

GIS Applications in the Social Sciences

PPHA 38520 2

Spring 2026

Tuesday, 3:30-6:20 PM

Keller

Instructor Office Hours: 1-3pm on Tuesdays at the NORC Offices at 1155 East 60th St. Please email for an appointment.

Teaching Assistant(s): Our TA(s) are here to help you with the labs and any technical issues, and will have regular office hours

Background and Goals:

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. We will primarily use R for data cleaning and geospatial operations and QGIS software for mapping and data analysis. The skills you learn will be directly transferable to other common GIS software.

Course Objectives:

- To understand basic concepts in GIS, cartography, and spatial data
- To be able to use Q and QGIS to create clean spatial data, create maps and conduct basic spatial analyses
- To understand how GIS can be used to facilitate or enhance analytical tasks and projects in the social sciences
- To use GIS in an actual applied research setting, and produce a work sample

Course Prerequisites:

- None and we assume no background in GIS or R, although either would be helpful

Course Text:

There is no single text, and so readings will be made available on Canvas on a weekly basis.



How the Course Works:

Each class will have a lecture component during the first half followed by a lab (graded, with report due one week after) during the second half, all of which is in-person. Classes will begin with a short quiz on lecture material from the previous week. There will be a final project designed to synthesize the labs and allow students to answer their own research questions. The final project will be submitted as an HTML file that can be displayed as a work sample using GitHub pages, and a short slide deck to be presented in class. Participation is graded based on contribution throughout the class, including discussion in class. Our TAs will help with technology during the labs as well as support students in their assignments and group projects.

Student Assignments and Class Schedule:

<i>Activity</i>	<i>Date Assigned</i>	<i>Date Due</i>
Lab 1 - Importing Data and Exporting Maps	24-Mar	31-Mar
Lab 2 - Choropleth Maps using Census Data	31-Mar	7-Apr
Lab 3 - Diseases of Despair	7-Apr	14-Apr
Lab 4 - Neighborhood Characteristics of Retailers	14-Apr	21-Apr
Lab 5 - Health Provider Deserts	21-Apr	28-Apr
Lab 6 - Mapping Crime Hot Spots	28-Apr	5-May
Lab 7 - Pollutant Exposure and Poverty in Chicago	5-May	12-May
<i>Final Project Presentations</i>		19-May/26-May
<i>Final Project Webpage Due</i>		26-May

Grading Policies and Procedures

- Participation: 10% of grade.
- Lab Reports: 30% of grade
- Short Quizzes: 30% of grade
- Final Project and Presentation: 30% of grade.
- Grading scale: A >92%; A- 90-92%; B+ 87-89%; B 83-86%; B- 80-82%; C+ 77-79%; C 73-76%; C- 70-72%; D 60-69%, F - <60%

Students may take my class pass/fail. In order to “pass”, a student must **do all lab assignments**, the **short quizzes**, the **final project**, the **final presentation**, and **participate** in class. Lab assignments are due by the specified due date and will have ten percentage points (10%) deducted for each day they are late without advance permission due to an unavoidable personal conflict. The midterm will be based primarily on the material presented in class lectures and labs, as enriched by readings. Two weeks’ notice is required for rescheduling exams or labs for unavoidable personal conflicts. Copying assignments is not permitted and considered plagiarism. Any student who believes they may need assistance should inform the Office of Student Disability Services by the end of the first week of class. Once you have received an accommodation letter, it should be presented to the course instructor immediately. <https://disabilities.uchicago.edu/>



AI Policy

Students will be allowed to use AI in Lab assignments and the Final Project.

Course Calendar

Session #	Date	Lecture	Activity	Final Project
1	24-Mar	Course overview, Spatial Data and Projections, Overview of GIS Software	Lab 1 - Importing Data and Exporting Maps	Submit research area of interest
2	31-Mar	Introduction to Census Data, Data Joins, Cartographic Design	Lab 2 - Choropleth Maps using Census Data	
3	7-Apr	Sources of Spatial Data, Data Manipulation in R, Mapping Regression Residuals	Lab 3 -Diseases of Despair	
4	14-Apr	Spatial Queries and Operations with Vector Data in R: Clips, Buffers and Spatial Joins <i>Guest Lecture – Illinois Senior State Demographer Lee Fiorio on GIS in Data Collection</i>	Lab 4 - Neighborhood Characteristics of Retailers	Submit ideas for sources of spatial data
5	21-Apr	Geocoding, Network Analysis and Interactive Mapping	Lab 5 - Health Provider Deserts	
6	28-Apr	Spatial Autocorrelation and Spatial Regression	Lab 6 - Mapping Crime Hot Spots	Submit research proposal
7	5-May	Aggregation and Raster Analysis	Lab 7 - Pollutant Exposure and Poverty in Chicago	
8	12-May	Reproducible Workflows, Working with Large Spatial Datasets <i>Guest Lecture –NORC Senior Data Scientist Dave McQuown on PostGIS and Address Based Sampling</i>	Work on Final Projects	
9	19-May	GIS in Field Data Collection-Final Project Presentation #1		
10	26-May	Final Project Presentations #2		