Geology 3401 – Interdisciplinary Geographical Information Systems

Fall, 2016
Class: TR 9:30-10:45, ACR 104
Lab T or W 2-5, WSB 310

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Office Hours: MW 10 - 11; TR 8:30-9:30

Course description: A geographic information system (GIS) is a computerized information system that is designed to integrate various types of spatial and nonspatial data for a particular area and application. It is a "thematic" map database in that it allows for various "themes", or layers of data types, to be superimposed upon each other. The resultant thematic map can then be printed, published to the internet, and/or analyzed for specific, generally spatial related, queries.

This class is designed to introduce the fundamental concepts of maps and GIS, and to provide the student with experience in utilizing one of the standard desktop GIS packages: ESRI's ArcGIS. The class is "interdisciplinary" – the application of a GIS is only limited by the imagination and experience of the individual. The only prerequisite is a basic knowledge of how to operate a Windows based PC. Typical applications of a GIS include: earth science, range management, ecology, hydrology, geography/urban planning, business management/trend and market analysis, sociology, archeology, and law enforcement.

Text:
Jensen and Jensen, Introductory Geographic Information Systems

Optional Texts:
Bernhardsen, T, 2002, Geographic Information Systems, An Introduction, 3rd edition, John Wiley and Sons, Inc., ISBN #0-471-41968-0
Chang, K, 2006, Introduction to Geographic Information Systems, 4th edition, McGraw Hill, ISBN 0-07-282682-7
Clark, K.C., 2011, Getting Started with Geographic Information Systems, 5th edition, Prentice Hall, ISBN 978-0-13-149498-5

Grading: Grading will be based upon: Attendance/quizzes; weekly labs, homework assignments, two midterms; one final exam. There will be 12 quizzes, and 12 labs. The final point breakdown will be:

	points ea	#	Total	%
Quizzes	10	12	120	18%
Chapter Questions	10	20	200	30%
Midterms	100	2	200	30%
Final Exam	150	1	150	22%
			670	100%

The final grade scheme is based upon the standard 90-100 = A, 80-90 = B, 70-80 = C, 60-70 = D, and <60 = F.

Expected Learning Outcomes/Objectives: Upon completion of this course, students will apply critical reasoning and problem solving skills to: 1. Understand the basic concepts of the GIS system; 2. Create ArcMap projects using readily available data types; 3. Create vector GIS data from GPS and from onscreen editing; 4. Manipulate raster based GIS data; 5. Perform spatial analysis using geoprocessing skills; and 6. Prepare output of these data and analyses

Methods of Assessment/Evaluation: Learning outcome assessment will be made on the basis of weekly quizzes, weekly lab exercises, two midterms and one Final Exam. The exams will assess the application of critical reasoning and problem solving skills through short answer questions, multiple choice questions, and essay type questions. The graded exams will be reviewed, by discussing the logic of the answers to and content of the questions missed by a majority of the class. The quizzes are designed to encourage students to read the assigned material in advance of the lectures, homework assignments will assess student problem solving skills in applying, describing, and explaining principles of GIS.

Conduct: Students are expected to observe the University's Code of Student Conduct (see Student Handbook, http://www.sulross.edu/sites/default/files//sites/default/files/users/docs/student_svc/handbook.pdf - page 38).

Please turn OFF all cellular phones, IPODs, MP3s, etc.

Sul Ross State University is committed to equal access in compliance with the Americans With Disabilities Act of 1973. It is the student's responsibility to initiate a request for accessibility services. Students seeking accessibility services must contact Mary Schwartze, M. Ed., L.P.C., in Counseling and Accessibility Services, Ferguson Hall, Room 112. The mailing address is P.O. Box C-122, Sul Ross State University, Alpine, Texas 79832. Telephone: 432-837-8203. E-mail: mschwartze@sulross.edu .

week	date	Topic	Lecture Reading	Lab
1	23-Aug	Introduction	Chapter 1	Lab history, Our hardware / software / GIS data
2	25-Aug	GIS Components	1	
	30-Aug	Georeferencing, coordinate systems	2	Spatial Data/Vector/Raster
3	1-Sep	Projections	2	
	6-Sep	Data for GIS, GPS, digitizing	3	Map Projections/Basic Map Elements
4	8-Sep	Remote sensing	3	
	13-Sep	LIDAR	3	Symbology/Features/Classifying Data
5	15-Sep	**Exam 1**		
	20-Sep	Data Quality, Spatial Data Models; Vector vs raster	4, 5	Attribute Data/Tables
6	22-Sep	Databases	5	
	27-Sep	Spatial Analysis of Vector and Raster Data: Vector	6	Queries
7	29-Sep	Spatial Analysis of Vector and Raster Data: Raster	6	
	4-Oct	Network Analysis: Transportation	7	Midterm
8	6-Oct	Network Analysis, Geometric	7	
	11-Oct	Network Analysis	7	GPS
9	13-Oct	Statistics	8	
	18-Oct	Statistics	8	Joins
10	20-Oct	Statistics	8	
	25-Oct	Spatial Analysis: Vector, TIN	9	Geoprocessing/Spatial Analysis
11	27-Oct	Spatial Analysis: Raster, examples	9	
	1-Nov	**Exam 2 (tentative schedule)**		**Raster Analysis**
12	3-Nov	Cartography	10	
	8-Nov	Photogrammetry	10	Photogrammetry
13	10-Nov	Cartography	10	
	15-Nov	GIS Hardware/Software	11	Editing/Topology
14	17-Nov	GIS Hardware/Software	11	
	22-Nov	Future Considerations	12	Geodatabases
	24-Nov	**Thanksgiving break**		
15	29-Nov	TBD	12	LAB FINAL
	5-Dec	**Final Exam @ ARR**		