

## ***Introduction to Geographic Information Systems (GIS)***

This course provides you with the fundamentals of GIS and digital mapping. You will be introduced to basic GIS skills and the structure of digital geographic databases necessary to create a GIS, using the ArcView 9.2 suite of software applications. The goal of this course is to understand GIS as a useful and flexible tool that you can use to address and solve a wide range of everyday “geographic” questions and problems.

Open to all majors – no prerequisites, but basic computer skills are necessary.

Note: This course is a prerequisite for GARP0344 (Advanced Geographic Information Systems, Spring 2008 semester).

### **Time, Location, Numbers**

- GARP 0244; CRN 11745, 3 credit hours
- Tuesday and Thursday, 15:45 to 17:00, Wilson 139 computer lab

Please note: We meet formally only twice every week. Therefore, missing class (for any reason) leaves you with a considerable gap in your learning process. This schedule also implies that you will have to spend significant additional time each week outside of class practicing with the software and working on the exercises, homework assignments, and projects.

### **Your Instructor**

Dr. Carsten Braun ([cbraun@wsc.ma.edu](mailto:cbraun@wsc.ma.edu) 413.572.5595)

Office: Bates 06

Office Hours: MWF, 12:15 to 13:15 (or anytime by appointment)

**→ If you feel that you are not progressing as well as you hoped, please feel free to talk to me during my office hours or a mutually convenient time – the sooner the better! Please do not wait until the end of the semester. I’m happy to support you to help you succeed.**

## **Required Resources**

### **GIS Tutorial Updated for ArcGIS 9.2: Workbook for Arc View 9, 2<sup>nd</sup> edition**

- W.L. Gorr and K.S. Kurland.
- ISBN 978-1589481787, 354 pp., ESRI Press July 2007, \$69.95.
- Available at the WSC bookstore.

This excellent tutorial/textbook includes a series of chapters, exercises and assignments to provoke critical thinking and develop quantitative problem-solving skills using a GIS.

Please note: This is the 2<sup>nd</sup> edition of this textbook, updated for ArcGIS 9.2, and not the same book used in this course one year ago.

Please note: The GIS Tutorial includes two CD's. One CD contains the necessary exercise data, the other CD contains a free 180-day fully-functional version of ArcView 9.2 – a great deal! The data and software are provided for you in the computer lab (Wilson 139). However, if you are planning to use the data and software on your own computer (highly suggested!) – then do **NOT** purchase a used copy of this book (the software may not work anymore).

### **A USB thumb-drive/memory stick**

- A USB thumb-drive or memory stick is required for this class (in order to save your data, exercises, assignments, and projects).
- USB thumb-drives/memory sticks are available from the WSC bookstore, from local retailers (e.g. Staples, BestBuy, etc.), and from a variety of online vendors.
- Suggested size: 1GB and greater; approximate cost: \$25 and up.
- A USB thumb-drive or memory stick is also useful for your other classes.

### **A notebook and 3-ring binder**

- To create and continuously update your own personal GIS tutorial/help function. The software comes with a very comprehensive help function, but it is always more efficient to write down your own tricks and procedures.
- To organize hand-outs and printed maps.

## **Course Logistics – The Big Picture**

This is a “hands-on” class → Practice! Practice! Practice! Geospatial databases (i.e. GIS) are fairly complex – “learning-by-doing” is therefore the most appropriate and efficient teaching/learning method. We will create and foster a cooperative learning environment in-class and beyond by supporting each other in order to understand concepts and to solve problems.

One of the best techniques to learn yourself is by teaching others! I encourage you to collaborate with other students in-class, on the assignments, and the

projects. However, at the end, you are always responsible to hand-in your own original work and dead lines.

I expect a high level of individual effort and engagement, especially when it comes to the in-class exercises, assignments/exercises, and projects. What you get out of this class is primarily a function of the amount of effort you put in. This is not a class where you can sit back and wait for “learning to happen”. In this course, you have to consistently and actively engage with the tasks, questions, assignments/exercises, and projects in order to (a) learn to use the GIS software and (b) to understand what a GIS can do for you.

**→ If you feel that you are not progressing as well as you hoped, please feel free to talk to me.**

## **Course Logistics – Details**

Each week is broadly arranged around a corresponding chapter in the GIS Tutorial (see course schedule below). There will be a short introduction lecture and a review of the previous week’s topics and assignments (as needed). I may arrange for (a) guest speaker(s) – GIS professionals who actually use GIS as part of their daily work. Dates tbd.

Each chapter of the GIS Tutorial takes you through a series of tasks and steps to familiarize yourself with the topic/theme of the chapter. Once you’re finished with that particular section, you can start with the homework assignment or work on the projects. It remains your responsibility to complete the homework assignments and projects by the assigned due date. About half of the homework assignments are taken from the GIS Tutorial, the other half are specially designed to practice important GIS skills.

