

## **USP/PLSI 493: Methods of Planning Data Analysis (4 credits)**

Department of Urban Studies and Planning  
San Francisco State University

**Professor Ayse Pamuk**  
Fall 2009

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Mondays and Wednesdays 2:10-3:50pm (HSS 380 – BSS computer lab)

Office hours: T 2-3pm W 4-5pm and by appt. (call 338-1178 to schedule an appt.)

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### **Course Description**

USP/PLSI 493 is the second course in the USP 492 (Research Methods)--USP 493 (Data Analysis) course sequence. It should be taken *after* completing USP 492 or equivalent (e.g., PLSI 300). It is a lecture and computer lab course designed to introduce Urban Studies and Planning students (and others interested in professional applied training in social science and public policy analysis) to a range of commonly used quantitative methods of analysis in urban policy, planning, and administration. The course emphasizes the use of various practical methods appropriate to analyzing planning and policy problems and building a conceptual framework for reasoning about planning and policy issues. Methods for analyzing primary and secondary data are introduced. Statistical formulas are downplayed. The use of computers as tools for data analysis and spatial analysis is emphasized.

The course is organized into three parts. Part One covers an introduction to spatial analysis of data using ArcGIS 9.3. Part Two focuses on the analysis of secondary data including census data on population and housing. The use of descriptive statistics is introduced with examples of public policy applications of GIS using U.S. and international census data. Part Three focuses on the analysis of primary data (e.g. gathered through surveys) including inferential statistics, bivariate measures of association, and multivariate analysis.

Lectures and computer lab exercises will start with introductory material and will gradually add new layers of information. Therefore, it is very important to follow all readings, lectures, and lab exercises to complete the requirements of this course successfully. The course requires a steady and regular level of effort (required attendance and required reading of assigned books) throughout the semester. Assignments make up sixty five percent of the course grade.

### **Prerequisites**

USP 492 (Research Methods) or PLSI 300 or equivalent.

## Student learning outcome objectives

At the end of the semester, students who complete the requirements of this course successfully should be able to:

- Have a foundation in critical thinking and reasoning skills based on data;
- Understand data retrieval from a wide range of reliable public and private sources for analysis;
- Gain proficiency in empirical analysis (working with numbers);
- Understand basic statistical concepts (percentage change, mean, median, percentiles) and use them to discover patterns in data;
- Understand complex urban problems by analyzing data rather than through anecdotal information;
- Construct and test research hypotheses with data;
- Undertake local census data analysis at the census tract level (compare them to county-level data) and prepare community profiles;
- Understand different sampling strategies (probability versus non-probability samples) and appropriate use of data from each;
- Distinguish descriptive, exploratory, and explanatory research from one another,
- Undertake simple bi-variate and multivariate data analysis;
- Analyze data using spreadsheets (Excel) and SPSS;
- Analyze data spatially with ArcGIS;
- Gain proficiency in a range of GIS methods in urban analysis.
- Communicate analysis results effectively

## Data Files

GIS data files (on a CDROM) for the GIS assignments come with the *Mapping Global Cities* book. Other data files are located on the BSS College data server. These files can be accessed from the BSS lab (HSS 380), HSS 383, and PSIRUS lab (HSS 360) computers. Other useful links to data in the public domain are listed at [bss.sfsu.edu/pamuk/data.html](http://bss.sfsu.edu/pamuk/data.html).

## Required readings

The following books are available at the University bookstore at SFSU.

Pamuk, Ayse. *Mapping Global Cities: GIS Methods in Urban Analysis*. Redlands, CA: ESRI Press., 2006.

Myers, Dowell. *Analysis with Local Census Data: Portraits of Change*. Boston: Academic Press, Inc., 1992.

Frankfort-Nachmias, Chava and Anna Leon-Guerrero (2008) *Social Statistics for a Diverse Society*. 5<sup>th</sup> Edition. Thousand Oaks: Pine Forge Press.

Additional materials will be placed on E-reserve at SFSU's Library web site.

