

**GEO4151/5159**  
**GEOGRAPHIC INFORMATION SYSTEMS**  
(Fall 2004)

**Lecture Instructor:**

Professor Xiaojun Yang, 304 Bellamy, Phone:644-8379, Email: xyang@fsu.edu

**Lecture Hours:**

Tuesdays and Thursdays: 9:30 - 10:45 a.m (Room 0105a Bellamy Building)

**Lab Instructor:**

Shivangi Prasad ([sprasad@mailier.fsu.edu](mailto:sprasad@mailier.fsu.edu))

**Lab Hours:**

Tuesdays **OR** Thursday: 2:00 – 3:15 p.m. (Room 320 Bellamy Building)

(You must register for one of the above two lab sessions; they are in separate course codes, GEO4905)

**Office Hours:**

Tuesdays and Thursdays: 10:45 a.m. – 12:00 p.m. or by appointment.

**Teaching Assistant:**

Chris Lesser ([lesserce@yahoo.com](mailto:lesserce@yahoo.com))

**Computing Lab Manager (any problem related to computer system):**

Mr. Shawn Lewers ([SWL2727@mailier.fsu.edu](mailto:SWL2727@mailier.fsu.edu))

**Course Description**

Geographic Information Systems (GIS) represent the latest technologies that are revolutionizing the disciplines of geography and environmental sciences in the information age. This course will offer an introduction to methods and technologies for managing and processing spatial information. Emphasis will be placed on the nature of spatial information, spatial data models and structures, data input, storage and manipulation, spatial analytic and modeling techniques, and output. The course is made of two components: lectures and labs. In the lectures, the conceptual elements of the above topics are explained. The labs are designed in such a way that students will gain first-hand experience in data input, data management, data analyses, and result presentation using one or more GIS software packages.

**Objectives**

In general, this is an ice-breaking course into GIS and serves as the foundation for other advanced courses in geographic information technologies and environmental modeling. The basic objectives of this course for students are: 1) To understand the basic components, concepts, and methods of GIS; 2) To gain a hand-on experience with daily routines of GIS operations; and (3) To gain practical experience with major GIS software packages.

**Prerequisite**

Currently, there is no any prerequisite enforced for this course. However, we are considering to use a cartography course as prerequisite in near future. You will know that GIS has a fundamental root on cartography. If you do not feel comfortable with a basic cartographic concept, you should try to read a cartography textbook.

**Computing Environment and GIS Software Packages**

Windows-based ArcGIS Desktop software packages will be used for class assignments to illustrate the practical use of some geographic information processing concepts and techniques. **However, This is not a software training course. If you are looking for such a course (learning a specific software package), you might visit [www.esri.com](http://www.esri.com) or any other web sites for specific software packages. These software vendors provide numerous short training courses.**

When you are at the computer lab, you must observe our lab and FSU's related policies. It is your responsibility to check appropriate documents for these policies.

### Course Website and Materials

I will develop a website for this course and you will be notified with details shortly. I will post the course materials there. You should check that site from time to time as I will post some important announcements there.

### Grading

*System:* A (> 94), A- (90-93), B+ (87-89), B (84-86), B- (80-83), C+ (77-79), C (72-76), C- (70-71), D+ (66-69), D (62-65), D- (60-61), F (< 59)

#### *Components:*

For undergraduate students

Attendance: 5%

Exams: 40%. There are two mid-term exams and each carries the same weight. THERE IS NO FINAL EXAM!

Homework Assignments: 10%

Lab Assignments: 30%. There are a number of lab assignments and you will need to complete them within a fixed period.

Research Project: 15%. You will need to complete a project, prepare a report, and present it to the entire class.

For graduate students

Attendance: 5%

Exams: 35%. There are two mid-term exams and each carries the same weight. THERE IS NO FINAL EXAM!

Homework Assignments: 10%

Lab Assignments: 30%. There are a number of lab assignments and you will need to complete them within a fixed period.

Research Project: 20%. You will need to complete a project, prepare a report, and present it to the entire class.

#### ***Attendance:***

Students are required to attend all classes. Missing even one lecture can affect your grade substantially. Announcements regarding the course outline and the schedule of the lectures, labs and exam (including changes of these) may be made in class. All organizational/administrative announcements made during the class period are assumed to be known by all students.

#### ***Exams:***

The exam can involve any material covered in lectures, reading assignments, and labs. There is no provision for extra credit work. No make-up exam is allowed. If you miss the exam, you must present a signed physician's excuse or, if the exam is missed due to a family funeral, a dated newspaper obituary. Most other excuses for missing the exam are not acceptable. This policy will be applied stickily.

#### ***Homework assignments:***

You will be given some assignments and they must be completed within a fixed period. You must type your answer and submit it to me as either a hardcopy or an email attachment.

