



Geology 3401 – Interdisciplinary Geographical Information Systems

Fall, 2019

Class: TR 9:30-10:45, WSB 321

Lab T 2-5, W 2-5 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. The class is “interdisciplinary” – the application of a GIS is only limited by the imagination and experience of the individual. The only prerequisite is 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, homework assignments, two midterms; one final exam. The final percentage breakdown will be:

| | Points each | Number | Total | % |
|--------------------|-------------|--------|-------|-----|
| Quizzes / homework | 5 | 15 | 75 | 18% |
| Labs | 10 | 12 | 120 | 29% |
| Lab midterm | 25 | 1 | 25 | 6% |
| Exam 1 | 100 | 1 | 100 | 24% |
| Exam 2 | 100 | 1 | 100 | 24% |

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

| week | date | Topic | Lecture Reading | Lab |
|------|-------|----------------------|-----------------|---|
| 1 | 8/27 | Introduction | | Lab history, Our hardware / software / GIS data |
| 2 | 8/29 | GIS Components | | |
| | 9/3 | What is GIS? | 1 | ArcGIS overview |
| 3 | 9/5 | | | |
| | 9/10 | Mapping GIS data | 2 | Symbology/Features/Classifying Data |
| 4 | 9/12 | | | |
| | 9/17 | Presenting GIS data | 3 | Creating layouts, now we can have so many |
| 5 | 9/19 | | | |
| | 9/24 | Coordinate Systems | 4 | If only the world was flat ... |
| 6 | 9/26 | | | |
| | 10/1 | Exam 1 | | Lab midterm |
| 7 | 10/3 | | | |
| | 10/8 | Managing vector data | 5 | points, lines and polygons |
| 8 | 10/10 | | | |
| | 10/15 | Managing raster data | 6 | look at all of the pretty grid cells |
| 9 | 10/17 | | | |
| | 10/22 | Attribute Data | 7 | that other part of a feature class |
| 10 | 10/24 | | | |
| | 10/29 | Editing | 8 | modify/create your own GIS data |
| 11 | 10/31 | | | |
| | 11/5 | Queries | 9 | ask questions about your data |
| 12 | 11/7 | | | |
| | 11/12 | Joins and overlays | 10 | connect, extract look for coincidence |
| 13 | 11/14 | | | |
| | 11/19 | Raster analysis | 11 | analyze in the raster world |
| 14 | 11/21 | | | |
| | 11/26 | Raster analysis | | |
| | | Thanksgiving | | |
| 15 | 12/3 | Sharing | 12 | LAB FINAL |

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.

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, periodic homework assignments/**project**, weekly lab exercises, two Midterm Exams, 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.

The optional project will be a cooperative effort to produce data for a local entity such as the City of Alpine or the Sul Ross campus. The project will involve field data collection and lab processing. Examples include the collection of data on water meters, traffic signs, environmental concerns, or other.

Distance Education Statement: Students enrolled in distance education courses have equal access to the university's academic support services, such as Smarthinking, library resources, online databases, and instructional technology support. For more information about accessing these resources, visit the SRSU website. Students should correspond using Sul Ross email accounts and submit online assignments through Blackboard, which requires secure login information to verify students' identities and to protect students' information. The procedures for filing a student complaint are included in the student handbook. Students enrolled in distance education courses at Sul Ross are expected to adhere to all policies pertaining to academic honesty and appropriate student conduct, as described in the student handbook. Students in web-based courses must maintain appropriate equipment and software, according to the needs and requirements of the course, as outlined on the SRSU website.

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