Advanced Geographical Information Systems (GIS)

(GARP 0344, 3 credits)

What is "Advanced GIS"?

This course builds upon the skills and knowledge you acquired during the "Introduction to GIS" course. I prefer to think of "Advanced GIS" as "Advanced and Applied GIS" in the sense that the content of this course is designed to be applicable to your own interests and needs.

Essentially, we are taking GIS beyond merely dealing with specific tasks and problems and extending our application towards larger problems and projects – using GIS as a tool.

We will spend the first few weeks of the semester refreshing our knowledge of ArcGIS and then explore new themes/aspects of GIS, for example joining/relating of attribute tables, map projections, digital elevation models, 3-D mapping, site location analysis, GPS mapping, and georeferencing.

➔ **Success in this course depends entirely on your own motivation!**

Dates/Times/Location

Monday	16:30 to 18:00	Wilson 139
Wednesday	16:30 to 18:30	Wilson 139

Throughout the semester, it will/may be necessary to meet (occasionally) at different/longer times/locations in order to complete some of the (GPS) mapping and data collection tasks in the field. It may also be necessary (and beneficial) to meet on the weekend.

We will make every effort possible to account/compensate for everyone's needs and responsibilities when scheduling extra/longer meetings.

Your Instructor

Dr. Carsten Braun (cbraun@wsc.ma.edu 413.572.5595)
Office: Bates 06 (basement, next to the lab room)
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! My job is to help you succeed.

Textbook: Getting to Know ArcGIS Desktop (Second Edition)

Basics of ArcView, ArcEditor, and ArcInfo, Updated for ArcGIS 9
Ormsby, Napoleon, Burke, Groess, and Feaster
ESRI Press, 2004, ISBN: 1-58948-083-X, 588 pages
Available from amazon.com or others ($39.57)

We will not cover every single chapter of this book, but rather focus on selected aspects and themes. This book, however, is an invaluable resource and reference book to supplement the extensive help functions included in ArcGIS.

Each book chapter contains conceptual material followed by scripted software exercises. Readers acquire skills in a variety of areas—map symbology, data overlay, map projection, and data conversion, to name a few—as they make maps and analyze geographic data. The book culminates with a set of spatial modeling exercises using the ModelBuilder technology of ArcGIS version 9. ModelBuilder is a graphical environment for representing, automating, and solving spatial analysis problems.

Included with the book is a fully functioning 180-day trial version of ArcView 9.1 software on CD-ROM, as well as a CD of data for working through the book's exercises. Once installed and registered, the single-use software cannot be reinstalled, and the time limit cannot be extended.

In addition, we will be using three tutorials published by ESRI. These tutorials (and the associated data) are available on each PC and on the server.

1. ArcGIS 9 Getting Started With ArcGIS
2. ArcGIS 9 Using ArcGIS 3D Analyst
3. ArcGIS 9 Using ArcGIS Spatial Analyst

These (and other excellent books and manuals) are also available as hard copies from ESRI (prices vary between $20 and $50 each).
http://store.esri.com/esri/category.cfm?SID=2&Category_ID=27

Other Required Resources

1. A USB memory stick / thumb-drive. Capacity: 1 GB or greater. Available everywhere.
2. A notebook.
3. A three-ring binder to organize notes and hand-outs.

Projects

In addition (and in parallel) to the course schedule (see below), we will be working on six projects over the course of the semester. These projects will form the basis for your evaluation.

Project #1: Review Project
"Getting Started with ArcGIS" (Chapters 4 to 8). The scenario for this project involves finding the best site for a new wastewater treatment plant for the fictitious city of Greenvalley. This project provides an excellent review of the skills and tools learned in the fall. It also introduces you to a range of new tricks and skills, which you can further explore in the other projects.
Start Date: 01/29/2007
Due Date: 03/07/2007
10 percent of your final grade

Project #2: Spatial Analyst Project (Site Location Analysis)
"Using ArcGIS Spatial Analyst" (Exercises 1 to 3). This project and tutorial will introduce you to many of the available tools in ArcGIS Spatial Analyst and will give you a solid basis from which you can start to think about your own specific site location analysis.
Start Date: 03/26/2007 (or sooner)
Due Date: 04/18/2007
10 percent of your final grade

Project #3: Demographics Project

Analyze population demographics for U.S. cities, counties, and states and create a series of choropleth maps depicting population patterns of interest.

Start Date: 02/05/2007
Due Date: 03/07/2007
10 percent of your final grade

Project #4: Digital Elevation Model (DEM) Project

Here, you will create a series of 3-dimensional maps (using a digital elevation model) for towns located in the Westfield River watershed. Topographic maps, aerial photographs, and vector data can be "draped" over a DEM to visualize the landscape in 3-D. In addition, you will derive quantitative topographic data (e.g. slope, aspect, etc.) to serve as a basis for site location analysis.

Start Date: 03/19/2007
Due Date: 04/18/2007
15 percent of your final grade

Project #5: (Group) Mapping Project at WSC

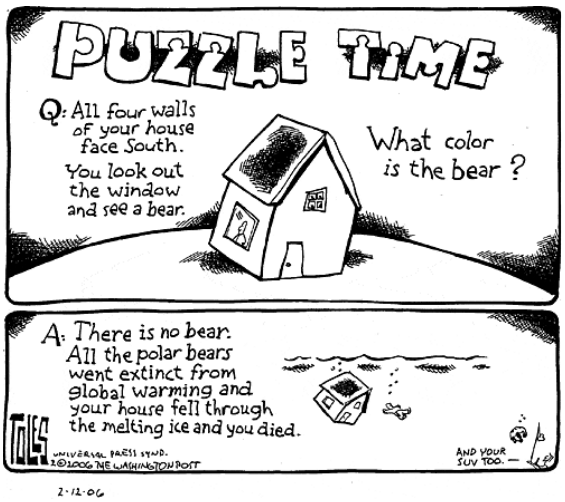
In small groups, we will create an original map of an area of interest on/near campus. We will collect the spatial data using GPS, supplemented by appropriate attribute data. Possible mapping tasks include: mapping the proposed new access road to campus from Route 20, trail mapping/environmental mapping in Stanley Park, mapping the environmental walk along the north side of campus.

