

GGG 664 Spatial Data Structure
Instructor: Dr. Chaowei (Phil) Yang
Time: Wednesdays, 7:20-10:00 pm. Place: Exploratory Hall 2310

Course Description

This course explores object models and % structures used to effectively represent, store and index geographic data. Emphasis is on core data structures and modeling concepts rather than domain-specific models. Specific topics include database theory, computational geometry, spatial indexing, semantics & ontology.

Prerequisite

GEOG 650 or a working knowledge of any programming language.

References

The following books will serve as references:

Worboys & Duckham 2004. *GIS: A Computing Perspective (2nd ed.)*. CRC Press. (required)

A Programming Language reference book of your choice

Grading:

The components of the final grade are as follows:

Class Participation:	10%
Homeworks:	60% (15% each)
Individual Project:	30%

Class Participation

All students are expected to keep up with assigned readings, complete in-class exercises and participate in class discussion. You may be asked to demonstrate data structures and algorithms during class.

Homework Assignments

Four homeworks will entail creation or handling of specific data structures or related algorithms. A working software implementation is required for at least one of these assignments (student's choice). Pseudocode may be used for the remaining three assignments.

Project

Each student must complete an original research project that involves a complex geographic data structure or modeling technique. Past projects have addressed issues such as topology, spatial indexing and spatial search, semantics, uncertainty and interoperability.

All assignments should be submitted before class on the due date.

4 Homework (60%)

Project (25%) and Presentation (5%)

Class Activity and Participation (10%)

Computer Hardware and Software

Exploratory 2310 is not available for student access outside of class time, and all files are erased each night. Therefore, please be sure to transfer all of your work to a portable medium such as a *USB Flash Drive* at the end of each class.

To complete assignments and projects outside of class, you may work in the *GIS Lab*. You may also work on your own computer.

Grading Policy

1. Documentation

You should document your solution to each assignment as if you were providing a product to software development company. This means providing:

- a) A description of the general purpose of the programming class structure that is developed
- b) A description of how to use the programming class structure
- c) Detailed documentation within your code or pseudo-code
- d) Evaluation of efficiency, robustness, or other characteristics as presented in the assignment instructions

2. Assignment Grading

Each assignment will be graded on:

- a) Logical correctness of the code
- b) Robustness in handling special cases
- c) Clarity of documentation
- d) Accurate evaluation of efficiency, robustness, or other characteristics as presented in the assignment instructions

3. Late Assignments

Late assignment credit will be reduced on a basis of 10% (1st day), 30% (2nd day), 50% (3rd day), and no credit will be given with more than three days late.

4. Working with Other Students

You are encouraged to discuss assignments with other students, but *all work must be your own*. Violation of this rule will result in both students receiving zero credit.

5. Programming Languages

You may use any programming language you wish for your modeling assignment and final project. No programming assistant will be given.

6. Working with Existing Data Structures

You are encouraged to explore existing software libraries and their component object models for your final project. All use of such libraries must be properly documented.

Schedule

Class	Topic	Readings
8/28	Introduction	Worboys & Duckham: Chapter 1
9/4 (hw#1 given)	Background & conceptual models	Chapter 1 & 2
9/11	Instructor Out of Town	Chapter 1 & 2; work on your homework
9/18(hw#1 due)	Conceptual models: DB	Chapter 2
9/25 (hw#2 given)	Conceptual models: Spatial	Chapter 3
10/2	Conceptual models: Spatial Models	Chapter 4
10/9 (hw#2 due, hw#3 given)	Data models: Representation & Algorithms	Chapter 5
10/16	Data models: Representation & Algorithms	Chapter 5
10/23 (hw#3 due, hw#4 given)	Data structures, (TA will give the lecture)	Chapter 6
10/30 (project given)	Data structures	Chapter 6
11/6 (hw#4 due)	Data structures	Chapter 6
11/13	Distributed & Communication	Chapter 7, 8
11/20	Uncertainty/Time	Chapter 9, 10
11/27	Thanksgiving Recess	
12/4 (project due)	Project presentation	

Contact Information

Instructor	Chaowei (Phil) Yang
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Time

Tuesdays: 2:00-3:00 pm and 7:10-8:00 pm

Wednesdays: 3:00-6:00 pm

Teaching Assistant

Teaching Assistant	Jizhe Michael Xia
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Time

Mondays: 5-6pm; Fridays: 5-6pm