SPATIAL MODELS AND DECISION ANALYSIS

FNR 4XXX (3 credits)
Spring 2010

GENERAL COURSE OVERVIEW

This class introduces concepts and applications of environmental modeling in space. Basic concepts of Geographic Information Systems (GIS) will be introduced (e.g. digital mapping, data structures) to the extent necessary, but GIS map-making capabilities (descriptive tools) will not be stressed. We will focus on spatial reasoning and development of prescriptive tools (multi-criteria assessment, surface inference and dynamic simulation) that are generally raster-based. We will use a sophisticated, yet simple to learn, raster-based GIS software called Idrisi (http://www.clarklabs.org/).

The course will provide a basic toolkit for providing spatial decision support for natural resource management; examples will be drawn from forestry, watershed hydrology, biodiversity conservation and pollution control. Students taking the class will be expected to demonstrate competence in spatial reasoning and then use those skills in a team setting to develop, execute and report on a research project.

PREREQUISITES

Forest Resource Information Systems (or equivalent)
AND
Basic Statistics (numerous alternatives) **OR** Instructor permission

HOURS AND LOCATION

Class Time: Tues. (9:35-11:30 a.m.)/Thurs. (9:35-10:25) **Location:** TBA

INSTRUCTOR

Matthew Cohen (Associate Professor) mjc@ufl.edu
328 Newins-Ziegler Hall (352) 846-3490
Class Website – http://mjcohen.ifas.ufl.edu/teaching/spat_anal.htm

RECOMMENDED TEXT(S)

- *GIS and Multi-Criteria Decision Analysis***.** 1999. J. Malczewski
- *Class Handouts*

ADDITIONAL REFERENCE MATERIALS (available at course reserve in Marston Science Library)

- *Idrisi Tutorial*. 2006. J. Ronald Eastman et al. (Andes Edition) [available in pdf format]
- *Spatial Data Analysis: Theory and Perspectives.*2003. Robert Haining
- *Statistics for Spatial Data (2nd Ed.).* 1993. N.A.C. Cressie

FNR4XXX – Spatial Models and Decision Analysis (Tentative Spring 2010)

Week of…	Lecture Topic	Lab Topic	Due Dates
8-Jan	Overview: GIS, raster data and digital maps	Introduction to Idrisi	
15-Jan	Basic raster analysis functionality	Basic Map Operations	
22-Jan	Local vs. Global Operations	Intermediate Map Operations	Lab Report 1 due
29-Jan	Neighborhoods and raster filters	Advanced Map Operations	
5-Feb	Conceptualizing Spatial Models	Flow Charts and Algorithms	
12-Feb	**Graduate Student Paper Presentations**	**Graduate Student Paper Presentations**	Lab Report 2 due;
19-Feb	Multi-criteria decision analysis	Boolean operators, weighted linear models	
26-Feb	Multi-criteria decision analysis	Continuous operators, multiple objectives	
5-Mar	Digital Elev. Models and Terrain Analysis	Terrain Analysis Tools	Lab Report 3 due; **Take-home midterm due**
12-Mar	**SPRING BREAK**		
19-Mar	Landscape pattern	Pattern Inference	Lab Report 4 due; **Group Proposals due**
26-Mar	Predictive Modeling: Process and Risk	Regression and Uncertainty	Lab Report 5 due
2-Apr	Spatial Statistics	Basic Spatial Statistics	Lab Report 6 due
9-Apr	Interpolation	Interpolation	
16-Apr	Advanced Topics	Project Work	Lab Report 7 due
23-Apr	Project Work	Project Work	
30-Apr	**CLASS PRESENTATIONS**		**Final Reports due**

GRADING

	Points
Midterm	100 pts
Lab Reports (7 assignments)	210 pts
Final Project	90 pts

Overall Grades:

360 – 400	= A
350 – 359	= B+
320 – 349	= B
310 – 319	= C+
280 – 309	= C
270 – 279	= D+
240 – 269	= D
<240	= E

Attendance and Class Participation are required.

