SOCIOLOGY 1871F
PRINCIPLES AND METHODS OF GEOGRAPHIC INFORMATION SYSTEMS

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Office Hours: Mondays, 10 am to noon, and other times by appointment

Lecture Time and Location: Tuesdays, 4:00 – 6:20pm
Watson (CIT) Center 267

Course Description: This course introduces students to the tools, techniques, and underlying theories that comprise Geographic Information Systems (or GIS). The primary purpose of the course is to enable you to become enlightened producers and consumers of geographic data, analysis, and products as performed using a GIS. By the end of the course, you will be proficient in the independent use of ArcGIS, the most commonly used GIS software package. You will also be comfortable with geographic data sources and typical types of analysis conducted using a GIS. Your final course project will provide you the opportunity to develop a research topic and question that can be addressed from a spatial perspective using geographic data and analytical tools.

The course will entail a good deal of lecture material, which will cover the theory, history, and common applications of GIS. Approximately 50 percent of class-time will be devoted to the mechanics of ArcGIS, through hands-on lab exercises. Material covered in lecture will be supplemented by readings, lab exercises, and by a semester project designed to encourage you to problem-solve and work independently with ArcGIS.

Objectives: By the end of the semester, you will be able to:

- Explain what a GIS is and give examples of common applications
- Make a map, with appropriate symbology, labeling, and color schemes
- Understand characteristics of "spatial" data and have ideas where to look for such data
- Find, import, and perform analysis on data in a GIS environment
- Understand what typical GIS actions such as joins, queries, or buffers are and why we use them
- Conduct independent spatial analysis and be able to comprehend and assess spatial analysis research conducted by others
- Discuss some of the main shortcomings or issues one faces when working with a GIS

Final Project: As with most analytical tools, the best way to learn GIS (and, by extension, ArcGIS) is by completing a semester-long independent project, which will entail analysis, a written product, and a poster presentation. Important due dates are listed on the class schedule on page three of this syllabus. It is a good idea to plan to come see me to discuss your project ideas early on – that way your project proposal is more a formal statement of an agreed-upon topic than anything else. See accompanying handout for detailed project requirements and specifications.

Assignments: Most lectures will be accompanied by a lab exercise. Exercises not completed during lab time will need to be completed on your own time.

Attendance and Participation: This portion of your grade derives from being in class and participating in discussion. I expect that during lecture time, unless otherwise instructed, your attention will be directed towards me and not towards the computer screen in front of you (that means no quick peeks at email, for example!). I will provide links to slides used during lecture on our MyCourses site. These will generally be available on the day of class, if you prefer to take notes directly on copies of the slides.

Required Course Textbook: *Mastering ArcGIS*, by Maribeth Price. Additional readings will be assigned throughout the semester and will be made available on the course website through MyCourses. The Price book is useful for understanding ArcGIS but is less thorough in its coverage of GIS theory and background. Supplemental readings are geared towards filling this gap, as well as providing a grounding in the range of common GIS applications.

Course Assessment: Evaluation in the course will be based on lab assignments, a midterm exam, the final project, and classroom participation. All course materials will be available via MyCourses. Each component will be weighted as follows:

Attendance & Participation	5%
Midterm Exam	25%
Lab Assignments	35%
Project	35%

Grading: Late assignments will be penalized by a grade a day. That said, it's always better to turn an assignment in late than not at all. The midterm exam and final project will be worth 100 points. Lab assignments and project pieces (proposal, etc.) will be worth 10 points each.

Course Schedule

(Note: If necessary, schedule may be adjusted during the course of the semester)

Week	Date	Topic + Deliverable	Reading*
1	9/13	- Course housekeeping - What is (a) GIS?	
2	9/20	- Spatial Data Structures - Projections, Coordinate Systems, and Georeferencing - Working with ArcGIS	Price, Chapters 1 & 11 Burrough and McDonnell, pp. 1-34
3	9/27	- Cartography 101 - Library fieldtrip	Price, Chapters 2 & 3 Star and Estes, pp. 174-190
4	10/4	- Data: Management and Manipulation in a GIS	Price, Chapter 4 Longley et al., pp. 225-245
5	10/11	- Querying a GIS - Joins - Census Geography & Data **Project Proposals Due**	Price, Chapters 5 & 6 Fotheringham et al., pp. 30-64
6	10/18	- Common Issues with Spatial Data - Geoprocessing I	Price, Chapter 7 Rogerson, pp.12-15
7	10/25	- Geoprocessing II	Longley et al., pp. 277-302
8	11/1	- Geocoding	Price, Chapter 10
9	11/8	**Midterm Exam**	
10	11/15	- Feature Editing in ArcGIS - Metadata **Project Literature Reviews Due**	Price, Chapters 12, 13 & 15
11	11/22	- Brief introduction to Spatial Sampling, Interpolation, and Geostatistics - Raster Analysis	Price, Chapter 8
12	11/29	- Spatial Analysis - Introduction to GeoDa **Draft Projects Due**	Longley et al., pp. 303-323
13	12/6	- Network Analysis - Discussion of final projects & posters	Price, Chapter 9 Boyle (from Stillwell & Clarke), pp. 111-136
14	12/13	**Poster Presentations/ Final Projects Due**	

* To be completed in advance of that week's lecture; that is, the date shows the day the reading is "due."

Further Reading

Ackerman, W. and A. Murray (2004). "Assessing spatial patterns of crime in Lima, Ohio." Cities **21**(5): 423-437.

Bateman, I., A. Jones, et al. (2002). "Applying geographical information systems (GIS) to environmental and resource economics." Environmental and Resource Economics **22**(1): 219-269.

Benoit, D. and G. Clarke (1997). "Assessing GIS for retail location planning." Journal of retailing and consumer services **4**(4): 239-258.

Gregory, I. (2000). "Longitudinal Analysis of Age-and Gender-Specific Migration Patterns in England and Wales: A GIS-Based Approach." Social Science History **24**(3): 471.

Lovett, A., R. Haynes, et al. (2002). "Car travel time and accessibility by bus to general practitioner services: a study using patient registers and GIS." Social Science & Medicine **55**(1): 97-111.

Luo, W. and F. Wang (2003). "Measures of spatial accessibility to health care in a GIS environment: synthesis and a case study in the Chicago region." Environment and Planning B **30**(6): 865-884.

Murray, A. (2001). "Strategic analysis of public transport coverage." Socio-Economic Planning Sciences **35**(3): 175-188.

Norman, P., P. Rees, et al. (2003). "Achieving data compatibility over space and time: creating consistent geographical zones." International journal of population geography **9**(5): 365-386.

Pearce, J., K. Witten, et al. (2006). "Neighbourhoods and health: a GIS approach to measuring community resource accessibility." Journal of Epidemiology and Community Health **60**(5): 389.

Rodriguez, M., C. Sirmans, et al. (1995). "Using geographic information systems to improve real estate analysis." Journal of Real Estate Research **10**(2): 163-173.

Rosero-Bixby, L. (2004). "Spatial access to health care in Costa Rica and its equity: a GIS-based study." Social Science & Medicine **58**(7): 1271-1284.

Thill, J. (2000). "Geographic information systems for transportation in perspective." Transportation Research Part C: Emerging Technologies **8**(1-6): 3-12.

Thrall, G. (1998). "GIS applications in real estate and related industries." Journal of Housing Research **9**(1): 33-59.

Yu, D. and Y. Wei (2003). "Analyzing regional inequality in post-Mao China in a GIS Environment." Eurasian Geography and Economics **44**(7): 514-534.