GIS Applications in the Social Sciences

38520- 01

Spring 2017

Instructor: Ned English

TA: Luis Herskovic Maida

Course Description:

Geographic Information Systems (GIS) refers to tools and techniques for handling, analyzing, and presenting spatial data. GIS has become a powerful tool for social sciences applications over the past thirty years, permitting lines of scientific inquiry that would not otherwise be possible. This course provides an introduction to GIS with a focus on how it may be applied to common needs in the social sciences, such as economics, sociology, and urban geography, as distinct from physical or environmental sciences. Students will learn basic GIS concepts as applied to specific research questions through lectures, lab exercises, and in-class demonstrations. Examples of the kinds of topics we will pursue include how we can use GIS to understand population trends, crime patterns, asthma incidence, and segregation in Chicago. This course is designed to be "hands-on" and so demos and labs will be featured in nearly every session.

Course Objectives:

- To understand basic concepts in GIS, cartography, and spatial data
- To be able to use GIS to create maps and conduct basic spatial analyses, with a focus on *ESRI ArcGIS*
- To understand how GIS can be used to facilitate or enhance analytical tasks and projects in the social sciences

Course Text:

There is no single text, and so readings will be made available on Chalk. Additional readings will be suggested for enrichment.

Assignment	Date Assigned	Due Date
Lab 1- Voting and Race/Ethnicity	4/11/16 (class 3)	4/18/16 (class 4)
Lab 2- Buffering	4/25/16 (class 5)	5/2/16 (class 6)
Project Proposal		5/2/16 (class 6)
Lab 3- Map Design	5/16/16 (class 8)	5/23/16 (class 9)
Lab 4- Arc Statistical Capes	5/23/16 (class 9)	5/30/16 (class 10)
Final Project		5/30/16 (class 10)

Grading

- *Participation: 10% of grade.*
- *4 Lab Reports: 40% of grade.*
- *Midterm Exam: 20% of grade.*
- *Final Group Report and Presentation: 30% of grade.*
- *Grading scale: A - >92%, B - 91%-84%, C - 83%-76%, D - 75%-68%, F - <67%*

Lab assignments will due by the specified due date, and will have one letter grade deducted for each day they are late without advance permission due to an unavoidable personal conflict. Exams will consist of the material from your textbooks as well as any readings and/or material presented in class lectures and labs. Two weeks' notice is required for rescheduling exams or labs for unavoidable personal conflicts.

Course Calendar

Week 1: Overview of GIS, how GIS is used in the social sciences, why spatial data matter

Week 2: Measurement, coordinate systems, map scale, map errors, thematic maps, overlay

Week 3: Topology, data structures, Census data and GIS, relational databases, joins, buffering

Week 4: Data input, editing, geocoding

Week 5: Spatial autocorrelation, spatial analysis, measures of segregation

Week 6: Local indicators of spatial autocorrelation (LISA), urban studies applications

Week 7: Survey applications, visualization, critical cartography

Week 8: Big data, data mining, social media, GPS, remote sensing

Week 9: Interpolation, web GIS, community participation GIS

Week 10: Public health applications, spatial/temporal, the future, limitations