Geog 4516/5516 Fundamentals of Spatial Database Systems

Syllabus information may be subject to change. The most up-to-date syllabus is located within the course in HuskyCT.

Course and Instructor Information

Course Title: Geog 4516/5516 Fundamentals of Spatial Database Systems
Credits: 3
Format: Online
Prerequisites: Geog 2500 or Permission of the instructor

Professor: Xiang "Peter" Chen
Office Hours:
If you have course questions or need an in-person meeting:

- Email **peter.chen@uconn.edu** with your questions or make an appointment.

Course Materials

Required textbook:

There is no required textbook for this course. All the required reading materials will be posted on the course website.

Other Suggested Textbook:

- (WD) Worboys, M. and Duckham, M. (2004) GIS: A Computing Perspective.
- (SC) Shekhar, S. and Chawla, S. (2003) Spatial Databases: A Tour.
- Zeiler, M. (2010) Modeling Our World: The ESRI Guide to Geodatabase Concepts, Second edition.

Additional course readings and media are available within HuskyCT, through either an Internet link or Library Resources.

Course Website:

Course materials are accessible through UCONN HuskyCT [https://huskyct.uconn.edu/].

Course Description

The future will be data-driven. Most scientific and professional enterprises, as well as consumers, are generating and using data in most activities. Much of these data will be georeferenced and have geospatial footprints.

This course focuses on designing, implementing, querying and managing *spatial databases* or persistent data stores where most entities have footprints in geographic space and time. This is critical for designing and implementing GIS for projects and organizations. It is also crucial for moving beyond GIS to the bigger world of *geographic information* services.

In designing any GIS project, a fundamental decision is how to represent the world of interest in the computer. This is critical since no GIS or spatial analysis tools – no matter how powerful – can extract more information than is designed in the database representation. The growing size of geospatial databases requires these databases to support efficient querying and searching. A well designed spatial database can also evolve as the questions in the project or organization change over time. A poorly designed spatial database is difficult to rewind and fix.

Understanding spatial database design and management is not only essential for designing and implementing GIS, but also to support a much wider range of geographic information services such as Google Maps and location-based services such as the location apps on your smartphone. This is a much bigger market than the market for

professional GIS services.

Course Format

Classes will be split into lecture and lab sessions each week. The lecture sessions will focus on the theories and principles behind the spatial database management system (SDBMS). The lab sessions focus on the training of open GIS and object-relational database management system (ORDBMS) that are of relevance in both geographic and non-geographic contexts (e.g., Structured Query Language [SQL] and database design). Students will learn how to design and set up a spatial database. Students will work on both open-source technologies (specifically, QGIS and SpatiaLite).

You are expected to participate in all of these activities. Failure to participate in these activities may affect your final class grade. You are strongly encouraged to ask questions during class. The more questions you ask, the more you will get out of the course.

Course Objectives

By the end of the semester, students should be able to:

1. Understand database design with spatial objects;
2. Be able to collect open access data;
3. Understand physical data storage and performance tuning;
4. Apply SQL queries to datasets;
5. Apply GIS data skills to problem-sovling.

Course Outline (and Calendar if Applicable)

Please refer to HuskyCT for the latest schedule.

Course Requirements and Grading

Point Accumulation	
Assignments	**Points**
Lab Assignments (x12)	800
Course Project	200
TOTAL	**1000**

Grade Scale	
Percent	Grade
930-1000	A
900-929	A-
870-899	B+
830-869	B
800-829	B-
770-799	C+
730-769	C
700-729	C-
670-699	D+
630-669	D
600-629	D-
Below 600	E

(80%) Lab Assignments: All assignments are due at the specific time assigned. No late assignments will be accepted except in extraordinary circumstances.

(20%) Course Project: At the final weeks of this course, students will carry out a course project. This project will require a 5-6 page (Not including works cited page or graphics), double-spaced research paper.

Please notes: *The topics of GEOG 5516 are the same as GEOG 4516. But for GEOG 5516, graduate students will have an additional reading and additional assignments.*

Your instructor and the university have a responsibility to promote academic honesty and integrity. You, as a student, are (1) responsible for the honest completion and representation of your work, (2) expected to respect the academic endeavors of others.

STUDENTS WITH SPECIAL NEEDS SHOULD INFORM THE INSTRUCTOR AS EARLY AS POSSIBLE.

Due Dates and Late Policy

All course due dates are identified in the course outline. **Due dates for lab assignments are usually a week after they are assigned.** If you have not made arrangements with the instructor prior to the due date, **late assignments will be given a reduction in points. The deduction is by 20% for each day after due.** Assignment submitted five days after the due will not be accepted except under special circumstances. Deadlines are based on Eastern Standard Time; if you are in a different time zone, please adjust your submittal times accordingly. *The instructor reserves the right to change dates accordingly as the semester progresses. All changes will be communicated in an appropriate manner.*

Student Responsibilities and Resources

As a member of the University of Connecticut student community, you are held to certain standards and academic policies. In addition, there are numerous resources available to help you succeed in your academic work. This section provides a brief overview to important standards, policies and resources.

