

## Syllabus for GEOG 674: Spatial Databases

### **Instructor**

*Name:* Jianguo (Jack) Ma, Ph.D.  
*Office:* LeFrak1137  
*Email:* [jma3@umd.edu](mailto:jma3@umd.edu)  
*Phone:* (301) 405-3861  
*Office Hours:* Wednesdays (3:00pm-5:00pm) or by appointment

### **About the Course**

*Time:* 5:30m – 8:00pm, Wednesdays  
*Location:* Online (<http://elms.umd.edu>)

### **Description**

Designed specifically for students in the Master of Professional Studies, Geospatial Information Sciences program, this course will help students understand, analyze, design, and implement spatial databases. While the basic concepts and theories of database will be introduced, the focus of this course will be on providing students with hands-on experiences to practice the technical skills used in spatial database design and implementation.

Upon completion of this course, students should be able to:

- Develop a fundamental knowledge of spatial database systems
- Understand the spatial data models, spatial query languages, database architecture, database technology for spatial database systems
- Gain practical experiences with Oracle
- Design simple database models
- Implement database design
- Use SQL to establish and interrogate databases
- Design databases in GIS context

The format of this course will consist of lectures, reading assignments, lab assignments, and a final project. The lectures will be presented via the Live Classroom on Blackboard. All lectures including the interaction between students and the instructor during the class in real-time will be archived into videos which will then be made available on the Blackboard. Please note that video archives are only intended for occasional or backup use in case students have to miss the lectures sometime due to personal, business, or medical reasons. And real-time online participation is strongly recommended. The reading and lab assignments will also be posted on the Blackboard.

### **Prerequisites**

Students should be proficient in desktop GIS and possess basic computer skills. Students may also find it helpful to have some background in computer programming such as VB, .NET and scripting.

### **Textbooks**

There are no required textbooks. However, there are a few recommended books that you might want to use. Additional reading materials (in electronic format or as links to certain web sites) will be posted on the Blackboard by the instructor.

The following books are recommended.

- Shekhar, Shashi, Sanjay Chawla. *Spatial Databases: A Tour*. Prentice Hall, 2002. ISBN: 0-13-017480-7.
  - Note: Some of the materials in this book will be available on the Blackboard in electronic format.
- R. Elmasri, and S. B. Navathe, *Fundamentals of Database Systems*, 5<sup>th</sup> Edition, Addison-Wesley, 2007. ISBN: 0321369572
- Rick Greenwald, Robert Stackowiak, and Jonathan Stern. 2007. *Oracle Essentials: Oracle Database 11g* (4<sup>th</sup> edition). O'Reilly. ISBN: 0-596-51454-9.
  - Note: You can read this book for free if you log in here with an UMD computer: <http://proquest.safaribooksonline.com/9780596514549>
- David Arctur, and Michael Zeiler. 2004. *Designing Geodatabases: Case Studies in GIS Data Modeling*. ESRI. ISBN: 1-58948-021-X.

### **Assignments**

There are totally five (5) lab assignments and each will count towards 13% of the final grade. The due date will be specified in the lab document. Late submission of lab reports will result in a deduction of 10 points (out of 100 in total) per day. However, in some rare situations (e.g. medical or family emergency), extension is possible if you contact the instructor before the due date.

### **Final Project**

A final project is required to complete this course. It will provide students an opportunity to design and build a spatial database that is closely related to their study, research or work. The project must be carried out individually and independently.

The final project consists of two parts: a proposal and the actual result (i.e. a spatial database in this case). The proposal of your project must be at least two pages (single space). The proposal should: (1) identify research problem; (2) provide background information; (3) list objectives; and (4) describe methods. Specific guidelines will be provided later on. Students are encouraged to contact the instructor early during the semester to discuss potential topics and scope. This proposal will be worth 5% of your final grade while the result will account for 30%.

