

Geocomputing: GIS Modeling and Simulation

GEOG 475/575
 4 Credits
 Spring Quarter 2006
 T/Th 3:10-5pm
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Reading/Text: There is no assigned text for this course, but I have set aside several readings form journals and book chapters that we will utilize throughout the quarter. They are listed below and copies of each can be downloaded from the TEXT BOOK section of the blackboard site.

The essence of this course is to introduce you to methods and issues in spatial modeling and simulation. Spatial modeling and simulation can be a very powerful tool for planning and understanding the world when coupled with visual output in the form of maps. With the proliferation of spatially explicit data and the ubiquitous nature of GIS, the ability to model human and environmental systems has never been so accessible. Despite this fact there are many difficulties that one must confront when undertaking a project where these tools are used including; data quality, scale, and error propagation. This class serves to not only teach modeling techniques based in the ARCGIS and Idrisi software packages, but to help you in identifying and addressing issues of error, scale, and transparency of method which competent and high quality models rely. To these ends we will do three class-based projects and one group project that will be submitted to a journal for publication at the end of the quarter. Additionally, you will be expected to actively participate in class discussions based on the week's readings.

Schedule

Week	Date	Topics	Readings
1	Mar 28/30	Introduction – Model Design; Group Assignments and project organization.	[1]
2	Apr 4/6	Conceptual Models; No class Apr 6 (guest lecture at Georgia Southern University); Sign up for a group meeting with me	[2]
3	Apr 11/13	Data Quality and Accuracy Assessment; ARCGIS Modelbuilder Review, (Project 1)	[3] Ch3
4	Apr 18/20	GPS/Accuracy Assessment; No class Apr 20 (speaking at Mangrove conference in Miami) (Project1 cont)	[4]
5	Apr 25/27	Weighted Modeling, Model Automation(Project 2); Sign up for a group meeting with me	[5]
6	May 2/4	Scenario-based modeling; Future Scenarios (Project 2 cont)	[6]
7	May 9/11	Model Validation, Sensitivity and Uncertainty Analysis (Project 3)	[7]
8	May 16/18	Simulation (Project 3 cont); Sign up for a group meeting with me	[8]
9	May 23/25	Finish Project 3, Work on Final Projects	N/A
10	May 30/ Jun 1	Work on Final Projects	N/A
11	June 8	Final Exam - Thursday, June 8th @ 12:20 pm – Final Papers and Project Presentations due and ready for submission.	N/A

Grade breakdown and due dates:

Project #	Name	Due Date	% of Grade
1	Accuracy Assessment of Athens County Landcover Data	Apr 25	10
2	Build a weighted model and automate it	May 9	15
3	Future looking scenario model	May 25	15
Participation	Class Participation	N/A	10
Final	Group Project	June 8	50

All assignments are due at the end of class on the specified due date above.

Grading Schedule:

Grade	A	A-	B+	B	B-	C+	C	C-	D+	D	D-	F
% Range	100-94	93-90	89-87	86-84	83-80	79-77	77-74	73-70	69-67	66-64	63-60	59 or less

Group Projects:

The essence of the group project is to create a GIS modeling project of a high enough quality that will be submitted to a peer-review journal at the end of the quarter. The main goal of your projects will be to actualize a current conceptual model of an environment or system with appropriate primary and secondary data sources, or to create and test a conceptual model of your own. This is a challenging task in 11 weeks, but one that can be accomplished and will provide great rewards when completed. A handout of the specific tasks will be provided during the second class of the quarter. You will be evaluated on the final paper, presentation your individual contributions to the project (documented in a personal work log), your group's assessment of your contributions, and your attendance and participation at 3 mandatory group meetings. **Internet sources in and of themselves are not good enough;** you must use academic journals and select books to build your case. Use ISI Web of science to find and download articles:

<http://wok3.ohiolink.edu/portal.cgi?Init=Yes&SID=A2Hi33cJ8MGPbIDEAHK>

see also the external links section on the blackboard site.

