

Course Syllabus

[Jump to Today](#)

Course Syllabus

GLY 6932 Special Topics – GIS Applications in Earth Sciences

Instructor

John Jaeger

WH 225 846-1381

Office Hours: MWF 1-2:30 pm

Course Meeting Schedule-Spring 2018

Lecture: Tuesday Period 6

Lab: Thursday Period 6-7

Williamson 218

Course Description

This course will provide a practical, hands-on approach to spatial database design and spatial data analysis with Geographical Information Systems (GIS) as applied to the geological sciences. The platform used will be QGIS, an open-source program for all operating systems, and Microsoft Excel, but the techniques developed will be applicable to other software. You will be using your own laptops in lecture/lab.

The project-based nature of the course will encourage students to bring in real data that they are working on, and leave the course with significant progress on their project. Grades will be based upon ~8 assignments (50% of grade), a midterm exam (25% of grade), and a final project (25% of grade) that the student will design with guidance from the instructor.

This is a fast-paced course, and I leave out a lot of historical material, except to explain some goofy file format, naming convention, etc; or to build a core understanding of the material. I also do not cover Network Analysis, though if a student has a need for this (for stream network, etc) we can pursue this during the individual projects. By leaving out these 2 topics we have time to cover more advanced material in analysis, statistics and modeling. By the time you finish this class you will be "GIS-Dangerous"!

The lecture will be devoted to explanation of the basics of each weekly topic. Thursday's lab will be devoted to hands on instruction and working on that week's assignment.

Prerequisite: By its nature, GIS is a computer intensive endeavor. You should be comfortable with general operating system concepts like file-types, directory structures and network resources. Those with less background will still be able to succeed, but they will find themselves working harder than their more computer-proficient peers. From what I've observed, prior computer experience is more important than prior GIS experience.

Background:

Geological features vary in space and time. This fundamental characteristic is responsible for making it a most genuine application field of Geographical Information Systems, where the strength lies in defining the two dimension (X,Y extent), third dimension (Z component) and the fourth dimension (time) of spatial information (Ray, 2002). This course constitutes a practical introduction to the use of Geographic Information Systems (GIS) software to manipulate and analyze spatial data for use in geological applications. In my opinion, GIS is a tool, no different than a microscope, for analyzing geological data. The quality of your observations using a GIS (or microscope) is only as good as the data (or thin section) that are prepared and used. GARBAGE IN=GARBAGE OUT. So, my goal this semester is to make sure that you are able to prepare and utilize the highest quality geologic data in a GIS and to show you basic ways of manipulating and analyzing the data. I will not have time to go into advance GIS techniques. If you want to do this, there are several graduate courses in Geography that can help you.

Course Objectives:

- Knowledge of the fundamentals of GIS theory, and the stages of developing and using a GIS

- Proficiency in the use of the QGIS software for visualization, query, mapping, and analytical purposes.
- Familiarity with GIS data sets
- Knowledge of various GIS data formats
- How to obtain, prepare, translate, document, and analyze GIS data
- Importance of scale, resolution, accuracy & precision, map projections
- Understanding of the relationship between spatial and tabular data
- Development of good ‘computer lab technique’ vis-à-vis documenting procedures, data, software tools, results, and challenges
- Ability to teach selves & others new techniques
- Ability to use resources such as the web for acquiring GIS data and tools.
- Exposure to advanced techniques and methods

Exercises

The bulk of the semester will consist of individual exercises that will make you GIS-capable and therefore dangerous. Also, you will be required to complete a semester project. The project will encapsulate assorted stages of creating a GIS project from scratch: Field mapping & data collection, GIS & database creation, air photo and GPS integration, spatial analysis, and map making may all be encountered. The exercise will be scored as a complete project at the end. In general, all materials will be submitted by students electronically, via Adobe Acrobat files.

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Text

[Introduction to Geographic Information Systems with Data Files CD-ROM \(Links to an external site.\)](#), 6th Edition, Kang-tsung Chang,

Lab Book

Each student should purchase a 1 bound book for keeping notes on their rough computer work. There’s nothing worse than forgetting how you carried out some magical technique.