#### ***Lab grading policies:***

Grades of your lab exercises are based on the quality of your answers. Any answer should be concise and be well organized. They must be **in print**. The grade for each of the exercises is reported as *points\_scored /total\_points\_of\_exercise*. For example, if an assignment is worth 20 points and your answers score 16 points then you should see 16/20 on your marked assignment.

Each of the assignments will have a due day clearly written on the first page of your lab assignment. The due time is 5:00 p.m. on the due day. Any assignment that is turned in after the due time on the due day is considered late, which will receive penalty strictly.

The penalty for a late assignment is based on the number of days late (including weekends). If an assignment is late less than 24 hours, it is considered 1 day late. If an assignment is late less than 48 hours but more than 24 hours, it is considered 2 days late, and so on. Late assignments are penalized 20% per day. Here is the formula for calculating the points of a late assignment:

$$\text{Points}_{\text{get}} = \text{Points}_{\text{scored}} - 0.20 * \text{num\_days\_late} * \text{Points}_{\text{scored}}$$

The minimum value of  $\text{Points}_{\text{get}}$  is 0. Assignments handed in after I have returned the graded assignment to class (usually one week after the due date) will receive no points. Again, you must provide acceptable excuse (see exam section) in order to receive more time for you to complete lab exercises without penalty applied. You should discuss with your lab instructor about your situation no later than the due day. This policy will be applied stickily.

**Research project:**

Will be discussed in a separate document.

### Course Materials

**Required text:**

- Heywood, I., Cornelius, S., and Carver, S., 2002. An Introduction to Geographical Information Systems (2nd). England: Prentice Hall, 295 p.

**Other Texts:**

- Aronoff, S. 1989. Geographic Information Systems: A Management Perspective. Ottawa: WDL Publications. 294 p.
- Bernhardsen, T. 2002. Geographic Information Systems: An Introduction (3rd). New York: John Wiley & Sons. 428p.
- Berry, J. K. 1993. Beyond Mapping: Concepts, Algorithms, and Issues in GIS. Fort Collins: GIS World Books, 246 p.
- Burrough, P.A. and McDonnell, R. A. 1998. Principles of Geographic Information Systems. New York: Oxford University Press. 333 p.
- Clarke, K.C. 2003. Getting Started with Geographic Information Systems (4th). Upper Saddle River, New Jersey: Prentice Hall. 340 p.
- Chrisman, N. 2002. Exploring Geographic Information Systems (2<sup>nd</sup>). New York: John Wiley & Sons. 301p.
- DeMers, M.N. 2000. Fundamentals of Geographic Information Systems (second edition). New York: John Wiley & Sons. 498 p.
- Huxhold, W. E. 1991. An Introduction to Urban Geographic Information Systems. New York: Oxford University Press. 337 p.
- Lo, C. P. and Yeung, A. K. W. 2002. Concepts and Techniques of Geographic Information Systems. New Jersey: Prentice Hall. 492p.
- Longley, P. A., Goodchild, M. F., Maguire, D. J. and Rhind, D. 2001. Geographical Information Systems and Science. New York: Wiley and Sons. 454p.
- Martin, D. 1996. Geographic Information Systems: Socioeconomic applications. Routledge, New York. 210 p.
- Star, J. and Estes, J. 1990. Geographic Information Systems: An Introduction. New Jersey: Prentice-Hall. 303 p.
- Theobald, D. M. 2003. GIS Concepts and ArcGIS Methods. Colorado: Conservation Planning Technologies. 334p.
- Tomlin, D. 1990. Geographic Information Systems and Cartographic Modeling. New Jersey: Prentice Hall. 249 p.

**Journal articles:**

In this course, journal articles will be recommended to students to read. Students should constantly check the following journals for useful articles on GIS applications:

- *International Journal of Geographic Information Science* (academically the most prestigious)

- *Photogrammetric Engineering and Remote Sensing* (academically the most prestigious)
- *Transaction in GIS* (a good GIS journal)
- *Cartography and Geographic Information Science* (the cartography journal for ACSM; more emphasizing GIS use in cartography). However, it is more cartography than GIS.
- *Computer, Environment and Urban Systems* (academically a good journal, focusing on urban applications of GIS)
- *GeoWorld* (formerly GIS World) (This is a trade magazine, but it does contain many short, well illustrated articles on the actual application of GIS technology in different situations. You should read this constantly to keep yourself informed of changes.)
- *GeoInfo Systems* (another trade magazine, but sometimes it contains some real good articles with more depths than those in GeoWorld).

Because students in GIS classes come from different disciplines, they can refer to professional journals in their own fields to find useful GIS application papers, e.g. for landscape architects, a journal such as *Landscape and Urban Planning* will be useful. Two other geography journals are also useful: *Applied Geography* and *The Operational Geographer*. Also environmental management and natural resources journals contain more and more GIS papers (e.g. *Landscape Ecology*, or *Journal of Environmental Management*.)

#### ***Electronic discussion groups and internet for GIS:***

Students with an electronic mail account can sign up for an electronic discussion group on GIS. The most important group is called GIS-L. There are many discussion groups for individual software, e.g., there is one for ARC/INFO, one for IDRISI.