EXAM

Take-Home Midterm – pickup week of March 5th; return within 24 hours
No Final Exam

LAB ASSIGNMENTS

During the semester, exercises that explore the concepts and tools that have been introduced in the lecture or computer lab classes will be assigned. Reports are due one week after the exercises are assigned, and will require a short-write up with screen captures of the maps produced. Reports will be graded on the basis of output accuracy, text clarity (process descriptions, inference) and timeliness (late reports will be penalized 1 letter grade per day)

Further information can found at:
http://mjcohen.ifas.ufl.edu/teaching/spat_anal/lab_assign.htm

FINAL PROJECT

Your goal, working in a team of 2-3, will be to develop a spatial model to address some specific question. You are encouraged to choose data and problems that are specific to your own research. There are three major assessment components:

Proposal (10% of group grade): Your group will be require to submit a project proposal (DUE March 19th) that presents the objectives and necessary data to answer a specific spatial question. You will be expected to provide a detailed flow chart of the model, and give a list of the final products.

Final Report (60% of group grade): Your final report (DUE April 30th) should document the project objectives, the data sources, the analytical processes, the results and a discussion of the results. Full citation of all data sources and concepts is expected. The paper should be concise but sufficiently describe why this problem is relevant, document other research on the topic and make inference regarding the results. A flow chart documenting methods as they were used should be provided.

Final Presentation (30% of group grade): Your group will collectively present your work and conclusions during the last week of class. Expect to present for 20-30 minutes, providing project objectives, background on the problem, proposed methods, results and discussion. Make sure you spend some time at the end pointing out how you would do things differently. For example, were there limitations of the data, limitations of the methods, limitations of the software, conceptual flaws in your approach, etc.?

Further information is available at:
http://mjcohen.ifas.ufl.edu/teaching/spat_anal/project.htm

ADDITIONAL INFORMATION

Academic Honesty:
The University of Florida requires all members of its community to be honest in all endeavors. Cheating, plagiarism, and other acts diminish the process of learning. When students enroll at UF they commit themselves to honesty and integrity. Your instructor fully expects you to adhere to the academic honesty guidelines you signed when you were admitted to UF. As a result of completing the registration form at the University of Florida, every student has signed the following statement: *"I understand the University of Florida expects it students to be honest in all their academic work. I agree to adhere to this commitment to academic honesty and understand that my failure to comply with this commitment may result in disciplinary action up to and including expulsion from the University."* Furthermore, on work submitted for credit by UF students, the following pledge is either required or implied: "*On my honor, I have neither given nor received unauthorized aid in doing this assignment.*" It is to be assumed all work will be completed independently unless the assignment is defined as group project, in writing by the professor. This policy will be vigorously upheld at all times in this course.

Software Use:
All faculty, staff, and students of the University are required and expected to obey the laws and legal agreements governing software use. Failure to do so can lead to monetary damages and/or criminal penalties for the individual violator. Because such violations are also against University policies and rules, disciplinary action will be taken as appropriate.

Campus Helping Resources:
Students experiencing crisis or personal problems that interfere with their general wellbeing are encouraged to utilize the university's counseling resources. Both the Counseling Center and Student Mental Health provide confidential counseling services at no cost for currently enrolled students. Resources are available on campus for students

having personal or lacking clear career and academic goals, which interfere with their academic performance. The Counseling Center is located at 301 Peabody Hall (next to Criser Hall). Student Mental Health is located on the second floor of the Student Health Services in the Infirmary.

1. *University Counseling Center*, 301 Peabody Hall, 392-1575; personal and career counseling: **www.counsel.ufl.edu**
2. *Student Mental Health*, Student Health Care Center, 392-1171, personal counseling: **www.hsc.ufl.edu/shcc/smhs.htm**
3. *Sexual Assault Recovery Services (SARS)*, Student Health Care Center, 392-1161, sexual assault counseling; and
4. *Career Resource Center*, Reitz Union, 392-1601, career development Assistance and counseling.

Students with Disabilities Act:
The Dean of Students Office coordinates the needed accommodations of students with disabilities. This includes the registration of disabilities, academic accommodations within the classroom, accessing special adaptive computer equipment, providing interpretation services, and mediating faulty-student disability related issues. *Dean of Students Office*, 202 Peabody Hall, 392-7066, **www.dso.ufl.edu.**