

URPL-GP-1620 Spatial Analysis and Visualization Fall 2021 Syllabus

Last updated August 31 2021

## Course dates: September 13 - December 13, 2021

## Lecture

### Co-Instructors

Maxwell Austensen (he/him)

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Lucy Block (she/her)

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Sam Rabiyah (he/him)

sam.rabiyah@nyu.edu

### Schedule

Mondays, 6:45-8:25pm, [Zoom](https://nyu.zoom.us/s/96214595489)

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## Lab

**Section Leaders**

Section 2 - Maxwell Austensen, [Zoom](https://nyu.zoom.us/j/94202792123)

Section 3 - Sam Rabiyah, [Zoom](https://nyu.zoom.us/j/8098130699)

Section 4 - Lucy Block, [Zoom](https://nyu.zoom.us/j/5129575329)

**Schedule**

Mondays, 8:35-10:15pm

## Office Hours

Instructors will be available on Slack to answer questions at the following times each week:

Maxwell Austensen — Tuesday, 7pm-8pm

Sam Rabiyah — Wednesdays, 12-1pm

Lucy Block — Fridays, 9am-10am

Individual check-ins are by appointment only.

## Course Description

Open Data and Open Source software have democratized the ability of urban planners to obtain, analyze, map, and visualize data to support their work. This course will provide immersion into the world of planning-related data, providing hands-on experience with the tools, languages, and processes for working with data in the planning realm. Instead of focusing on one tool all semester, we will dive into a wide variety of data tools and skills, applied to both spatial and non-spatial data. Students will achieve a basic level of data literacy, and demonstrate basic coding, data analysis, visualization, presentation, and data storytelling skills upon successful completion of this course.

This course will involve data analysis in Google Sheets, coding in R, and working with the mapping software QGIS. It may require a significant amount of time outside of class periods to work on assignments and the final project. A personal laptop is required.

## Objectives

1. Understand the ecosystem of data relevant to the planning realm
2. Learn how to find and access data, and understand sources, metadata, and limitations
3. Explore modern tools and techniques to process, munge, manipulate, and aggregate raw data
4. Visualize, chart, and map data with purpose, gain insights, and tell stories with data
5. Prepare a comprehensive, data-driven analysis of an urban planning Issue that uses the tools and techniques learned in class.

## Notes

* The course requires a computer (Mac, Windows, or Linux) that can handle data processing and has permissions to install software. *Students will not be dependent on a computer lab to do their work.* Please contact the course instructors as early as possible if this requirement poses any issue to you.
* All tools taught and demonstrated in the course will be either Free and Open Source Software (FOSS) or free-tier cloud services. This provides maximum potential for application of these skills during the student’s time at Wagner and beyond.
* Students should give clear attribution and sourcing for all code and data, in assignments and the final project.

## Class Format

Lecture - Each class will include a presentation of concepts, mixed with live technical demonstrations and coding. Students are encouraged not to follow along line-by-line with live coding during the lecture, and to wait for the lab to “try things out.” Classes will build on previous material and become more technical as the semester progresses, so students should plan to arrive early and attend every class. The instructors will publish all code created during class, which students can use to review concepts, or modify/build-on for their own use. The lecture section of class is co-taught by your instructors Maxwell Austensen, Sam Rabiyah, and Lucy Block.

Guest Presenters - The instructors coordinate for guest presenters during lecture throughout the semester to present real-world data analysis vignettes and case studies

Software - Some work in this course will require the installation of software on the student’s laptop. The instructor will notify the class indicating what software should be installed prior to each lecture. Instructors will be available to assist if students encounter issues.

Lab - Labs occur immediately following the lecture, and are meant for students to tinker with and try out the tools and skills covered in the lecture with help close-by from the instructors. Labs will not include a formal presentation. Some students may be able to complete assignments during the lab session, but this is not required or expected. Each lab will be run by one instructor, who will also grade your assignments.

Assignments - There are three assignments which will be graded on a 10-point scale and total 30% of the final grade. The assignments will be based on the techniques and tools covered in class, but allow for flexibility depending on the student’s interest and skill level. Rule of thumb: “Make it your own”. Shared code and resources are abundant online. Re-using shared code is encouraged, but students should modify it to suit their needs and demonstrate proficiency and understanding of the concepts.

Notes doc - The instructors and students will collaborate using a google doc during each session to keep track of class Zoom recordings, as well as any other relevant notes, links, code snippets and other resources for students to reference. Students are encouraged to participate in the note-taking for the benefit of themselves and the entire class.

Slack - The instructors will create a slack workspace and will share code snippets, examples, links, and other resources. Students are encouraged to ask questions in the #general channel, share work, and help each other if possible. **Do not direct message the instructors with technical questions.** Ask questions in the #general channel, so everyone can benefit from the exchange.

Brightspace - Brightspace will be used only for assignment submission and for grading.

## Class Schedule

The class schedule is roughly divided into three blocks, covering Intro to Data Analysis, R, and QGIS with the last three class periods set aside for final project prep and presentations. The planned blocks are subject to change.

