

CRP 386-01492: Introduction to Geographic Information Systems: Participation and Social Implications

Fall 2006

School of Architecture, University of Texas, Austin

Lecture: MW 1:00-2:00 Sutton 2.114	Instructor: Bjørn Sletto bjornsletto@mail.utexas.edu	TA: Ahmed Abukhater abukhater@mail.utexas.edu
Lab: Th 6:30-9:30 pm Sutton Computer Lab	Sutton 3.144 Phone: 607/853-0770 Office hours: Th 6:30-9:30 pm	Sutton 3.114 Phone: 512/471-0124 Office hours: T 5:00-7:00 pm

Required textbooks:

Ormsby et al. 2004. Getting to Know ArcGIS Desktop, 2nd Edition (ArcGIS 9.1).
Redlands: ESRI Press.

Required articles:

CRP 368 Course Reader

Required course materials:

One flash drive (512mb minimum) to save your work.

Recommended text:

Heywood et al. 2002. *An Introduction to Geographical Information Systems*. New York: Prentice Hall.

Course Description

This course consists of two major components—the social dimensions of GIS and the techniques of GIS—which will speak to each other in ways that are not typical in a GIS course. The intent is to teach skills that will make you fluent in the uses of GIS, but also to help you understand the role that GIS, and you, as a GIS specialist, play in society.

Social dimensions of GIS: GIS is a very powerful technology that is widely used in city and regional planning, as well as in business management, in environmental management, and for strategic purposes and warfare. Since it is such a powerful technology, the uses of GIS have many important social implications: who controls the technology and what GIS are being produced and for what reasons, and how can disenfranchised groups access and use these technologies to better their conditions? We will discuss issues such as “empowerment,” citizen participation, and organizational, political, and economic constraints, to better understand the role of GIS in society *and* the influence of the social environment on GIS applications and development.

Techniques of GIS: We will introduce the fundamentals of Geographic Information Systems (GIS), including important sources of data, data acquisition and entry, data and spatial analysis using GIS, and production and representation of spatial data using GIS. We will also give a brief introduction to remote sensing analysis and the principles and uses of the Global Position System (GPS), using spatial analysis functions in ArcGIS. The techniques component of the course will in part be taught with lectures in the classroom, and in part through exercises in the GEDDES lab.

You should be prepared for a course that is challenging in many (good) ways. There’s no denying you’ll have a lot of reading and you need to spend many hours in lab each week. But you also need to get used to question the limitations of GIS, participate in class discussions, and

think carefully about the pros and cons of the ways in which GIS has been applied in the real world. You will have writing assignments, not just technical labs. This means you need to stay on top of the work and come to lectures regularly. If you start missing labs, you will quickly fall behind. I intend for you to leave this class technically proficient, with the skills necessary to ask good questions and solve difficult planning problems, *and* with an awareness of the power and limitations of GIS that is not common among GIS practitioners. The idea is not to simply be a “good” GIS analyst, but an intelligent and critical GIS analyst.

Assignments and workload

1. Lab assignments

You will have 6 lab assignments, the last of which you will finish three weeks before the semester is over. You should read through the labs in GTKArcGIS before the lab, so you are better prepared and you can maximize your lab time. See lab schedule, attached.

2. Lab exercises

As you complete the lab exercises in your textbook, *Getting to Know ArcGIS Desktop*, your TA will review your work and give you credit for completing the exercise. You should save your exercise using “Save As” on your hard drive as a separate file for the TA to review, before you proceed to the next exercise. Monitoring your work progress in the lab is as important as the result. The exercises must be completed on the day of the lab. You will be downgraded by one grade point (e.g. from A to B) if you do not complete the exercises—i.e. if you don’t come to lab without an acceptable excuse. All exercises can easily be completed within the lab period.

3. PPGIS/WEB GIS presentation

We will be spending a couple of weeks talking about Web-based GIS and public participation in GIS, and to round off this part of the semester, you will work in groups of up to three students to research and present a PPGIS or Web GIS project. See presentation format, attached.

4. Response paper

You are also required to write a 2- to 3-page “response” paper to comment about the readings. See instructions attached.

