



GEORGETOWN UNIVERSITY
McCourt School of Public Policy

PPOL 6802: Data Visualization
Fall 2024
Wednesdays 6:30 - 9 pm
Course location: 125 E St. Room 370

Instructor Information

Professor: Maddie Pickens

- Email: mp1595@georgetown.edu
- Office hours virtually by appointment: <https://calendly.com/maddiepickens>

TA: Jenny Gong

- Email: jg2190@georgetown.edu
- Office hours: Virtually by appointment - <https://calendly.com/jg2190-georgetown/office-hour>

Please be considerate of the time and availability of the professor and TAs. See “How To Ask for Help” section beginning on page 6 for additional instructor contact policies and guidance on debugging collaboratively.

Course Overview

Data visualization is both art and science. This course will emphasize both aspects, encouraging students to consider both subjective design tradeoffs and existing research on visualization best practices when crafting data visualization products. Students will also learn the necessary technical skills to incorporate these principles into all elements of their data analysis workflow. The course will provide students with the following:

- Foundation in data visualization theory and principles;
- An awareness of data visualization anatomy, common visualization types, and their appropriateness for particular tasks;
- Experience designing and implementing static and interactive visualizations;
- Familiarity with several popular visualization tools; and

- Opportunity to demonstrate their skills via a final project or portfolio.

Since this course targets McCourt students, this course will also consider how visualization can be applied in the public policy context. Students are encouraged to focus on their own policy areas of interest where applicable when completing assignments. No prior experience with R or Tableau is required.

Thanks to Professors Taylor Corbett, Alex Lundry, and Wesley Joe, whose curricula provided inspiration for this course and content structure.

Course Materials

This course will focus on the following technologies:

- R
- Tableau

Students must have access to (and bring to class) a Mac or Windows laptop with the following software installed. If the software is already installed, students are strongly encouraged to update it to the latest available version.

- Microsoft Excel
- R (available for free download here: <https://cran.rstudio.com/>)
- RStudio, minimum version v2022.07 (available for free download here: <https://posit.co/download/rstudio-desktop/>)
- Tableau Desktop (free licenses available to students here: <https://www.tableau.com/university-students>)

During class, students are expected to use only course-related technologies. Please refrain from using other technologies to allow yourself and other students to focus on the material at hand.

All course readings will be available to students as either open source texts (or occasionally videos) or for free via Lauinger Library or Canvas. Students are expected to complete course readings according to the dates listed in the “Course Schedule” section beginning on page 10.

Course Requirements and Grading

Elements of the course grading and their corresponding weight are listed below:

Quiz - Introduction to R and Data Structure	10%
Data Visualization of the Day Presentations	5%
Final Project Peer Review (In-Class)	5%
Participation	10%
Canvas discussions	10%
Problem Sets	30%
Final Project or Portfolio	30%
Total	100%

Letter grades in this course will be determined according to the following scale:

Letter	Range
A	95% - 100%
A-	91% - 94%
B+	87% - 90%
B	84% - 86%
B-	80% - 83%
C	70% - 79%
F	<70%

Students will be provided with the grading criteria for each assignment at least one week in advance of the assignment due date. Data visualization requires attention to detail; failing to follow submission or formatting instructions when submitting

an assignment will affect the final assignment grade. See the “Course Requirement Details” section beginning on page 7 for a detailed breakdown of assignment requirements and due dates.

Late Work Policy

Students may request up to **two** “no questions asked” extensions throughout the semester. Extension requests should be emailed to the professor with the TAs cc’ed **before the original assignment deadline** and include the requested updated deadline (which should be no more than one week past the original deadline).

If extension requests are not received before the original assignment deadline, or the two allowed extensions have both been used, late assignments will be docked 10 percentage points per day until they are submitted (“Day 1” begins one minute past the due date, and includes weekends and university holidays). Exceptions to this policy may be made only in extreme cases, such as hospitalization or bereavement. Each unused extension will add one percentage point to the student’s final grade.