**Unit 1:** The Intro to Data Analysis unit will introduce students to the topics of data analysis, data storytelling, and data visualization. We will start with an overview of the data ecosystem, with emphasis on NYC Government Open Data, and planning-related datasets. We will use Google Sheets in class, though everything we learn will be easily translatable to Excel.

*September 6 - Labor Day, no class*

**September 13 - Class 1** - Intro to class, data storytelling, data uses and sources, data types & formats

**September 20 - Class 2** - Data manipulation, descriptive statistics, data aggregation, and pivot tables

**September 27 - Class 3** - Documenting your work, intro to visualization and post-processing

* Peer Review: Work in progress on Assignment 1

**Unit 2:** Students will be introduced to programming R Studio cloud, and will explore the various packages available to help clean data, create visualizations, and share their work online.

**October 4 - Class 4** - R1: The Basics of R & Data Manipulation

* Assignment 1 Due

**October 12 (Tuesday) - Class 5** - R2: Data Manipulation

**October 18 - Class 6** - R3: Data Visualization, Pivoting, Post-Processing

**October 25 - Class 7** - R4: Spatial Data, Maps, and Census Data

* Peer Review: Work in progress on Assignment 2

**Unit 3:** The QGIS unit will focus on spatial data, and creating useful and compelling static maps. Students will learn GIS basics, and will be able to create maps from spatial data, build their own spatial datasets, conduct light spatial analysis, and learn the fundamentals of map design.

**November 1 - Class 8** - QGIS 1: Intro to Cartography and Styling

* Assignment 2 Due

**November 8 - Class 9** - QGIS 2: Geoprocessing and Simple Analysis

**November 15 - Class 10** - QGIS 3: Joins and Census Data

**November 22 - Class 11** - QGIS 4: Advanced Spatial Analysis & Special Topics

* Peer Review: Work in progress on Assignment 3

The following two lecture periods are reserved for demonstrations of advanced techniques and tools, assistance with final projects, etc.

**November 29 - Class 12 -** Flexible Lecture 1

* Assignment 3 Due

**December 6 - Class 13 -** Flexible Lecture 2

The final class is reserved for final presentations. Students will present their final projects to the rest of the class, instructors, and visiting faculty.

**December 13 - Class 14 -** Final Presentations

## Evaluation

### Participation

The participation grade will be based on the student’s engagement on the course Slack workspace, as well as active engagement during lectures, lab and peer review sessions with fellow students. As we are moving quickly and learning a variety of new tools and skills, there are many opportunities to ask for help, to help others, or to share tips, tricks, and best practices. Students are also encouraged to share articles, visualizations, maps, tools, and anything else relevant to the course material to facilitate discourse.

### Assignments

The three assignments are spread across the three main blocks of instruction. Assignment deliverables will require demonstration of data analysis and presentation concepts covered in class, and students are encouraged to choose subjects and data sources that interest them. Assignments will be graded on a 10 point scale and account for 30% of the student’s final grade.

### Final Project

The final project will be a presentation of an urban planning-themed data analysis that makes use of the tools and techniques presented in class. Students may work alone or in teams of 2 or 3, and should prepare a presentation that frames an issue, presents relevant data resources, shows analysis, tables, charts, maps, and visualizations, and draws some conclusions. In addition to the in-class presentation, each team must also prepare a blog post summarizing their issue and analysis.

### Grading Breakdown

* Participation: 20%
* 3 assignments: 30%
* Final Project: 50%
	+ 10% - In-class presentation
	+ 40% - Blog post and supporting documents

### Extra Credit

Many lab sessions will involve a small assignment or activity that builds on the skills covered in lecture. While students are not required to complete these activities, students will have the opportunity to submit their completed work for 0.5 points of extra credit per assignment.

In order to receive extra credit, students must turn in their completed lab assignment (Google Sheets document, R code sample, or QGIS map, along with any relevant visualizations) to their lab section leader. These assignments may also include a methodology write-up that explains the skills and methods used in completing the assignment, and/or a discussion of remaining questions and issues that you faced while completing the activity.

Extra-credit assignments must be submitted to your lab section leader by midnight on the Friday following each class. These pieces of work can be submitted directly to your lab section leader via email. Extra credit points will be tallied at the end of the semester and added on to your final course grade. You cannot lose points by submitting extra credit assignments, only gain points.

## Additional Notes

### Academic Integrity

Academic integrity is a vital component of Wagner and NYU. Each student is required to sign and abide by Wagner’s Academic Code. Plagiarism of any form will not be tolerated since you have all signed an Academic Oath and are bound by the academic code of the school. Every student is expected to maintain academic integrity and is expected to report violations to me. If you are unsure about what is expected of you should *ask*.

### Accommodations for Students with Disabilities

Academic accommodations are available for students with disabilities. Please visit the Moses Center for Students with Disabilities (CSD) website at www.nyu.edu/csd 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.

### Religious Holidays

NYU’s Calendar Policy on Religious Holidays states that members of any religious group may, without penalty, absent themselves from classes when required in compliance with their religious obligations. Please notify your lab instructor in advance of religious holidays that might coincide with exams to schedule mutually acceptable alternatives.