

ENVIRONMENTAL CHANGE MODELING (Fall 2008)
GEO5934-04

Class meets: W 2:30-5:00 pm, Bellamy 035
Office hour: M F 1-2 pm or by appointment

Instructor

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Credit Hours: 3

Course Objectives

This course is designed to help students understand the contemporary environmental changes as well as modeling techniques used for evaluating, simulating and predicting these changes. Lectures focus on human dimensions of environment change, with emphasis on terrestrial ecosystems. Topics include population dynamics, land-cover/land-use change, ecosystem dynamics, human behavior and institution, and vulnerability and adaptation of human-natural systems. You will also explore data used for modeling environmental changes and errors associated with data manipulation. IDRISI and NetLogo are the main software packages for labs and assignments.

Electronic Materials

Class announcements, part of lecture materials, readings, and grades will be posted on Blackboard course site ENV CHANGE MODELING (GEO5934-04.F08).

Grading

You will be graded based on contribution to class discussion (20%), three assignments (45%), and a term project (35%).

Term Project

All students are required to select two to three articles on a modeling approach that is used to evaluate or predict environmental change, and to read, review, and report to the class. Your articles must be approved by the instructor. The report includes an oral and written summary and critiques of the articles.

Course Policies

Attendance is required throughout the semester. Persistent informal talking and any reading or studying of other materials will not be tolerated.

Delay of the submission of assignment decreases 10% of the maximum possible score per day. No delay will be accepted for the term project.

All changes to the course schedule made in class are the responsibility of the student. Students are responsible for all missed class materials. Office appointments will be made only when there is a clear conflict with the student's course schedule.

Honor Code Statement

The Florida State University Academic Honor Policy outlines the University's expectations for the integrity of students' academic work, the procedures for resolving alleged violations of those expectations, and the rights and responsibilities of students and faculty members throughout the process. Students are responsible for reading the Academic Honor Policy and for living up to their pledge to "be honest and truthful and...[to] strive for personal and institutional integrity at Florida State University" (Academic Honor Policy, <http://www.fsu.edu/~dof/honorpolicy.htm>).

Americans with Disabilities Act

During the first week of class, students needing academic accommodations should: 1) register with and provide documentation to the Student Disability Resource Center; and 2) bring a letter to the instructor from the Student Disability Resource Center, indicating the need for academic accommodations. For more information about services available to FSU students with disabilities, contact

Student Disability Resource Center
97 Woodward Avenue, South
108 Student Services Building
Florida State University
Tallahassee, FL 32306-4167
(850) 644-9566 (voice)
(850) 644-8504 (TDD)
sdrc@admin.fsu.edu

Syllabus Change Policy

This syllabus is subject to change with advance notice.

Schedule
(subject to change)

Week	Date	Topic	Readings	Lab
1	Aug 27	Environmental change & models	n/a	Intro to IDRISI
2	Sept 3	Data & spatial data visualization	Andrienko et al., 2003	
3	Sept 10	Uncertainty & sensitivity	Burnicki et al., 2007; Fuller et al., 2008	Assignment 1: Accuracy Assessment (due on Sept. 24)
4	Sept 17	Population forecast	Wilson & Rees, 2005	
5	Sept 24	Land-cover/-use change	Turner et al., 2007; Theobald, 2005	Develop term project
6	Oct 1	Land-cover/-use change (cont.)	Wood et al., 1997; Batty, 1997	Assignment 2: CA-Markov Model (due on Oct. 15)
7	Oct 8	Ecosystem dynamics	Sturtevant et al., 2004	
8	Oct 15	Changing ecosystem functions	Zhou et al., 2008	Topic & readings of term project due
9	Oct 22	Human behavior	Brown, 2006; Grimm et al., 2005	Assignment 3: Agent-Based Model (due on Nov. 5)
10	Oct 29	Institution	Young, 2003; Manson, 2005	
11	Nov 5	Vulnerability & adaptation	Eakin, 2008; Cutter et al., 2000	
12	No class. Prepare for the term project oral and written reports.			
13	Nov 19	Oral report I	Student's choice	n/a
14	Nov 26	Oral report II	Student's choice	n/a
15	Dec 3	Course summary & evaluation	n/a	n/a
16	Dec 10	Term project written report due by 5 pm. No delay will be accepted.		