These extensions may not be used on the Final Project or asynchronous Canvas discussions, as these deadlines are determined by the Georgetown Academic Calendar. For these assignments, late assignments will be docked 10 percentage points per day until they are submitted (“Day 1” begins one minute past the due date, and includes weekends and university holidays). Exceptions may be made only in extreme cases, such as hospitalizations or bereavement.

The extensions also may not be used on the Data Visualization of the Day Presentation, the Quiz on R Concepts and Data Structures, or the Final Project Peer Review, as these are scheduled during class time and impact lesson planning and pacing.

- Instead, for the presentations, students may request to swap their presentation slots with one another as long as the professor is informed of the change before the class begins. If a student misses their assigned presentation slot without making alternate arrangements, they will receive a 0 for the presentation, except in extreme cases, such as hospitalization or bereavement.
- The quiz will be administered in-class and students are expected to attend. Students who will be absent from class on this date are required to inform

the professor as far in advance as possible and will be required to make up the quiz. Students who do not inform the professor of their absence ahead of time will receive a 0.

- For the peer review, students are expected to attend class and participate; if students are unable to attend the final class session, they should alert the professor as soon as possible, and will need to make up the assignment via an additional component of the Final Project. Students who do not inform the professor of their absence ahead of time will receive a 0.

Students seeking extensions due to religious holidays should notify the professor in writing at the start of the semester per the Provost Policy outlined on page 14, and these will not count against their extension quota.

General Course Policies

Use of Canvas

In addition to hosting applicable course materials and asynchronous class discussions, **all course announcements will be made via Canvas**. Students should ensure they are subscribed to Canvas email announcements and that emails from Canvas are not marked as spam.

Instructional Continuity

In the event that a class session is canceled unexpectedly, the session will be made up virtually. Following any cancellation announcement, instructional continuity plans will be shared via Canvas or email announcement as soon as possible.

Use of AI/ChatGPT

The use of ChatGPT and other AI-driven tools is permitted for course assignments, provided that the following conditions are met:

- 1) Only use it to produce and/or refine initial drafts. The text it generates often lacks a “human” touch and it will certainly not capture their voice. Students should make any language it produces their own.
- 2) Do not rely on it for factual information. It is frequently confidently wrong about things.

- 3) If students do use it (**including for code generation**), they must include it in their bibliography or otherwise cite it (contact the professor if you have questions about how to do this for a given assignment).
- 4) When citing usage, students must include each of the specific prompts you used to generate the text or code.

Syllabus and Course Schedule Changes

Changes to the syllabus and/or course schedule, including assignment deadlines, may be made as the semester progresses. If applicable, these changes will be announced in class and on Canvas.

Attendance

Regular attendance in class is expected. If a student is unable to attend a class or must arrive late/leave early, they are expected to notify the professor beforehand via email. In the event of an absence, it is the students' responsibility to review the materials from the missed class. Repeated absences may impact a student's participation grade.

How To Ask for Help

Please direct questions about course policies, assignment requirements, and general course concepts to the professor (Maddie Pickens). Please direct questions about technical issues like debugging code and software errors to the TA (Jenny Gong); the TA may escalate these issues as appropriate.

When debugging over email, providing more information up front will make it easier for instructors to provide a timely response. The following elements are **strongly recommended** to include when requesting help:

- A .R, .qmd, or .rmd source file (or Tableau packaged workbook, .twbx) with the latest version of your code (copy-pasting directly into email can cause additional issues);
- The dataset(s) used by your source file;
- The exact error output you are seeing (copy-pasting is more appropriate than a screenshot because it facilitates searching for references to the error), **and/or** the problematic visualization output in an appropriate file format (.png, .pdf, and/or .html are likely candidates for static output);

- Indicate which operating system (e.g. Windows or Macintosh) you are using, as well as the version of R and RStudio (or Tableau) you are using.

Emails sent after business hours and on weekends may require additional response time. **Be aware that emails sent less than 24 hours before an assignment deadline may not receive a response before the deadline.**

Course Requirement Details

Unless otherwise indicated, all assignments should be submitted on Canvas.