Group Project Deadlines and Information:

Item	Deliverable	Due Date	% of Project
Group Formation	Assigned to project group for the quarter	Mar 30	0
Project Idea / Designate Roles	Come up with a topic and project question(s), assign who will do what.	Apr 5	0
Attend mandatory group meeting	Standard outline that maps the flow and expectations for your project.	Apr 3-5	5
Attend mandatory group meeting	Have a journal picked out, lit review and background sections drafted, data collected and analysis begun.	Apr 24-27	5
Attend mandatory group meeting	Have a rough draft completed	May 15-18	5
Work Log	Turn in your work-log that indicates your direct contribution to the project (typed)	June 8	15
Peer Evaluation	Evaluate the performance of others in your group	June 8	10
Presentation	10 Presentation of your project	June 8	15
Final Paper	Paper completed and ready for submission	June 8	45

Academic Honesty: Academic dishonesty will not be tolerated. Although it is expected that students will help each other while working on the projects, what you turn in should reflect your knowledge, competence, and acquired skills. Anyone who turns in someone else's work as his own will receive a grade of F for the quarter, and may be reported to the Director of University Judiciaries for further action.

Disabilities: If you have a disability that may hinder your performance in the class please inform me at the beginning of the quarter.

Computer and Lab Use: You will need to use the computers outside of the regularly scheduled class time to work on projects and explore the functionality of the software. Dedicated lab times have been established for our class use; I will be present at this time to help answer your questions. You may use the computers at other times during the week except during designated lecture/lab times for other Geography courses (a schedule is posted on the lab door). The lab is not intended for general use, and entrance to the lab is restricted. To enter, punch in the last 6 digits of your PID and then press the * key (the keypad "beeps" with every button pushed). The green light will flash and the door will unlock. Do not leave the door propped open. Please see handout # 1 for additional information about logging on and computer lab use.

IMPORTANT: The computer lab is your resource for the quarter so please abide by its rules and limit your printing to class projects. Below are some basic tips to keeping your data safe and backed up.

1. Copy all your data and do all processing on your local machine. It is much faster and more reliable for data analysis.
2. When working on a local machine put your data in C:\Workspace
3. In doing the above, **MAKE SURE TO COPY ALL YOUR DATA BACK TO YOUR L: DRIVE** after working in the lab. The machines may be gutted at anytime so any work that is not backed up to the L drive will be lost.

Course Readings

1. Lenz, R. and D. Peters, *From data to decisions - Steps to an application-oriented landscape research*. Ecological Indicators, 2006. **6**(1): p. 250-263.
2. Ogden, J.C., et al., *The use of conceptual ecological models to guide ecosystem restoration in South Florida*. Wetlands, 2005. **25**(4): p. 795-809.
3. Schuurman, N., *GIS : a short introduction / Nadine Schuurman*. 2004, Malden, MA. :: Blackwell Pub.,.
4. Behera, M.D., et al., *Utility of GPS in classification accuracy assessment*. Current Science, 2000. **79**(12): p. 1696-1700.
5. Store, R. and J. Jokimaki, *A GIS-based multi-scale approach to habitat suitability modeling*. Ecological Modelling, 2003. **169**(1): p. 1-15.
6. Wang, X.H., S. Yu, and G.H. Huang, *Land allocation based on integrated GIS-optimization modeling at a watershed level*. Landscape and Urban Planning, 2004. **66**(2): p. 61-74.
7. Crosetto, M., S. Tarantola, and A. Saltelli, *Sensitivity and uncertainty analysis in spatial modelling based on GIS*. Agriculture Ecosystems & Environment, 2000. **81**(1): p. 71-79.
8. Polimeni, J.M., *Simulating agricultural conversion to residential use in the Hudson River Valley: Scenario analyses and case studies*. Agriculture and Human Values, 2005. **22**(4): p. 377-393.