

Michigan Technological University
School of Forest Resources and Environmental Science

Geographic Information Systems for Resource Management
FW5550

Fall Semester 2007

Instructor:

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Office Hours: By Appointment

Text: Introduction to Geographic Information Systems, Fourth Edition
Kang-tsung Chang
McGraw Hill, 2007
450 pp.

Note: This is a new edition. The older editions are seriously outdated on several key topics and lab exercises, and should NOT be purchased.

Objective

The objective of this class is to provide you with an in-depth understanding of the theory and application of GIS to resource management issues. Each major component of a GIS will be explored in depth. Lectures will look at the theory and background of each component, while the laboratory exercises will provide hands-on experience with the most widely used commercial GIS software package, ArcMap. At the completion of the class, it is hoped you will understand the technology of GIS, know where to look for data, how to manipulate the data, analyze it and present the information to a variety of end users.

Class Philosophy

GIS is very much a “hands-on” technology. Therefore it is important that you stay current on the readings and understand each lab exercise. The lab exercises build on each other; so do not fall behind. A GIS project will require you to assemble data, build a small GIS database, perform analyses with the data set, and put together a portfolio showcasing your project. You should begin thinking about a geographic area of interest, questions to pose, and begin searching the Internet for information. If you feel you are currently at a lost for a topic, I would suggest you look at several GIS systems currently on the web. Look at the systems for National Forests and Parks, check out what state agencies are doing, as well as local and city governments. Utilize the search engines available to you. I also have several ongoing research projects, that you may be able to tie in with.

Attendance at all lectures and labs is expected. If you are going to miss a class or lab, please try to let me know ahead of time. I am more than willing to pass on lecture notes and meet with you to make up labs.

Grade Guidelines

There will be 3 1-hour exams each worth 10%. Lab reports are worth 20%, the class project 25% and the lab practical 25%. Lab reports are due weekly. The lab practical will be conducted during the last week of classes during the lab session and will involve solving a resource management problem. There is no final exam in the class.

Course Prerequisites

Skills and knowledge are expected in the following areas: basic statistics, word processing, presentation skills, basic computer skills (moving, creating and deleting files, managing large numbers of files, basic Microsoft workstation commands). If you need help in any of these areas, please let me know ASAP.

SYLLABUS

Week 1: September 3 - 7

Lectures: What is a GIS?

What is georeferenced data? How do the GIS and data work together?

Lab: Introduction to ArcCatalog, ArcMap and working with geographic and planar coordinate systems. Tasks 1 and 2, Chapter 1 and tasks 1, 2, 3, 4 and challenge, Chapter 2.

Readings: Chapters 1 and 2

Week 2: September 10 - 14

Lectures: Data model overview, georelational vector data model and its derivatives 1

Lab: Importing, registering and editing vector data in ArcMap using Digital Line Graph data and the Michigan Framework Base version 5a.

Readings: Chapter 3

Week 3: September 17 - 21

Lecture: The raster data model Digital elevation models (DEM)- a special type of raster data set, deriving slope and aspect from DEMs, land use/cover information.

Lab: Working with DEMs in ArcMap, construction of slope and aspect maps, and the use of color to convey information. Tasks 1 through the Challenge Task, Chapter 14.

Reading: Chapters 5 and 14

Note: Ann is out of town the 20th-21st

Week 4: September 24 - 28

Lectures: Attribute input and management

Lab: Creating and managing attributes in a GIS

Reading: Chapter 9

Week 5: October 1 - 5

First Hour Exam, Thursday, October 4th

Lecture: The cartographically correct map

Lab: Map layout, construction, and printing. Tasks 1-3, Chapter 10.

Reading: Chapter 10

Week 6: October 8 - 12

Lecture: Object based vector data models and geodatabases

Lab: Building, creating and converting to the geodatabase format

Reading: Chapter 4 and handouts

Week 7: October 15 - 19

Lecture: GIS analysis functions- vector based analysis

Lab: Basic GIS analysis functions in ArcMap

Reading: Chapters 11 and 12

Week 8: October 22 - 26

Lectures: GIS analysis functions- raster based analysis

Lab: More GIS analysis functions in ArcMap

Readings: Chapters 12 and 13

Week 9: October 29 - November 2

Ann is out of town this week. Work on project and review all analysis functions in preparation for exam 2.

Week 10: November 5 - 9

Second Hour Exam, Thursday, November 8th

Lectures: Geometric transformations

Lab: Working with geometric transformations

Readings: Chapter 7

Week 11: November 12 - 16

Lectures: Spatial interpolation

Lab: Introduction to spatial interpolation

Readings: Chapter 16

Week 12: November 26 - 30

Lectures: Spatial interpolation (cont.)

Lab: Spatial interpolation analysis

Readings: Chapter 16

Week 13: December 3 - 7

Lectures: Modeling in GIS

Lab: Building a simple GIS model

Readings: Chapter 15, starting page 301

Week 14: December 10 - 14

Third Hour Exam, Tuesday, December 12th

Lecture: No lectures this week- finish project and prepare for lab practical

Lab: Lab practical

GIS Projects are due no later than 5 pm on Wednesday, December 19th

Grading Scale

100 - 93	A
92 - 90	AB
89 - 83	B
82 - 80	BC
79 - 73	C