Data Visualization of the Day Presentations

Weight: 5%

Due Date: Varies (See Canvas schedule)¹

Students should identify a visualization that they particularly like or dislike, and give a presentation (3-5 minutes) in class addressing the following points:

- Overview of the visualization
- Who is/was the intended audience?
- Did the visualization accomplish its goal? Why/why not?
- If providing praise, why is this the best form for this visualization? Are there any alternatives?
- If providing a critique, what about the visualization does not work? How could it be made better? What restraints/restrictions for the designer may have led them to make these choices?
- Be prepared to address questions from the class and/or professor (no more than 3 questions/5 minutes of discussion following the presentation).

The schedule for these presentations will be posted on Canvas and announced on the first day of class. Because of the number of students who must present, **time limits will be strictly enforced** and going over the allotted 5 minutes will impact the final presentation grade.

Students are not required to create or submit slides, but must email the professor a link to their chosen visualization by the start of class.

¹ Because the schedule of these presentations impacts class planning and pacing, presentation slots are **not** eligible for a no-questions-asked extension. Instead, students are allowed to swap slots with one another as long as the professor is informed before the start of class.

Participation

Weight: 10%

Due Date: Rolling

In-class discussion

- Students are strongly encouraged to participate meaningfully in class discussion.
- Recognizing that there are often cultural, language, or other barriers that can make in-class discussion particularly intimidating, students can boost this aspect of their participation grade by participating asynchronously in additional discussion threads on Canvas. Each additional discussion thread will boost students' grades by 1 percentage point, for a maximum of 3 additional percentage points.
- Students will be informed of their current grade for in-class participation midway through the semester to give time for adjustments.

In-class activities

- In some class sessions, there will be in-class activities. Students are expected to participate in these activities and submit their work if indicated by the instructor (detailed instructions for each activity will be announced in class).

Canvas discussions

Weight: 10%

Due Date: December 10, 2024 (Last day of classes), 11:59 pm²

Asynchronous discussion threads

- All students are required to participate meaningfully in at least two asynchronous discussion threads on Canvas. Discussion threads will be announced via Canvas when they are posted.

Asynchronous discussion replies

- All students are required to reply at least twice to other students' discussion thread responses. When replying, students should identify and explain aspects of the response that they found notable, interesting, or that they (respectfully) disagree with.

² Asynchronous Canvas participation is **not** eligible for a no-questions-asked extension as the deadline is determined by the Georgetown Academic Calendar.

Problem Sets (4)

Weight: 30% (4 problem sets)

Due Date: October 9, 2024 (Problem Set 1), October 23, 2024 (Problem Set 2), November 6, 2024 (Problem Set 3), November 20, 2024 (Problem Set 4). All problem sets are due at the start of class (6:30 pm).

Throughout the semester, there will be four problem sets that will test students' knowledge of course concepts by replicating existing visualizations and creating original visualizations. File submission instructions, coding and formatting conventions will be specified alongside each problem set, and will be enforced as part of the final grade.

Quiz - Introduction to R and Data Structures

Weight: 10%

Due Date: September 11, 2024 (in-class)³

There will be an in-class quiz in Week 3 of the course covering material from Weeks 1 and 2. A list of topics will be provided to students ahead of time. The goal of this quiz is to ensure everyone is on the same page with regards to key course terminology, particularly introductory R concepts and quantitative analysis concepts.

Final Project

Weight: 35% (5% peer review, 30% project)

Due Date: December 4, 2024 (peer review in-class) and December 17, 2024 (final project, 11:59 pm)⁴

For this project, students will have the opportunity to create a data visualization project that tells a story with data and to refine a portfolio of visualizations created throughout the semester. There are three components to the project: a data visualization story, a final portfolio of standalone visualizations, and technical documentation. Students will also participate in an in-class peer review of their project drafts.

³ Students who will be absent from class on this date are required to inform the professor as far in advance as possible and will be required to make up the quiz. Students who do not inform the professor of their absence ahead of time will receive a 0.

⁴ The in-class peer review and final project are **not** eligible for a no-questions-asked extension as these deadlines are set by the Georgetown Academic Calendar. If students are unable to attend the final class session to participate in the peer review, they must alert the professor as soon as possible, and will be expected to complete an additional component of the final project to make up for the absence.

