

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



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January 14, 2012

- Our first lab is Tuesday, Jan. 24
- 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.

January 14, 2012

- Welcome to the Spring 2012 GIS/GPS class. Watch this page and/or the class Blackboard site for announcements.

Last updated January 14, 2012

Comments and questions to helper@mail.utexas.edu

Geological Sciences, U. Texas at Austin



Spring 2012

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

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Syllabus

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- Instructor: Mark Helper; GEO 4.112; 471-1009
helper@mail.utexas.edu
- Lab: Tu 2:00 - 4:00, JGB 2.312 (Lab Syllabus link)
- Lecture: T, Th 11 - 12:30, JGB 2.312
- Teaching Assistant: Karen Black
karenb2987@gmail.com
Lab Syllabus
- Office Hours: T & Th 9:30 - 11 and whenever my door is open.
Karen: Fri. & Mon., 1 - 2, JGB 2.312
- Grading: Exam 1: 15%
Exam 2: 15%
Labs: 35%
Project: 20%
Final Exam: 15%
- 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, 2nd edition**, 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; 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 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:

A **field trip** organized around GPS surveying is a required part of the class. **This year's trip is likely to be on March 24-25**. A firm date will be settled by the 2nd week of class. 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
Jan. 17	What is GIS?	No lab this week
19	Datums and Coordinate Systems	
24	Map Projections & Coordinate Systems	1. Introduction to ArcGIS v. 10
26	Projections in ArcGIS	
31	Maps as Numbers: Vector Data Models	2. Map Projections
Feb. 2	Vector Data Models in ArcGIS	
7	Databases	3. Labeling, Annotations, Reference Scales, Graticules, Grids, Selecting in ArcMap
9	Digitizing, Editing and Georeferencing with ArcGIS	
14	Guest Lecturer	4. Geodatabase Construction and Digitizing
16	The Raster Data Model	
21	Review/ArcGIS work session	5. Digitizing (cont.)
23	Exam 1	
28	The Global Positioning System	6. GPS Instruments / Exporting & Importing Data
March 1	GPS II	
6	Spatial Analysis: Raster Data	7. Spatial Analysis I - Antarctica
8	DEMs & TINs: Terrain Modeling	
----- Spring Break March 10-18 -----		
20	Field Data Collection Software	8. Spatial Analysis II - Volcanic Hazards
22	Field Trip Preparation	
----- GPS Field Trip; March 24-25 -----		
27	Geostatistics	9. Completion of Field Project
29	Remote Sensing & GIS	
April 3	Exam 2 Review	10. Obtaining and Using Data from the Internet
5	Exam 2	-- Project ideas due --
10	Internet mapping tools	Project Work
12	Web applications, KML	
17	ArcGIS work session	Project Work
19	ArcGIS work session	
24	ArcGIS work session	Project Work
26		

Spring 2012

GEO327G/386G: GIS & GPS Applications in Earth Sciences**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 TA **lab syllabus** for grading policy, due dates, etc. Karen Black can be reached at karenb2987@gmail.com. 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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GEO327G/386G: GIS & GPS Applications in Earth Sciences**Semester Project Description***** [Fall 2011 projects are now posted](#) ***

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Project Description, Spring 2012

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...?".

See
examples
from
other
classes
and
some
untested
ideas

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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GEO 327G/386G: GIS & GPS Applications in Earth Sciences Lab Syllabus—Spring 2012

Lab room: GEO 2.108

Lab time: Tuesday 2:00–4:00 P.M.

Lab instructor: Karen Black

Karen.Black@utexas.edu

Office: GEO 6.302

Office Hours: Friday 1:00-2:00, Monday 1:00-2:00 Held in GEO 2.108

(additional times may also be scheduled via email)

GIS is an amazing tool and I look forward to helping you learn how to use it. We will have a lot of fun in this lab, and we will also work a lot of hard hours. Please don't hesitate to ask for my help at any time.

Attendance

Weekly attendance is MANDATORY. We will start each new lab assignment as a class so everyone gets off to a good start. It will pay off if you show up each week on time.

Weekly Work Time

Taking this course will require a SIGNIFICANT time investment on your part. Time required for each assignment will vary, but you will likely spend substantial time on your lab assignments beyond the two hours devoted to lab each week, perhaps as much as 6-8 hours more. If you cannot find the necessary time, you will likely neither perform well nor enjoy the course, and you should consider taking the course during a lighter semester. Please take full advantage of my office hours and arrange for additional office hours if necessary. I am more than happy to work with you outside of class.

Grading

Lab is worth 35% of your overall grade in this course. This 35% will be divided among week and two-week long assignments. Also, the skills you will need to develop a successful class project (worth 20% of the overall course grade) will be developed in lab. (See the course website at: <http://www.geo.utexas.edu/courses/371c/projects.htm> for more information on the class project.) Lab assignments will be due at the beginning of the lab period on the date due for the assignment. For each day (up to 5 days) that an assignment is late, you will lose 10% of the attainable score. Beyond 5 days you can still turn in the assignment with a penalty of 50% of the original attainable score.

Academic Dishonesty

This shouldn't have to be mentioned for an upper division/graduate course, but cheating in ANY FORM will not be tolerated. It is okay to consult your classmates for help/clarification when working on lab assignments, but YOU must do the work and turn in YOUR OWN INDIVIDUAL RESULTS. Unacceptable actions include but are not limited to:

- 1) Copying or paraphrasing an answer developed by another student (current or former)
- 2) Modifying graphics developed by another student (current or former) and turning it in as your own work