GEOG 478 / 578  Principles of Geographic Information Systems

COURSE SYLLABUS  Spring Quarter, 2011

Lecture:  Mon/Wed @  1:10 pm – 3:00 pm  
Lab:  Fri @  11:10 pm – 1:00 pm  

Instructor:  Dr. Gaurav Sinha  
Office:  Clippinger, 105A  
Email:  sinhag@ohio.edu  
Home Office:  740.743.7188  
Campus Office:  740.593.0304  
Office Hours:  Mon/Wed @ 12:00 pm – 1:00 pm  
(and by appointment)  

Teaching Assistant:  Xiuming Jin  
Office:  Clippinger, 102  
Email:  xj175609@ohio.edu  
Phone:  
Office Hours:  Tue @ 3 pm – 5 pm  
(and by appointment)

Course overview

A Geographic Information System (GIS) in its simplest form is any computer system for interacting and managing geographic data. More broadly, geographic information systems are a special class of information systems dedicated to the storage, management and analysis of geographically referenced data. GIS technology has a strong basis in map making, but it truly is a functional integration of several types of digital geographic technologies, including spatial analysis, surveying, automated mapping, database management systems, and remote sensing. The value of GIS is widely recognized and in numerous disciplines within physical and social sciences, planning and engineering, and business analysis. This course has been conceived to help students achieve much more than simply extend their knowledge of how to use GIS software. The primary objective is to help students both distinguish, and establish a connection, between the principles of spatial analysis and the corresponding tools provided in commonly used GIS software. The course has an intensive laboratory component, which will engage students in several real world problem solving exercises. These exercises have been designed to challenge students’ ability to begin from a real world problem, develop GIS amenable methods for addressing the problem, and finally implementing the solution using GIS and other software.

Learning Objectives

The course lectures will educate students about:

- what a GIS is and what it can do.
- what geographic data models are and how they determine what can be done with GIS.
- what geographic data are, how they are collected, and how to acquire geographic data.
- what GIS databases are and what kind of software tools and functions are needed to manage geographic databases.
- what spatial analysis is and solve geographic problems using ArcGIS analysis tools.
- what the common GIS tasks are and identify which application is used for each task.
The lab exercises and projects will give students skills for
- using online mapping tools for mapping and exploring geographic information.
- making GIS maps.
- collecting georeferenced data from field-mapping and online data sources.
- geospatial database construction and management skills.
- feature based data analysis.
- raster data management and analysis.
- utilizing GIS and other analytical tools such as MS-Excel, MS-Access, and Google Earth to solve problems.
- developing GIS based workflows for solving typical GIS tasks.
- recognizing geographic aspects of complex real-world problems, identifying how GIS can help, and developing GIS based solutions keeping in mind resources, time, desired sophistication level.

Course Prerequisites

Undergraduate: GEOG 268 / Graduate: None

Suggested Reading Material (Optional)


Class lectures and lab exercise material will be the basis for exams and quizzes. Attending classes is mandatory. Lectures will be supported by PowerPoint slides. Lecture material will be based on several text books, articles, journal publications, and the instructor’s research and professional background in application and development of GIS principles and software.

Lecture Topics

1. Introduction to GIS: Definition; Functions of GIS; Components of GIS; Using GIS; GIScience; Evolution of GIS and Mapping; Current and Future Trends.
2. Representing Geography: Geographic Representation Basics; Geographic Data Modeling Fundamentals; Vector, Raster, Object and Network Data Models
4. Database Fundamentals: Overview of Hierarchical, Network, Relational and Hybrid Databases; Manipulating and Querying Databases
5. Geographic Data Collection: Ground Surveys, GPS, Aerial Photography, Satellite Imagery
6. GIS Data Creation & Storage: Vector and Raster Data Creation and Editing; Metadata; File Systems; Indexing and Trees; Raster Data Compression; Data Storage and Querying
7. Spatial Analysis: Analysis of Features/Vector Data; Raster Analysis; Terrain Analysis; Network Analysis; Cartographic Modeling

Lab Exercises

There will be several lab exercises, projects and tutorials to be completed. There will be no lab exam. The grade from lab assignments will count toward 50% of the final grade. All material from lab exercises and tutorials will also be included as study material for exams and quizzes. Consult the detailed curriculum for testing GIS software use competency accompanies this syllabus.
**Attendance**

Attendance is mandatory. It is strongly suggested that all students attend class everyday because there will be quizzes regularly during class, results of which will contribute to the final grade. Also, as mentioned above, information provided through lectures will not necessarily be available in the textbook or even on the PowerPoint slides. Students missing class will be responsible for coming prepared for subsequent classes and quizzes.

**Grading**

The lectures and lab exercises will be considered together for grading purposes. All lecture, class discussions, assigned readings, student presentations, lab exercises, and relevant book chapters will define the scope of quizzes and exams. One make up exam may be given (*but is not guaranteed*) when a student contacts the instructor either before the commencement of the scheduled examination with an acceptable excuse (such as illness, school sponsored activity etc.). In the case of serious illness or accident, a medical certificate from a physician will be required. Under no circumstance will a student be permitted to take more than one make-up exam in the quarter. The following is the grading strategy and schedule that will be used to determine the final grade for each student.

- Mid-Term 1 (*Fri, April 15 @ 11:10 pm*) 10%
- Mid-Term 2 (*Fri, May 13 @ 11:10 pm*) 10%
- Final Exam (*Mon, June 6 @ 12:20 pm*) 20%
- Lab Exercises + Projects 50%
- Class Participation/Quizzes 10%

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*No automatic incomplete grade will be given.*

**Academic Integrity**

Students are expected to abide by the Ohio University Student Code of Conduct. Depending on the nature of the violation, the instructor’s response may range from imposing grade penalty to assigning an automatic failure grade. Students will be reported to the respective advisor and appropriate school authorities in case of academic misconduct and/or misdemeanor in class.

**Other Instructions**

The course will utilize Blackboard only partially for some postings. Some lecture and lab material will be made available only on the local network drive allocated for the class. Please check your O.U. email regularly as that will be the preferred system of communication. Also note that this course, especially the lab exercises, are extremely time intensive. Please allocate sufficient time to work on labs beyond the officially allocated class hours. During lectures, computer monitors should be switched off unless authorized by the instructor. No phone calls or texting is allowed during class. Students will be disciplined and penalized depending on the judgment of the instructor.
Institutional Equality

In compliance with the Americans with Disabilities Act (ADA), all students who have a document disability are entitled to “reasonable academic accommodations.” If you are a student with special needs, it is your responsibility to be registered with the Institutional Equity representative at Student Services. In addition, you need to inform your instructor each quarter before the end of the second week of class.