### **Recommended readings for review of URBS 492 material**

Fowler, Floyd J. Jr. *Survey Research Methods*, 4<sup>th</sup> edition. Newbury Park: Sage Publications, 2008. (available at SFSU bookstore)

### **Assignments, Exams, and Grading**

There will be 2 short assignments (most involving computer analysis) over the course of the semester, a midterm, and a final project. Late paper penalty is .50 points per day (out of a total of 10 points for Assignment #1, for example). Students are expected to complete all readings before each class meeting, and bring required material to computer lab sessions. Attendance in all classes and labs are required.

1. Spatial analysis with ArcGIS (10%) (9/16)
2. Characteristics of the housing stock (census-tract level analysis) (15%) (10/14)
3. Midterm (20%) (10/21)
4. Module GIS Exercise (final project) (40%) due: Fri., Dec. 18, by 4pm latest.
5. Class participation (10%)

### **Please also note**

Course drop deadline: Friday, Sep. 11, 2009

Course withdraw deadline: Thursday, Nov. 19, 2009

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**Course Outline**

**Introduction to course and requirements (week 1)**

**Part 1: Exploring global metropolitan regions with ArcGIS (week 2)**

**Part 2: Analyzing secondary data and descriptive statistics (weeks 3-9)**

- Accessing and analyzing U.S. census data
- Statistics in social science research
- Census data analysis
- Urban planning and policy applications of GIS using census data
- Analyzing spatial patterns in metropolitan areas with GIS
- Understanding demographics
- Introduction to survey research methods

**Part 3: Inferential statistics using survey data (weeks 11-15)**

- The Normal curve, distribution, sampling, and sampling distribution
- Estimation procedures and confidence intervals
- Hypothesis testing (one sample)
- Hypothesis testing (two samples)
- Identification of differences and similarities between groups of observations
- Correlation among variables
- Introduction to regression
- Working with SPSS & ArcGIS

## Detailed Course Schedule

### WEEK 1 (Aug. 26)

#### Introduction to course and requirements

- What is data analysis?
- Importance of up-to-date and accurate data for informed public- and private-sector decision making: an international perspective
- Data Sources on the Internet: an overview
- Survey of students

#### Reading

Pamuk, Ayse. 2001. "Tools for a Land and Housing Market Diagnosis" In *The Challenge of Government: Policies and Practices* edited by M. Freire and R. Stren. Washington, D.C.: The World Bank Institute and CUCS, University of Toronto. (on e-reserve)

Lab Activity #1: Introduction to Data Sources for Urban Planners and Policy Analysts (international, national, regional, 9-county Bay Area, and San Francisco)

<http://bss.sfsu.edu/pamuk/data.html>

## **PART I: Exploring global metropolitan regions with GIS. Spatial analysis with ArcGIS and an introduction to U.S. and international census data**

### WEEK 2 (Aug. 31 and Sep. 2)

#### Combining Data Analysis with Spatial Analysis

- What is GIS?
- Asking geographic questions
- 2000 census data
- 2006 American Community Survey data
- GIS in public policy
- Using GIS in analyzing cities in a global world
- Using GIS to solve public policy problems—identifying the need for Head Start services in San Francisco
- Spatial data

#### Readings

Pamuk, Ayse 2006. Introduction and Chapter 1: Using GIS to analyze cities in a global world In *Mapping Global Cities*. pp. 1-45.

