EEOS 465 / EEOS 627 – Environmental Modeling with Raster GIS

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Wednesdays 4:00 PM – 5:30 PM S-3-020

Lecture: Wednesdays 5:30 to 8:00 PM McCormack 02-0621

Description: This course consists of three parts. In the first four weeks, we will focus on raster data models, their structure and function, and in particular on their use in a modeling context. In other words, we will first study what modeling capabilities the GIS provides. This will be accomplished primarily through readings, discussion and laboratory exercises. Once a more thorough knowledge of GIS capabilities is attained, we will proceed to the design, modeling and implementation phase of the course. From the fifth to eighth week, we will introduce the design of GIS projects and spatial interactive modeling. In the final seven weeks, the class will be used to conduct a final project. Upon completion of the course, students will be in a position to participate (most likely as a junior GIS analyst) in studies utilizing these techniques and, as a user of GIS technology or as an organizational manager concerned with GIS, to intelligently deal with the results of such investigations.

The course will include lectures, laboratory exercises, and a final project (7 weeks). In the final project, you will design your own project as a real-world experience. This will give you an opportunity to employ your knowledge within a real design scenario.

Web Page: http://alpha.es.umb.edu/~david.tenenbaum/eeos465

Text: Michael N. DeMers. GIS Modeling in Raster. Wiley, 2002. ISBN 0-471-31965-1.

Course Evaluation:

Lab exercises	40%	(30% for graduate students)
Graduate presentations		(10% for graduate students only)
Class participation	10%	
Team self-evaluation	10%	
Progress reports	10%	
Final project presentation	10%	
Final project report	20%	

Students are reminded that they are required to adhere to the Code of Student Conduct, including its provisions related to Academic Honesty.

Project: The final project will simulate a real-world setting by establishing a GIS consulting firm. The CEO of the firm is the instructor, who will be responsible for helping the project teams complete their work in a timely and professional manner. The CEO will also review team performance and the quality of their output. Students may conduct the project in a team consisting of no more than 3 members. Each team will have an elected team leader. This team leader is responsible for communications between the CEO and individual team members. In other words, the team leader is the 'point person' for project management.

The classroom time allocated for lab sessions will provide a common time for project teams to meet each week. During certain phases of the project, additional team meetings will need to be scheduled. From the 9th week, each team or individual will give a 5 to 10 minute report on that week's progress either to the entire class or to the instructor. Team members will take turns to presenting your project progress each week. This 'staff meeting' will allow everyone to follow the progress of the group as a whole, and should eliminate duplication of effort during the data collection phase of the project. All members should feel free to offer comments and suggestions to other teams.

Project results will be communicated through a final presentation, and a final report. These must include the following components:

1. A statement of a broad policy or scientific question with issues that will be informed by the results of this project i.e. a statement of the importance of this issue to local government and society as a whole.

2. A statement of a specific question that is directly addressed by the results of this project.

3. A description of each GIS data source used in the GIS analysis, including the core metadata fields for each data set.

4. A diagram of the data model used in the GIS analysis.

5. A technical description of the GIS analysis completed, including the reasons for the selection of particular types of analyses.

6. A non-technical description of the primary results of the GIS analysis.

7. A non-technical description of how the results of the GIS analysis answer the specific question (see above) and how the results inform the policy question (see above).

8. A final report of 10 pages, excluding figures and tables (5 pages for undergraduate students)

9. A 10-minute presentation, supported by visual aids (e.g. a PowerPoint slideshow, or other illustrative materials) to the class

SYLLABUS

Date	Topic	Background Material	Lab / Project Work
AN INTRODUCTION TO ENVIRONMENTAL MODELING WITH RASTER GIS			
01/28/09	Course Intro.	• Chapter 1: Introduction, pp. 1-9.	• Exercise 1 – Explore Class Data
02/04/09	Raster Data and ArcGIS Spatial Analyst	• Chapter 2: Nature of the Data, pp. 10-34.	• Exercise 2 – Raster Concepts
02/11/09	Raster Representations and Calculations	• Chapter 3: Map Algebra, pp. 35-57.	• Exercise 3A – Build A Raster Database • Exercise 3B – Georeference a Raster
02/18/09	Raster Analysis and Functions	• Chapter 4: Characterizing the Functional Operations, pp. 58-80.	• Exercise 4A – Use Objects, Operators, and Commands • Exercise 4B – Build Expressions with Functions
02/25/09	Building Spatial Models	• Chapter 5: Modeling Essentials, pp. 94-120. • Chapter 6: Conceptualizing the Model, pp. 121-139.	• Exercise 5 – Raster Processing Tools • Exercise 7 – Analyze Topography
03/04/09	Building Spatial Models II & Raster Analysis & Functions II	• Chapter 7: Model Formulation, Flowcharting, and Implementation, pp. 140-161. • Chapter 4: Characterizing the Functional Operations, pp. 81-93.	• Exercise 8A – Surface Hydrology Tools • Exercise 8B – Groundwater Hydrology Tools
03/11/09	Model Design and Evaluation	• Chapter 8: Conflict Resolution and Prescriptive Modeling, pp. 162-174. • Chapter 9: Model Verification, Validation, and Acceptability, pp. 175-190.	• Exercise 10A – Modeling Techniques and Tools • Exercise 10B – ModelBuilder and Weighted Suitability
03/18/09	*Spring Vacation*	N/A	N/A
PROJECTS USING ENVIRONMENTAL MODELING WITH RASTER GIS			
03/25/09	Group Formation and Proposal Creation	• Project Outline	• Preliminary Project Work
04/01/09	Project Design and Document Preparation	• Project Implementation	• Progress Report 1, Discussion, and Collaboration
04/08/09	Formulation and Implementation I	• Graduate Reading Assignments	• Graduate Presentations
04/15/09	Formulation and Implementation II	N/A	• Progress Report 2, Discussion, and Collaboration
04/22/09	Verification and Validation	N/A	• Progress Report 3, Discussion, and Collaboration
04/29/09	Document and Presentation Preparation I	N/A	• Progress Report 4, Discussion, and Collaboration
05/06/09	Document and Presentation Preparation II	N/A	• Progress Report 5, Discussion, and Collaboration
05/13/09	Project Presentations	N/A	• Project Presentations