

URBP 70200

Introduction to GIS for Urban Planning and Policy

Instructor: Assistant Professor, Mehdi P. Heris (call me Mehdi)

Location: WH606 lab

Pre-requisites: None. Students with any background and skill level can take this course.

Course Overview

In this course, you will learn about the applications of Geographic Information Sciences (GIS) in urban and environmental planning. This course is specifically designed to analyze spatial data in urban environments and to inform urban policymaking; however, all topics and skills are applicable to other disciplines. The difference between this course and the ones offered in other departments/programs is that we will focus on the applications and uses of the spatial tools rather than learning how to develop such tools. Therefore, our course will teach you the use of available tools in our field, not the theories behind tool development.

This course is at the introductory level, and students do not need prior knowledge of GIS or spatial data analysis. However, proficiency in navigating computer applications and file management will be needed. Students can use the Lab computers for their assignments. Having a personal laptop/desktop computer would be very helpful, and ArcGIS licenses will be provided for personal computers. Note that ArcGIS can be installed on Windows machines only. Mac users will need to install a Windows OS or alternatively use QGIS; Limited materials will be offered for QGIS users. We assume that everyone will have access to ArcGIS either on their personal machines or lab computers.

Each session will be a combination of lectures and in-class exercises. There will be video tutorials for ArcGIS and some for QGIS on key tasks. Students need to come to class prepared. That means they must watch the videos and read the reading materials. Please read the class decorum document before our first session.

If you are exposed to COVID, let the instructor know. You will be provided options to isolate and still participate in the class via Zoom. Please avoid coming to the classroom if you have known exposure or symptoms.

Learning Objectives:

The learning objectives of this course include:

1. To understand the nature, types, and applications of spatial data analysis in urban contexts.
2. To gain a good understanding of currently available data in major cities including NYC.
3. To learn how to map and visualize urban data.
4. To be fluent with either QGIS or ArcGIS basic functionalities.
5. To be able to produce complex maps that include multiple layers for an urban area.
6. To explore and visualize the relationships between various variables in urban areas.
7. To learn very basic programming skills using Python and Jupyter Notebook to read and visualize spatial data.

Sessions:

Week	Agenda	Assignment due	Reading due

Week 1: Aug 31st	Let's get started, download some data and explore some data! <ul style="list-style-type: none"> • Class logistics and ground rules; • File management, file types, downloading, etc.; • Software installation 	Watch videos for installing Python and preparing your environments.	Mitchell (1999) chapters 1 and 2
Week 2: Sep 7th	The college is closed.		
Week 3: Sep 14th	Let's get started with the software and mapping some layers! <ul style="list-style-type: none"> • Key terms: projects, layers, dataframes, tables, and features. • Download and open a layer 	Assignment #1	
Week 4: Sep 21st	Let's tackle projection systems! <ul style="list-style-type: none"> • Key terms and concepts: geographic systems, datums, and projection. • Common systems. • Projecting a layer from one system to another. • We will also learn about layouts and map design. 	Assignment #2	1- Understanding Map Projections: Chapters 1 and 2 (Uploaded) 2- Watch the Youtube video (posted in the reading materials)
Week 5: Sep 28th	Let's color code the data! <ul style="list-style-type: none"> • We will review the map CRS. Download and change projection. • We will talk about data types. • We will use attributes to color code the maps and will practice with data types and classification methods. 	Assignment #3	1- Mitchell (1999) Chapter 3: Mapping the Most and the Least
Week 6: Oct 5th	College is closed		
Week 7: Oct 12th	Let's relearn and talk about your projects! <ul style="list-style-type: none"> • We will also work with layout and map design. • We will review and synthesize the previous topics and start the final project frameworks and guidelines. • We will review selection methods. • Introduction of the final project 		
Week 8: Oct 19th	Let's overlay layers! <ul style="list-style-type: none"> • Intersect, clip, and join tables. • Calculate fields and area. 	Assignment #4	
Week 9: Oct 26th	Let's connect a layer to another layer! <ul style="list-style-type: none"> • Spatial join 	Assignment #5	
Week 10: Nov 2nd	Let's learn about raster layers! <ul style="list-style-type: none"> • Map DEM and density. 	Assignment #6	
Week 11: Nov 9th	Let's write a simple Python code! <ul style="list-style-type: none"> • Reading a Shapefile and a raster layer. 	Assignment #7 due.	
Week 12: Nov 16th	Let's summarize a few variables in neighborhood boundaries! <ul style="list-style-type: none"> • We will aggregate, intersect, summarize, and join tables to connect layers. 		

Week 13: Nov 23rd	Let's build a suitability model using rasters! <ul style="list-style-type: none"> • We will learn the basics about rasters and map algebra. 	Assignment #8	
Week 14: Nov 30th	How to successfully apply your GIS skills in planning departments of local governments and private consulting firms.		
Week 15: Dec 7th	Let's present what we learned! <ul style="list-style-type: none"> • <u>Progress presentations.</u> 	Assignment #9	
Week 16: Dec 14th	Progress presentations.		
Week 17: Dec 21st	Final Project due		

Evaluation:

Students will be evaluated based on their engagement in the class (10%) and take-home exercises (70%) and a final project (20%). Attendance is essential for this course. To learn the concepts, procedures, and tools, students need to be active learners in the class. In case students miss a class, they need to study the class documents (handouts, readings, exercises, etc.). They also need to seek guidance from the instructor on how to catch up with the class progress before and after the session. We might be able to provide the recording of the class. Every session will have a group in-class assignment that students will work together to implement the tasks. In each session, following a demonstration of general concepts by the instructor, there will be an in-class activity guided by a handout. Assignments will have general guidance. The guidance will not be step by step but will provide a general path to implement procedures. Each assignment comes with a rubric to provide a detailed evaluation guideline. The final project will be an essential component of the course. Students will need to design a project (with a research question), identify related data, propose appropriate methods/tools for implementing data analysis, and finally visualize and present the results. The final project guideline will be detailed, including a rubric for evaluation. The instructor will have one-on-one check-in sessions with individual students during office hours to guide the projects. Students need to carry out final projects individually. However, in special cases, if the project scope is extensive enough, students can work in pairs.

	Items	Due date	Points
Assignments	Assignment #1	September 14th	5%
	Assignment #2	September 21st	10%
	Assignment #3	September 28th	5%
	Assignment #4	October 19th	10%
	Assignment #5	October 26th	5%
	Assignment #6	November 2nd	15%
	Assignment #7	November 9th	5%
	Assignment #8	November 23rd	10%
	Assignment #9	December 7th	5%
Final project			20%
Active participation	The instructor will evaluate your participation based on multiple areas of engagement. The class needs to be an active environment, and your contribution matters. Class attendance, participating in class conversations (both technical and fun things), active interactions in our MS Teams, asking questions or answering questions in MS Teams, and other types of engagements are encouraged.		10%