PPPA 6021 Spring 2025

Course Meetings

- Mondays, 3:30 to 5:20
  - MPA 307
  - NOTE: Wednesday, April 30 is a “designated Monday” and is our last class

Course Description and Learning Goals

Course Purpose

Not all graphics are created equal: some lie, some obscure, some illuminate, and some compel. This course studies how to spot lies and obfuscation and teaches you how to illuminate and compel. In this class, we learn how to distill large quantities of data into pictures that communicate.

Ideally, policy choices are driven by information. Because of its ability to generalize across large populations, the most credible information is frequently quantitative. However, data alone tell no story. Without visualization, it is very difficult for data to influence policy. This course challenges you to take raw numbers and create a story that can change impressions, long-held beliefs and ultimately policy. Together, we learn to tell stories with numbers using graphics.

Learning Objectives

- Value high quality data graphics
- Present data to illustrate a narrative that influences policy
- Understand how visualizations can rapidly and accurately convey a large amount of quantitative data
- Follow the logic of technical software that creates data visualizations
- Implement your own programming logic
- Critically analyze data visualizations
- Work with big-ish datasets to produce summary analyses

- Use summary statistics -- from econometrics and research methods courses -- appropriately in producing graphics
- Recognize the limits of cognition of visually displayed data, and produce graphics that speak to the broadest possible audience

Instructor

Professor: Leah Brooks

Media and Public Affairs Building, Room 601F
Office Hours: Mondays, 8:15 PM to 9:15 PM (last appt ends at 9:30); Tuesdays 10:30 AM to 1 PM. Evening hours always on zoom. Daytime hours on zoom unless you notify me otherwise.

- Use the scheduler to book a 15-minute slot
- If there are no other students waiting, I am happy to talk beyond the 15 minute limit
- Office hours are by Zoom, unless you would prefer to meet in person, which I can usually accommodate with advance notice.
- Your confirmation email from the scheduler will contain the Zoom link
- No office hours Mondays Jan. 20, Feb. 17, March 24 and 25, and April 7.

lfbrooks at gwu.edu, but please use Piazza email for all non-private issues

Contact policy: I will do my best to answer emails within 24 hours during weekdays, or within 24 hours on the soonest weekday if you email on the weekend. If you do not hear from me within this time frame, you should assume that your email has been lost and you should re-send.

If you have missed a class, your first line of defense to ask what you have missed is another student.

Prerequisites

- I do not assume prior programming knowledge, either in R or any other statistical programming language.
- Because this class focuses on learning the basics of statistical programming, expect a greater time commitment if you have no prior programming experience.

Readings

Required Readings

See lectures tab for reading dates and specific pages.

- Few, Stephen, *Show Me the Numbers: Designing Tables and Graphs to Enlighten*
- Chang, Winston, *R Graphics Cookbook: Practical Recipies for Visualizing Data*, Second Edition. Available online for free here
- Knaflic, Cole Nussbaumer Storytelling with Data
- Tufte, Edward, *The Visual Display of Quantitative Information*
- Manson, Steven. *Mapping, Society and Technology*, University of Minnesota, 2017.

Most of these books are available used online at a substantial discount. The Chang and Manson readings are available free online. See full details with chapter and dates on lectures tab.

Books are on order at the campus bookstore, and are widely available online. I have tried to link to all remaining content from this syllabus. Please let me know if you have difficulties with any of the links, or with permissions.

Supplemental Readings -- For Reference

- Lima, Manuel, *Visual Complexity: Mapping Patterns of Information*, available online at GW Library
- *Learning R*
- Schwabish, Jonathan, *Better Presentations: A Guide for Scholars, Researchers and Wonks*
- Schwabish, *Better Data Visualizations: A Guide for Scholars, Researchers and Wonks*, 2021.
- Other Data Visualization Courses
  - Enrico Bertini
- Newman, Winifred E. *Data Visualization for Design Thinking: Applied Mapping*
- Brunsdon and Comber, *An Introduction to R for Spatial Analysis and Mapping*
- Healy, Kieran, *Data Visualiation: A Practical Introduction*
- Brewer, Cynthia A., *Designing Better Maps: A Guide for GIS Users*

