



Geology 5402 – Interdisciplinary Geographical Information Systems

Fall, 2019

Class: TR 12:30 -1:45, WSB 301

Lab T 6-9, WSB 310

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Office Hours: TWR 11-12; MW 9-10 and by appointment

TA: ?

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 Pro. The class is “interdisciplinary” – the application of a GIS is only limited by the imagination of the individual. The only prerequisite is a knowledge of basic computer skills. 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.

Texts:

Price, Maribeth, Mastering ArcGIS Pro, 1st edition, McGraw-Hill ISBN 978-1-260-58733-3

Grading: Grading will be based upon: Attendance/quizzes; weekly labs, 2 lab midterms, homework assignments/, two exams, and a term project (s). There will be 12 labs. The final point breakdown will be:

	Points each	Number	Total	%
Quizzes	5	10	50	9%
Homework	10	2	20	4%
Labs	10	12	120	22%
Lab midterm	25	1	25	5%
Lab final	25	1	25	5%
Project / Presentation	100	1	100	19%
Exam 1	100	1	100	19%
Exam 2	100	1	100	19%

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

Conduct: Students are expected to observe the University's Code of Student Conduct (see Student Handbook, <http://www.sulross.edu/pages/3633.asp>).

Please turn OFF all cellular phones, IPODs, MP3s, etc. No tobacco products allowed in class

week	date	Book	Lab Chapter	Additional
1	8/28	GIS DATA: Details of our software: ESRI ArcGIS software		
	8/30			SRGIS library, NAS, shares, drive mapping, data redundancy issues, Quadrangle selection,
2	9/4	Managing GIS data	1	
	9/6			Add DRGs, group in TOC, create boundary py
3	9/11	GPS / Coordinate Systems	2	
	9/13			GPS
4	9/18	Coordinate Systems	3	
	9/20			Add DOQQ's group in TOC
5	9/25	Mapping GIS data	4	
	9/27			Add LANDSAT subset, set symbology, enable dataframe clip from boundary py
6	10/2	Exam 1	Lab midterm	
	10/4			Add TXDOT trans, borrow symbology from layer file, save
7	10/9	Presenting GIS data	5	
	10/11			Add contours, borrow symbology from layer file
8	10/16	Attribute Data	6	
	10/18			Add stream lines, set
9	10/23	Basic Editing	7	
	10/25			Add geology / soils, set symbology
10	10/30	Queries	8	
	11/1			Add NED/DEM, calc hillshade, slope, aspect
11	11/6	Spatial Joins	9	
	11/8			Calculate zonal statistics combing a py layer with NED/slope/aspect
12	11/13	Map overlay and Geoprocessing	10	
	11/15			Project work
13	11/20	Raster Analysis	no lab	
	22-Nov	Thanksgiving		
14	11/27	Raster Analysis	11	
	11/29			Case studies
15	10/4	Case studies	project presentations	
	12/12	Exam 2, Wednesday 10:15-12:15		

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; 7. Perform any other GIS related functions needed to complete the term project discussed above.

Methods of Assessment/Evaluation: Learning outcome assessment will be made on the basis of weekly quizzes, periodic homework assignments, weekly lab exercises, two Midterm Exams, one Final Exam, and a term project (or projects for graduate students). 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. Completion of the term project will require a thorough knowledge of GIS principles.

Term Project: Students will choose between: 1) A compilation of GIS data for a particular research area (individual components included in the syllabus, far right column), or 2) The construction of an orthophoto and Digital Elevation Model using Photogrammetry, or 3) a GIS data collection project for a local entity such as the city of Alpine or the Sul Ross campus.

Americans with Disabilities Act: 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 Schwartz, 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 8691. E-mail: mschwartz@sulross.edu