GEOG 5150/6150: Spatial Data Design for GIS – Fall 2016
JTB 130
M,W 8:05-9:25am

Instructor:
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(801) 585-6245
Office Hours: W 10:00-11:30am or by appointment

Lab Section:
Instructor – Ryan Hile
Meeting location and time – AEB 330, M 9:40-11:35am

Texts:
Required
Optional

Course Overview:
This course takes you beyond the world of GIS to the bigger world of spatial databases. Spatial database management systems (SDBMS) are database management systems designed to store, manage and query data on spatial objects and their attributes. Understanding SDBMS is not only essential for advanced GIS, but also to support a much wider range of geographic information services such as Google Maps and location based apps.

Learning Objectives:
After successful completion of this course, you should:
1. Understand the relational database design process and be able to design and normalize relational data;
2. Understand spatial object definition and construction to be an intelligent consumer of these objects and methods;
3. Understand how to bring #1 and #2 together and be able to design a spatial database;
4. Be able to write and execute traditional and spatial queries using SQL;
5. Understand the basics of physical data storage and access, and their implications for database performance tuning;
6. Understanding the basics of systems and database architectures and distributed databases;
7. Understand the basics of temporal, spatio-temporal and moving objects database management.

Grading:
The components of the final grade are as follows:
Examinations: 50%
Lab Assignments: 50%

Exams:
There will be approximately 4 exams, none of which are comprehensive.
Tentative schedule of exams:
Exam 1 – Monday, September 14th
Exam 2 – Wednesday, October 5th
Exam 3 – Monday, November 14th
Exam 4 – Thursday, Dec. 15, 2016, 8:00 - 10:00am

Policies:
1) Individual extra credit will not be assigned.
2) An "incomplete" will be given only in extreme cases when conditions beyond the student's control require an extended period of absence. Even in this case, at least 80% of the course requirements must be completed.
3) Examinations must be taken during scheduled times announced in class. If you have a legitimate excuse (such as medical, family illness or unavoidable work conflicts), you must contact the instructor before the examination. If you do not contact the instructor before the examination you will not be able to make up the examination unless the circumstances were extreme and contacting the instructor was difficult.
4) The University of Utah seeks to provide equal access to its programs, services and activities for people with disabilities. If you will need accommodations in the class, reasonable prior notice needs to be given to the Center for Disability Services, 162 Olpin Union Building, 581-5020 (V/TDD). http://disability.utah.edu/. CDS will work with you and the instructor to make arrangements for accommodations. All written information in this course can be made available in alternative format with prior notification to the Center for Disability Services.
5) Academic misconduct will not be tolerated. Penalties may include failure of an assignment, the entire course, and/or the filing of formal charges with appropriate university authorities. Academic misconduct includes, but is not limited to, cheating, misrepresenting one’s work, and plagiarism:
- Cheating involves the unauthorized possession or use of information in an academic exercise, including unauthorized communication with another person during an exercise such as an examination.
- Misrepresenting one’s work includes, but is not limited to, representing material prepared by another as one’s own work or submitting the same work in more than one course without prior permission of all instructors.
- Plagiarism means the intentional unacknowledged use or incorporation of any other person’s work in one's own work offered for academic consideration or public presentation.

Course Webtools
This course has an online component using the CANVAS e-learning environment. It is available through the Campus Information System at www.utah.edu. You are responsible for all announcements, additional reading assignments and other material posted at the GEOG 5150/6150 site, so be sure to check it frequently. I will also be posting PDFs of the slides I use in the lectures, as well as links to helpful and interesting websites.

Course Outline:
Topic Readings
1. Introduction
   Introduction to databases WD 1-43
   Introduction to spatial databases SC 1-20
   Spatial object-relational databases Zeiler 1-19
2. Object-relational databases and spatial objects
   Relational databases WD 43-45
   Database development WD 55-71
   Object-orientation and spatial objects WD 71-82
Designing spatial object-relational databases

3. Relational algebra and SQL
   Overview of relational algebra and SQL       WD 221-229
   Examples                                   SC 52-82

4. Structures and access methods
   General database structures and access     WD 221-229
   From one to two dimensions               WD 229-234
   Raster structures                         WD 234-240
   Point structures                          WD 240-248
   Linear objects                            WD 248-250
   Object collections                        WD 250-255
   Spherical data structures                 WD 255-258

5. Architectures
   Hybrid, integrated and composable          WD 259-262
     architectures                           
   Syntactic and semantic heterogeneity      WD 262-266
   Distributed systems                       WD 266-278
   Location-aware computing                  WD 278-291

6. Time
   Introduction                              WD 359-367
   Temporal databases and versioning         WD 367-371
   Spatio-temporal databases                 WD 371-382
   Mobile objects databases                  TBD

TBD Topics
   NoSQL
   Hadoop (Spatial Hadoop)

**Last Day of Class:** Thursday, December 8th

**Holidays:**
Labor Day – Monday, September 5th
Fall Break – Sun-Sun, October 9-16th
Thanksgiving Break – Thursday-Friday, November 24-25th