

GIS and Landscape Modeling

NRE 534; Fall Semester 2008

Professor	Dan Brown (danbrown@umich.edu)
Office	3505 Dana; 763-5803; hours: 3-5 pm Tuesdays
Course Meets	Tues, Thurs 10 am-12 pm in 1064 Dana and 3325 Dana (Computing Lab)
Course Objectives	The goal of this class is to explore various approaches to modeling landscape pattern and change. The focus is on understanding, describing, and predicting the land-use and land-cover. The course will necessarily move between social and ecological processes and applications of the models. During the course we will read about different modeling approaches, discuss applications of the models, and work on 4-5 exercises. We will explore computer-based land modeling approaches using a number of GIS-based techniques. Students completing the course will be able to evaluate the trade-offs associated with use of a particular modeling approach within a given situation, and to implement (at least minimally) several of the approaches discussed.
Prerequisites	Because the models we are exploring are both spatial and quantitative in nature, it is important that students have a background in these two areas. The following courses (or equivalents) are prerequisites: NRE 531 - Principles of GIS; NRE 438 - Natural Resource Statistics
Readings	There is no text. Required readings are assigned from the literature. All readings are (or will be) available for download from the <i>CTools</i> site set up for this course. In addition to pre-assigned readings, all students will report on a reading to the rest of the class (see below).
Computer Assignments	During the semester, 4-5 computer exercises will be assigned. They will use ArcGIS or NetLogo, which will be available in most public campus computing sites. We will meet in the lab on occasional Thursdays (see schedule) to go over the assignment and provide some time for you to complete it (most will also require time outside class). A write-up of each exercise will be due on CTools one week after the assignment is made.
Journal Article Report	All students are required to select one to two articles on a modeling approach covered in class, and to read, review, and report to the class. Your articles must be approved by the instructor and fit the topic. The report will take the form of a written and oral summary and critique of the articles.
Final Project	Each student is required to complete an end-of-term project that applies concepts learned in the class. The project can take one of at least two forms: 1) create and analyze a new model in ArcGIS, NetLogo, or another platform, or 2) modify or run and analyze an existing model. Other options are possible, but should be approved by the instructor beforehand.
Grading	Your grade will be determined on the basis of your combined performance on your article review (20%), contribution to class discussion (10%), lab assignments (35%), and final project (35%).

GIS and Landscape Modeling - Provisional Schedule

Days	Topic(s)	Required Readings (subject to change)	Lab Assignment
Sep 2	Modeling and GIS Preliminaries LCLUC Definitions and scope	(GLP 2005), p. 1-8; 38-47 (Turner et al. 2001), Ch. 3	
Sep 4	ArcGIS & Model Builder (lab)		Arc Model Builder
Sep 9	Terrain modeling	(Gallant and Wilson 2000) (Wilson and Gallant 2000)	
Sep 11	lab	(Gessler, Chadwick et al. 2000)	Terrain Analysis
Sep 16	Habitat modeling	(Guisan and Zimmermann 2000) (Pearson and Dawson 2003) (Carroll et al. 1999)	
Sep 18	Multi-criteria evaluation and land allocation	(Eastman et al. 1995) (Wang and Medley 2004)	
Sep 23	Guest Multi-criteria evaluation and land allocation		
Sep 25	lab		Multi- Criteria
Sep 30	Spatial land-use modeling: Purposes and approaches	(Verburg et al. 2004)	
Oct 2	Brown in Berlin		
Oct 7	Simulation and Cellular Models	(Smith 2000) (Batty et al. 1999) (Verburg 2006)	
Oct 9	Article reports (5)		
Oct 14	Cellular models	(Clarke et al. 1997) (Soares-Filho et al. 2006) + supplementary material (White and Engelen 2000)	
Oct 16	lab		Cellular models
Oct 21	<i>Fall Break</i>		
Oct 23	Pattern-process and explanation	(Brown 2006) (Grimm et al. 2005)	

Oct 28	Map comparison	(Pontius et al. 2008) (Hagen 2003)	
Oct 30	Article reports (5)		
Nov 4	Agent-based Models	(Brown 2006) (Brown et al. 2005) (Parker et al. 2003) (Jepsen et al. 2006)	
Nov 6	lab		NetLogo I
Nov 11	Agent-based Models: Decision Making and Participatory Models	(Manson and Evans 2007) (Castella et al. 2005)	
Nov 13	lab		NetLogo II
Nov 18	Article reports (5)		
Nov 20	Model evaluation and scenarios Example from SLUCE	(Brown et al. 2005) (Robinson and Brown 2008) (Brown et al. 2008)	
Nov 25	Project work		
Nov 27	<i>Thanksgiving</i>		
Dec 2	Article reports (5)		
Dec 4	Project work		
Dec 9	Final project due		

References

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