Lab Activity # 2: Pamuk, Ayse (2006) GIS Exercise #1: “Create a thematic map using Brazil census data” Data on *Mapping Global Cities* CD

Assignment #1: Spatial analysis with ArcGIS handed out (due: 9/16);  
GIS exercise #1 and 2 with a brief write-up interpreting results

## **PART II: Analyzing secondary data and descriptive statistics**

### **WEEK 3**

**Monday, Sep. 7 – no class. Labor Day holiday. Campus closed.**

**(Weds. Sep. 9)**

#### **Accessing and analyzing U.S. census data**

- Local area analysis with census data
- Bottom up orientation
- Census sampling frame: all known addresses in the U.S.
- What is census data good for?
  - Measuring changes over time
  - Comparing places.
- Common/typical questions answered by census data
  - Overall growth
  - Composition or make-up of local population
- Census geography
  - Hierarchical structure
  - Definitions
- Population vs sample
- Structure of datasets\linkages\questionnaire (short and long form)
- Universe\base\population concepts
- Comparability of boundaries over time
- STF3A (Summary Tape Files for 1990) vs printed tables
- SF1, SF3 (Census 2000)
- American Community Survey data (2006)

#### Readings

Pamuk, Ayse. 2006. Chapter 2: Spatial Data. In *Mapping Global Cities*. pp. 47-66.

Myers, Chapter 1-2 (pages 1-31), Chapter 3 (pages 33-61), and part of Chapter 4 (pages 63-82 only)

Lab Activity # 3: Working with census data and GIS. Exercise #2: “Spatializing non-spatial data” Data on *Mapping Global Cities* CD.

Assignment # 2 handed out: Characteristics of the housing stock in SF census tract 208, 1990-2000 (due: 10/14).

#### **WEEK 4 (Sep. 14 and Sep. 16)**



Assignment # 1 due (9/16)

#### **Statistics in Social Science Research**

- Theory, Research (exploratory, descriptive, explanatory), and Data Analysis
- Levels of measurement: ordinal, categorical, continuous.
- Types of variables: dependent and independent.
- Measurement scales
- Distributions
- Basic descriptive statistics,
- Indices
- Univariate analysis of data
- Percentages, proportions, frequencies, ratios, rates.
- Measures of central tendency to summarize/describe the distribution of a single variable: Mode, median, mean
- Percentiles
- Standardizing data

#### Readings

Frankfort-Nachmias and Leon-Guerrero (2008), Chapters 1: “The what and the why of statistics” Chapter 2: “Organization of information: frequency distributions; Chapter 4: “Measures of central tendency”

Lab Handout: Introduction to Microsoft Excel 2007

Lab Activity # 4: Creating Excel tables showing change in housing stock in a SF census tract (absolute change, percent change, percentage point change).

#### **WEEK 5 (Sep. 21 and Sep. 23)**

#### **Census data analysis. Urban Planning & Policy Applications of GIS using census data**

- Analysis of local housing conditions at the census tract level
- Population age structure (age pyramids)
- Household relationships
- Population pyramids at the census tract level
- International comparisons
- Age group versus cohort
- Cohort retention
- Using interpolation techniques to divide age groups

## Readings

Pamuk, Ayse. 2006. Chapter 3: "Urban planning applications of GIS in local government" pp. 69-92. Chapter 4: "GIS Analysis in Planning Social Delivery. pp. 93-105 in *Mapping Global Cities*.

Myers, Chapter 6 (pages 129-150); Chapter 8 (pages 151-188);

Greene, R.W. *GIS in Public Policy: Using Geographic Information for More Effective Government*. Redlands, CA: ESRI Press. June 2000. pp. 4-8, pp.22-27, pp. 72-79 (On e-reserve)

Lab Activity #5: Pamuk (2006) GIS Exercise #3: Analyze vector data using US census data (Data on *Mapping Global Cities* CD).

## **WEEK 6 (Sep. 28)**

Lab Activity #6: Pamuk, Ayse (2006) GIS Exercise #4: "Analyze raster data using census data" Data on *Mapping Global Cities* CD.

**Sep. 30 – No class – Pamuk at ACSP conference.**

## **WEEK 7 (Oct. 5 and Oct. 7)**


### **Analyzing Spatial Patterns in Metropolitan Areas with GIS**

Lab Activity #7: GIS exercise #5: "Create new information." Data on *Mapping Global Cities* CD.