- Wilkinson, Leland, et al, *The Grammar of Graphics*. The intellectual inspiration for ggplot.
- W.E.B. DuBois Center, *W.E.B. DuBois's Data Portraits: Visualizing Black America*
- Alberto Cairo
  - 2016: The Truthful Art
  - 2020: How Charts Lie
  - 2023: The Art of Insight: How Great Visualization Designers Think

Weekly Plan

Each week, the in-class lecture is half design principles and half R coding. I expect that you do the associated reading before arriving in class. In class, we will discuss the readings and the R lesson for the week. To recap,

Before Class

- You read the assigned texts
- Shortly before class, I post the week's programming tutorial

During Class

- Administration overview
- Good, Bad and Ugly
- Answer questions from reading
- Present lecture on design principles and coding
- Discuss some coding examples
- Time permitting, you work on coding

I aim to end class 10 to 20 minutes before 5:20. I encourage you to use this remaining time to ask coding questions or start on the tutorial so that I can help with problems as they arise. I will always stay until 5:20 to answer any remaining questions or provide programming help.

Outside of class

- Use Piazza for coding questions
- Familiarize yourselves with features that show blocks of code
- Learn how to create a “minimal reproducible example” of your problem. See Stack Overflow's excellent description here

Assessment and Evaluation of Learning

1. Weekly Programming Practice (30%)

- Creating data visualizations requires technical knowledge.
- These problem sets are designed to develop your R skills so you can successfully create the final project.
- You will begin these tasks in class each week; you need to finish them by the following class to turn in on paper in class and online at the beginning of class.
- Logistics
  - The final product should be typed. Early in the semester I will show you how to use Quarto to make a submittable document. After that point, submissions should be in quarto.
  - Of the 10 weeks with programming practice, seven weeks of assignments will count toward your grade.
  - Each class I will provide a structured handout to follow with questions to answer.
  - Submit write-up online by the beginning of the following class.
- I grade this assignment pass/fail
- Work with others on these assignments. Whatever you turn in, however, needs to be in your own words; no work should directly duplicate classmates' work.
- I accept no late assignments

2. One Fully Composed Chart (5%)
   - This assignment is a warm-up for your policy brief and a chance to get feedback before the policy brief.
   - Lecture 5 you will turn in a fully-executed graph on the topic of your choice, along with the code in R.
   - See further details in handout.
   - I do not accept late assignments
3. Visualizations: The Good, the Bad and the Ugly (5%)
   - One of the goals of this course is for you to recognize quality data visualizations and misleading data visualizations.
   - This will help you review and identify the strategies from the previous class, and will require you to explain the strengths and weaknesses of the graphics.
   - To this end, one or two students each week will find a visualization that can be improved based on the previous week's class.
   - We will post them on the course website and each student is responsible for bringing three specific discussion points on the graph for the beginning of class.
   - We will make assignments for this activity the first class.

    - No late assignments are accepted.
4. Policy Brief (40%)
    - A policy brief -- a version of a short memo -- is the primary method of policy communication. This assignment asks you to create such a memo.
    - For our final class, you will turn in an approximately five page policy brief, with approximately five data visualizations.
    - This project includes interim steps described below.
    - The goal of this exercise is for you to
        - Connect what we've learned in course with policy
        - Practice R
        - Direct inquiry toward an unstructured project
        - Challenge your newly developed visualization skills
    - You are required to use micro data, in the sense that the data you load are less aggregated than (at least) some of the data you present.
    - For relevant briefs, you are very welcome to post on the Center for Washington Area Studies page
    - Logistics
        - Paper is due the Monday following the final lecture.
        - You are welcome, but not required, to work in pairs. Requirements do not differ if you work in pairs; you should correctly interpret this as an incentive to work in pairs.
        - Extensions will be given only the case of illness
        - Briefs will be graded out of 100 points
        - Any essays submitted late will decline by ten points for each twelve hours the essay is late, e.g. if the essay is due on Friday and is received Monday, if it would have received 70%, it now receives 30%
5. Interim Assignments for Policy Brief (total of 15%)
    - Policy Brief Proposal (5%)
        - To make sure that you have chosen a manageable assignment, on week 3 you will turn in a description of what you are planning to visualize
        - This should be one page or less. It should identify your data source(s), and outline what you'd like to say.
        - I will provide written feedback on your proposal within one week of submission.
        - I will comment on, but not give credit for, late work

