GEOG 359/557 Introduction to Geographic Information Systems

(Fall Semester, 2009)

Professor: Dr. Wei Luo Office: Davis Hall 120 (753-6828)
e-mail: wluo@niu.edu Office Hours: F 9:00-10:30
T.A: Thomas Walsh

Lecture: Class meets MW 9:00-9:50 am in DH 116
Lab: Sec. A: M 11:00-12:50; B: F 8:00-9:50; all meet in DH 101.
Text: Longley et al. (2005), *Geographic Information Systems and Science*, 2nd edition, Wiley & Sons, 517p.
Course web: *http://webcourses.niu.edu (If you have not used the blackboard website before, please go to the website and click on Student Help button for general information.*)

Course Description and Objectives

This course offers an introduction to the concepts, principles, and theories behind Geographic Information Systems and Science (GIS), with emphasis on the nature of geographic information, data models and structures for storing geographic information, geographic data input, data manipulation, and simple spatial analysis and modeling techniques.

The course is composed of two components: lectures and labs. The lectures will discuss the above theories and concepts and the labs will reinforce them through hands-on exercises and projects. Students must be clear that this is not a class on any specific GIS software. It is a course on the underpinning theory and concepts in GIS. However, students will be exposed to two major commercial GIS software packages (GeoMedia and ArcView) in their labs.

After successful completion of this course, the students will be able to:

1. describe what GIS is; name the major GIS software available; know where to find more information;
2. explain the components and functionality of a GIS and the differences between GIS and other information systems;
3. understand the nature of geographic information and explain how it is stored in computer (including map projection) and the two types of GIS data structure;
4. conduct simple spatial analysis using GIS software;
5. design and complete a GIS project from start to finish (data capture, data storage and management, analysis, and presentation);

Evaluation

Your course grade will be based on warm-up exercises, exams, and labs.

Warm-up exercises

As a student, you are expected to attend class. BlackBoard website will be used *extensively* in this course. *Familiarize yourself with BlackBoard if you never used it before.* The online warm-up exercise is designed based on the "Just-in-time teaching" pedagogy and intended to engage students in active learning. The warm-up exercise will be composed of 2-5 short questions related to the content that will be covered or just covered recently. I will adjust my teaching based on your answers and your needs. **It is due 8:00 AM Wednesday (you are strongly urged to complete it by Tuesday night).** It will only take about 10-15 minutes to complete. The grading of the warm-up exercise will be based more on your **effort** and less on the correctness of your answer, i.e., if you ***make your best effort*** to answer the question, you will get full credit even if your answer is wrong. The warm-up exercises account for **5%** of your course

grade. Previous experience shows that students who regularly complete warm-up exercises also perform better in exams. To take the full advantage of warm-up exercises, you must make your best effort and complete them on time.

Exams

One Mid-term examination and one Final examination will be given. They account for **60%** of your course grade. Each exam will cover the material presented in class, the associated readings, and the lab exercises. While the Final exam is not comprehensive, you may be asked to utilize and apply concepts learned earlier in class. The exams may consist of definition, multiple choice, true or false, short answer, and problem solving. The on-line practice quizzes are designed to help you prepare for the exams and will not enter the calculation of your course grade. **There will be no make-up exams unless you have legitimate reason communicated to me *well before* the exam.**

Labs

Labs (may be short exercises and long projects) are designed to reinforce the concepts and principles learned in lecture and account for **35%** of the course grade. Each lab is usually due at the beginning of your lab session on the specified due date. Late work will be penalized 15% for each day of delay (Points_get = Points_scored - 0.15*num_days_late*Points_scored). Late work will not be accepted after the graded work is returned (usually 1 week after it is due). The TA will grade your work based on paper print-outs *and* the digital files stored on the server. Copying other person's work is not acceptable.

Additional requirement for GEOG 557: graduate students may be asked to answer more challenging questions in labs and/or exams.

Course Grade Calculation

There will be no extra credit for this course. A total score will be calculated based on the following formula:

(w1+w2+…)/(W1+W2+…)*5% + (l1 + l2 +…)/(L1 + L2 +…)*35% + (m + f)/(M + F)*60%

where upper case letters represent the maximum possible score you can get and the lower case letters represent the actual score you get (w1=warm-up exercise 1, l1=lab 1, m=midterm, f=final). The total score is then converted to letter grade according the following table:

Total Score	Course Grade
≥ 90 %	A
80-89 %	B
70-79 %	C
60-69 %	D
<60 %	F

A total score very close to the break point (e.g., 89.9) *may* be elevated at my discretion (often *only if* there is a natural gap or breaking in the score distribution)

Each student is expected to work independently on all exams, which will be close-book. Any cheating behavior will result in a grade of F. You may consult with others on the labs. However, you must go through the exercises yourself in order to master the usage of the software. If you have questions, ask your TA or myself during the lab or office hours, or make an appointment. Historically students usually find it difficult to succeed in this course if they do not attend class regularly, take good notes, and complete all lab exercises and projects.