Software

The primary GIS software used in this course is QGIS. This software package is open source and is based on the same Python code that ArcGIS uses. It has a large international user base so Googling should get you answers to your questions. Through the base package and optional add-

ins, or 'extensions' QGIS is a highly capable package providing many or most of the tools of a modern GIS. Plus its FREE!

Grading

This topic is a source of such anxiety for some that I want to be clear about my approach to grading and how it works in this course. I'm most interested in you demonstrating growth throughout the semester.

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Editorial

This course is an opportunity for you to:

- develop basic GIS and spatial analysis skills using geologic data and examples
- extend your awareness of quantitative and computational approaches to solving problems
- broaden your exposure to topics and problems in the geosciences
- improve your critical thinking skills
- learn new applications and tools
- have some fun (requires geeky humor and ability to laugh when system is "uncooperative")

These things can improve your ability to solve problems in other courses or research, and may help you to qualify for interesting, rewarding jobs. There are other opportunities as well:

- use the course, lab resources, and my knowledge and experience as a springboard into more advanced areas of GIS not covered in the course
- gain experience working with others, managing and creating projects
- establish a reputation with me (good for future references) and your fellow students (just plain good) as a capable GIS analyst and problem-solver

I am here to help in whatever way possible with all of the above; it's your job to take advantage of these opportunities as best you can. The only "grade" that really matters in the long run is how well you learn, retain, and apply the material covered in this course to future pursuits.

Nonetheless, there are reasons why I will assess your overall performance and learning and assign you a letter grade for the course:

- you deserve feedback on how well I think you are doing, and a grade is a concise and relatively well understood way to encapsulate that feedback in a way that my comments on your work may not
- others may need some measure of how well I think you have done in developing the skills covered in the course

- grades provide an incentive to wrestle in earnest with new and challenging material

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Nuts and bolts

What the grades mean

The following points scale (out of 100 total points) will be used to assign letter grades:

A = 90 or above; A- = 87 - 89; B+ = 84 - 86; B = 80 - 83; B- = 77 - 79; C+ = 74 - 76; C = 70 - 73; C- = 67 - 69; D+ = 64 - 66; D = 60 - 63; D- = 57 - 59; E = 56 or below

Each letter grade has the following impact on GPA calculation:

Letter	A	A-	B+	B	B-	C+	C	C-	D+	D	D-	E	WF	I	NG	S-U
Grade																
Grade																
Points	4.0	3.67	3.33	3.0	2.67	2.33	2.0	1.67	1.33	1.0	0.67	0.0	0.0	0.0	0.0	0.0

For greater detail on the meaning of letter grades and university policies related to them, see the Registrar's Grade Policy regulations at

<http://www.registrar.ufl.edu/catalog/policies/regulationgrades.html> (Links to an external site.)

I realize that not everyone comes into this course with the same background in computers. Some of you will be able to dive right into these assignments; others will require a fair amount of time to get up to speed on how to do basic tasks. Because of this discrepancy in backgrounds, my grading is somewhat subjective based on your level of computer experience. I see the final grade that you receive in this course will most strongly depend on the individual progress that you make as a student. If you start off getting C's & B's on assignments and then end up with mostly A's towards the end, you'll get an A in the course. The opposite holds true (I hope NONE of you regress).

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There are three parts to your overall grade in the course:

- Exercises - each student will receive an individual grade for each exercise; the grade will be based on my evaluation of the write-up and maps turned in each week.
- Project - final projects will be graded based on the final writeup

- Mid-term- I need to make sure that you have learned (memorized?) the basic concepts of file formats, projections, databases, etc. before moving onto more detailed concepts

Here's how grades will be weighted to compute a final overall grade for the course:

Labs	50%
Project	25%
Midterm	25%

Attendance and Make-up work Policy:

Attendance at class is strongly recommended. If you miss a lecture, you are responsible for staying informed of the material covered and any announcements made in class. (Many announcements will also be posted on the Web, and may be accessed by following the Announcements link from the course Web page.) Personal issues with respect to class attendance or fulfillment of course requirements will be handled on an individual basis.

