URPL – GP 2618 Geographic Information Systems and Analysis

Fall 2024

# Instructor Information

* Matthew Pietrus, AICP
* Email: mp5065@nyu.edu
* Office Hours: By appointment

# Course Information

Meeting Times

Saturdays, 10:00 am – 2:00 pm (class), 2:10 pm - 3:40 pm (lab)

* September 7, 2024
* September 14, 2024
* September 21, 2024
* October 5, 2024
* October 19, 2024
* November 2, 2024

In-Person Instruction

Bobst, Room LL 1.12

# Course Prerequisites

Students are expected to have basic experience working with data.

# Course Description

Understanding geographic relationships between people, land use, and resources is fundamental to planning. Urban planners routinely use spatial analysis to inform decision- making. This course will introduce students to Geographic Information Systems (GIS), a tool to analyze and visualize spatial data. The course will emphasize the core functions of GIS: map

making, data management, and spatial analysis. Students will learn cartographic best practices, how to find and create spatial data, spatial analysis methodology, and how to approach problem solving from a geographic perspective. Throughout the course, students will build a portfolio of professional quality maps and data visualizations.

# Course and Learning Objectives

Students will gain the following skills and abilities:

1. An understanding of what GIS is and how GIS is used in planning and other fields;
2. The ability to critically examine maps, including the intent, intended audience, bias, and methods used
3. Fluency in the ESRI ArcGIS interface;
4. An understanding of where to find existing GIS data and how to create custom GIS data;
5. Ability to make professional quality maps;
6. Expertise in working with and visualizing geographic data; and
7. Ability to solve a “spatial question” using GIS.

## Learning Assessment Table

URPL-GP, MSPP-GP, PHD-GP, UPADM-GP

|  |  |
| --- | --- |
| **Graded Assignment** | **Course Objective Covered** |
| Map Summaries | 1-2 |
| Map Portfolio | 1-5 |
| Spatial Analysis Memo | 1-6 |
| Research Memo | 1-6 |

# Course Structure

Course content includes a mix of lectures and self-directed lab exercises. Materials for the lab exercises are provided in advance of each class.

# Academic Integrity

Academic integrity is a vital component of Wagner and NYU. All students enrolled in this class are required to read and abide by [Wagner’s Academic Code.](https://wagner.nyu.edu/portal/students/policies/code) All Wagner students have already read and signed the [Wagner Academic Oath](https://wagner.nyu.edu/portal/students/policies/academic-oath). Plagiarism of any form will not be tolerated and students in this class are expected to report violations to me. If any student in this class is

unsure about what is expected of you and how to abide by the academic code, you should consult with me.

# Guidance on the Use of Generative AI Tools

The advent of AI tools (ChatGPT, Gemini, Azure AI, Microsoft Copilot, etc.) has shifted the way work has been done, so it is important to understand how to use them. While it is permitted to use AI tools in this class to help clarify concepts or help generate a workflow, it cannot be used to generate or draft text for assignments, create maps or any elements within them (titles, descriptions, images, etc), or perform analyses. Your original thinking, creativity, and analysis are essential to understanding GIS and its utility. In short, use AI tools to enhance your understanding, not to replace your effort.

If you use generative AI tools for assignments, you must identify for what it was used and include the prompt.

# Henry and Lucy Moses Center for Students with Disabilities at NYU

Academic accommodations are available for students with disabilities. Please visit the [Moses](https://www.nyu.edu/students/communities-and-groups/students-with-disabilities.html) [Center for Students with Disabilities (CSD) website](https://www.nyu.edu/students/communities-and-groups/students-with-disabilities.html) and click on the Reasonable Accommodations and How to Register tab or call or email CSD at (212-998-4980 or mosescsd@nyu.edu) for information. Students who are requesting academic accommodations are strongly advised to reach out to the Moses Center as early as possible in the semester for assistance.

