
Public Policy 1700; Section 1

GIS and Public Policy

Spring, 2008
3-5:20 p.m. Monday

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Office Hours: 3-4 pm Tuesday/Thursday; 2-3 p.m. Wednesday and by appointment
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Course Rationale: This seminar presents an introduction to the theory and practice of social science Geographic Information Systems (GIS) applied to public policy analysis. We will cover a variety of topics, such as the geographical basis of policy issues, spatial mapping, and use of ArcGIS software to study policy problems. The course will involve discussions, hands-on computer laboratory exercises, take-home problem sets, and feature a variety of public policy issues.

The goals of the class are: 1) learning how to use GIS software and techniques, 2) database development and editing 3) spatial modeling techniques, and 4) using GIS to study policy issues.

Class attendance each week is mandatory. It is essential that all of the readings be done carefully and by the date indicated, and that students keep up with in-class exercises and take-home problem sets. This is not a class where you can fall behind since each week builds on concepts and techniques covered in prior sessions.

Required Reading (available on class GIS CD):

Using ArcMap, ESRI (Environmental Systems Research Institute, Inc.) 2006
Using ArcCatalog, ESRI (Environmental Systems Research Institute, Inc.) 2005
Getting Started with ArcGIS, ESRI (Environmental Systems Research Institute, Inc.) 2005
Geoprocessing in ArcGIS, ESRI (Environmental Systems Research Institute, Inc.) 2004
Geocoding in ArcGIS, ESRI (Environmental Systems Research Institute, Inc.) 2004

Required Discussion Readings (available on class CD): We will provide you with a free CD containing a series of research articles. These articles will form the basis of our weekly discussions, and must be read in advance of class.

Class Discussions: For the first two-thirds of the semester, class discussions will be based on two research articles per week chosen to illustrate various features of GIS and spatial analysis. Each student should read the assigned articles by class time and come prepared to discuss what the articles tell us about GIS techniques. How is GIS used? How effective and persuasive is the article, both from a research methodology and substantive standpoint? Are there any problems with the analysis? Are there other things the author could or should have done?

In-Class Exercises: Each week, there will be in-class lab exercises designed to show you how to complete various aspects of GIS and spatial analysis. These in-class exercises are not graded.

Data Sources: We have available a range of GIS data sources (point, line, and shapefiles) dealing with education, health care, crime, human services, and census demographics, among other

things. This material covers a range of geographic areas from census block groups, to the city of Providence and the state of Rhode Island to the 50 states of the national government. Take-home problem sets will be drawn from these sources and you can draw on these materials for your independent research projects.

Take-home Problem Sets: During the first two thirds of the semester, there will be eight graded, take-home laboratory problem assignments illustrating key aspects of GIS and spatial mapping techniques. Each assignment will be handed out and explained in class and will be due by the following class. These assignments will take a few hours each week to complete. As we get into the last third of the semester, your homework will consist of work on your independent research projects which is due May 5.

Independent Research Project Proposal: By February 25, you should write a two page description of your independent research project. This description should discuss your topic, data sources, and methodology. Your project must involve a social science issue. You can use the data we make available for this course, find appropriate data from relevant agencies and online sources or you can collect your own data.

Independent Research Project Presentation: Starting March 31 and running thereafter, each student will give a short presentation regarding progress on his or her research project. These presentations should describe your topic, data, and preliminary results.

Independent Research Project Progress Report: March 10, please hand in a four page progress report on your research project in which you summarize your topic, data, and preliminary results.

Independent Research Project Paper: A research project of 15-20 pages is required in this course. The written paper is due on May 5, and must involve GIS analysis of a social science public policy issue.

Practical Exam: Given during the regular exam period for this class hour and applying the major components of GIS to specified problems. You will have access to all class readings, in class exercises, notes and online references. May 16, 9:00 (Computer Lab)

Tutorial: In lab each week we will use a series of tutorial exercises developed by ESRI. "Introduction to ArcGIS" consists of 9 different modules, each with individual lessons covering various aspects of GIS.

Internet Resources: There are many websites, such as www.gis.com, with links that provide additional information about GIS. You can consult with these sites for other material on GIS data and applications.

Grading: Course grades will be based on class participation and research project presentation (5%), take-home problem sets (45%), the independent research final paper (25%), and a Practical Exam (25%).

Reading Assignments:

January 28: What is GIS?

Course introduction, data sources, outline of the course, assignments

February 4: Getting Started with ArcGIS Desktop

Reference Readings: [Getting Started with ArcGIS](#), section 1; [Learning ArcGIS 9.1](#), Module 1,

Discussion Reading I: Juliana Maantay, "[Zoning, Equity, and Public Health](#)"

Discussion Reading II: Claire Kremen, et al., "[Designing the Masoala National Park in Madagascar Based on Biological and Socioeconomic Data](#)"

GIS Lab Tutorial: [Using ArcMap](#), chap. 2 Quick-start tutorial and Module 1 (Exploring a GIS map, Exploring ArcGIS Desktop, and Using GIS to solve problems)

Lecture Topics: explore a GIS map, preview geographic data and metadata, add data to a map, data formats, point, line, and polygon features, describing spatial relationships and using GIS to solve problems.

In-Class Exercises: Exploring a GIS map, Exploring ArcGIS Desktop, and Using GIS to solve problems

Problem Set 1

**February 11: Joining Data in ArcGIS, working with tables
(2 page research proposal due)**

Reference Readings: [Using ArcMap](#), chap. 10 "Working with tables, and [Joining Census Data to ArcGIS](#), Jack D. Combs.

