

Geography 687: Design and Implementation of GIS

The Ohio State University

Autumn 2009

Location: 1116 Derby Hall (Lecture), 0140 Derby Hall (Lab)
Time: TT 12:30 - 1:48 PM (Lecture), Th 2:30 - 4:48 PM (Lab)
Course URL: <http://carmen.osu.edu>

Instructor: Prof. Ningchuan Xiao
Office: 1132 Derby Hall
Phone: 292-4072
E-mail: xiao.37@osu.edu
Office Hours: Tu 3:00-4:00 PM or by appointment

This course covers design and implementation techniques that are commonly used in developing today's geographical information systems and other computer programs for spatial analysis. Major topics of this class include project management, requirement analysis, spatial database design, object-oriented analysis and design, unified modeling language, and system verification and validation. Students will learn the GIS development skills using different programming languages through weekly lab exercises and group projects that address "real-world" GIS application problems.

The topics covered in this course are selected to help students achieve the following goals:

- Understanding the design and implementation issues in GIS development
- Mastering basic software development techniques, especially those using object-oriented approaches
- Understanding spatial database design techniques
- Developing personal experience of GIS development through hands-on labs and projects
- Understanding GIS related ethical issues

Texts

The following two books are required for the lecture and labs:

- Schmuller, J. 2004, *SAMS Teach Yourself UML in 24 Hours*, 3rd Ed. SAMS Publishing. (available through the university libraries)
- R. Burke, 2003, *Getting to Know ArcObjects: Programming ArcGIS with VBA*, ESRI Press.

In addition to the above required texts, the following two books have been reserved at the main library and are recommended for your reference.

- Yeung, A.K.W. and Hall, G.B. 2007. *Spatial Database Systems: Design, Implementation and Project Management*, Springer.
- Sommerville, I. 2006. *Software Engineering*. 8th Ed. Addison Wesley Publishers. (Other editions of this book are also good.)

The lecture does not necessarily follow the textbooks. Instead, I will use my own lecture notes, which will be made available on the course web site. Therefore, students are expected to attend each class and participate in discussion and exercises. Further readings, when applicable, will be handed out during the class.

Prerequisites

Geography 685 or consent of instructor.

Credit Hours

This class is for 5 credits.

Evaluation

Student performance is assessed by the following five components:

- **Labs (25%).** Hands-on approaches will be used. Seven of the nine weekly lab assignments are based on the book *Getting to Know ArcObjects* and supplementary materials; the other two labs will be based on hand-out instructions. A lab session may have two parts. The first part is a short lecture/discussion that is designed to introduce the background and some useful

programming techniques. Under some circumstances, we may move these topics to a regular lecture session or have student discussion and/or demonstrations. Following the lecture, students will be given an assignment. Unless otherwise announced, all assignments are due in one week and only printed lab reports will be accepted. Please be sure to print your name and the course number on your answers. Late submission will result in a deduction of up to 50% off the total points of that assignment, unless a good, acceptable reason is provided *a priori*.

- **Group Project (25%).** Students attending this class will be divided into several groups, each working with a "client" on a GIS development project. Members of each group will determine necessary working teams to fulfill a particular design and implementation goal of the project. The projects should be concluded by (a) delivering the final products including a full set of documentations to the clients, and (b) professionally presenting the project to the clients and the class. During the quarter, a number of formal presentations will be made by each group to the class to report the progress. The performance of each group and its members will be reviewed by peers (groups and individuals), their clients, and the instructor. Detailed review instruction and forms will be handed out. It is important for each group to deliver their product by the time specified in the schedule. The final grade of this class is pending on confirmation of safe receipt from the clients.
- **Examination (20%).** A comprehensive examination will be given.
- **Homework (15%).** There will be at least two homework assignments. A homework assignment is normally due in one week after it is handed out. All homework assignments are due before class starts on the date specified in the schedule.
- **Case studies (10%).** In addition to attending the lecture, students should also play an active role in group studies. A number of groups will be created during the second week. Each group will choose (or be assigned) some GIS applications and additional reading materials. Groups should thoroughly study these materials and professionally present them to the class. The performance of each student will be evaluated by the peers and the instructor.
- **Participation (5%).** Attendance and participation in class discussion are expected of all students. There will be a number of in class exercises or quizzes.

Important Issues

- **Students with Disabilities:** I would like to hear from anyone who has a disability that may require some modification of seating, testing, or other class requirements so that appropriate arrangements may be made. Please talk with me after class or during my office hours. If you need more information about disabilities and accommodations, contact the Office of Disability Services.
- **Policy on Plagiarism and Academic Misconduct:** In the Code of Student Conduct, academic misconduct is defined as "any activity that tends to compromise the academic integrity of the university, or subvert the educational process"; plagiarism is defined as "the representation of another's work or ideas as one's own; it includes the unacknowledged word-for-word use and/or paraphrasing of another person's work, and/or the inappropriate unacknowledged use of another person's ideas."
Plagiarism is wrong and should be prohibited. The University has a policy on academic misconduct and plagiarism, as provided in the [Code of Student Conduct](#). To further understand this, it is worthwhile to read the Eight Cardinal Rules of Academic Integrity at <http://www.northwestern.edu/uacc/8cards.html> and guidelines to avoid plagiarism at <http://www.northwestern.edu/uacc/plagiar.html>.

Schedule

The [schedule](#) will be updated whenever new materials become available.

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Geography 687: Course Schedule

This is a tentative course schedule. This page will be updated frequently. The links will be made available the day before class.

Week	Date	Theme	Lecture (TT 12:30-1:48)	Activity	Labs (Th: 2:30-4:48)
1	9/24	Overview	Introduction		Customization
2	9/29		Requirements	Group formation	
	10/1		Project management		VBA Programming
3	10/6		Programming languages		
	10/8		Coding clinics		Knowing the objects
4	10/13	Design	What is design?	Briefing	
	10/15		UML: object orientation		Tools & commands
5	10/20		UML: use cases		
	10/22		UML applications	Project progress *	Symbolizing layers
6	10/27		ER database model		
	10/29		Relational database model	Homework 1	Features
7	11/3		Case Study: ethics		
	11/5		Guest lecture		Dynamics & tables
8	11/10		Web-based GIS	Homework 2	
	11/12		Coding clinics		Web GIS I
9	11/17	Implementation	Verification and validation		
	11/19		Software testing	Project progress *	Web GIS II
10	11/24		Case Study: GIS and people		
	11/26		No class		No lab
11	12/1		Examination		
	12/3			Group meeting	Presentations *
12	12/8			Package Delivery	

* Evaluation (within group, between group, or client evaluation)

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