Natural Resources 658/Geography 658
Introduction to Geographic Information Systems

Purpose of Course : To introduce the students to the principles and practices of geographic information systems, primarily through conceptual lectures, practical homework assignments and hands-on lab exercises.

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Office Hours: MW 10-11am and T 9-11am or just knock

Examinations:
1. Mid-Term #1, Wed., Feb. 27 -worth 100 points
2. Mid-Term #2, Wed., April 16 -worth 100 points
3. Final exam (cumulative), Wed., May 21, 1-3pm - worth 150 points

Quizzes: There will be a weekly quiz (either on M or W) worth 5 points each on material from the previous lecture and/or readings for the week
15 quizzes x 5 points = 75 points

Laboratories: **14 lab reports** worth 15 points each –total 210 points
These reports will be a summary/journal of the work done each week in the hands-on learning labs using ArcView 3.x. They will be due at the beginning of the next week's lab. The labs will be run by the course teaching assistants (TA's).

Lab Project worth 125 points – see instructions on Lab Outline

Homework: Due at the beginning of lecture on the date specified on the assignment.
6 assignments - 90 points (5+20+20+15+20+10)

Lab Access: This lab is available during regularly scheduled lab hours and during special undergraduate access hours.
Security and lab rules will be discussed in class.
Failure to obey lab rules will result in loss of lab privileges.

Grading: (850 total points)
Used as a general guide for you and me. (+ and - grades will be used)

850 - 765 = A (90%)	679 - 595 = C (70%)
764 - 680 = B (80%)	594 - 510 = D (60%)

Texts:
1- Bolstad, Paul. 2005.GIS Fundamentals: A First Course on GIS. 2nd edition. Eider Press. MN.
2- Environmental Systems Research Institute. 2001. Getting to Know ARCVIEW GIS. ESRI, Inc., Redlands, CA.

Academic Dishonesty Policy: You must do your own work on all exams, quizzes, and homeworks. Labs are a learning exercise and student interaction is expected. You must prepare your own individual lab reports. Any type of academic dishonesty including plagiarism is unacceptable and will result in an automatic course grade of F. Please come see me or your TA if you need any help.

Course Objectives:

1. To insure that each student has introductory knowledge of the concepts and applications of geographic information systems (GIS)

2. To insure that each student has basic knowledge of

   a. how to build a GIS, and

   b. how to manipulate and analyze data in a GIS , and

   c. how to assess GIS data quality and standards.

3. To insure that each student has a basic understanding 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

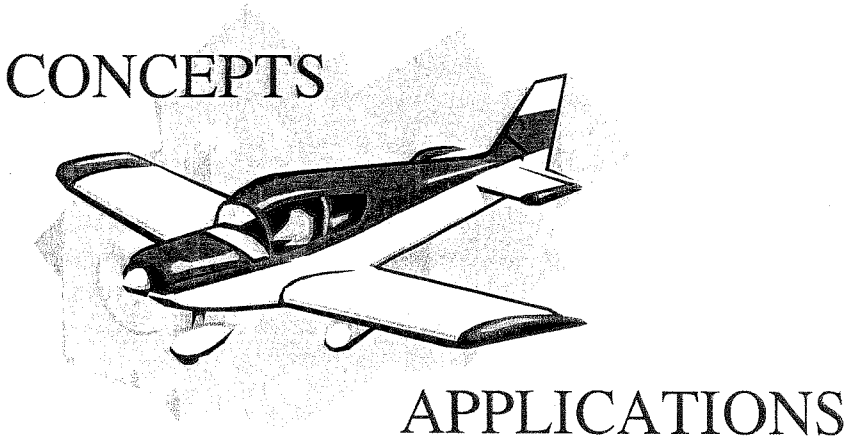
   c. how to integrate remotely sensed data into a GIS, if necessary.

4. To insure that each student has an introduction to

   a. current applications of GIS to natural resource management and related fields,

   b. future applications of GIS to natural resource management and related fields.