## Readings

Pamuk, Ayse. 2006. Chapter 5: "Locating immigrant clusters with census data." pp. 109-127. Chapter 6: "Comparing immigrant clustering patterns across metropolitan areas"

## **WEEK 8 (Oct. 12 and Oct. 14)**

 Assignment #2 due (Oct. 14)

### **Introduction to Survey research methods**

- Sampling frame
- Sample size
- Sampling strategy
- Probability sampling


- Response and non-response bias
- Methods of data collection
- Questionnaire design
- Survey interviewing

Readings

Fowler (2008). Chapters 1-3 (pages 1-47). Fowler, Chapters 4 and 6 (pages 49-113), Chapter 8 (pages 127-144)

**WEEK 9 (Oct. 19 and Oct. 21)**

**Oct. 19** Midterm review

	<b>Oct. 21</b>	<b>Midterm exam</b>
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**WEEK 10 (Oct. 26 and Oct. 28)**

**Oct. 26** No class. State Budget Campus Closure

**PART III: Inferential statistics using survey data**

**Oct. 28** Introduction to inferential statistics

<u>Lab Activity # 8:</u> Review of SPSS 17. (handout: basics of SPSS).
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**WEEK 11 (Nov. 2 and Nov. 4)**

**The Normal Curve. Distribution, Sampling, and Sampling Distribution**

- Measures of dispersion (range, percentile ranks, standard deviation)
- Shape of the distribution (e.g., normal)
- Central limit theorem
- The normal curve (standardized theoretical curve)
- Z-scores
- Concept of probability

Readings

Frankfort-Nachmias and Leon-Guerrero (2008), Chapter 5: Measures of variability” Chapter 6: The normal distribution” Chapter 7: “Sampling and sampling distributions” Chapter 8: “Estimation”

## WEEK 12 (Nov. 9)

### Estimation procedures, and confidence intervals, Hypothesis (significance) testing (one sample)

- Sampling distribution – theoretical basis for inferential statistics
- Standard deviation of the sampling distribution
- Strategies to reduce nonsampling error
- Confidence intervals
- Hypothesis testing
- One- and two-tailed tests
- Student's t (small samples)

#### Readings

Pamuk, Ayse. 2006. "Comparing immigrant clustering patterns across metropolitan areas." In *Mapping Global Cities*. pp. 129-152.

Frankfort-Nachmias and Leon-Guerrero (2008), Chapter 9: "Testing hypotheses"

Lab Activity # 9: Recoding Variables in SPSS and descriptive statistics for the new variables.

Assignment # 3 handed out (Analyzing survey data, sampling, and confidence intervals)  
(due: Dec 2)

**Nov. 11 – No class. Veteran's Day – Campus Closed.**

## WEEK 13 (Nov. 16 and Nov. 18)

### Hypothesis (significance) testing (two samples),

- Measures of association
- Bivariate tables
- Chi square test for independence

#### Readings

Frankfort-Nachmias and Leon-Guerrero (2008), Chapter 10: "Relationships between two variables: crosstabulation" Chapter 11: "The Chi-square test" Chapter 12: "Measures of association for nominal and ordinal variables"

Lab Activity # 10: Crosstabs and measures of association with SPSS (handout)

**Fall recess (Thanksgiving )– No class (Nov. 23 and Nov. 25)**

**WEEK 14 (Nov. 30 and Dec. 2)**

**Introduction to regression (bi-variate and multivariate)**

- Correlation
- Causality
- Scatterplots
- Bi-variate and multiple regression

Readings


Frankfort-Nachmias and Leon-Guerrero (2008), Chapter 13: “Regression and correlation”

Lab Activity # 11: Regression analysis with SPSS (handout)

**WEEK 15 (Dec. 7 and Dec. 9)**

Lab Activity #12: Pamuk (2006) GIS Exercise #6: Self-directed project: Planning in the new global metropolis. Data on *Mapping Global Cities* CD.

**WEEK 16 (Dec. 14)**

 **Module GIS exercise (final project) due on or before Weds, Dec. 16 at 4pm.**