
PPAI 1700J; Section 1

GIS and Public Policy

Spring, 2014
9:00-10:20am Tuesday and Thursday, CIT 265

Professor Jack D. Combs
Office: Room 201, Taubman Center, 67 George Street
Office Hours: 11-12:00 pm Tuesday/Thursday; and by appointment
Phone: 863-3413
Email: jack_combs@brown.edu

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Course Rationale: This seminar presents an introduction to the theory and practice of social science Geographic Information Systems (GIS) as 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 a wide range of policy issues. The course will involve discussions, hands-on computer laboratory exercises, take-home problem sets, an independent research project and a Practical Exam.

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 take a break and realistically expect to catch up since each week builds on concepts, procedures and techniques covered in prior sessions.

Required Reading (available on Canvas):

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 Canvas): A series of research articles that will form the basis of our weekly discussions, and must be read in advance of class.

Class Discussions: For the first three-quarters of the semester, class discussions will be based on two research articles per week chosen to illustrate various features of GIS and spatial analysis. You are expected to 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 standpoints? Are there any problems with the analysis? Are there other things the author could or should have done?

In-Class Exercises: Each class meeting will include an in-class lab exercises designed to demonstrate how to use various techniques and tools of GIS and spatial analysis. In-class exercises are not graded.

Data Sources: You will have access to a range of GIS data sources (point, line, and polygon shape files) dealing with education, health care, crime, human services, and census demographics among other things. This material covers geographic areas ranging from census blocks, to the

city of Providence and the state of Rhode Island, and to the 50 states of the national government. Take-home problem sets will utilize these data sources and you can draw on these materials for your independent research projects as well.

Take-home Problem Sets: During the first three-quarters of the semester, there will be eight to ten 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. These assignments will take a few hours each week to complete. In general, problem sets are assigned on Tuesday and due the following Monday. (Problems sets are individual work and not groups projects!) As we get into the last quarter of the semester, your homework will consist of work on your independent research projects which is due May 6.

Independent Research Project Paper: A research project of 15-20 pages is required in this course. The written paper is due on **May 6**, and must involve GIS analysis of a social science/public policy issue of your choosing.

Independent Research Project Proposal: By *February 6*, 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 and incorporate a GIS analysis. 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 Progress Report: *March 6*, 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 Presentation: Starting April 3 and running thereafter, each student will give a short 6-10 minute presentation of progress on his or her research project. These presentations should describe your topic, why it is important, your data, and results.

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 8, 9:00 am (CIT 265)*

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 are based on class participation and research project presentation (5%), take-home problem sets (45%), your independent research paper (25%), and a Practical Exam (25%).

Class Periods:

January 23: What is GIS?

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

January 28: Getting Started with ArcGIS Desktop

Reference Readings: Getting Started with ArcGIS, section 1;

Getting Started with ArcGIS desktop

Discussion Reading: Juliana Maantay, "Zoning, Equity, and Public Health"

GIS Lab Tutorial: Module 1 (Using GIS to solve problems)

In-Class Exercises: Exploring a GIS map, Exploring ArcGIS Desktop.

Problem Set 1

January 30:

Discussion Reading : Claire Kremen, et al., "Designing the Masoala National Park in Madagascar Based on Biological and Socioeconomic Data"

Demonstration 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.

February 4: Joining Data in ArcGIS, working with tables

Reference Readings: Using ArcMap, chap. 10 "Working with tables, and Joining Summary File Census Data to ArcGIS Geographic Themes-SF3 as an Example with Office 2007.pdf, Jack D. Combs.

Discussion Reading: Jennifer M. Norton, Steve Wing, Hester J. Lipscomb, Jay S. Kaufman, Stephen W. Marshall, Altha J. Cravey "Race, Wealth, and Solid Waste Facilities in North Carolina"

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

Problem Set 2

February 6: (Two page description of your independent research project due.)

Discussion Reading: Leonard Pearlstine, et al., "Impacts of Citrus Development on Habitats of Southwest Florida"

GIS Lab Tutorial:

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

In-Class Exercises: create new variables in a joined data table.

February 11: Creating Map Symbology

Reference Reading: Learning ArcGIS 9.2, Module 2; Using ArcMap, chap. 6 "Symbolizing features" M2 Creating Map Symbology.pdf

Discussion Reading: P. C. Lai, C. M. Wong, A. J. Hedley, S. V. Lo, P. Y. Leung, J. Kong, G. M. Leung, "Understanding the Spatial Clustering of Severe Acute Respiratory Syndrome (SARS) in Hong Kong"

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

In-Class Exercises: Module 2, Display and label map features, display features with categories and quantities.