Submission instructions and more detailed requirements for each component will be made available on Canvas and announced in class during the semester.

Data Story

- The data story should consist of at least two original visualizations accompanied by narrative text. For this portion of the assignment, students may **not** reuse visualizations created during the semester for problem sets; the original visualizations should be new work.
- The project must tell a “story” around the data, providing qualitative or quantitative context for those visiting the project. The story should focus on key points that are based substantially on insights obtained from the visualizations.
- The topic must be public policy related, and rely upon a pre-existing data set from a reputable organization.

Final Portfolio

- The portfolio will consist of revised original visualizations (that is, not the replications) that students submitted throughout the semester as part of the problem sets. Visualizations should be polished and updated based on the feedback received throughout the semester and students’ knowledge of visualization best practices.

Peer Review (In-Class, December 4)

- Seeking and providing substantive feedback is an important part of being a visualization practitioner. Students will be randomly assigned to provide peer commentary to other students based on preliminary (incomplete) drafts of final projects due at the last class session.

Course schedule

The instructor reserves the right to make changes to required readings and assignment due dates as needed. Changes will be announced in class and on Canvas.

Week	Date	Topic(s)	Required Readings* *readings marked with an asterisk are available online through Lauinger Library	Assignment Due
1	August 28, 2024	Course introductions and data visualization anatomy	Fundamentals of Data Visualization Chapter 2 : Visualizing Data: Mapping Data onto Aesthetics and Chapter 4 : Color Scales, Study: Charts Change Hearts and Minds Better than Words Do	
2	September 4, 2024	Introduction to R programming	Data Visualization: A Practical Introduction Chapter 2: Get started , R for Data Science Chapter 4 : Data Transformation	
3	September 11, 2024	Introduction to ggplot2 and the grammar of graphics	Data Points: Visualization that Means Something Chapter 3: Representing Data*, R for Data Science Chapter 2 : Data Visualization	Data and R Concepts Quiz (in-class)
4	September 18, 2024	Perception and cognition for data visualization	Data Points: Data Visualization that Means Something Chapter 5: Visualizing with Clarity*, rstudio::conf(2020) talk: The Glamour of Graphics	
5	September 25, 2024	Visualizing distributions and time series data	The Truthful Art: Data, Charts, and Maps for Communication Chapter 7: Visualizing Distributions*, Histogram Design Decisions , 11 Ways to Visualize Change Over Time	
6	October 2, 2024	Visualizing amounts, proportions, and comparisons	Fundamentals of Data Visualization Chapter 6 : Visualizing Amounts, Methods of Comparison Compared, Are Pie Charts the Aquaman of	

			Data Visualization?	
7	October 9, 2024	Visualizing relationships	The Truthful Art: Data, Charts, and Maps for Communication Chapter 9: Seeing Relationships*, Fundamentals of Data Visualization Chapter 12: Visualizing Associations	Problem Set 1 (6:30 pm)
8	October 16, 2024	Text and annotations	Practical Typography: Typography in 10 Minutes, Make Grey Your Best Friend	
9	October 23, 2024	Exploratory data analysis	Data Points: Visualization that Means Something Chapter 4: Exploring Data Visually*	Problem Set 2 (6:30 pm)
10	October 30, 2024	Data storytelling	Good Charts: The HBR Guide to Making Smarter, More Persuasive Data Visualizations Chapter 6: Refine to Persuade*, Nature Methods: Storytelling, Dashboard design patterns	
11	November 6, 2024	Introduction to Tableau	Practical Tableau Chapter 3: An Introduction to Connecting to Data, Chapter 4: Shaping Data for Use with Tableau, Chapter 5: Getting a Lay of the Land, Chapter 6: Dimension vs. Measure, Chapter 7: Discrete vs. Continuous*	Problem Set 3 (6:30 pm)
12	November 13, 2024	Geospatial visualization	Fundamentals of Data Visualization Chapter 15 : Visualizing geospatial data, Let's Tessellate : Hexagons for Tile Grid Maps, Choosing Map Bins	
13	November 20, 2024	Evaluating data visualizations	The Truthful Art Chapter 2: Five Qualities of Great Data Visualizations*,	Problem Set 4 (6:30 PM)

