAL (SH 324)

Other useful resources: <http://landscape.forest.wisc.edu/courses/Landscape565spr07/> and http://www.umass.edu/landeco/teaching/landscape_ecology/schedule/landeco_schedule.html

Paper list (in order of their occurrence in the course; including optional readings):

1. Turner, M.G. 2005. Landscape ecology: What is the state of the science? *Annual Review of Ecology Evolution and Systematics* 36:319-344. → **2.Landscape ecology**
2. (Optional) Levin, S.A. 1992. The problem of pattern and scale in ecology. *Ecology* 73:1943-1967. → **3.Scale**
3. Riitters, K.H. 2005. Downscaling indicators of forest habitat structure from national assessments. *Ecological Indicators* 5:273-279. → **3.Scale**
4. Jackson, L.J., A.S. Trebitz, and K.L. Cottingham. 2000. An introduction to the practice of ecological modeling. *BioScience* 50:694-706. → **4.Models**
5. Gustafson, E.J. 1998. Quantifying landscape spatial pattern: What is the state of the art? *Ecosystems* 1: 143-156. → **6-7.Quantifying Patterns**
6. (Optional) Neel, M.C., K. McGarigal, and S.A. Cushman. 2004. Behavior of class-level landscape metrics across gradients of class aggregation and area. *Landscape Ecology* 19:435-455. → **6-7.Quantifying Patterns**
7. (Optional) McGarigal, K., Tagil, S., & Cushman, S. A. 2009. Surface metrics: an alternative to patch metrics for the quantification of landscape structure. *Landscape ecology*, 24(3), 433–450. → **6-7.Quantifying Patterns**
- 8 (Optional) Linderman, M.A., L. An, S. Bearer, G. He, and J. Liu. 2006. Interactive effects of natural and human disturbances on vegetation dynamics across landscapes. *Ecological Applications* 16: 452-463. → **9.Disturbance**
9. Schoennagel, T., T.T. Veblen, and W.H. Romme. 2004. The interaction of fire, fuels and climate across Rocky Mountain forests. *BioScience* 54(7): 661-676. → **9.Disturbance**
10. McKenzie, D., Peterson, D. L., & Littell, J. J. (2008). Global warming and stress complexes in forests of western North America. *Developments in Environmental Sciences*, 8, 319–337. → **10-11.Ecosystem Processes**
11. Lindenmayer, D. B., Fischer, J., Felton, A., Crane, M., Michael, D., Macgregor, C., Montague-Drake, R., et al. 2008. Novel ecosystems resulting from landscape transformation create dilemmas for modern conservation practice. *Conservation Letters*, 1(3), 129–135. → **10-11. Ecosystem Processes**
12. (Optional) Lillesand, T.M., R.W. Kiefer, and J.W. Chipman. 2004. Remote sensing and image interpretation. (5th Edition), New York: Wiley. → **Remote Sensing & GIS**
13. Lachowski, H.M. and V.C. Johnson. 2001. Remote sensing applied to ecosystem management. In: An Integrated Ecological Assessment Protocols Guidebook, P. Bourgeron, M. Jensen and G. Lessard (eds.), Springer-Verlag, New York, 135-150. → **12-13.Remote Sensing & GIS**
14. (Optional) Mladenoff, D. J., and Host, G. E. 1994. Ecological perspective: current and potential applications of remote sensing and GIS to ecosystem analysis. In: Remote Sensing and GIS in Ecosystem Management, V. A. Sample (ed.), 218-242. → **12-13.Remote Sensing & GIS**
15. (Optional) Tilman, D., R.M. May, C.L. Lehman, and M.A. Nowak. 1994. Habitat destruction and the extinction debt. *Nature* 371: 65-66. → **14.Metapopulations**
16. (Optional) Drechsler, M., K. Frank, I. Hanski, R.B. O’Hara, and C. Wissel. 2003. Ranking metapopulation extinction risk: From patterns in data to conservation management decisions. *Ecological Applications* 13: 990-998. → **14.Metapopulations.**

17. Coffin, A. W. 2007. From roadkill to road ecology: A review of the ecological effects of roads. *Journal of Transport Geography* 15(5), 396-406. → **15.Road ecology**
18. Chen, H. L., and J. L. Koprowski. 2015. Animal occurrence and space use change in the landscape of anthropogenic noise. *Biological Conservation* 192 (2015) 315–322. → **15.Road ecology**
19. Holl, K. D., Crone, E. E., & Schultz, C. B. 2003. Landscape Restoration: Moving from Generalities to Methodologies. *BioScience*, 53(5), 491-502. → **17.Restoration**
20. (Optional) Bernhardt., E.S., M.A. Palmer, et al. 2005. Synthesizing US river restoration efforts. *Science* 308: 636-637. → **17.Restoration**
21. Palmer, M.A., R.F. Ambrose, and N.L. Poff. 1997. Ecological theory and community restoration ecology. *Restoration Ecology* 5: 291-300. → **17.Restoration**
22. (Optional) Pyke, C.R. 2004. Habitat loss confounds climate change impacts. *Frontiers in Ecology and the Environment* 2: 178-182. → **18.Reserve design and management**
23. (Optional) Williams, J.C., C.S. ReVelle, and S.A. Levin. 2004. Using mathematical models to design nature reserves. *Frontiers in Ecology and the Environment* 2: 98-105. → **18.Reserve design and management**
24. (Optional) Forman, R. T. T., & S. K. Collinge. 1997. Nature conserved in changing landscapes with and without spatial planning. *Landscape and Urban Planning*, 37(1-2), 129-135. → **18.Reserve design and management**
25. Lindenmayer, D., Hobbs, R. J., Montague-Drake, R., Alexandra, J., Bennett, A., Burgman, M., Cale, P., et al. 2007. A checklist for ecological management of landscapes for conservation. *Ecology Letters* 11: 78–91 → **18.Reserve design and management**
- 26 (optional), 27 (optional), and 28 (optional). Chapters 1, 2, and 14 from *Key Topics in Landscape Ecology* by Wu and Hobbs 2007. → **19.Conclusion and new directions**

Further Readings (Recommended, not required):

- Christensen, N.L., A.M. Bartuska, et al. 1996. The report of the ecological society of America committee on the scientific basis for ecosystem management. *Ecological Applications* 6: 665-691. → **Ecosystem Processes**
- Forman, R. (1998). Road ecology: A solution for the giant embracing us. *Landscape Ecology*, 13(4). → **Road ecology**
- Foster, D.R. 1992. Land-use history (1730-1900) and vegetation dynamics in central New England, USA. *Journal of Ecology* 80: 753-772. → **Pattern**
- Malkinson, D., and R. Kadmon. 2006. The effects of inter-plant interactions and density-dependent disturbances on vegetation pattern formation. *Landscape Ecology* 21: 259-270. → **Models**

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