The University of Texas at Austin
Jackson School of Geosciences

Department of Geological Sciences

GEO327G/386G: GIS & GPS Applications in Earth Sciences

Messages

August 11, 2013

- Our first lab is Tuesday, September 3
- You will need:
  - an I-button or swipe card for access to the classroom/lab. Needed paperwork will be distributed the first day of class.
  - A logon ID and password for the classroom computers. All students will have automatic access using their EID and UT password.
- A 4 Gb or larger flash drive (a.k.a. "memory stick", "thumb drive", etc.) *is highly recommended*. You will have 1 Gb of secure network storage space for this class, but a flash drive will prove useful for working outside the lab.

August 11 2013

- Welcome to the Fall 2013 GIS/GPS class. Watch this page and/or the class Blackboard site for announcements.

Last updated August 11, 2013
Comments and questions to helper@mail.utexas.edu
Geological Sciences, U. Texas at Austin

Fall 2013

GEO327G/386G: GIS & GPS Applications in Earth Sciences

Syllabus

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• Instructor:	Mark Helper; GEO 4.112; 471-1009 **helper@jsg.utexas.edu**
• Unique #s	Geo327G: #27660 Geo386G: #27885
• Lab:	Tu 2:00 - 4:00, JGB 2.312
• Lecture:	T, Th 11 - 12:30, JGB 2.312
• Teaching Assistant:	T.B.A. Lab Syllabus (to be linked)
• Office Hours:	T & Th 9:30 - 11 and whenever my door is open. T.A.: XXXX, JGB 2.312
• Grading:	Exam 1: 15% Exam 2: 15% Labs: 35% Project: 20% Final Exam: 15% Plus and minus grades will be used for the final course grade.
• Texts:	P. Bolstad, **GIS Fundamentals, 2nd edition**. Eider Press, 543 p. An excellent text that is very well suited to the course. Ormsby, T., et al., 2004, **Getting to Know ArcGIS Desktop 10, 2nd edition**, Updated for ArcGIS 10, ESRI press, 604 p. This is not a required text but you may find it useful for labs and future reference. It is a workbook with exercises that lead one through the various tools available in ArcGIS software. The 2nd edition contains a fully functional, 180-day "trial version" of ArcGIS desktop 10; do not buy a used copy of either edition if you want the software. **Power Point presentations** and printed notes will be available for most lectures.
• Website	**http://www.geo.utexas.edu/courses/371c** The class web site will be used extensively for lab exercises and class information. *Equivalent or more up-to-date information is posted on the class Blackboard site*.
• Term Projects:	A GIS **project** involving a component of spatial or image analysis is an integral part of the course. Term projects will be **posted** to a class web site. This course carries the Quantitative Reasoning flag. Quantitative Reasoning courses are designed to equip you with skills that are necessary for understanding the types of quantitative arguments you will regularly encounter in your adult and professional life. You should therefore expect a substantial portion of your grade to come from your use of quantitative skills to analyze real-world problems. The term project is a chance to further to develop your skills in this area.
• Email & Network Accounts:	All students must have an email address and a user ID/password for the Geo. Building network.
• Field Trips:	An overnight weekend **field trip** organized around GPS surveying is a required part of the class. The date for this year's trip is November 9-10. Students participating in off-campus field trips are required by the University to have health insurance. Please let me know if you are not insured; I can arrange free coverage for the days of the trip. Off-campus travel also requires a few forms, which can be downloaded **here**.
• Academic Integrity:	**Scholastic dishonesty** of any type will not be tolerated. Violators will be referred to the Office of the Dean of Students for possible disciplinary action, which in the extreme may result in expulsion from the University.
• Students with Disabilities:	Students with disabilities may request appropriate academic accommodations from the Division of Diversity and Community Engagement, Services for Students with Disabilities, 512-471-6259, **http://www.utexas.edu/diversity/ddce/ssd/**

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Date	Lecture	Lab
Aug. 29	What is GIS?	No lab this week
Sep. 3	Datums and Coordinate Systems	1. Introduction to ArcGIS v. 10
5	Map Projections & Coordinate Systems	
10	Projections in ArcGIS	2. Map Projections
12	Maps as Numbers: Vector Data Models	
17	Vector Data Models in ArcGIS	3. Labeling, Annotations, Reference Scales, Graticules, Grids, Selecting in ArcMap
19	Databases	
24	Digitizing, Editing and Georeferencing with ArcGIS	4. Geodatabase Construction and Digitizing
26	The Raster Data Model	
Oct. 1	Review/ArcGIS work session	5. Digitizing (cont.)
3	**Exam 1**	
8	The Global Positioning System	6. GPS Instruments / Exporting & Importing Data
10	GPS II	
15	Guest Lecture	7. Spatial Analysis I - Antarctica
17	ArcGIS work session	
22	Spatial Analysis: Raster Data	8. Spatial Analysis II - Volcanic Hazards of Mt. Rainier
24	DEMs & TINs: Terrain Modeling	
29	Field Data Collection Software (GSA Mtg.)	9. Developing a GIS from GPS data and Orthophotos
31	Geostatistics	
Nov. 5	Remote Sensing & GIS	10. Completion of Field Project
7	Field Trip Preparation	-- ***Project ideas due*** --
	GPS Field Trip, Nov. 9-10	
12	Exam 2 Review	11. Obtaining and Using Data from the Internet
14	**Exam 2**	
19	Internet mapping tools	Project Work
21	**Thanksgiving Holiday**	
26	ArcGIS work session	Project Work
28	ArcGIS work session	
Dec. 3	Evaluations, Review	Project Work
5	Project Work	**Project Due**
11	**Final Exam** (9 - noon)	