- In-class Storyboarding Workshop (0%)
  - Week 7 you will work together with your classmates to tell a story with your findings
- Policy Brief Workshop (5%)
  - To make sure that you are on track to complete a high-quality policy brief at the end of the semester, and to hone your critical visualization skills, on week 9 you will produce a draft of your policy brief for peer feedback.
  - Specifically, you will post a draft of your policy brief, complete with draft visualizations, and give and receive feedback on these visualizations.
  - We will work in small groups that I will assign, and you comment on your group members' work
  - I will provide more details in a handout in week 7
- Policy Brief Presentations (5%)
  - We use classes 13 and 14 for presentations of your policy briefs
  - Half of your grade will be based on your comments on your classmates' presentations (2.5%)
  - Half of your grade will be based on your presentation (2.5%)
  - I will provide more details for this activity closer to the date.
  - No late work is accepted

6. Class Participation (5%)
   - To make sure you're up to date with the reading -- which should help you understand the creation of good graphics – I will ask questions of all students in each class.
   - Come prepared to answer questions

Course Material Copyright

Course materials posted on this website, Piazza, or elsewhere are intellectual property belonging to the author. Students are not permitted to buy or sell any course materials without the express permission of the instructor. Such unauthorized behavior constitutes academic misconduct.

Accommodations

We want to provide an environment that helps every student in this course succeed. If you have accommodations of which the instructor should be aware, please inform the

instructor no later than the first week of the course so we can plan together for a successful semester.

In order to receive accommodations on the basis of disability, you'll need to provide proper documentation to the Office of Disability Support Services, Marvin Center 436, 202-994-8250. We accomodate students based on the recommendations of the DSS Office.

GWU Policies

University Policies

- *Academic Integrity Code*
  Academic integrity is an essential part of the educational process, and all members of the GW community take these matters very seriously. As the instructor of record for this course, my role is to provide clear expectations and uphold them in all assessments. Violations of academic integrity occur when students fail to cite research sources properly, engage in unauthorized collaboration, falsify data, and otherwise violate the Code of Academic Integrity . If you have any questions about whether or not particular academic practices or resources are permitted, you should ask me for clarification. If you are reported for an academic integrity violation, you should contact the Office of Student Rights and Responsibilities (SRR) to learn more about your rights and options in the process. Consequences can range from failure of assignment to expulsion from the university and may include a transcript notation. For more information, please refer to the SRR website, email rights@gwu.edu, or call 202-994-6757.
- *University policy on observance of religious holidays*
  Students must notify faculty during the first week of the semester in which they are enrolled in the course, or as early as possible, but no later than three weeks prior to the absence, of their intention to be absent from class on their day(s) of religious observance. If the holiday falls within the first three weeks of class, the student must inform faculty in the first week of the semester. For details and policy, see Religious Holidays.
- *Use of Electronic Course Materials and Class Recordings*
  Students are encouraged to use electronic course materials, including recorded class sessions, for private personal use in connection with their academic program of study. Electronic course materials and recorded class sessions should not be shared or used for non-course related purposes unless express permission has been granted by the instructor. Students who impermissibly share any electronic course materials

are subject to discipline under the Student Code of Conduct. Contact the instructor if you have questions regarding what constitutes permissible or impermissible use of electronic course materials and/or recorded class sessions. Contact Disability Support Services if you have questions or need assistance in accessing electronic course materials.

