



Geology 5402 – Interdisciplinary Geographical Information Systems

Fall, 2021

Class: MWF 12-1:50, WSB 301

Lab T 6-9, WSB 310

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Office Hours: MW 8:30-10, TR 8-9:30, T 12:30-2 and by appointment

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, some version of this is required

Expected Learning Outcomes/Objectives: Upon completion of this course, students will apply critical reasoning and problem solving skills to:

1. Recall 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
6. Prepare output of these data and analyses

Methods of Assessment/Evaluation: Learning outcome assessment will be made on the basis of the following:

1. Weekly Blackboard quizzes: These will be completed out-of-class and will be administered through the Modules/Quiz area. 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.

2. Weekly in-class quizzes: These will be administered in-class using Plickers cards; these usually occur on Thursday
3. Weekly Blackboard journal entries: These will be administered through Blackboard and will be completed outside of class
4. Weekly lab exercises: These will be subsets of the textbook lab material and will be done in the lab on the scheduled day. They will be due at the end of lab each week. This also includes a lab midterm exam and a lab final exam. These exams will require practical, hands-on skills to solve GIS problems (see learning outcomes listed above).
5. Two midterm lecture exams. 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 and content of the questions missed.
6. **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 LiDAR, or 3) a GIS data collection project for a local entity such as the city of Alpine or the Sul Ross campus. The project will be presented in story map form.

	each	number	total	percent
Blackboard quizzes	5	15	75	9%
Plickers quizzes	5	15	75	9%
Blackboard journal entries	5	15	75	9%
Lab quiz/exercises	15	12	180	22%
Lab midterm	50	1	50	6%
Lab final	50	1	50	6%
Exam 1	100	1	100	12%
Exam 2	100	1	100	12%
Term project	100	1	100	12%
			805	

week	date	Book	Lab Chapter	Additional
1	8/23	GIS DATA: Details of our software: ESRI ArcGIS software		
	8/25			mapping, data redundancy issues, Quadrangle selection, DD vs DMS
	8/27			
2	8/30	What is GIS?	1	
	9/1			Add DRGs, group in TOC, create boundary.py
	9/3			
3	9/8	Mapping GIS data	2	
	9/10			GPS
	9/13		3	
4	9/15	Presenting GIS data		
	9/17			Add DOQQ's group in TOC
	9/20		4	
5	9/22	Coordinate Systems		
	9/24			Add LANDSAT subset, set symbology, enable dataframe clip from boundary.py
	9/27		Lab midterm	
6	9/29			
	10/1	Exam 1		Add TXDOT trans, borrow symbology from layer file, save
	10/4		5	
7	10/6	Managing vector data		
	10/8			Add contours, borrow symbology from layer file
	10/11		6	
8	10/13	Managing raster data		
	10/15			Add stream lines, set symbology
	10/18		7	
9	10/20	Attribute Data		
	10/22			Add geology / soils, set
	10/25		8	
10	10/27	Editing		
	10/29			Add NED/DEM, calc hillshade, slope, aspect
	11/1		9	
11	11/3	Queries		
	11/5			Calculate zonal statistics combing a py layer with
12	11/8	Joins and overlays	10	
	11/12			Project work
	11/15		11	
13	11/17	Raster analysis		
	11/19			
14	11/22	Raster analysis	12	Case studies
15	11/23	Project Presentations	Lab final	
15	12/1	Project Presentations		
	12/7	Final Exam, Tuesday 12/7 12:30		

Americans with Disabilities Act: SRSU Disability Services. Sul Ross State University (SRSU) is committed to equal access in compliance with Americans with Disabilities Act of 1973. It is SRSU policy to provide reasonable accommodations to students with documented disabilities. It is the student's responsibility to initiate a request each semester for each class. Students seeking accessibility/accommodations services must contact Rebecca Greathouse Wren, LPC-S, SRSU's Accessibility Services Coordinator at 432-837-8203 (please leave a message and we'll get back to you as soon as we can during working hours), or email rebecca.wren@sulross.edu. Our office is located on the first floor of Ferguson Hall (Suite 112), and our mailing address is P.O. Box C-122, Sul Ross State University, Alpine. Texas, 79832.

Libraries: The Bryan Wildenthal Memorial Library in Alpine. Offers FREE resources and services to the entire SRSU community. Access and borrow books, articles, and more by visiting the library's website, library.sulross.edu. Off-campus access requires logging in with your Lobold and password. Librarians are a tremendous resource for your

coursework and can be reached in person, by email (srsulibrary@sulross.edu), or phone (432-837-8123). The Southwest Texas Junior College (SWTJC) Libraries at Uvalde, Del Rio, and Eagle Pass. Offer additional access to library spaces and resources. Del Rio, Eagle Pass, and Uvalde students may also use online resources available through SWTJC website, library.swtjc.edu. The SWTJC Libraries serve as pick-up locations for InterLibrary Loan (ILL) and Document Delivery from the Alpine campus.

Academic Integrity: Students in this class are expected to demonstrate scholarly behavior and academic honesty in the use of intellectual property. A scholar is expected to be punctual, prepared, and focused; meaningful and pertinent participation is appreciated. Examples of academic dishonesty include but are not limited to: Turning in work as original that was used in whole or part for another course and/or professor; turning in another person's work as one's own; copying from professional works or internet sites without citation; collaborating on a course assignment, examination, or quiz when collaboration is forbidden.

Classroom Climate of Respect: Importantly, this class will foster free expression, critical investigation, and the open discussion of ideas. This means that all of us must help create and sustain an atmosphere of tolerance, civility, and respect for the viewpoints of others. Similarly, we must all learn how to probe, oppose and disagree without resorting to tactics of intimidation, harassment, or personal attack. No one is entitled to harass, belittle, or discriminate against another on the basis of race, religion, ethnicity, age, gender, national origin, or sexual preference. Still we will not be silenced by the difficulty of fruitfully discussing politically sensitive issues.

Diversity Statement: I aim to create a learning environment for my students that supports a diversity of thoughts, perspectives and experiences, and honors your identities (including race, gender, class, sexuality, religion, ability, socioeconomic class, age, nationality, etc.). I also understand that the crisis of COVID, economic disparity, and health concerns, or even unexpected life events could impact the conditions necessary for you to succeed. My commitment is to be there for you and help you meet the learning objectives of this course. I do this to demonstrate my commitment to you and to the mission of Sul Ross State University to create an inclusive environment and care for the whole student as part of the Sul Ross Familia. If you feel like your performance in the class is being impacted by your experiences outside of class, please don't hesitate to come and talk with me. I want to be a resource for you.