5. Final project

For your final project, you will combine your GIS skills *and* your insights into the theory and social implications of GIS. For instance, you may wish to research a social, environmental, economic, or other issue that has important empowerment or equity implications, and use GIS to represent alternative perspectives and planning solutions for this problem. Or you can choose a local issue or work on a regional case of your own interest. We will discuss the final project in more detail as the course progresses, and we will devote two days to talking about your project ideas in class.

Due dates

All lab assignments are due at the *beginning* of the lab session. Late lab assignments (i.e. if you turn in the assignment after the lab has started) will automatically be downgraded by 10% (up to one week) and 25% (after one week) unless there is a medical or family emergency. Disabling of computer lab accounts due to violation of lab rules will not be accepted as an excuse.

Lab assignments:

Lab 1: Thursday, September 14.

Lab 2: Thursday, September 21.

Lab 3: Thursday, October 5.

Lab 4: Thursday, October 12.
Lab 5: Thursday, November 2.
Lab 6: Thursday, November 16.

Response paper:

Monday, October 2.

PPGIS/WEB GIS Project:

Choose website and post on discussion board: Friday, October 27, by 6:00 p.m.

Presentation: Monday, November 6.

Final project:

Preliminary discussion: Monday, October 16.

Outline and data sources: Tuesday, November 19, by 6:00 pm.

Final presentations: Wednesday, December 13-Friday, December 15.

Final project due date: Friday, December 15, by 5:00 pm.

Participation

For this course to work well, it's important that everyone participates in class discussions, asks questions, and engages critically with the readings. When we discuss the social implications of GIS, I want you to express your own ideas and critiques and pose your own questions about the power and limitations of GIS. I also believe in grading for effort. We will take attendance in lab through the exercise grade, but not in lecture (it's your decision to invest effort in this course, and your level of effort will inevitably be reflected in your grade), although I will give you extra marks for your enthusiasm, engagement, and attitude in class. After all, we are all here to share our ideas and learn and grow together.

Grading

Grades are calculated on the following basis:

Response paper	10%
PPGIS presentation	10%
Lab assignments (6)	30%
Lab exercises	10%
Final project	40%
Positive attitude and engagement	Maybe enough to make a difference...

Note on the schedule

I will bring guest speakers to class and the syllabus might be slightly adjusted, depending on their availability. In particular, readings might be due a few days later. To keep this class current, I also regularly research and communicate with colleagues about the latest in GIS applications and resources, which might lead me to revamp the schedule. We will always discuss any postponement in due dates early on; no assignment will be due earlier than indicated here.

Policy on Scholastic Dishonesty

Students who violate University rules on scholastic dishonesty are subject to disciplinary penalties, including the possibility of failure in the course and/or dismissal from the University. Since such dishonesty harms the individual, all students, and the integrity of the University, policies on scholastic dishonesty will be strictly enforced. For further information please visit the Student Judicial Services Web site:
<http://deanofstudents.utexas.edu/sjs>.

LECTURE SCHEDULE

PART I: MAPS, GIS and POWER

- Wed., Aug. 30:** **Course introduction, logistics and getting to know each other**
- Wed., Sept.6:** **Introduction to GIS: History and economics of GIS**
Clarke, "What is a GIS," pp. 2-10 in *Getting Started with Geographic Information Systems*.
Chrisman, "What does 'GIS' Mean?" pp. 175-186 in *Transactions in GIS* 3 (2), 1999.
Longley et al., "Systems, science and study," pp. 10-26 in *Geographic Information Systems and Science*.
GTK ArcGIS Chapters 1 and 2.
- Mon., Sept. 11:** **Introduction to GIS: Components, Data, and Applications**
Greenman, "Turning a map into a layer cake of information," *New York Times*, January 20, 2000.
Longley et al., "A gallery of applications," pp. 27-58 in *Geographic Information Systems and Science* (skim).
Heywood, Ch. 2, pp. 20-44.
- Wed., Sept. 13:** **Map production: layout, design, symbolization, classification**
Wright, "Map Makers are Human," pp. 527-544, in *Geographical Review*, 32 (4), 1942.
Monmonier, "Map goals, map titles and creative labeling," pp. 92-117 in *Mapping It Out*.
Longley et al., "Visualization and user interaction," pp. 248-260 in *Geographic Information Systems and Science*.
Heywood, Ch. 8, 155-170.
- Mon, Sept. 18:** **Maps and geography: Lies, Truth, and the Power of Representation**
Crampton, "Maps as social constructions," pp. 235-252 in *Progress in Human Geography* 25 (2), 2001.
Harley, "Deconstructing the map," pp. 231-247 in *Writing Worlds*.
Monmonier, pp. 1-4, 88-99, and 157-159 in *How to Lie with Maps*.
- Wed., Sept. 20:** **Measuring the world: projections, datums, coordinate systems, address matching and other cartography basics**
Longley et al., "Georeferencing," pp. 79-96 in *Geographic Information Systems and Science*.
Heywood, pp. 27-31.