» *Out of Class Learning*
Average minimum amount of independent, out-of- class, learning expected per week: In a 15 week semester, including exam week, students are expected to spend a minimum of 100 minutes of out-of- class work for every 50 minutes of direct instruction, for a minimum total of 2.5 hours a week.

Academic support

» *Academic Commons*
Academic Commons is the central location for academic support resources for GW students. To schedule a peer tutoring session for a variety of courses visit here. Visit Academic Commons for study skills tips, finding help with research, and connecting with other campus resources. For questions email academiccommons@gwu.edu.

» *Writing Center*
GW's Writing Center cultivates confident writers in the University community by facilitating collaborative, critical, and inclusive conversations at all stages of the writing process. Working alongside peer mentors, writers develop strategies to write independently in academic and public settings. Appointments can be booked online.

Support for students inside and outside the classroom

» *Disability Support Services*
202-994-8250
Any student who may need an accommodation based on the potential impact of a disability should contact Disability Support Services to establish eligibility and to coordinate reasonable accommodations.

» *Student Health Center*
202-994-5300, 24/7
The Student Health Center (SHC) offers medical, counseling/psychological, and psychiatric services to GW students. More information about the SHC is available

here. Students experiencing a medical or mental health emergency on campus should contact GW Emergency Services at 202-994-6111, or off campus at 911.

GW Campus Emergency Information

GW Emergency Services: 202-994-6111 For situation-specific instructions, refer to GW's Emergency Procedures guide.

- *GW Alert*
  GW Alert is an emergency notification system that sends alerts to the GW community. GW requests students, faculty, and staff maintain current contact information by logging on to alert.gwu.edu. Alerts are sent via email, text, social media, and other means, including the Guardian app. The Guardian app is a safety app that allows you to communicate quickly with GW Emergency Services, 911, and other resources. Learn more at safety.gwu.edu.
- *Protective Actions*
  GW prescribes four protective actions that can be issued by university officials depending on the type of emergency. All GW community members are expected to follow directions according to the specified protective action. The protective actions are Shelter, Evacuate, Secure, and Lockdown (details below). Learn more at safety.gwu.edu/gw-standard-emergency-statuses.
  - Shelter
    - Protection from a specific hazard
    - The hazard could be a tornado, earthquake, hazardous material spill, or other environmental emergency.
    - Specific safety guidance will be shared on a case-by-case basis.
    - Action: Follow safety guidance for the hazard.
  - Evacuate
    - Need to move people from one location to another.
    - Students and staff should be prepared to follow specific instructions given by first responders and University officials.
    - Action
      - Evacuate to a designated location.
      - Leave belongings behind.
      - Follow additional instructions from first responders.
  - Secure
    - Threat or hazard outside of buildings or around campus.

    - Increased security, secured building perimeter, increased situational awareness, and restricted access to entry doors.
    - Action
        - Go inside and stay inside.
        - Activities inside may continue.
- Lockdown
    - Threat or hazard with the potential to impact individuals inside buildings.
    - Room-based protocol that requires locking interior doors, turning off lights, and staying out of sight of corridor window.
    - Action
        - Locks, lights, out of sight
        - Consider Run, Hide, Fight

PPPA 6021 Spring 2025

Syllabus | **Lectures** | Resources

Outline and Meetings | Good/Bad/Ugly

Course Outline and Readings

C#	Date	Topics	Handouts/Deadlines
0		**Setting Up RStudio**	*Handouts* » Tutorial 0
1	Jan. 13	**Data Visualization Ur-Text and Starting R** Reading » Tufte, Part 1 » Chang Chapter 1, Chapter 15:1-15:7, 15:15-15:18	*Handouts* » Lecture notes » Policy brief proposal instructions » Fully composed chart instructions » Good/Bad/Ugly instructions
	Jan. 20	MLK Holiday	
2	Jan. 27	**Intro to Nuts and Bolts of Visualization and Data Prep in R** Reading » Few, Chapters 3 and 5 » Tuva's Graph Choice Chart	*Due* » Tutorial 1. *Handouts* » Tutorial 2 » Lecture notes
3	Feb. 3	**Levels and Shares, Bars and Lollipops** Reading » Few, Chapters 9 and Chapter 10, pages 210-217 (on bars) » Chang, Chapter 3	*Due* » Tutorial 2. » Policy brief proposal *Handouts*

