

# *Natural Resources 760/860, Geography 760*

## *Geographic Information Systems in Natural Resources*

Purpose of Course: To master the principles and practices of geographic information systems (GIS), primarily with regard to natural resource management and related disciplines. This course is designed for the highly motivated student.

Prerequisites: Permission of the Instructor and willingness to work hard.

Instructor : Dr. Russell G. Congalton  
Office: 116 Hewitt Hall ANNEX  
Phone: 862-4644 868-3688 (home)  
Office Hours: MW 10-11am and T 9-11am or just knock

Examinations: 1. Mid-Term #1 – Mon., Feb 23 -worth 100 points  
2. Mid-Term #2 – Mon., April 13 -worth 100 points  
3. Final exam (cumulative) –Mon., May 18 8-10 -worth 150 points

Laboratories: **8 lab reports** worth 10 points each - 80 points

**Lab preparation evaluation** - 40 points -- quiz at the very beginning of lab each week for the 8 labs. Each student will be responsible for reading the entire lab before coming to lab and answering the questions on a short quiz. The goal here is to confirm that you are prepared to do the lab. There will typically be 5 short questions worth 1 point each.

**1 Lab Project/Presentation** - 175 points -- due Monday, May 11  
Information about this project will be distributed separately.

**Graduate Students** will be required to make an oral presentation about a GIS application. More details on this will be provided (100 points).

Homework: Due at the beginning of class on the date specified on the assignment.  
3 assignments worth 10 points each - 30 points

Class Participation: 25 points (based on class discussions and self-generated reading list)

Lab Access: This lab is available 24 hours a day if a class is not using it.  
Security and lab rules will be discussed in class.

Grading: (700 total points for undergrads, 800 total points for grads)  
Used as a general guide for you and me. (+ and - grades will be used)

635 - 700 = A (90.7%)	725 - 800 = A (90.7%)
570 - 634 = B (81.4%)	655 - 724 = B (81.9%)
505 - 569 = C (72.1%)	580 - 654 = C (72.5%)
440 - 504 = D (62.9%)	500 - 579 = D (62.5%)

Texts:                   1- DeMers, Michael. 2009. 4th Edition, Fundamentals of GIS.  
                              John Wiley & Sons. 443p.  
                              2- Environmental Systems Research Institute. 2004. 2<sup>nd</sup> Edition – Updated  
                              for ArcGIS 9.3. Getting to Know ARC GIS Desktop. ESRI, Inc., Redlands,  
                              CA.

Required Lab Supplies:    USB thumb/flash drive for back-up

Course Objectives:

1. To insure that each student has a knowledge of the concepts and applications of geographic information systems (GIS)
2. To insure that each student has knowledge of
  - a. how to build a GIS, and
  - b. how to manipulate and analyze data in a GIS , and
  - c. how to assess the accuracy of GIS data.
3. To insure that each student has knowledge of
  - a. how to define the GIS database needed to fulfill the user's stated objectives, and
  - b. where existing GIS data which fulfills his/her objectives may be located, and
  - c. how to integrate remotely sensed data into a GIS, if necessary.
4. To insure that each student has knowledge of
  - a. current applications of GIS to natural resource management and related fields,
  - b. future applications of GIS to natural resource management and related fields.

## *GIS in Natural Resources Lecture Outline*

<u>WEEK</u>	<u>TOPIC</u>	<u>READINGS (from Demers, 4th ed.)</u>
1	Conduct and motivation of course	
2	Introduction, definitions, terms	Ch. 0 and 1 Paper - "ABC's of GIS" (on BlackBoard)
3	Geographic Concepts & Map Basics	Ch. 2 and 3
4	Data Structures and Models	Ch. 4 and 5
5	Data input, storage, and editing	Ch. 6 and 7
6	Exam #1	
7	Spatial Analysis Basics	Ch. 8, 9, and 10
8	More Spatial Analysis	Ch 13 and 14
9	Spring Break	
10	Spatial/Cartographic Modeling	Ch. 15 Paper – "GIS Modeling" (on Blackboard)
11 and 12	Surfaces and Terrain Analysis	Ch. 11 and 12 Paper – "Network Analysis" (on Blackboard)
13	Exam #2	
14	Data Quality	Paper – from Manual of GIS (on Blackboard)
15	Data Output and Visualization	Ch 16 and 17
16	Data Sources/Remote Sensing	Appendix A and B
17	Review for final exam	

## *GIS in Natural Resources Laboratory Outline*

<u>WEEK</u>	<u>LAB TOPIC</u>	<u>READING/EXERCISES</u> (from ARC GIS Book) <b>READ BEFORE COMING TO CLASS</b>
1	No Lab (Classes began on Tuesday)	
2	Introduction/Rules	
3	#1 Getting Started/Basics	Chapters 1, 2, 3, 4 Basics Exercises 3a, b, c & 4a, b, c
4	#2 Africa Atlas Poster	Chapter 5 Symbols Exercises 5a, b, c, d Chapter 6 Classifying Exercises 6a, b, c, d
5	#3 Ministry of Tourism and US Census Map	Chapter 7 Labeling Exercises 7a, b, c Chapter 13 Map Projections Exercises 13a, b
6	#4 Real Estate Analysis and Environmental Risk Assessment	Chapter 8 Queries Exercises 8a, b, c Chapter 9 Joins and Relates Exercises 9a, b
7	#5 Gourmet Food Store	Chapter 10 Analysis Exercises 10a, b
8	#6 Timber Harvest Planning	Chapter 11 & 12 More Analysis Exercises 11a, b, c, d & 12a, b, c
9	Spring Break	No Lab
10	#7 City Planning	Chapters 14, 15, 16 Creating & Editing, Chapter 17 (extra credit) Exercises 14a, b, c & 15a, b & 16a, b, c (17a, b, c optional)
11	#8 Making Maps	Chapter 18 Quick Maps Exercises 18a, b, c (no write-up) Chapter 19 Presentation Maps Exercises 19a, b, c, d

12 -15	Project Time
16	Project Presentations during Lab
17	Project due

## **LAB INFORMATION**

There will be two components of every lab. First, each student is responsible for reading, reviewing, and being familiar with the lab materials before coming to lab. A short (5 question, 5 point) quiz will be given at the beginning of each lab. Second, a short (1-2 page, typed) lab report will be required from each student for each of the 8 labs. Each report will be worth 10 points. The lab reports should clearly and concisely contain the following information:

- Student Name
- Lab number and lab name
- Motivation or justification of the lab (i.e., an introduction)
- Lab objective(s)
- Key concept(s) learned
- Any appropriate hardcopy of maps or other documentation

This report is meant to provide another review for the student of what they accomplished. NOTE: If there are two separate example projects for a given lab, then a lab report for each example project is required. In other words, labs 3 and 4 require two lab reports each. See me with questions.