Readings

Recommended Textbook

Mackenzie, F.T. (2002). *Our Changing Planet: An Introduction to Earth System Science and Global Environmental Change* (3rd Edition). Prentice Hall.

Required Journal Articles

- Andrienko, N., Anderienko, G., and Gatalsky, P. (2003). Exploratory spatio-temporal visualization: An analytical review. *Journal of Visual Languages and Computing* 14: 503-541.
- Batty, M. (1997). Cellular automata and urban form: A primer. *Journal of the American Planning Association* 63 (2): 266-274.
- Brown, D.G. (2006). Agent-based models. In: H. Geist (Ed.) *The Earth's Changing Land: An Encyclopedia of Land-Use and Land-Cover Change*. Westport CT: Greenwood Publishing Group, pp. 7-13.
- Burnicki, A.C., Brown, D.G., and Goovaerts, P. (2007). Simulating error propagation in land-cover change analysis: The implications of temporal dependence. *Computers, Environment and Urban Systems* 31: 282-302.
- Cutter, S.L., Mitchell, J.T., and Scott, M.S. (2000). Revealing the vulnerability of people and places: A case study of Georgetown County, South Carolina. *Annals of the Association of American Geographers* 90 (4): 713-737.
- Eakin, Hallie (Lead Author); Maggie L. Walser (Topic Editor). (2008). "Human vulnerability to global environmental change." In: *Encyclopedia of Earth*. Eds. Cutler J. Cleveland (Washington, D.C.: Environmental Information Coalition, National Council for Science and the Environment). [First published in the *Encyclopedia of Earth* December 6, 2007; Last revised September 14, 2008; Retrieved November 2, 2008].
http://www.eoearth.org/article/Human_vulnerability_to_global_environmental_change
- Fuller, M.M., Gross, L.J., Duke-Sylvester, S.M., and Palmer, M. (2008). Testing the robustness of management decisions to uncertainty: Everglades restoration scenarios. *Ecological Applications* 18 (3): 711-723.
- Grimm, V., Revilla, E., Berger, U., Jeltsch, F., Mooij, W.M., Railsback, S.F., Thulke, H-H., Weiner, J., Wiegand, T., and DeAngelis, D. L. (2005). Patter-oriented modeling of agent-based complex systems: Lessons from ecology. *Science* 310: 987-991.
- Manson, S.M. (2005). Agent-based modeling and genetic programming for modeling land change in the Southern Yucatán Peninsular Region of Mexico. *Agriculture, Ecosystems and Environment* 111: 47-62.
- Sturtevant, B.R., Zollner, P.A., Gustafson, E.J., and Cleland, D.T. (2004). Human influence on the abundance and connectivity of high-risk fuels in mixed forests of northern Wisconsin, USA. *Landscape Ecology* 19: 235-253.
- Theobald, D.M. (2005). Landscape patterns of exurban growth in the USA from 1980 to 2020. *Ecology and Society* 10 (1): 32. URL:
<http://www.ecologyandsociety.org/vol10/iss1/art32/>

- Turner II, B.L., Lambin, E.F., and Reenberg, A. (2007). The emergence of land change science for global environmental change and sustainability. *Proceedings of the National Academy of Sciences of the United States of America* 104 (52): 20666-20671.
- Wilson, T., and Rees, P. (2005). Recent development in population projection methodology: A review. *Population, Space and Place* 11: 337-360.
- Wood, E.C., Lewis, J.E., Tappan, G.G., Lietzow, R.W. (1997). The development of a land cover change model for southern Senegal. In: Land use modeling workshop; 1997 June 5-6; Sioux Falls, SD. Santa Barbara, CA: National Center for Geographic Information and Analysis. Available at <http://www.ncgia.ucsb.edu/conf/landuse97/>
- Young, O.R. (2003). Environmental governance: The role of institutions in causing and confronting environmental problems. *International Environmental Agreements: Politics, Law and Economics* 3: 377-393.
- Zhou, X., Weng, E., and Luo, Y. (2008). Modeling patterns of nonlinearity in ecosystem responses to temperature, CO₂, and precipitation changes. *Ecological Applications* 18 (2): 453-466.