Accommodations for Students with Disabilities

If you require classroom accommodation because of a disability, you must first register with the Dean of Students Office (<http://www.dso.ufl.edu/>). The Dean of Students Office will provide documentation to you, which you then give to the instructor when requesting accommodation. The College is committed to providing reasonable accommodations to assist students in their coursework.

Counseling and Student Health

Students may occasionally have personal issues that arise in the course of pursuing higher education or that may interfere with their academic performance. If you find yourself facing problems affecting your coursework, you are encouraged to talk with an instructor and to seek confidential assistance at the University of Florida Counseling Center, 352-392-1575, or Student Mental Health Services, 352-392-1171. Visit their web sites for more information: <http://www.counsel.ufl.edu/> or <http://www.health.ufl.edu/shcc/smhs/index.htm#urgent>

The Student Health Care Center at Shands is a satellite clinic of the main Student Health Care Center located on Fletcher Drive on campus. Student Health at Shands offers a variety of clinical services, including primary care, women's health care, immunizations, mental health care, and pharmacy services. The clinic is located on the second floor of the Dental Tower in the Health

Science Center. For more information, contact the clinic at 392-0627 or check out the web site at: www.health.ufl.edu/shcc

Crisis intervention is always available 24/7 from:

Alachua County Crisis Center: (352) 264-6789.

BUT – Do not wait until you reach a crisis to come in and talk with us. We have helped many students through stressful situations impacting their academic performance. You are not alone so do not be afraid to ask for assistance.

Academic Honesty: All University of Florida students are required to abide by the University's Academic Honesty Guidelines and by the Honor Code, which reads as follows:

“We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honesty and integrity. On all work submitted for credit by students at the University of Florida, the following pledge is either required or implied: "On my honor, I have neither given nor received unauthorized aid in doing this assignment."

Cheating, plagiarism, or other violations of the Academic Honesty Guidelines will not be tolerated and will be pursued through the University's adjudication procedures.

Course Summary:

Date	Details
Thu Jan 18, 2018	Assignment Module 1 -Assignment 2 due by 11:59pm
Tue Jan 23, 2018	Assignment Module 2 -Assignment 1 due by 11:59pm
Thu Jan 25, 2018	Assignment Module 2 -Assignment 2 due by 11:59pm
Thu Feb 1, 2018	Assignment Module 3 Assignment 1 due by 11:59pm
Thu Feb 8, 2018	Assignment Module 4 -Assignment 1 due by 11:59pm
Tue Feb 13, 2018	Assignment Module 5 - Assignment 1 due by 11:59pm

Date	Details
Thu Feb 15, 2018	Assignment Module 5- Assignment 2 due by 11:59pm
Thu Mar 1, 2018	Assignment Module 6 Assignment 1 due by 11:59pm
Thu Mar 22, 2018	Assignment GLY 6932 Spring 2018 Midterm due by 11:59pm
Mon Mar 26, 2018	Assignment Module 7- Spatial Queries Part 1- Tutorials due by 11:59pm
Tue Apr 3, 2018	Assignment Module 7 -Assignment 2 Spatial Queries Real-World Application: HayWired scenario due by 11:59pm
Thu Apr 5, 2018	Assignment Module 8- Raster Modeling of Landslides due by 11:59pm
Wed Apr 25, 2018	Assignment Module 9: Interpolation and Interrogation of rasters due by 11:59pm
Fri May 4, 2018	Assignment Module 9-Florida Aquifer Modeling due by 11:59pm
Tue Jan 21, 2020	Assignment Module 1 -Assignment 1 due by 11:59pm

January 2020

Calendar						
Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
29 Previous month	30 Previous month	31 Previous month	1	2	3	4
5	6	7	8	9	10	11
12	13 Today	14	15	16	17	18
19	20	21 Click to view event details	22	23	24	25
26	27	28	29	30	31	1 Next month
2 Next month	3 Next month	4 Next month	5 Next month	6 Next month	7 Next month	8 Next month

Course assignments are not weighted.