

Spring 2008

ES212: Introduction to GIS and Remote Sensing



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Lecture: Tu-Th 11:00-12:15 Diamond 223

Laboratory: Th 1:00- 4:00 Diamond 222

Office Hours: Stop by anytime, or by appointment

Course Overview

This is a comprehensive theoretical and practical introduction to the fundamental principles of geographic information systems and remote sensing digital image processing. Topics we cover include data sources and models, map scales and projections, spatial analysis, elementary satellite image interpretation and manipulation, and global positioning systems. We also discuss current issues and applications of GIS, with particular emphasis on interdisciplinary topics with an environmental studies focus. Each of you will develop and carry out independent projects using GIS.

The lecture component of this course focuses on geographic information science principals and concepts. The laboratory introduces you to ArcGIS, one of the most widely-used desktop GIS applications in the world. You will use ArcGIS and its extensions to complete and present independent projects.

This course is a lot of work—we cover a considerable amount of material—but I hope you will also find it fun and rewarding. By the end of the term you will be exposed to the fundamental principals and methods of introductory and intermediate geographic information science, improve your ability to think spatially, and develop an ability to work with and apply your new GIS knowledge to real world problems.

Assignments and Grading

You will be responsible for information covered in the assigned readings and materials covered during lectures. You will be expected to complete the specified assignments during or outside of the designated laboratory and lecture periods as necessary. You will have time during several laboratory periods to work on independent projects but you will be expected to work on these outside of formal class hours also.

The following is a summary of the assignments, exams, and projects. Additional information and handouts will be provided about each assignment as necessary.

Assignments and Exams	% of Grade
Exams (20 + 25)	45
Projects (15 + 20)	35
Laboratory assignments	15
Participation	5
TOTAL	100

Exams

Exams emphasize material from the lecture component of the course, but you also will be responsible for material covered in laboratories. I provide study guides before the exams.

Laboratory activities and assignments

Laboratory exercises generally will be made available the day we cover the material. Lab assignments are due the beginning of the following laboratory period, unless otherwise noted.

Projects

You will work on two GIS projects this semester. The first, emphasizing “visual GIS,” is called *The Atlas of Maine*. This exercise gives you the opportunity to develop a map of Maine using data from the Maine Office of GIS, USGS, and/or other sources. Each of you individually will select a specific theme (e.g., related to land cover or geology or human demography) and create a full-scale base map of the entire state. The output for this assignment will include: (1) a full-sized (poster-sized) map for the Undergraduate Research Symposium, (2) an ArcIMS-ready project that we will upload to a dynamic web server; and (3) the completed data and a meta-data document describing the source data and your final map. Your grade will be based on a map proposal (2%), your draft map (5%), and your final revised map as a printed poster and as an internet-ready product (8%).

The second project, emphasizing “analytic GIS,” will give you the opportunity to develop and complete a quantitative research project. I will provide possible research topics and will consider proposals from you. Projects will be carried out in pairs (depending on final enrollment), and final grades will be based on individual and group output. The output for this assignment will include: (1) a research poster for the Undergraduate Research Symposium, (2) an ArcIMS-ready project that we will upload to a dynamic web server, and (3) an in-class presentation about your research to your peers. Your grade will be based on your project proposal (2%); a draft research poster (5%); your final poster (10%), and your final oral presentation, archived data, and posting to web site (3%).

Participation: You will be expected to attend class and laboratory periods regularly. Planned absences should be discussed with me beforehand. Your participation grade will be based on participation in lecture and laboratory sessions and participation in the Colby Undergraduate Research Symposium.

Summary of Major Project Deadlines

Th February 14	Atlas of Maine Proposal due in class (2%)
Th February 28	Atlas of Maine Map due beginning of lab (5%)
Th March 13	Atlas of Maine map revision due beginning of lab (8%)
Th March 20	GIS project proposal due in class (2%)
Th April 17	GIS project poster due end of laboratory (5%)
Th May 1	GIS project poster revisions due in time for research symposium (10%)
Tu-Th May 6-8	GIS project presentation (3%)

Required Texts, Readings, and Materials

DeMers, Michael C. 2005. *Fundamentals of Geographic Information Systems* (3rd Edition). New York: John Wiley and Sons.

Additional course material will be handed out or made available through the library’s electronic reserves or the fileserver.

Schedule

Wk	Date	Topic	Readings & Assignments
February			
1	Th 7	Introduction to GIS	DeMers Ch. 1 & 2
	LAB 1	Introduction to ArcGIS	
2	Tu 12	GIS data models and sources	DeMers Ch. 4 & 5
	Th 14	Map scale and projections	DeMers Ch. 3 pp. 46-56, Atlas of Maine proposal due
	LAB 2	Importing, preparing, organizing data	
3	Tu 19	Coordinate systems	DeMers Ch. 3 pp. 56-71
	Th 21	Data display and cartography	DeMers Ch. 14
	LAB 3	Map projections, design, and layout	Start Atlas of Maine projects
4	Tu 26	Data management and queries	DeMers Ch. 6
	Th 28	Data editing and standards	
	LAB 4	Querying and working with tables	Atlas of Maine map due
March			
5	Tu 4	EXAM	EXAM
	Th 6	Atlas of Maine projects: In Lab	
	LAB 5	Digitizing and editing; work on Atlas of Maine	
6	Tu 11	Spatial analysis I	DeMers Ch. 7, 8
	Th 13	Spatial analysis II	DeMers Ch. 9
	LAB 6	Spatial analysis & processing	Atlas of Maine map revision due
7	Tu 18	Spatial analysis III	DeMers Ch. 10 and Ch 11 (pp. 274-285)
	Th 20	Spatial analysis IV	
	LAB 7	Advanced spatial analysis	Project proposal due
	Tu 25	SPRING BREAK	
	Th 27	SPRING BREAK	
April			
8	Tu 1	Spatial modeling with GIS	DeMers Ch 13
	Th 3	Work on GIS projects	
	LAB 8	Work on GIS projects	
9	Tu 8	Remote sensing I	Lo and Yeung, ch 8 pp. 287-295; 304-323 (library reserve)
	Th 10	Remote sensing II and GPS	
	LAB 9	Introducing Remote sensing & GPS	GPS exercise (weather permitting) GIS project poster due
10	Tu 15	Work on final GIS projects	

Th 17	Work on final GIS projects	
LAB 10	Introducing Remote Sensing	(GPS rain day)

11	Tu 22	Work on GIS projects
	Th 24	Work on GIS projects
	LAB 11	Work on final GIS projects

12	Tu 29	Work on GIS projects
	May	
	Th 1	Work on GIS projects
	LAB 12	Work on final GIS projects
		Final GIS project poster due for Colby Research Symposium

13	Tu 6	Work on final presentations	Work on presentations and uploading to server
	Th 8	Final presentations, comments, review	Final presentations
	LAB 13	Final presentations (as necessary)	All project materials due

FINAL (Date, time, location as posted)

Second Semester	
Wednesday, February 6	First classes
Saturday, March 22, through Sunday, March 30	Spring recess (dorms closed)
Friday, May 9	Last classes of second semester
Saturday, May 10	Last day for scheduled events
Wednesday, May 14, through Monday, May 19	Semester examinations