# NYU’s Calendar Policy on Religious Holidays

[NYU’s Calendar Policy on Religious Holidays](https://www.nyu.edu/about/policies-guidelines-compliance/policies-and-guidelines/university-calendar-policy-on-religious-holidays.html) states that members of any religious group may, without penalty, absent themselves from classes when required in compliance with their religious obligations. Please notify me in advance of religious holidays that might coincide with assignments to schedule mutually acceptable alternatives.

# Student Resources

Wagner tutors are available to help students with their writing skills. Please see details on the [Wagner Writing Center page](https://wagner.nyu.edu/portal/students/academics/advisement/writing-center).

For additional GIS support, see [NYU Data Services](https://guides.nyu.edu/dataservices).

# Graded Assignments

Graded assignments are an opportunity to build a portfolio of professional quality GIS work. Further assignment instructions and grading rubrics will be posted for students. Grades will be posted to NYU Brightspace.

## Map Summaries (10 points)

While data and mapmaking are often taken at face value, every map has a point of view. This assignment is meant for you to critically examine two maps that you find online. These maps can be from academic publications, newspapers, Reddit, or anywhere else you find a map. For each map, write a brief (no more than 5 sentence) summary that answers the following questions:

* Where is the map from and who is the author?
* What is the map’s purpose? Is it conveying a finding, referencing a location, used for wayfinding, or something else?
* What data is being used? Is it clear where it comes from and can it be accessed? Does it seem accurate?
* Who is the intended audience?
* Does it effectively convey its message? Is it trustworthy?

This assignment is due at **11:59pm the day before class (9/13)**

## Map Portfolio (30 points)

The Map Portfolio is a series of four maps that tell a story about a neighborhood or place, or highlight a particular topic, and use cartographic best practices. The maps should speak for themselves, but when combined, tell a larger story about the topic of your choosing.

## Spatial Analysis Memo (30 points)

The Spatial Analysis Memo addresses a spatial research question. The analysis must utilize ***at least two*** geo-processing tools. This can build off of the topic explored in the map portfolio, but must include additional GIS analyses and a 200-300 word write-up detailing the following:

* Description of the topic explored
* Data used or created in the analysis
* Description of the analysis performed
* Findings from the analysis
* Lessons learned and any troubleshooting

## Research Memo and Presentation (30 points)

The Research Memo explores a geographically focused research question or topic. Students will present a summary of their Research Memo during the last class.

***No extensions will be given for the final assignment. Late submissions will be deducted two-thirds a letter grade for the first day (2 points), and one-third a letter grade for each day thereafter (1 point).***

# Course Materials

## ESRI ArcGIS

Students wishing to install GIS software on their personal computers can receive a free educational license of ESRI ArcGIS from NYU Data Services. Fill out this [NYU Data Services](https://guides.nyu.edu/appointment) [form](https://guides.nyu.edu/appointment) to request a free copy: <http://guides.nyu.edu/appointment>. Note: ESRI software only runs on Windows operating systems. Students may also access ESRI ArcGIS via NYU’s Virtual Computer Lab.

*Note: Students may use QGIS to complete graded assignments as long as project requirements (e.g., use of geospatial tools) are met.*

## Optional Texts

* + *Getting to Know ArcGIS for Desktop*, 3rd edition or later, Michael Law and Amy Collins

## Lectures and Lab Documents

Resources will be delivered through Google Drive or NYU Brightspace.

Semester Overview *(Subject to change)*

**Class 1, September 7 INTRODUCTION TO GIS**

* + - ***Concepts***: GIS, Reference vs. Thematic Maps, Layers, Shapefiles, ArcGIS, QGIS, Raster vs. Vector Data, Elements of Map Making, Data Manipulation, Extent, Scale, Orientation, Coordinate Systems & Projection, Geodesic vs. Planar, Symbology, Attributes
		- ***GIS Skills***: Adding Data, Table Joins, Definition Queries, Map Layouts, Reprojecting, Symbology, Labels, Map Views, Cleaning Data
		- ***Lab Exercise***: Explore ArcGIS, Create a Reference Map
		- ***Assignment Due****:* None