### **Grading**

The plus/minus grading system will be used to assign student grades which will be determined as follows:

97-100 = A+
93-96.99 = A
90-92.99 = A-
87-89.99 = B+
83-86.99 = B
80-82.99 = B-
77-79.99 = C+
73-76.99 = C
70-72.99 = C-
67-69.99 = D+
63-66.99 = D
60-62.99 = D-
<60 = F

Minor adjustments to this scale might be made based on the performance of the class as a whole.

**Software**

The software to be used include: ArcGIS and Oracle. ArcGIS is available in the department's Open Lab or through Citrix server: <http://geogwi.umd.edu/GeogCitrix/auth/login.aspx> . You can log in using your UMD ID and password.

**Course Communication**

All students are required to have a GLUE account and a UMD email address. We will frequently use email for communication in the class and we will **only** use UMD email addresses. Lectures, readings, assignments, announcements, datasets, etc. will be made available via Blackboard: <http://elms.umd.edu>. It is your responsibility to check Blackboard and your UMD email account often so that you will get all the information sent to the class.

**Rules & Policies****Attendance Policy**

You are recommended but not required to attend every lecture in real-time online. We will meet online at the announced time for a live audio/video lecture. The lecture will be archived for anyone who absolutely must miss the class, but I encourage you to login at the appointed time so that you can ask questions and keep up with the course schedule.

**Class Environment**

In this class, students will meet in a virtual space online which will be treated as a classroom. It is important to recognize that the classroom is an environment that requires respect for all participants. Therefore, students are expected to conduct themselves in a considerate manner.

Disruptive behavior of any kind will not be tolerated. Students who are unable to show civility with one another, the teaching assistants, or myself will be subject to being referred to the Office of Student Conduct or to Campus Police. You are expected to adhere to the Code of Student Conduct.

**Students with Disabilities**

Any students with a disability in this class are 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 who provide me with a University of Maryland DSS Accommodation form.

**Religious Preference Absence**

Please refer to the Online Undergraduate Catalog Policy on Religious Observance.

**Academic Dishonesty**

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. It is very important for you to be aware of the consequences of cheating, fabrication, facilitation, and plagiarism. For more information on the Code of Academic Integrity or the Student Honor Council, please visit <http://www.shc.umd.edu>.

**Course Schedule**

This is a tentative schedule and may be adjusted to suit our class. Changes will be announced and posted on Blackboard.

Week	Date	Lecture Topics	Readings*	Assignments **
1	Mar 4	Course Overview Introduction to Spatial Database	Lecture Slides Assigned Readings	
2	Mar 11	Fundamentals of Database Spatial Concepts Database Models	Lecture Slides Assigned Readings	Lab 1
3	Mar 18	Spring Break		
4	Mar 25	Database Manipulation Database Query Spatial Query Languages	Lecture Slides Assigned Readings	Lab 2
5	Apr 1	Database Design	Lecture Slides	Lab 3
6	Apr 8	Spatial Storage and Indexing	Lecture Slides Assigned Readings	Lab 4
7	Apr 15	Query Processing and Optimization	Lecture Slides	Lab 5
8	Apr 22	Object-Oriented Data Model	Lecture Slides Assigned Readings	
9	Apr 29	ArcGIS and Databases Web-based DBMS	Assigned Readings	Proposal due
10	May 6	Data Mining Trends in Spatial Databases Conclusion	Lecture Slides Assigned Readings	
11	May 13	Final Project Presentation ***		Final project due May 12

**Note:**

\* - The assigned reading material will be posted on Blackboard in PDF format or as a link.

\*\* - Since most of you work full-time, the best time for you to work on the lab assignments might be the weekends. Accordingly, the lab assignment will be posted on Blackboard by Friday in that week and is due the following Sunday. So, you will have two weekends (totally about 9 days) to finish it.

\*\*\* - Students may be required to attend the class in person on this date. So, you might want to mark your calendar early. However, it is also likely we will do the presentations online if we can find a technical solution with Blackboard. You will be notified before the end of this semester.