			Good Charts: The HBR Guide to Making Smarter, More Persuasive Data Visualizations Chapter 7: Persuasion or Manipulation?*, Why People Make Bad Charts and What to Do When It Happens	
14	November 27, 2024	NO CLASS	NO CLASS	
15	December 4, 2024	Overflow topics/Peer review	Design and Redesign , Good Charts: The HBR Guide to Making Smarter, More Persuasive Data Visualizations Chapter 9: Visual Crit: How to Practice Looking at (and Making) Good Charts*	Final project peer review (in class)
-	December 10, 2024	-	-	Last day of classes; last day for asynchronous Canvas discussion participation (11:59 pm)
-	December 17, 2024	-	-	Final project due (11:59 pm)

Additional Policies and Information

Academic Resource Center/Disability Support: If you believe you have a disability, contact the Academic Resource Center (arc@georgetown.edu) for further information. The Center is located in the Leavey Center, Suite 335 (202-687-8354). The Academic Resource Center is the campus office responsible for reviewing documentation provided by students with disabilities and for determining reasonable accommodations in accordance with the Americans with Disabilities Act (ASA) and University policies. For more information, go to <http://academicsupport.georgetown.edu/disability/>.

Important Academic Policies and Academic Integrity: McCourt School students are expected to uphold the academic policies set forth by Georgetown University and the Graduate School of Arts and Sciences. Students should therefore familiarize themselves with all the rules, regulations, and procedures relevant to their pursuit of a Graduate School degree. The policies are located at:

<https://sites.google.com/a/georgetown.edu/gsas-graduate-bulletin/vi-academic-integrity-policies-procedures>.

Provost's Policy Accommodating Students' Religious Observances:

Georgetown University promotes respect for all religions. Any student who is unable to attend classes or to participate in any examination, presentation, or assignment on a given day because of the observance of a major religious holiday or related travel shall be excused and provided with the opportunity to make up, without unreasonable burden, any work that has been missed for this reason and shall not in any other way be penalized for the absence or rescheduled work. Students will remain responsible for all assigned work. Students should notify professors in writing at the beginning of the semester of religious observances that conflict with their classes. The Office of the Provost, in consultation with Campus Ministry and the Registrar, will publish, before classes begin for a given term, a list of major religious holidays likely to affect Georgetown students. The Provost and the Main Campus Executive Faculty encourage faculty to accommodate students whose bona fide religious observances in other ways impede normal participation in a course. Students who cannot be accommodated should discuss the matter with an advising dean.

Title IX/Sexual Misconduct

Georgetown University and its faculty are committed to supporting survivors and those impacted by sexual misconduct, which includes sexual assault, sexual harassment, relationship violence, and stalking. Georgetown requires faculty members, unless otherwise designated as confidential, to report all disclosures of sexual misconduct to the University Title IX Coordinator or a Deputy Title IX Coordinator. If you disclose an incident of sexual misconduct to a professor in or outside of the classroom (with the exception of disclosures in papers), that faculty member must report the incident to the Title IX Coordinator, or Deputy Title IX Coordinator. The coordinator will, in turn, reach out to the student to provide support, resources, and the option to meet. [Please note that the student is not required to meet with the Title IX coordinator.]. More information about reporting options and resources can be found on the Sexual Misconduct

Website: <https://sexualassault.georgetown.edu/resourcecenter>.

If you would prefer to speak to someone confidentially, Georgetown has a number of fully confidential professional resources that can provide support and assistance. These resources include:

Health Education Services for Sexual Assault Response and Prevention: confidential email sarp@georgetown.edu

Counseling and Psychiatric Services (CAPS): 202.687.6985 or after hours, call (833) 960-3006 to reach Fonemed, a telehealth service; individuals may ask for the on-call CAPS clinician

More information about reporting options and resources can be found on the [Sexual Misconduct Website](https://sexualassault.georgetown.edu/resourcecenter).