### **Short Projects**

The three short projects (see course schedule) are designed to further practice important aspects of GIS.

- 1) Demographics of Western Massachusetts cities.
- 2) “Lying with Maps”
- 3) Congressional Districts in Massachusetts.

### **MassGIS Project**

The MassGIS project involves downloading different types of data from the MassGIS WWW site and creating a series of meaningful maps, graphs, and reports related to land use changes over time. We will dedicate the class on December 11 to project presentation and discussion.

### **Final Project**

The Final Project will take you through a series of tasks and steps in order to plan, conduct, and interpret a “real” GIS project. You will receive the Final Project on

Thursday, December 13 (last GARP 0244 class) and you can start immediately. The Final Project is due Tuesday, December 18 at 12:00 noon.

## **Assessment**

Your final course grade is a function of your performance throughout the entire semester and combines the 9 homework assignments, the three short projects, the MassGIS project, and the Final Project. You will not “flunk” this course based on any one poor grade. If you are concerned about your grades or performance in the course – please talk to me.

Please note: Grading is a time-consuming process – please allow at least one week for the results to be ready.

- 9 homework assignments. 30 percent of your final grade.
- 3 short projects. 30 percent of your final grade.
- MassGIS project. 30 percent of your final grade.
- Final project. 10 percent of your final grade.

Please note: The assigned due dates are mandatory – I will deduct 5 points for each late day. No exceptions.

<b>Letter</b>	<b>Points</b>	<b>Letter</b>	<b>Points</b>	<b>Letter</b>	<b>Points</b>
A	93 to 100	B-	80 to 82	D+	67 to 69
A-	90 to 92	C+	77 to 79	D	63 to 66
B+	87 to 89	C	73 to 76	D-	55 to 62
B	83 to 86	C-	70 to 72	F	<55

**→ There are no tests, quizzes, or exams in this course.**

## **The Fine Print**

- Attendance is mandatory.
- The required resources are mandatory.
- The due dates are mandatory.
- Please be on time (i.e. get there before class starts).
- Don't leave before the end of class.
- Turn off your electronic gizmos.
- If you have to miss class – please inform me beforehand.

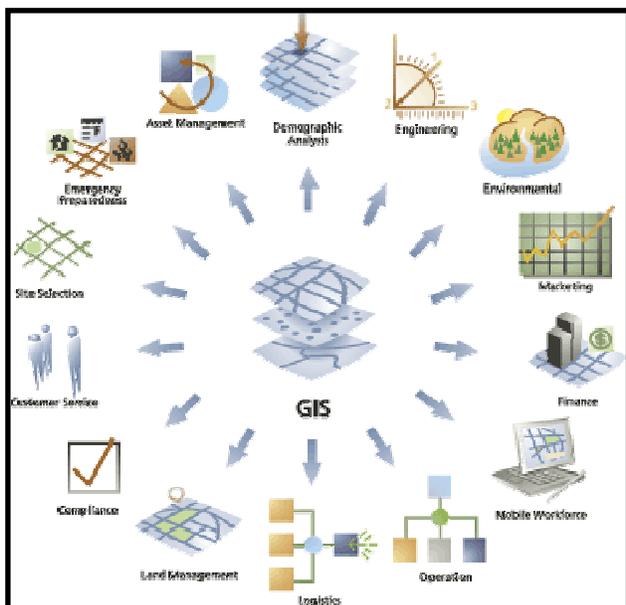
## **Notes on the Course Schedule**

- Tuesday, November 13 (Week 11) follows a Monday schedule at Westfield State College – no GARP 0244 class that day.
- No GARP 0244 class on Thursday, November 22 (Thanksgiving Recess).
- Last GARP 0244 class: Thursday, December 13.