			» McGinty, "Grasping Giant Numbers is Far From Second Nature", *Wall Street Journal* » Great lollipop from Wall Street Journal here. Full article is "In Triumph or Tragedy, View of Trump Don't Waver", *Wall Street Journal* » Discuss legends and keys	» Tutorial 3 » Lecture notes, figures only [link] » Lecture notes [link] » Tutorial 3 » Lecture notes
4	Feb. 19	**Histograms and Distributions** Reading	» Few, Chapter 6 » Chang, Chapter 6 (through 6.5) » Merrill and Leatherby, "Here's How America Uses Its Land" » Discuss formatting text, numbers, dates	*Due* » Tutorial 3. *Handouts* » Tutorial 4 » Lecture notes [link] » Lecture notes, figures only [link]
	Feb. 17	Presidents Day		
5	Feb. 24	**Maps I and Data via API** Reading	» Manson, *Mapping, Society and Technology*, Chapter 3 » Great dot density from *Post* here; if you can't get the full article, the picture of goats is here » Discuss how to get data via API	*Due* » Fully Composed Chart » Tutorial 4. *Handouts* » Tutorial 5 » Lecture Notes
6	March 3	**Functions and Storyboarding** Reading	» Knaflic, Chapters 7 and 8	*Due* » Tutorial 5. *Handouts* » Tutorial 6 » Lecture notes » In-class workshop instructions
	Mar. 10	Spring Break		

7	Mar. 17	**Maps II and Themes** Reading » Manson, *Mapping, Society and Technology*, Chapter 7 » Takenaga, "How the Times Makes Those Addictive Election Maps", *New York Times* » Chang, Chapter 9: 9.2 to 9.6 » Discuss choosing colors	*Due* » Tutorial 6. *Handouts* » Tutorial 7 » Lecture notes
8	March 24	**Student Consultations** » No in person class » Instead, consultations the week prior; sign up coming here	*Due* » Tutorial 7.
9	Mar. 31	**Line charts and Annotations** Reading » Few, Chapter 10, pages 217-220 (on lines) and Chapter 13 » Chang, Chapter 4 and Chapter 7 » How to adjust for inflation; how to normalize to 1	*Handouts* » Tutorial 8 » Lecture notes » Final presentation and paper instructions
10	April 7	**Guest speaker and In-class workshop** » Guest speaker TBD » In-class workshop	*Due* » Tutorial 8. » Materials to your classmates for in-class workshop *Handouts* » Lecture notes
11	April 14	**Scatter plots** Reading » Friendly and Denis, "The Early Origins and Development of the Scatterplot", *Journal of the History of the Behavioral Sciences*, 2005. [link] (skim is sufficient) » Few, Chapter 10, pages 206-210 (on scatters) and Chapter 11 » Chang, Chapter 5	*Handouts* » Tutorial 9 » Lecture notes

		» Discuss formatting gridlines, tick marks, axis lines, borders	
12	April 21	**Storytelling, Accessibility and Interactivity** Reading » Knaflic, Chapter 9 » Few, Chapter 10, pages 224-246 (secondary component design) » On minimal reproducible examples, and a specific R case	*Due* » Tutorial 9 *Handouts* » Tutorial 10 » Lecture notes
13	April 28	Presentations and feedback » Presentations	*Due* » Tutorial 10
14	**Wed.** April 30	Presentations and feedback » Presentations	
	Mon., May 5		*Due* » Policy brief

Good, Bad and Ugly Assignment

- Presenters and Commenters list coming here
- Finders must
  - link a graphic on the sheet by the Wednesday noon following the lecture
- Commenters must
  - come prepared with three specific points
  - these can be criticisms, appreciations, or suggestions
  - criticisms are best paired with suggestions
- Each student is a presenter once and a commenter once