

GEOG655 Syllabus Spatial Database System

Course Details:

Session: Winter 2024
Format: In-person and remote
Classroom: LEF 1158
Lecture and Lab Times: Mon/Tue 5:30 pm – 8:00 pm

Instructor: Xin Tao (xtao@umd.edu)
Office: LEF 1167
Office hours: By appointment
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Office hours: By appointment

Course Objectives:

This course helps students understand, analyze, design, and implement spatial databases. It introduces the basic concepts and theories of database. Structured Query Language are used to design and handle data for applications. There are hands-on practices to help students develop technical skills in spatial database design and implementation.

The format of this course will consist of lectures, lab assignments, readings, and a final project. The lectures will be presented online via the Live Classroom on the Zoom. All lectures involve the interaction between students and the instructor in real time. Lectures will be archived into videos that will be made available. Please note that video recordings are intended for occasional or backup use in case students have to miss lectures due to personal, business, or medical reasons. Real time, online participation is strongly recommended. The readings and lab assignments will also be posted in a timely manner.

Learning Outcomes

The specific objectives of this course are that students are expected to learn the following:

- Design and create databases
- Manage and query databases
- Know the use of SQL to handle data from databases
- Deliver geospatial data on the Web
- Can build web map application with database and Map APIs

Prerequisites

GEOG653 is pre-requisite, or you should have a minimum of GIS skills. Computer programming skill (e.g., scripting) is desired but not required.

Course Outline:

Database design.....	1 week
Database model.....	1 week
Database manipulation.....	1 week
Structured Query Language.....	1 week
Databases	1 week
Server scripting language	1 week
Spatial databases	2 weeks
Geodatabases.....	2 weeks
Object-oriented databases.....	2 weeks

References

Shekhar, Shashi, Sanjay Chawla. Spatial Databases: A Tour. Prentice Hall, 2002.
<http://www.spatial.cs.umn.edu/Book/>
 David Arctur, and Michael Zeiler. 2004. Designing Geodatabases: Case Studies in GIS Data Modeling. ESRI.
 W3Schools online web tutorial, <http://www.w3schools.com/>
 PostGIS, <https://www.postgis.net/>
 MySQL Documentations, <https://dev.mysql.com/doc/>
 Leaflet JavaScript Library for Interactive Map, <https://leafletjs.com/>

Grading:

It is strongly encouraged to attend each lecture and actively participate in the online discussion board as well as in class. Students are required to post a reply on the forums posted by the instructor. Lab assignments will be given weekly to help students gain practical experience in developing database applications. Students need to complete final projects to design and implement a database application.

There will be 7 labs and 1 final project. The lowest lab score will be dropped and the highest six is worth 66% of the final grade. The final project score will be worth 24% of the final grade. 10% will be based on attendance and participation.

Grade Policy:

- Project, online class activities, and labs:

	% of total grade	Due date
Project	24%	2/13
Online class activities	10%	In class
Labs	66% (11% × highest 6 labs)	12/11 (Lab 1), 12/18 (Lab 2), 1/2 (Lab 3), 1/15 (Lab 4), 1/22 (Lab 5), 1/29 (Lab 6), 2/5 (Lab 7)

Letter Grade Distribution:

The plus/minus grading system will be used to assign student grades. Minor adjustments to this scale might be made based on the performance of the class as a whole.

97-100.0 = A+
90-96.99 = A
85-89.99 = A-
80-84.99 = B+
75-79.99 = B
70-74.99 = B-
67-69.99 = C+
64-66.99 = C
60-63.99 = C-
57-59.99 = D+
54-56.99 = D
50-53.99 = D-
<50 = F

All students must have a computer with access to ArcGIS and PostgreSQL. Students have a UMD TerpConnect (used to be Glue) account to upload HTML, CSS, and JavaScript files to your account on at <http://terpconnect.umd.edu>. Details about the webserver will be provided in the class.

Academic Honesty: The University of Maryland, College Park, has a nationally recognized Code of Academic Integrity, administered by the Student Honor Council. This Code sets standards for academic integrity at Maryland for all undergraduate and graduate students. As a student, you are responsible for upholding these standards for this course. You need to be aware of the consequences of cheating, fabrication, facilitation, and plagiarism.

Within our class, students may work together to review class notes and home assignments. However, assignments must be done individually. Each student must turn in his or her own work, from his or her personal computer. Any discussion or problem solution must be his or her alone, without assistance from any other person.

Accessibility Resources: Any student with a disability is encouraged to meet with the instructor privately during the first week of class to discuss accommodations. I will make every effort to accommodate students who are registered with the Disability Support Services (DSS) Office and provide a DSS accommodation form. Please refer to the Online Undergraduate Catalog Policy on Religious Observance.

Email: Both the TA and the instructor will always be available by email. The professor may not always reply to emails after 6pm or on weekends. Normally, an email would be replied within 24 hours. Emails sent over weekend may not be replied until next work day. E-mails should be respectful and professional.

Course schedule

The weekly coverage is subject to change as it depends on the progress of the class. However, you must keep up with the reading assignments.

Week	Date	Topics	Readings	Assignments
1	11/27 11/28	Introduction Database design	W3Schools	
2	12/4 12/5	Database model Entity relationship diagram	W3Schools	*Lab 1 out
3	12/11 12/12	Database manipulation Structured Query Language	W3Schools	Lab 1 due **Lab 2 out
4	12/18 12/19	PostgreSQL SQL	W3Schools	Lab 2 due ***Lab 3 out Project Proposal out
5	12/25 12/26	No class (holiday) No class (holiday)		
6	1/1 1/2	No class (holiday) Databases	MySQL documentation	Lab 3 due
7	1/8 1/9	PHP tutorial MySQL with PHP	W3Schools	Proposal due ****Lab 4 out
8	1/15 1/16	No class (holiday) Maps API	Leaflet tutorials	Lab 4 due *****Lab 5 out
9	1/22 1/23	Spatial databases Spatial databases	PostGIS documentation	Lab 5 due *****Lab 6 out
10	1/29 1/30	Geodatabases Geodatabases	PostGIS documentation	Lab 6 due *****Lab 7 out
11	2/5 2/6	Object-oriented databases Object-oriented databases	PostGIS documentation	Lab 7 due
12	2/12 2/13	Final project presentation Independent study for final project		Final Project due

*Lab 1: Entity relationship diagram and PostgreSQL

**Lab 2: PostgreSQL practice

***Lab 3: PostgreSQL and PostGIS

****Lab 4: Working with PHP and MySQL

*****Lab 5: Mapping houses

*****Lab 6: Spatial query

*****Lab 7: Spatial relations