TEACHING/LEARNING PHILOSOPHY



Introduction to GIS
(NR658/Geog658)
Laboratory Outline

WEEK	LAB TOPIC/NAME	READING/EXERCISES (from ARCVIEW Book) **READ BEFORE COMING TO CLASS**
1	No lab	
2	#1 Lab Setup and Introduction	Chapters 1-6
3	#2 Getting Started/Basics	Chapters 7-8
4	#3 Themes • Granit Data Handout	Chapters 9-10
5	#4 Distance, Area, and Scale *	Chapters 11-12
6	#5 Queries *	Chapters 13-14
7	#6 Managing Tabular Data *	Chapters 15-16
8	#7 Spatial Relationships * • XTOOLS tutorial	Chapters 17-18
9	Spring Break	No Lab
10	#8 More Spatial Relationships *	Chapters 19-20
11	#9 Presenting information *	Chapters 21-22
12	#10 Creating your own data *	Chapters 23-24
13	#11 More creating your own data *	Chapters 25-26
14	#12 Introduction to Avenue	Chapter 27
15	#13 Introduction to Geoprocessing *	Chapter 28
16	#14 Introduction to Spatial/3D Analyst *	Chapter 29
17	No lab (Lab #14 lab reports due in Monday lecture to your TA)	

INSTUCTIONS For Lab Reports:

A well-written (1-2 page, **typed**) lab report is required from each student. The lab reports should clearly and concisely contain the following information (use these headings in your report):

- Student Name and Lab Section
- Lab number and lab name
- Motivation or justification for the lab (i.e., an "big picture" introduction)
- Lab objective(s) – Be Specific
- Key concept(s) learned – use bullets or an outline form

- Any appropriate **B&W** hardcopy of maps or other documentation (label as figures or tables and refer to somewhere in the report)

* Any lab marked by a star will have an additional component of supplemental questions to answer. These supplemental questions should be answered on a separate sheet of paper labeled Supplemental Questions and stapled to the end of the lab report.

INSTUCTIONS For Lab Project (worth 125 points):

Objective: To aid the students in integrating the course material by considering a real life situation. The students will be the GIS experts and will be expected to generate a real problem (hypothesis) and solve it using GIS. This project will be performed during lab time and is complementary to the lab exercises.

Approach: All work will be done in teams of two with your current lab partner. All projects will use data that the students downloaded from the GRANIT website for NH. A single USGS 7.5 minute quad should be selected for analysis. Each team will come up with a hypothesis or problem to be solved using GIS. Then they will obtain the necessary data layers to solve the problem. All projects will be limited to a maximum of 5 data layers. The project must include performing 5 different spatial analysis techniques (as learned in lab) on the data layers to solve the problem. You may need to do multiple techniques on a single layer or you may need to combine layers in an overlay or you may need to do one technique on each layer.

Report: (must be professionally written, grammatically correct, and spell-checked)
Each group will write a single report on their project. The reports will be due in lab on the week of April 28. The written report should include the following:

Introduction: It is very important to have a powerful introduction
1) Compile any background/justification about the study - in other words, why would you do this project, what is its importance?
2) State the problem and/or the hypothesis - BE VERY CLEAR
3) Compile a literature review on GIS of the same sort of problems. Must include at least 3 peer-reviewed journal citations (included in Lit. Cited)
4) Describe the study area – Be Specific

Procedure: Describe in detail <u>how</u> you conducted the project
1) Describe the data layers that you selected and why
2) Describe the spatial analysis techniques that you used. Please number each technique (must have 5)
3) Describe anything else that you did here to accomplish your goals

Results & Discussion:
1) Clearly present and discuss the results of your analysis, use figures/maps and tables. There should be at least one figure for each analysis technique and a final figure/map that shows the results of the completed analysis
2) Summarize what you learned (both successes and failures)

Literature Cited: a proper list of citations from your report

Maximum limit of report: 10 type-written pages plus figures and tables. **Note: the maps should be scaled to fit on 8.5x11 inch paper - no big maps allowed.**

Introduction to GIS (NR658/Geog658)
Lecture Outline

WEEK	TOPIC	READING (from Bolstad)
1	Conduct and motivation of course	
2	Introduction, definitions, terms	Ch. 1 Paper - "ABC's of GIS" (See Readings in BlackBoard)
3	Data Models and Structures	Ch. 2 and 8 (Lecture handout in BlackBoard)
4	Map projections and datums	Ch. 3
5	Data input, output, and storage	Ch. 4 and 7
6	Exam #1	
7 and 8	Data Analysis and Modeling	Ch. 9, 10, and 13
9	Spring Break	
10	Interpolation & Additional Modeling	Ch. 12
11	Data Standards and Quality	Ch. 14
12	Digital Elevation Models	Ch. 11
13	Exam #2	
14	Choosing a GIS	Ch. 15
15	Integration with Remote Sensing	Ch. 6
16	Applications/GPS	Ch. 5
17	Review for final exam	