**Class 2, September 14 SYMBOLIZING & GENERALIZING GEOGRAPHIC DATA**

* + - * ***Concepts***: Attributes, Classification, Symbology, Joining Data, Accessibility
			* ***GIS Skills***: Table Joins, Definition Queries, Select by Attribute, Color Brewer, Clip Tool, Dot Density
			* ***Lab Exercise***: Thematic Map, Dot Density Map with Clip Tool
			* ***Assignment Due***: **MAP SUMMARIES DUE 9/13 at 11:59pm**

**Class 3, September 21 OVERLAY ANALYSIS**

* + - * ***Concepts***: Selection, Buffer, Data Manipulation
			* ***GIS Skills***: Select by Location, Spatial Join, Clip, Dissolve, Feature to Point/Polygon/Line, Merge, Erase, Intersect, Union, Near Analysis, Overlay Analysis
			* ***Lab Exercise***: Spatial Join
			* ***Assignment Due*:** **MAP PORTFOLIO**
			* ​

**Class 4, October 5 PROXIMITY ANALYSIS**

* + - * ***Concepts***: Proximity, Measuring Distance, Euclidean vs. “Manhattan” vs. Network Distance,
			* ***GIS Skills***: Buffer, Near, Point Distance, Polygon Neighbors
			* ***Lab Exercise***: Proximity Analysis, Multi-Step Proximity Analysis
			* ***Assignment Due*:** None

**Class 5, October 19 LOCATION, LOCATION, LOCATION**

* + - * ***Concepts***: Accuracy vs. Precision, Boundary Generalization, Census Boundary Changes, Geocoding, Mapping Coordinates
			* ***GIS Skills***: Near, Display XY
			* ***Lab Exercise***: Research Memo Outline, Near Analysis, Mapping Coordinates & Geocoding, Location Allocation
			* ***Assignment Due*:** **SPATIAL ANALYSIS MEMO DUE**

**Class 6, November 2 RASTER DATA & ADDITIONAL GIS TOOLS**

* + - * ***Concepts***: Raster Data, Satellite Imagery, Classification, Change Analysis, Data Visualization Best Practices
			* ***GIS Skills***: TBD
			* ***Lab Exercise***: None
			* ***Assignment Due*:** **RESEARCH MEMO PRESENTATIONS DUE**

**November 17 - RESEARCH MEMO DUE at 11:59pm (no class)**

# Letter Grades

*Student grades will be assigned according to the following criteria:*

* + (A, 94-100) Excellent: Exceptional work for a graduate student. Work at this level is unusually thorough, well-reasoned, creative, methodologically sophisticated, and well written. Work is of exceptional, professional quality.
	+ (A-, 90-93,) Very good: Very strong work for a graduate student. Work at this level shows signs of creativity, is thorough and well-reasoned, indicates strong understanding of appropriate methodological or analytical approaches, and meets professional standards.
	+ (B+, 87-89) Good: Sound work for a graduate student; well-reasoned and thorough, methodologically sound. This is the graduate student grade that indicates the student has fully accomplished the basic objectives of the course.
	+ (B, 84-86) Adequate: Competent work for a graduate student even though some weaknesses are evident. Demonstrates competency in the key course objectives but shows some indication that understanding of some important issues is less than complete. Methodological or analytical approaches used are adequate but student has not been thorough or has shown other weaknesses or limitations.
	+ (B-, 80-83) Borderline: Weak work for a graduate student; meets the minimal expectations for a graduate student in the course. Understanding of salient issues is somewhat incomplete. Methodological or analytical work performed in the course is minimally adequate. Overall performance, if consistent in graduate courses, would not suffice to sustain graduate status in “good standing.”
	+ (C/-/+, 70-79) Deficient: Inadequate work for a graduate student; does not meet the minimal expectations for a graduate student in the course. Work is inadequately developed or flawed by numerous errors and misunderstanding of important issues. Methodological or analytical work performed is weak and fails to demonstrate knowledge or technical competence expected of graduate students.
	+ (F, <70) Fail: Work fails to meet even minimal expectations for course credit for a graduate student. Performance has been consistently weak in methodology and understanding, with serious limits in many areas. Weaknesses or limits are pervasive.