Course Outline
GIS 821: ADVANCED GEODATABASE AND PROGRAMMING
Fall Semester , 2011

INSTRUCTOR Assistant Professor, Dr. Rizwan Bulbul
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SCHEDULE Theory Wednesdays 10:00 AM to 12:00 PM, CR-1
Lab Fridays 2:30 PM to 4:30 PM, Lab 2nd Floor

TEXT BOOKS
1. Philippe Rigaux etal, Spatial databases with applications to GIS
2. Shashi Shekhar and Sanjay Chawla, Spatial databases, A tour
3. Building a Geodatabase, ESRI Press
4. Modeling our world ESRI Press

PREREQUISITE Introduction to GIS database and programming

Spatial database is getting importance because of the increasing amounts of spatial data being generated in diverse domains, individual or at organizational levels. Based on the application domain, specific database requirements vary and needs the strong understanding of the fundamental spatial database concepts.

COURSE PURPOSE

The course will provide basic understanding of spatial database concepts. The students will implement some data structures and algorithms for spatial data modeling, access methods and indexing for getting insight into the spatial database core concepts. The usability of spatial databases will be demonstrated by studying two implementations, **PostGIS** and **Geodatabases** from research (open source) and industry (ESRI) respectively. At the end, the students will learn **Python** programming language which is one of the mostly used and recommended for **ArcGIS** scripting. In addition to the reference books reading, the students will read research papers both classic and state of the art for respective topics as the course moves on.

EXPECTATIONS FROM STUDENTS

The students enrolled for GIS-821 are expected to;

1. have basic database concepts (as is the prerequisite),
2. contribute actively in the class by constructive discussions,
3. frequent quizzes and assignments almost everyday,
4. perform well in quizzes and submit assignments on time,
5. do labs properly and as instructed, and
6. find an idea for your final thesis.

Warning: Plagiarism in deliverables is highly discouraged and will be dealt strictly.

COURSE OUTCOME

At the conclusion of the course, the students;

1. have deep understanding of the core spatial database concepts,
2. can implement a spatial database using PostGIS and Geodatabase,
3. and are able to do Geo database programming using Python as scripting language.

PRESCRIBED COURSE OUTLINE

The major topics to be covered in the course are;

1. Introduction to the course
2. Recall: Database basics, ER Modeling, and RDBMS
3. Introduction to spatial databases
4. Spatial data modeling
5. Spatial access methods
6. Query processing
7. Spatial indexing
8. Overview of SDBMS implementations: Open source and Industry
9. Spatial data mining and warehousing
10. Research trends in spatial databases

TENTATIVE COURSE DISTRIBUTION ON WEEKLY BASIS

1. Introduction to the course	Week 1
2. Recall: Database basics, ER Modeling, and RDBMS	Weeks 2- 4
3. Introduction to spatial databases	Week 5
4. Spatial data modeling	Weeks 6 -7
5. Spatial access methods	Weeks 8-9
6. Query processing	Weeks 10-11
7. Spatial indexing	Weeks 11-12
8. SDBMS implementations, PostGIS and Geodatabase	Weeks 12 -15
9. Spatial data mining and warehousing	Weeks 16 -17
10. Research trends in spatial databases	Week 18

LABS OUTLINE

The lab exercises will cover following topics;

1. Introduction to RDBMS and ER Modeling with MS Access
2. Introduction to SQL with MS Access
3. Implementation of spatial data with RDBMS
4. Introduction to PostGIS with QGIS
5. Introduction to Geodatabases

6. Introduction to Python

COURSE GRADING

		No.	Percentage
Theory	One hour tests	2	30%
	Final exam	1	40%
	Quizzes	In every class	10%
	Assignments	5-10	10%
	Final Project	1	10%
			100%
Lab	Assignments	10	40%
	Tasks	In every class	40%
	Lab exams	2	20%
			100%

Overall Marks = (Theory% x 2 + Lab% x 1) / (2+1)

CLASS TESTS

Class Tests	Tentative Week
1	Week 7
2	Week 15

DISCLAIMER

The instructor reserves the right to change, and adjust the policies and class schedule at any time during the semester.