Discussion Reading I: Christophe Z. Guilmoto and S. Irudaya Rajan, "[Spatial Patterns of Fertility Transition in Indian Districts](#)"

Discussion Reading II: Leonard Pearlstine, et al., "[Impacts of Citrus Development on Habitats of Southwest Florida](#)"

GIS Lab Tutorial:

Lecture Topics: geographic themes, data tables, joining data to geography, census data resources, and census geography

In-Class Exercises: join new data tables to geographic coverages

Problem Set 2

**February 25: Creating Map Symbology
(Two page description of your independent research project due.)**

Reference Reading: [Learning ArcGIS 9.1](#), Module 2; [Using ArcMap](#), chap. 6 "Symbolizing features"

Discussion Reading I: Dale M. Lewis, "[Importance of GIS to Community-Based Management of Wildlife: Lessons from Zambia](#)"

Discussion Reading II: Paul Gruenewald, et al., "[Evaluating the Alcohol Environment: Community Geography and Alcohol Problems](#)"

GIS Lab Tutorial: Module 2, Working with map symbols and labels; Symbolizing features based on attributes; Classifying data; Mapping density and proportion

Lecture Topics: Controlling how features draw, representing quantity with color, graduated color, dot density and chart. Classifying data

In-Class Exercises: Module 2, Classifying and scaling features, using gradient fill to clearly convey direction and strength of a measurement, choosing symbols that convey meaning

Problem Set 3

**March 3: Referencing Data to Real Locations
(4 page research project proposal due)**

Reference Reading: [Learning ArcGIS 9.1](#), Module 3; Understanding Map Projections, Chap. 1-3.

Discussion Reading I: Dolores Acevedo-Garcia, "[Zip Code-Level Risk Factors for Tuberculosis](#)"

Discussion Reading II: William Bowen, et al., "[Toward Environmental Justice](#)"

GIS Lab Tutorial: Module 3, Understanding coordinate systems, working with map projections,

Lecture Topics: Geographic coordinate systems, understanding datum's, map and display units, map projections,

In-Class Exercises: Module 3,

Problem Set 4

March 10: Organizing Geographic Data

Reference Reading: [Learning ArcGIS 9.1](#), Module 4; Building a Geodatabase, chap.1-3.

Discussion Reading I: "[Accessibility tradeoffs in public transit planning](#)"

Discussion Reading II: Peter Arno, et al., "[Analysis of a Populated-Based Pneumocystis carinii Pneumonia Index as an Outcome Measure of Access and Quality of Care for the Treatment of HIV Disease](#)"

GIS Lab Tutorial: Module 3, [Getting Started with ArcGIS](#), chap. 5, Assembling the database.

Lecture Topics: Geographic data models, vector and raster data, the geodatabase, coverages, shapefiles, understanding field types

In-Class Exercises: Understanding raster and vector data, building a geodatabase

Problem Set 5

Four page research project progress report due.

March 17: Creating and Editing Data

Reference Reading: [Learning ArcGIS 9.1](#), Module 5, [Geocoding in ArcGIS](#), chap 1, 3-4.

Discussion Reading I: Henrik Broseth and Hans Chr. Pedersen, "[Hospital Trade Areas](#)"

Discussion Reading II: Barbara Entwisle, et al., "[Geographic Information Systems, Spatial Network Analysis, and Contraceptive Choice](#)"

GIS Lab Tutorial: Module 5, [Geocoding in ArcGIS](#), chap.2, “Quick-start tutorial.

Lecture Topics: Editing features shapes and attributes, creating new features and attributes, calculating attributes, Geocoding address files and lists.

In-Class Exercises: Geocoding practices and expectations, creating new data, editing existing data and coverages

Problem Set 6

March 31: Getting Started with GIS Analysis

Research Paper Presentations

Reference Reading: [Learning ArcGIS 9.1](#), Module 6; [Getting Started with ArcGIS](#), chap. 6-7,

Discussion Reading I: Frank Curriero, et al., "[The Association Between Extreme Precipitation and Waterborne Disease Outbreaks in the United States, 1948-1994](#)"

Discussion Reading II: Liam Downey, "[Spatial Measurement, Geography, and Urban Racial Inequality](#)"

GIS Lab Tutorial: Module 6,

Lecture Topics: Defining the problem, choosing data for analysis, the analytical process, examining and presenting results

In-Class Exercises Finding features by attribute and /or location,

Problem Set 7

April 7: Working with Geoprocessing and Modeling Tools

Research Paper Presentations

Reference Reading: [Learning ArcGIS 9.1](#), Module 7, [Geoprocessing in ArcGIS](#), chap. 1, 3

Discussion Reading I: Tom Ricketts, "[Geography and Disparities in Health Care](#)" (from the National Health Care Disparity Report)

Discussion Reading II: Andrew J. Evans, Richard Kingston and Steve Carver, "[Democratic input into the nuclear waste disposal problem: The influence of geographical data on decision making examined through a Web-based GIS](#)"

GIS Lab Tutorial: Module 7, [Geoprocessing in ArcGIS](#), chap2. Quick-start tutorial

Lecture Topics: Geoprocessing, why use models, working with existing models, working ModelBuilder

In-Class Exercises the geographic join, buffers, joining aggregate data to person data

Problem Set 8

April 14: Designing Maps with ArcGIS

Research Paper Presentations

Reference Reading: Learning ArcGIS 9.1, Module 8, Using ArcMap, Section 4, “Map output”

GIS Lab Tutorial: Module 8,

Lecture Topics: Cartographic design principles, elements of maps, the layout environment, templates, organizing map elements

Homework: Independent research project

April 21: Research Paper Presentations

Homework: Independent research project

April 28: Research Paper Presentations

Homework: Independent research project

May 5: Research Paper Presentations

Homework: Independent research project

(Research Paper Due)

May 16; 9:00 am : Pratical Exam (group 13)