PART II: PLANNING AND GIS: CRITICAL PERSPECTIVES

- Mon. Sept. 25: Proposal and project development**
- Wed., Sept 27: GIS, planning, and rationality**
O’Looney, “GIS and decision making,” pp. 19-38, in *Beyond Maps*.
Kent and Klosterman, “GIS and mapping: pitfalls for planners,” pp. 189-198, in *APA Journal* 66 (2): 2000.
Flyvbjerg, “Bringing power to planning research,” pp. 353-366, in *Journal of Planning Education and Research* 21, 2002 (skim).
- Recommended:
Aitken and Michel, “Who contrives the “real” in GIS?” pp. 17-29, in *Cartography and Geographic Information Systems* 22 (1), 1995.
Sheppard, “GIS and society,” pp. 5-16, in *Cartography and Geographic Information Systems* 22 (1), 1995.
- Mon., Oct. 2: Data sources and acquisition: Web sources, private sources, GPS, and remote sensing**
Longley et al., “GIS data collection,” pp. 205-224 in *Geographic Information Systems and Science*.
Heywood, Ch. 5, pp. 89-108.
- Wed., Oct. 4: Data acquisition and input continued: public data, TIGER files and census data.**
- Guest speaker: Ryan Robinson, demographer, City of Austin**
- Mon., Oct. 9: Data acquisition and management**
Monmonier, “Statistical maps, data scaling and data classification,” pp. 158-185 in *Mapping It Out*.
Heywood, Ch. 4, pp. 71-87.
- Wed., Oct. 11: Attribute data management**
Heywood Ch. 4, pp. 71-87.
Heywood, Ch. 6, 109-135.
- Mon., Oct. 16: Preliminary discussion of final projects.**

PART III: ACCESS, EQUITY, and the INTERNET

Wed., Oct. 18:

Introduction to PPGIS

Aberley, "The Lure of Mapping: An Introduction," pp. 1-7, in *Boundaries of Home*.

Sawicki and Craig, "The democratization of data," pp. 512-523, in *APA Journal* 62(4), 1996.

Abbot et al., "Participatory GIS: opportunity or oxymoron?" in *PLA Notes* 33, 1998.

Recommended:

Talen, "Bottom-up GIS," in *Journal of the American Planning Association* 66 (3), 2000.

Mon., Oct. 23:

PPGIS: The Internet and WebGIS

Ghose, "Use of information technology for community empowerment," pp. 141-163 in *Transactions in GIS* 5 (2), 2001.

Elwood, "GIS use in community planning," pp. 905-922 in *Environment and Planning A* 34, 2002.

Parker, "Living neighborhood maps: the next wave of local community development."

Recommended:

Sui and Goodchild, "GIS as media?" pp. 387-390 in *International Journal of Geographical Information Science* 15 (5), 2001.

Guest speaker: Dr. Gary Chapman, LBJ School, UT

Wed., Oct. 25:

Introduction to remote sensing and raster-based data analysis

Turner and Taylor, "Critical reflections on the use of remote sensing and GIS technologies in human ecological research," pp. 177-182 in *Human Ecology* 31 (2), 2003.

Recommended:

Turner, "Methodological reflections on the use of remote sensing and geographic information science in human ecological research," pp. 255-279 in *Human Ecology* 31 (2), 2003.