Student Code

You are responsible for acting in accordance with the University of Connecticut's Student Code Review and become familiar with these expectations. In particular, make sure you have read the section that applies to you on Academic Integrity:

- Academic Integrity in Undergraduate Education and Research
- Academic Integrity in Graduate Education and Research

Cheating and plagiarism are taken very seriously at the University of Connecticut. As a student, it is your responsibility to avoid plagiarism. If you need more information about the subject of plagiarism, use the following resources:

- Plagiarism: How to Recognize it and How to Avoid It
- University of Connecticut Libraries' Student Instruction (includes research, citing and writing resources)

Copyright

Copyrighted materials within the course are only for the use of students enrolled in the course for purposes associated with this course and may not be retained or further disseminated.

Netiquette and Communication

At all times, course communication with fellow students and the instructor are to be professional and courteous. It is expected that you proofread all your written communication, including discussion posts, assignment submissions, and mail messages. If you are new to online learning or need a netiquette refresher, please look at this guide titled, The Core Rules of Netiquette.

Adding or Dropping a Course

If you should decide to add or drop a course, there are official procedures to follow:

- Matriculated students should add or drop a course through the Student Administration System.
- Non-degree students should refer to Non-Degree Add/Drop Information located on the registrar's website.

You must officially drop a course to avoid receiving an "F" on your permanent transcript. Simply discontinuing class or informing the instructor you want to drop does not constitute an official drop of the course. For more information, refer to the:

- Undergraduate Catalog
- Graduate Catalog

Academic Calendar

The University's Academic Calendar contains important semester dates.

Academic Support Resources

Technology and Academic Help provides a guide to technical and academic assistance.

Students with Disabilities

Students needing special accommodations should work with the University's Center for Students with Disabilities (CSD). You may contact CSD by calling (860) 486-2020 or by emailing csd@uconn.edu. If your request for accommodation is approved, CSD will send an accommodation letter directly to your instructor(s) so that special arrangements can be made. (Note: Student requests for accommodation must be filed each semester.)

Blackboard measures and evaluates accessibility using two sets of standards: the WCAG 2.0 standards issued by the World Wide Web Consortium (W3C) and Section 508 of the Rehabilitation Act issued in the United States federal government." (Retrieved March 24, 2013 from Blackboard's website)

Policy against Discrimination, Harassment and Inappropriate Romantic Relationships

The University is committed to maintaining an environment free of discrimination or discriminatory harassment directed toward any person or group within its community – students, employees, or visitors. Academic and professional excellence can flourish only when each member of our community is assured an atmosphere of mutual respect. All members of the University community are responsible for the maintenance of an academic and work environment in which people are free to learn and work without fear of discrimination or discriminatory harassment. In addition, inappropriate Romantic relationships can undermine the University's mission when those in positions of authority abuse or appear to abuse their authority. To that end, and in accordance with federal and state law, the University prohibits discrimination and discriminatory harassment, as well as inappropriate Romantic relationships, and such behavior will be met with appropriate disciplinary action, up to and including dismissal from the University. Refer to the Policy against Discrimination, Harassment and Inappropriate Romantic Relationships for more information.

Sexual Assault Reporting Policy

To protect the campus community, all non-confidential University employees (including faculty) are required to report assaults they witness or are told about to the Office of Diversity & Equity under the Sexual Assault Response Policy. The University takes all reports with the utmost seriousness. Please be aware that while the information you provide will remain private, it will not be confidential and will be shared with University officials who can help. Refer to the Sexual Assault Reporting Policy for more information.

Course Schedule*

Week	Topic
1	Lab Setup and QGIS Intro P1: Introducing QGIS A1: Introducing QGIS
2	Querying Data P2: Map Query A2: Mapping Landmarks
3	Data Joins P3-1: Styling in QGIS P3-2: Performing Table Joins A3: Mapping Inequity
4	Data Editing P4: Data Editing A4: Mapping COVID-19
5	Geodatabase P5: Geodatabase A5: Geodatabase
6	SpatiaLite Database P6: SpatiaLite A6: SpatiaLite
7	SQL Part 1: Basic Syntax P7: SpatiaLite A7: Querying Conference Attendance
8	SQL Part 2: Table Joins P8: SQL Part 2 A8: Querying Reading Club Members
9	SQL Part 3: Database Management P9: SpatiaLite Part 3 A9: COVID-19 Query
10	SQL Advanced: Creating and Modifying Geometry P10: Geometry A10: Geometry
11	SQL Advanced: Identifying Spatial Relationships P11: Spatial Relationships A11: Food Access Queries
12	Project Management in GitHub P12-1: Markdown P12-2: GitHub Project Management A12: GitHub Resume
13	Final Project
14	Thanksgiving Recess
15	Final Project

P: Practice lab. Submission is not required.
A: Assignment. Submission to HuskyCT is required.
* This schedule is subject to change. Please contact the instructor for the latest schedule.