Start Date: 04/02/2007 (or sooner!)
Due Date: 05/02/2007
25% of your final grade

Project #6: Your own GIS Project

Anything goes (with prior approval!). You should plan, conduct, and complete this project on your own (exceptions require prior approval!), but you can share resources and skills with other students in the class.

Start Date: asap!
Project Proposal due: 02/28/2007 (What? Why? How? Deliverable?)
Due Date: 05/02/2007
Project Presentations 05/07 and 05/09 2007



Spring 2007 Schedule

Week	Class	Date	Theme	Details / Assignments
Week 1	Class 1	1/17 (We)	Course Overview	Monmonier (2005), Ch.1/2/3/4
Week 2	Class 2	1/22 (Mo)	"Lying with Maps"	Choropleth maps MA, Ch.5/6/7
	Class 3	1/24 (We)	"Lying with Maps"	Choropleth maps MA, Ch.5/6/7
Week 3	Class 4	1/29 (Mo)	Review Project I	Finish Ch. 1/2/3/4/5/6/7
	Class 5	1/31 (We)	Review Project II	Finish Ch. 1/2/3/4/5/6/7
Week 4	Class 6	2/5 (Mo)	Attribute Table Queries I	Ch.8, Demographics Project
	Class 7	2/7 (We)	Attribute Table Queries II	Ch.8, Demographics Project
Week 5	Class 8	2/12 (Mo)	Tables: Joins/Relates	Ch.9 + GIS Tutorial
	Class 9	2/14 (We)	Tables: Joins/Relates	Ch.9 + GIS Tutorial
Week 6	Class 10	2/20 (Tu=Mo)	(Map) Projections I	Ch.13 + MassGIS
	Class 11	2/21 (We)	(Map) Projections II	Ch.13 + MassGIS
Week 7	Class 12	2/26 (Mo)	DEM: Introduction	Mount St. Helens: Before/After
	Class 13	2/28 (We)	DEM: Visualization	Using ArcGIS 3D Analyst
Week 8	Class 14	3/5 (Mo)	DEM: Quantification	Using ArcGIS 3D Analyst
	Class 15	3/7 (We)	Finish Projects	Project #1 / #3 are due
Week 9		*3/12 (Mo)*	*Spring Break*	
		3/14 (We)	*Spring Break*	
		3/16 (Fr)	*Spring Break*	
Week 10	Class 16	3/19 (Mo)	MassGIS: DEM	Creating a DEM for Western MA
	Class 17	3/21 (We)	MassGIS: DEM	Creating a DEM for Western MA
Week 11	Class 18	3/26 (Mo)	Site Location Exercise	Using ArcGIS Spatial Analyst
	Class 19	3/28 (We)	Site Location Exercise	Using ArcGIS Spatial Analyst
Week 12	Class 20	4/2 (Mo)	Mapping with GPS I	Basics of GPS
	Class 21	4/4 (We)	Mapping with GPS II	Data Collection / Attribute Data
Week 13	Class 22	4/9 (Mo)	Mapping from Home	Google Earth, Terraserver, etc.
	Class 23	4/11 (We)	Georeferencing	Making new base maps
Week 14		*4/16 (Mo)*	*Patriots Day (No class)*	
	Class 24	4/18 (We)	Work on Projects	Project #2 / #4 are due
Week 15	Class 25	4/23 (Mo)	Work on Projects	
	Class 26	4/25 (We)	Work on Projects	
Week 16	Class 27	4/30 (Mo)	Work on Projects	
	Class 28	5/2 (We)	Work on Projects	Project #5 / #6 are due
Week 17	Class 29	5/7 (Mo)	Project Presentations	
	Class 30	5/9 (We)	Project Presentations	

Notes on the Schedule

- Adjustments to the course schedule may be required to account for unforeseeable situations during the semester.
- Tuesday (02/20/2007) follows a Monday schedule at WSC.
- Monday (04/16/2007) is Patriots Day holiday in the Commonwealth of Massachusetts. Go to Boston and watch/run the marathon!

➔ **Refer to the Spring 2007 course booklet and academic calendar for more information**

The Fine Print…

- Please be on time (i.e. get there before class starts).
- Don't leave before the end of class.
- Turn off your cell phones.
- Attendance is Mandatory.

➔ The Three Secrets To Success: (1) Mutual Respect, (2) Shared Responsibilities, and (3) Proactive Communication.

Westfield State College Academic Calendar

SPRING SEMESTER 2007	
Martin Luther King's Birthday (No Classes)	Monday, January 15
Classes Begin	Tuesday, January 16
President's Day (No Classes)	Monday, February 19
Tuesday follow Monday Schedule	Tuesday, February 20
Session A Classes End	Friday, March 9
SPRING BREAK	Monday, March 12 - Friday March 16
Session B Classes Begin	Monday, March 19
Patriot's Day, Observed (No Classes)	Monday, April 16
Last Day of Classes	Wednesday, May 9
Exam Period Begins	May 10, 11, 14, 15
Senior Grades Due	Wednesday, May 16
Commencement	Saturday, May 19
All Other Grades Due by Noon	Tuesday, May 22