

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



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August 23, 2011

- Our first lab is Tuesday, Aug. 30
- 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 2 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 23, 2011

- Welcome to the Fall 2011 GIS/GPS class. Watch this page and/or the class Blackboard site for announcements.

Last updated August 25, 2011

Comments and questions to helper@mail.utexas.edu

Geological Sciences, U. Texas at Austin



Fall 2011

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

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<ul style="list-style-type: none"> Instructor: Mark Helper; GEO 4.112; 471-1009 helper@mail.utexas.edu 	
<ul style="list-style-type: none"> Lab: Tu 2:00 - 4:00, Rm. 2.312 (Lab Syllabus link) 	
<ul style="list-style-type: none"> Lecture: T, Th 11 - 12:30, Rm. 2.312 	
<ul style="list-style-type: none"> Teaching Assistant: Julio Leva Lopez julioleva@mail.utexas.edu, Geo. Rm. 2.312 	
<ul style="list-style-type: none"> Office Hours: T & Th 9:30 - 11 and whenever my door is open. 	
<ul style="list-style-type: none"> Grading: Exam 1: 15% Exam 2: 15% Labs: 35% Project: 20% Final Exam: 15% 	
<ul style="list-style-type: none"> 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, ESRI press, 572 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 ArcView 9; 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. 	
<ul style="list-style-type: none"> Website: http://www.geo.utexas.edu/courses/371c The class web site will be used extensively for lab exercises and class information. <i>Equivalent information is posted on the class Blackboard site.</i> 	
<ul style="list-style-type: none"> 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. 	
<ul style="list-style-type: none"> Email & Network Accounts: All students must have an email address and a user ID/password for the Geo. Building network. 	
<ul style="list-style-type: none"> Field Trips: A field trip organized around GPS surveying is a required part of the class. This year's trip is October 22-23. 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.
- 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.

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

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	Date Lecture	Lab
	Aug. 25 What is GIS?	No lab this week
	30 Datums and Coordinate Systems	1. Introduction to ArcGIS v. 10
	Sept. 1 Map Projections & Coordinate Systems	
	6 Projections in ArcGIS	2. Map Projections
	8 Maps as Numbers: Vector Data Models	
	13 Vector Data Models in ArcGIS	3. Labeling, Annotations, Reference Scales, Graticules, Grids, Selecting in ArcMap
	15 Databases	
	20 Digitizing, Editing and Georeferencing with ArcGIS	4. Geodatabase Construction and Digitizing
	22 The Raster Data Model	
	27 Review/ArcGIS work session	5. Digitizing (cont.)
	29 Exam 1	
	Oct. 4 The Global Positioning System	6. GPS Instruments / Exporting & Importing Data
	6 GPS II	
	11 Spatial Analysis: Raster Data	7. Developing a GIS from GPS data and Orthophotos
	13 Spatial Analysis: Raster Example	
	----- GPS Field Trip; Oct. 15-16? ----- -	
	18 Field Data Collection Software	8. Spatial Analysis I
	20 Field Trip Preparation	
	----- GPS Field Trip; Oct. 22-23? -----	
	25 Geostatistics	9. Completion of Field Project
	27 Exam Review/ArcGIS work Session	
	Nov. 1 Exam 2	10. Spatial Analysis II
	3 DEMs & TINs: Terrain Modeling	-- Project ideas due --
	8 Remote Sensing & GIS	11. Spatial Analysis III
	10 Remote Sensing & GIS II	
	14 Internet mapping tools	12. Obtaining and Using Data from the Internet
	17 ArcGIS work session	
	22 ArcGIS work session	Project Work
	24 Thanksgiving Holiday	

29	Evaluations, Review	Project Work
Dec. 1	Project Work	Project Due

13 Final Exam (9-12 noon)

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

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Select a Lab

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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: *geosrv/main/courses/course directories/Geo327g-386g* to get there, and/or map the location as a network drive for later use.
- See the **TA lab syllabus** for grading policy, due dates, etc. Julio Leva can be reached at JulioLeva@mail.utexas.edu. Office hours are held in room 6.302b.
- A **schedule for room 2.108** 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! Layout Guidelines** can get you there.

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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GEO327G/386G: GIS & GPS Applications in Earth Sciences**Semester Project Description***** [Fall 2010 projects are now posted](#)***

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Project Description, Fall 2011

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

See
examples
from
other
classes
and
some
untested
ideas

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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Field Trip

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A weekend field trip to collect GPS data is planned for **the weekend of October 15-16 or 22-23**.

The project site is still undecided but will be about 1.5 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 needed - will depend on the date) can be rented from the **UT RecSports**.

We will depart 7:30 AM, October 15 or 22 from the East basement door of the geology building and return the afternoon of Sun. October 16 or 23 before 5 PM.

Isaac **posted photos** of the Fall 2009 trip.

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

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