Another trend in GIS is the use of Internet to deliver GIS data and maps. Some GIS analyses can also be done through the Internet. You should constantly check the websites. There are many websites on GIS. You can use a search engine, such as <http://www.yahoo.com/> to search for them. If you are reading this syllabus in our GIS class website, you will be directed to link to a number of important websites for information on programs and data. The following websites (URL) are a must for you to explore:

- <http://www.usgs.gov/> [USGS WEBSITE]
- <http://www.esri.com/> [ARC/INFO WEBSITE]
- <http://www.idrisi.com/> [IDRISI WEBSITE]
- <http://www.census.gov/> [US CENSUS BUREAU WEBSITE]

#### **Honor Code**

Students are expected to uphold the Academic Honor Code. The Academic Honor System of The Florida State University is based on the premise that each student has the responsibility to:

- Uphold the highest standards of academic integrity in the student's own work,
- Refuse to tolerate violations of academic integrity in the University community, and
- Foster a high sense of integrity and social responsibility on the part of the University community.

#### **ADA Requirements**

Students with disabilities needing academic accommodations should:

Register with and provide documentation to the Student Disability Resource Center (SDRC).

Bring a letter to the instructor form the SDRC indicating you need academic accommodations. This should be done within the first week of class.

For more information about services available to FSU students with disabilities, contact the Assistant Dean of Students: [sdrc@admin.fsu.edu](mailto:sdrc@admin.fsu.edu), Disabled Student Services, 08 Kellum Hall, Florida State University, Tallahassee, FL 32306-4066, (850) 644-9566.

#### **Tentative Schedule**

No	Date	Lectures	Labs	Assignments	Remarks
1	1/08	Introduction to the course	Lab 0: Introduction to GIS Lab Facilities and Policies (No Grade)	Self Computer Test; Introductory Quiz	
2	1/13	What is GIS (I)	Lab 1: Internet Resources for GIS Learning and Education	Chapter One Web materials	
3	1/15	Video show and What is GIS (II)?		Chapter One Web materials	<b>Video</b>
4	1/20	Nature of Spatial Data (I)	Lab 2: Introduction to ArcGIS	Chapter Two Web materials	
5	1/22	Nature of Spatial Data (II)		Chapter Two Web materials	
6	1/27	Nature of Spatial Data (III)	Lab 3: Map Projection	Chapter Two Web materials	
7	1/29	Spatial Data Model (I)		Chapter Three Web materials	
8	2/03	Spatial Data Model (II)	Lab 4A: Raster Data Model	Chapter Three Web materials	<b>Project Title Due</b>
9	2/05	<b>Lecture and Reading Exam One</b>	Lab 4B: Vector Data Model	NA	
10	2/10	Attribute Data management	Lab 5: Digitizing and Data Automaton	Chapter Four Web materials	
11	2/12	Data Input and Editing (I)		Chapter Five Web materials	
12	2/17	Data Input and Editing (II)	Lab 6: Geocoding and Address Matching	Chapter Five Web materials	
13	2/19	Spatial Analysis (I)		Chapters 6 and 7 Web materials	<b>Proposal Due</b>
14	2/24	Spatial Analysis (II)	Lab 7: Spatial Query	Chapters 6 and 7	
15	2/26	Spatial Analysis (III)		Chapters 6 and 7 Web materials	
16	3/02	Spatial Analysis (IV)	Lab 8: Spatial Data Analysis: Classification	Chapters 6 and 7 Web materials	
17	3/04	<b>Lecture and Reading Exam Two</b>		NA	<b>Exam Two</b>
18	3/09	<b>FSU Spring Break (Enjoy!!!)</b>			
19	3/11				
20	3/16	<b>AAG Week (No Lecture). Lecture hour will be used for lab assignment</b>	Lab 9: Spatial Analysis: Map Overlay and Analysis		
21	3/18	<b>AAG Week (No Lecture). Lecture hour will be used for lab assignment</b>	Lab 10: Raster Data Manipulation and Presentation		

No	Date	Lectures	Labs	Assignments	Remarks
22	3/23	Map Design and Output	Lab 11: GIS Application	Chapter 12 and Web materials	
23	3/25	GIS Software Packages and Future of GIS		Chapter 8 and Web materials	
24	3/30	Video Show: GIS applications	Lab 12: Map Design and Output	Web materials	<b>Video Show</b>
25	4/01	<b>Reserved for Class Project</b>		NA	
26	4/06	<b>Reserved for Class Project</b> (Instructor and TA will be with you during regular class hours)			
27	4/08				
28	4/13				
29	4/15				
30	4/20	<b>Project Presentation (I)</b>			
31	4/22	<b>Project Presentation (II)</b> ; course evaluation			
32	4/27	FSU Final Exam Week (Good Luck !!)			
33	4/29				