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Labs

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Select a Lab

General Lab Information

- Data for lab exercises, web bookmarks, PDF copies of ESRI books, help files, and more, are available in the online class folder. Browse the building network path: *\\disk.austin.utexas.edu\root\geo-class\Geo-327g_386g* to get there, and/or map the location as a network drive for later use.
- See the lab syllabus for grading policy, due dates, etc. TA XXX can be reached at XXX. Office hours are held in the classroom.
- A **schedule for room 2.312** shows when the room is occupied.

Maps of the Week

- Fame, glory and the best from lab each week are at **Maps of the Week**!

Cartography Tips

- Want a Map of the Week? The **Layout Guidelines** can get you there.
- Wondering about **Cartography for Web Maps**?

Software Tips

- Useful techniques for labs or projects can be found in **Software Tips**.

Software Bugs and Workarounds

- A **tabulation of frustrating stuff** and what to do about it (see also the discussion group on this subject in the class Blackboard site).

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Field Trip

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A field trip to collect GPS data is the weekend of **November 9-10.**

The project site is a State Wildlife Management Area (with exotic game) north of Mason, TX, about 2.5 hours west of Austin.

- See a **description** of the field project and the equipment you will need.
- See a **location map** of the field site.
- See a **geologic map** (large file) of the field site.
- **Download** UT- and Department-required waiver forms.

Camping equipment (if desired) can be rented from the **UT RecSports**.

We will depart 7:30 AM, November 9 from the East basement door of the geology building and return the afternoon of Sun. November 10 before 6 PM.

See photos of **2001**, **2003**, **2006** and **2007** trips.

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Semester Project Description

*** *Fall 2012 projects are now posted****

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Project Description, Fall 2013

See examples from other classes and some untested ideas

The purpose of the class project is to use GIS to *answer a question* that can only be, or is best, answered using GIS methods. Making a map might only be a small part of this. Simply collecting data from the web and using it to make a map misses the point. Data should be used in a way that creates new information, and this new information should be used to answer a question. The question need not be profound but needs to be more than "can these data be overlain to make a map?".

GIS software provides a powerful way to quantify all sorts of spatial relationships and data; volumes, areas, statistical trends, and myriad other quantities can all be summarized, graphed and compared. Quantifiable results should be a part of the goal of your project; if possible find a way to ask questions about "how much...", "how many...", etc. rather than just "where is...?".

The project can be broken down into several areas:

[1] **Problem formulation** (20 points)

Did you clearly state the question and outline the techniques/methods for arriving at an answer? You should be able to state your question (i.e. hypothesis) in no more than 2 short sentences. Can the result(s) be quantified? If so, how and by what measure?

[2] **Data collection** (20 points)

Did you utilize readily available GIS data appropriate to the study area? Did you supplement GIS data with importable point data appropriate to the study? Did you get, utilize and store applicable metadata (i.e. feature definitions, spatial and aspatial precisions/accuracies, age of data, datum/projection)? Metadata should be visible in ArcCatalog, even if no more than a brief description (abstract) of the data and it's source.

[3] **Data preprocessing** (20/0 points)

Did you appropriately convert GIS data into an ArcGIS-readable format? (For example, E00 interchange format => uncompressed coverage.) Did you appropriately process and import point data? The preprocessing step can involve considerable time and effort, and this needs to be recognized in grading. [In the event that a project reasonably involves no preprocessing step, the points for this section will be distributed evenly to sections 4, 5, and 6.]

[4] **ArcGIS processing** (30/36 points)

Did you develop an ArcGIS processing scheme appropriate to the study? ArcGIS steps should be fully documented in the write-up.

[5] **Data presentation** (30/36 points)

Did you make one or more maps or otherwise present results in a graphically legible and attractive manner? Depending on the question addressed, making a single integrated map may be an appropriate subgoal. In other cases, a series of ArcMap screen captures that document the ArcGIS processing might be more appropriate. A common oversight is omission of figure captions and figure numbers that can be cited in the text. Another common problem is figures too small to show intended features. The software can be used to generate compelling maps and nicely labeled and annotated figures. I expect nothing less.

[6] **Write-up** (40/48 points)

Did you clearly state the question addressed, summarize the data collected to address it, document the data preprocessing, describe in detail the ArcGIS processing, and answer the question? Did you quantify your results in graphs or tables? Was your write-up in a form compatible with web-posting (i.e., in html-format with all related graphics saved as .gifs or .jpgs)?

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