Mon., Oct. 30:

Buffering and geoprocessing

Guest speaker: Matt Hollon, Program Manager, Planning and Watershed Protection & Development Review, City of Austin

PART IV: SCIENCE, RESEARCH, AND GIS

- Wed., Nov. 1: Indigenous territoriality and GIS applications**
Herlihy and Knapp, "Maps of, by, and for the Peoples of Latin America," pp. 303-314, *Human Organization* 62 (4), 2003.
Poole, "Indigenous lands and power mapping in the Americas," in *Native Americas* 15 (4), 1998.
- Recommended:
Hodgson and Schroeder, "Dilemmas of counter-mapping community resources in Tanzania," pp. 79-100 in *Development and Change* 33, 2002.
- Mon., Nov. 6: PPGIS/WEB GIS: Presentations and discussion**
- Wed., Nov. 8: GPS introduction and practice.**
- Mon., Nov. 13: GPS guest speaker: David Salisbury, Geography, UT.**
- Wed., Nov. 15: GIS, participatory development and local knowledge**
Tripathi and Bhattarya, "Integrating indigenous knowledge and GIS for participatory natural resource management," pp. 1-13 in *EJISDC* 17 (3), 2004.
Dunn et al., "GIS for development: a contradiction in terms?" pp. 151-159 in *Area* 29 (2), 1997.
- Recommended:
Agrawal, "Dismantling the divide between indigenous and scientific knowledge," in *Development and Change* 26, 1995.
- Possible guest speaker: Dr. Rodrigo Sierra, Geography, UT.**
- Mon., Nov. 20: Preliminary presentations of final project. Sign up for individual meetings.**
- Wed., Nov. 22: Thanksgiving, no class!**
- Mon., Nov. 27: Environmental and social justice and GIS**
Faber, "The Struggle for Ecological Democracy and Environmental Justice," pp. 1-26, in *The Struggle for Ecological Democracy*.
Harris et al., "Pursuing social goals through participatory geographic information systems," pp. 196-222 in *Ground Truth*.
- Recommended:

Weiner and Harris, "Community-integrated GIS for land reform in South Africa," paper presented at GISOC, June 1999.

Stonich, "Information technologies, PPGIS, and advocacy," paper presented at the PPGIS Specialist Meeting, October 1998.

Wed., Nov. 29:

Data quality: precision/accuracy, reliability, and metadata

Chrisman, "Speaking truth to power," pp. 27-31 in *Spatial Accuracy Assessment*, ed. Lowell and Jatton.

Veregin, "Data quality parameters," pp. 177-189 in *Geographical Information Systems*, ed. Longley et al. (skim).

Recommended:

Couclelis, "The certainty of uncertainty," pp. 165-175 in *Transactions in GIS* 7 (2), 2003.

Mon., Dec. 4:

Map design critique. Guest reviewer: Dr. Anne Beamish, UT School of Architecture.

Wed., Dec. 6:

Future of GIS: Control, access, and technological developments

Sheppard et al., "Geographies of the information society," pp. 797-823 in *International Journal of Geographic Information Science* 13 (8), 1999.

Heywood, Ch. 13, pp. 253-265.

Longley et al., "Epilog," pp. 437-448 in *Geographic Information Systems and Science*.

Recommended:

Carver, "The future of participatory approaches using geographic information," ESF-NSF meeting, December, 2001.

PART V: FINAL PRESENTATIONS

Wed., Dec. 13:

Final presentations (times to be announced)

Thu., Dec. 14:

Final presentations (times to be announced)

Fri., Dec. 15:

Final presentations (times to be announced)

LAB SCHEDULE

- August 31:** Introduction to the computer lab, lab administration and rules, managing folders and data, finding GIS resources online.
- September 7:** **ArcGIS Basics.**
Read GTK ArcGIS Chapters 1 and 2.
Work through GTK Exercise 3a, b, c, and 4a, b, c.
Begin Lab Assignment #1.
- September 14:** **Designing maps I.**
Work through GTK Exercise 5a, b, c, d and 6a, b, c, d.
Begin Lab Assignment #2.
Lab Assignment #1 due at the beginning of the lab.
- September 21:** **Designing maps II.**
Work through GTK Exercise 13 a, b, and c.
Begin Lab Assignment #3.
Lab Assignment #2 due at the beginning of the lab.
- September 28:** **Projections and address matching.**
Work through GTK Exercise 17a, b, c
Continue working on Lab Assignment #3.
Begin Lab Assignment #4.
- October 5:** **Address matching continued.**
Continue working on Lab Assignment #4.
Lab Assignment #3 due at the beginning of the lab.
- October 12:** **Attribute data management.**
Begin Lab Assignment #5.
Work through GTK Exercise 8a, b, c.
Lab Assignment #4 due at the beginning of the lab.
- October 19:** **Attribute data management.**
Work through GTK Exercise 9a, b; and 10a, b.
Continue working on Lab Assignment #5.
- October 26:** **Spatial analysis.**
Suitability analysis exercise.
Continue working on Lab Assignment #5.