Problem Set 3

February 13

Discussion Reading: Paul Gruenewald, et al., "Evaluating the Alcohol Environment: Community Geography and Alcohol Problems"

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

In-Class Exercises: Module 2, Explore methods of classifying data, map density and attribute relationships, choosing symbols that convey meaning

February 20:

Discussion Reading: Courtney Bell, "Geography in Parental Choice"

In-Class Exercise: 2010 Census Data

Importing 2010 Census data using Access to extract data for use in ArcMap

February 25: Mapping change

Change in location, change in location and magnitude, percent change in value.

Problem Set 4

February 27: Referencing Data to Real Locations

M3 Referencing Data to Real Locations.pdf

Reference Reading: Learning ArcGIS, Module 3; Understanding Map Projections, Chap. 1-3.

Discussion Reading: Dolores Acevedo-Garcia, "Zip Code-Level Risk Factors for Tuberculosis"

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

In-Class Exercises: Module 3; view and modify coordinate systems information.

March 4:

Discussion Reading: William Bowen, et al., "Toward Environmental Justice"

GIS Lab Tutorial: Creating new shape files,

Demonstration Topics: Creating new shape files,

In-Class Exercises: Using dissolve and merge to create new shape files from existing files

Problem Set 5

March 6: Organizing Geographic Data

(4 page research project proposal due)

Reference Reading: Learning ArcGIS 9.2, Module 4; Building a Geodatabase, chap.1-3.

Discussion Reading: "Accessibility tradeoffs in public transit planning"

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

In-Class Exercises: Understanding raster and vector data

March 11:

Discussion Reading: 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 4, Getting Started with ArcGIS, chap. 5, Assembling the database.

Demonstration Topics: The geodatabase, coverages, shapefiles, understanding field types

M4 Organizing Geographic Data.pdf

In-Class Exercises: Building a geodatabase

Problem Set 6

March 13: Creating and Editing Data

Reference Reading: Learning ArcGIS 9.2, Module 5, Geocoding in ArcGIS, chap 1, 3-4.

M5 Creating and Editing Data.pdf

Discussion Reading: Henrik Broseth and Hans Chr. Pedersen, "Hospital Trade Areas"

Demonstration 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

March 18:

Discussion Reading: 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.

Demonstration 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 7

March 20: Getting Started with GIS Analysis

Reference Reading: Learning ArcGIS 9.2, Module 6; Getting Started with ArcGIS, chap. 6-7,

M6 Getting Started with GIS Analysis.pdf

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

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

April 1:

Discussion Reading: Liam Downey, "Spatial Measurement, Geography, and Urban Racial Inequality"

GIS Lab Tutorial: Module 6,

Demonstration 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 8

**April 3: Working with Geoprocessing and Modeling Tools
Research Paper Presentations**

Reference Reading: Learning ArcGIS 9.2, Module 7, Geoprocessing in ArcGIS, chap. 1, 3

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

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

**April 8:
Research Paper Presentations**

Discussion Reading: 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
M7 Working with Geoprocessing and Modeling Tools.pdf

Demonstration 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 9

April 10: Designing Maps with ArcGIS

Discussion Reading: Christophe Z. Guilmoto and S. Irudaya Rajan, "Spatial Patterns of Fertility Transition in Indian Districts"

M8 Designing Maps with ArcGIS.pdf

Research Paper Presentations

April 15: Research Paper Presentations

Discussion Reading: Dale M. Lewis, "Importance of GIS to Community-Based Management of Wildlife: Lessons from Zambia"

Reference Reading: Learning ArcGIS 9.2, Module 8, Using ArcMap, Section 4, "Map output"

GIS Lab Tutorial: Module 8,

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

Homework: Independent research project

Problem Set 10

April 17: Research Paper Presentations
“Geoprocessing in ArcGIS.pdf”

Homework: Independent research project

April 22: Measuring geographic distribution
Calculating centers, weighted centers, standard distance, standard deviational ellipses, and linear directional mean.

Research Paper Presentations

Homework: Independent research project

April 24: Analyzing patterns
Average nearest neighbor, clustering of values, multidistance clustering, and spatial autocorrelation.

Research Paper Presentations

Homework: Independent research project

April 29: Identifying clusters

Research Paper Presentations

Homework: Independent research project

May 1: Special topic: Network Analysis

Research Paper Presentations

Homework: Independent research project

May 6: Research Paper Presentations
(Research Paper Due)

Saturday, May 8; 9:00 am : Practical Exam (CIT 165)