Other Information

About me: Please feel free to talk to me about any problems or concerns related to your schoolwork or anything else and I will try my best to help you or send you to the right person. I want this course to be a mutually enjoyable, constructive learning experience. If there is

anything about this course that you do not like or have any concerns, please let me know as soon as possible by phone, e-mail, BlackBoard, through the TA, leaving a note in my mail box, or directly talking to me. The sooner I get feedback, the sooner I can make correction and adjustment. I would encourage you visit my office at least once this semester during the office hours or appointment. I am here to help you and to make sure that you learn and achieve the objectives of this course. I do care about you because your success is also my success. *The best way to reach me is by e-mail. Please also check BlackBoard frequently for announcement and updates.*

About learning GIS software: the exercises and projects are designed to help you understand the concepts and to achieve the objectives of this course. You will be given enough time to complete the assignment. Please try to make a linkage between what you do in the lab and what you learn in the lecture. Due to time constraint, lecture and lab may not always be in sync.

The best way to learn GIS software is to complete a project from start to finish using that software by yourself. The quickest way to start is to follow some step-by-step instructions. However, the danger of this is that you may miss the big picture. I encourage you to ask yourself questions like "Why this step has to be done first?" "Is there a better way to do this?" Try to envision the big picture while following the steps. I will give step-by-step instructions in the first few exercises. Please keep in mind that there is always more than one way to do the same thing. The instructions will be less detail as you move on because I want you to think on your own, not just to follow instructions. **I will try to run interactive demonstrations in class whenever possible**. Please do not feel frustrated if you make mistakes because that's part of the learning process and you will learn a lot more once you figure out how to fix the mistakes. The TA and I are here to help you.

Plagiarism Statement: "The attempt of any student to present as his or her own work that which he or she has not produced is regarded by the faculty and administration as a serious offense. Students are considered to have cheated if they copy the work of another during an examination or turn in a paper or an assignment written, in whole or in part, by someone else. Students are guilty of plagiarism, intentional or not, if they copy material from books, magazines, or other sources or if they paraphrase ideas from such sources without acknowledging them. **Students guilty of, or assisting others in, either cheating or plagiarism on an assignment, quiz, or examination may receive a grade of F for the course involved and may be suspended or dismissed from the university.**" *Northern Illinois University Undergraduate Catalog*.

Receiving Assistance: Students are urged to contact me should they have questions concerning course materials and procedures. If you have a disability or any other special circumstance that may have some impact on your course work and for which you may require accommodations, please contact me privately early in the semester so that arrangements can be made with the Center for Access-Ability Resources (CAAR).

Tentative Schedule*

wk	Dates	Topics	Reading	Lab
1	8/24,26	Logistics, What is map, What is GIS	Ch. 1	Introduction, logistics
2	8/31,9/2	How is GIS used	Ch. 2	Map Projection exercise
3	9/9	The nature of geographic data (*9/7: no class*)	Ch. 4	Raster exercise
4	9/14,16	Georeferencing	Ch. 5	Simple Query exercise
5	9/21,23	Representing geography in computer (I)	Ch. 3,8	Simple Digitizing Project
6	9/28,30	Representing geography in computer (II)	Ch. 3,8	Apartment Project
7	10/5,7	GIS database creation and maintenance	Ch. 9,10	Apartment Project
8	10/12,14	10/12 review; **10/14: midterm**		Forest Project
9	10/19,21	Data quality, uncertainty, standard, metadata	Ch. 6	Forest Project
10	10/26,28	GIS analysis (I)	Ch. 14	Physician Project
11	11/2,4	GIS analysis (II)	Ch. 15	Physician Project
12	11/9,11	GIS analysis (III)	Ch. 16	Address Matching Project
13	11/16,18	GIS map construction and geovisualization	Ch. 12,13	Google Map GIS project
14	11/23	GIS project design (*11/25: no class*)	Ch. 17,18	Google Map GIS project
15	11/30,12/2	Distributed GIS	Ch. 11	TBD
	12/9	**Final: Wed. December 9, 8-9:50 a.m.**		

*The date for each topic may vary, but the midterm and final dates are fixed. It is the students' responsibility to be aware of all the changes that are announced in class.