- November 2: Geoprocessing and buffering.**
Work through GTK Exercise 11a, b, c, d and 12a, b, c.
Begin Lab Assignment #6.
Lab Assignment #5 due at the beginning of the class.
- November 9: Creating and editing features, GPS methods and adding GPS data.**
Work through GTK Exercise 15a, b and 16a, b, c.
GPS exercise.
- November 16: No lab.**
Lab Assignment #6 due by Noon, November 17, in my mailbox in Goldsmith Hall, Dean's office.
- November 23: Thanksgiving, no lab.**
- November 30: Work on final projects. Individual meetings with TA.**
- December 7: Work on final projects. Individual meetings with TA.**

Wed., Dec. 13:	Final presentations (times to be announced)
Thu., Dec. 14:	Final presentations (times to be announced)
Fri., Dec. 15:	Final presentations (times to be announced)

FORMAT FOR RESPONSE PAPER

Due date: Monday, October 2.

General notes:

Response papers are *not* simply summaries of the readings. It is very important that you use only one paragraph to summarize the paper(s) you are going to “respond” to, and use the rest of the paper for your analysis and critique. Also note that you should refer to all of the readings in your paper. You should be thinking critically about the papers you have read and try to analyze the arguments that were made: do you see any flaws in the argument, in light of the other readings or based on your experience or other readings outside class? Do you feel the argument in one particular article contradicts another reading, and if so, why? Think about the “positionality” of the writer: a GIS professional might be more likely to defend the profession and the benefits of GIS, while an academic might be thinking more critically. A community activist might be more likely to see problems with how GIS was implemented. Many of the arguments made are not necessarily “true” or “untrue.” It is more important to consider the rhetorical strength and validity of the argument.

Format:

2 pages, double-spaced, 12 point text. *Do not exceed the page limit!*

Put your name and student ID on the top of the paper.

As your title, simply put “Response Paper 1” or 2.

In your first paragraph, summarize the relevant part of the paper(s) you are going to analyze. In your last paragraph, summarize the argument you made in your paper.

Assignments:

You will be given your response paper question one week before the paper is due. To do well on your response papers, it is important to come to lecture and read the readings.

FORMAT FOR PPGIS/WEB GIS PRESENTATION

Post chosen website on the discussion board: Friday, October 27, by 6:00 pm.
Presentation: Monday, November 6.

General notes:

For this assignment, you will use the Internet to find and review different community-oriented GIS projects or programs that have a Web-GIS interface. This means projects that have an internet-based portal through which the public may access spatial data, conduct basic spatial analysis, and prepare their own maps based on the information available on the site. Projects can be domestic or international, private or public, and be urban-oriented or focus on land-use, regional, or environmental planning. We will not consider sites such as GIS/map sites used to find hotels and such, news sites where the user may track election results, for example, or other purely commercial sites.

Presentation:

You and your group member (four to five students may work together as a team) will prepare a Power Point demonstration of the site for the rest of the class. Make sure you save your links so you can go on-line during class.

Summary paper:

You will also write a 1-page summary paper of the site. You need to make a copy for me and for each class member and hand out at the time of your presentation. Include the following information in this order:

Title of the site.

Address of the site.

Name of the organization sponsoring and operating the site.

Purpose: Purpose/mission/objectives of the organization.

Summary: Brief summary of the site, including the tools available, information available, and what sorts of analyses can be made at the site.

Programs: What programs are used to operate the site.

Review: Your review of the site: how easy is it to navigate on the site, how accessible are the tools, and how useful is the data and the analyses that can be made for planning purposes.