## Class Schedule

Week	Date	Topic/Theme	In-Class Task(s)	Assignment
Week 1	Th 09/06	What Is GIS? Class Logistics	Online research	HW #1
Week 2	Tu 09/11 Th 09/13	What is GIS? (In-class project)	Online research Presentations	HW #2
Week 3	Tu 09/18 Th 09/20	Introduction to ArcMap and ArcCatalog	GT Ch. 1	HW #3 (Ex. 1.1)
Week 4	Tu 09/25 Th 09/27	GIS Map Design: Choropleth Maps	GT Ch. 2	HW #4 (Ex. 2.1)
Week 5	Tu 10/02 Th 10/04	GIS Outputs	GT Ch. 3	HW #5 (Ex. 3.1)
Week 6	Tu 10/09 Th 10/11	Start with Project 1: Cities in Western MA Start with Project 2: Lying with Maps		HW #6
Week 7	Tu 10/16 Th 10/18	Importing Data into a GIS	GT Ch. 5 Explore MassGIS	HW #7
Week 8	Tu 10/23 Th 10/25	Start with Project 3: Congressional Districts in Massachusetts		Work on Projects 1-3
Week 9	Tu 10/30 Th 11/01	Digitizing	GT Ch. 6	HW #8
Week 10	Tu 11/06 Th 11/08	Spatial Data Processing	GT. Ch.8 MassGIS Project	Work on Projects
Week 11	Th 11/15	Spatial Analysis	GT Ch. 9	Work on Projects
Week 12	Tu 11/20	Spatial Analysis	GT Ch. 9	<b>Projects 1-3 due MassGIS Project Progress Report due</b>
Week 13	Tu 11/27 Th 11/29	Where is it? (Geocoding)	GT Ch. 7	HW #9
Week 14	Tu 12/04 Th 12/06	Geodatabases Work on MassGIS Project	GT Ch. 4	<b>MassGIS Project due 12/06</b>
Week 15	Tu 12/11 Th 12/13	Project Presentation Start Final Project		

**Note: The Final Project is due Tuesday, December 18 at 12:00 noon.**

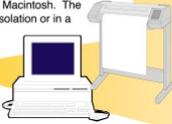


A Geographic Information System (GIS) links locational (spatial) and database (tabular) information and enables a person to visualize patterns, relationships, and trends. This process gives an entirely new perspective to data analysis that cannot be seen in a table or list format. The five components of a GIS are listed below.

## HARDWARE

The hardware is the computer and peripherals on which the GIS operates. Today, this could be a centralized computer server running the UNIX or Windows NT operating systems, a desktop PC, or an Apple Macintosh. The computer may operate in isolation or in a networked configuration.

- Computers
- Networks
- Peripheral Devices
- Printers
- Plotters
- Digitizers



## SOFTWARE

GIS software provides the functions and tools users need to store, analyze, and display geographical information. The key software components are

- GIS Software
- Database Software
- OS Software
- Network Software



## DATA

One of the most important component of GIS is the data. It is absolutely essential that data be accurate. The following are different data types:

- Vector Data
- Raster Data
- Image Data
- Attribute Data



# GIS

## PEOPLE

GIS technology is clearly of limited value without people to manage the system and to develop plans for applying it. Users of GIS range from highly qualified technical specialists to planners, foresters, and market analysts who use GIS to help with their everyday work.

- Administrators
- Managers
- GIS Technicians
- Application Experts
- End Users
- Consumers



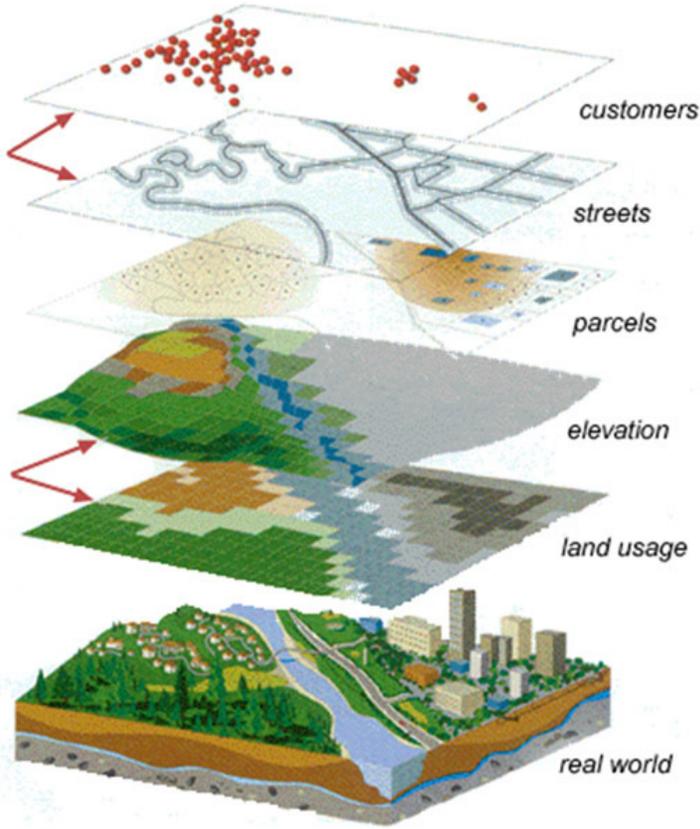
## METHODS

Methods are well designed plans and application-specific business rules describing how technology is applied. This includes the following:

- Guidelines
- Standards
- Procedures



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