DPR 101: Data Visualization for Political Research

Dr. Miles D. Williams

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Course Description

Is democracy worldwide in decline? Are wars becoming less frequent and deadly? Have politics really become more polarized? These are weighty questions, and depending on whom you ask, different people will provide you with different answers.

One of the primary culprits of divergent views in politics is the alternate bases of fact on which people draw conclusions. While there is no simple way to reconcile differences in values, it often helps to document the nature of our political and social world with transparency and consistency. This offers an objective basis of fact where anecdote and speculation would normally reign.

One of the most impactful ways of communicating documented facts about our political and social world is through data visualization. Data are being generated around us all the time. When people vote, data are generated. When members of parliament open their mouths, we have data. Court cases, polling, protests, passing legislation, raising money, civil wars – we have data. Especially with large datasets, we really have no idea what we have until we can **see it**.

Data visualization is the primary way in which we communicate trends and relationships to audiences, both public and private. Therefore, a course on data visualization is primarily a course on communication, where the data viz tells a story that can be clearly understood with methods that can be used by anyone to tell the same story.

This course will help you understand data and what to do with it. That means we will confront all sorts of data and gain techniques to wrangle it (understand, alter, or give it structure) and then explore a wide variety of visualization techniques available to us. By the end of the course, you will speak data and have a sizable data visualization toolkit. In addition, you will be able to articulate theories of visualization to explain why you chose a certain visualization and, though secondary, attach written communication that is as clear as your data viz.

Course Objectives

In this course, you'll develop a number of skills.

Quantitative You will develop your quantitative skills in the treatment of data. You'll learn how data are gathered, assembled into datasets, and most effectively visualized to describe and draw inferences for maximum impact.

Writing A picture may be worth a thousand words, but it helps if words are included. When you visualize data you will also write up your results. This will enhance your writing skills and reinforce the idea that data visualization is not a mechanical skill; it is a method of inquiry intended for public communication.

Critical Thinking Critical thinking involves "confronting multiple, competing perspectives and adjudicating between them." This is the essence of what is required to organize data, create effective visualizations, and draw conclusions.

Statistical Programming You will use R and RStudio to wrangle and visualize data. By the time you have finished this course you may not be an expert programmer, but you will be well versed in the basics of R and how to use the `{tidyverse}` suite of packages to assemble, organize, and visualize data.

Analysis Software

Students will use R and RStudio, which are free and open source! We will primarily use the RStudio version available through a web browser installed on a Denison server: `r.denison.edu`. This can be accessed on campus on any computer or through a VPN off campus. To use the VPN:

1. Go to myDenison.
2. Head to MyApps.
3. Select Remote Access.
4. Follow the instructions to download and use the VPN.

All necessary R packages for the course are already installed in the server version. While using the **Denison server version is highly recommended**, you are also welcome to download and install local versions of R and RStudio on your laptop. Follow this guide.

Required Readings

In addition to reading some short pieces written by journalists, academics, and others available online, we will primarily draw on Kieran Healy's excellent book on data viz:

> Healy, Kieran. 2019. *Data Visualization: A Practical Introduction*. Princeton: Princeton University Press.

Resources

We Have a TA!

Will Duquette is the Teaching Assistant for DPR 101. If you have questions about assignments or need help troubleshooting code, Will is an excellent resource.

Office Hours: 11:00 am – 1:00 pm

Location: Higley 408

Contact: duquet_w1@denison.edu

Accessibility

Students with a documented disability should complete a Semester Request for Accommodations through the MyAccommodations app on MyDenison. It is the student's responsibility to contact me privately as soon as possible to discuss specific needs and make arrangements well in advance of an evaluation. I rely on the Academic Resource Center (ARC) located in 020 Higley Hall, to verify the need for reasonable accommodations based on the documentation on file in that office. Reasonable accommodations cannot be applied retroactively and therefore ideally should be enacted early in the semester as they are not automatically carried forward from a previous term and must be requested every semester.

Writing Center

Staffed by student Writing Consultants, the Writing Center is a free resource available to all Denison students. Writing Consultants from a range of majors work with writers one-on-one in all phases of the writing process, including (but not limited to): deciphering assignments, discussing ideas, developing an argument, integrating research and sources, working with faculty feedback, and/or polishing a draft. In addition, Consultants are happy to help with all types of writing, from lab reports, research papers, and informal writing assignments to cover letters, personal statements, and other application materials. The Center welcomes writers from all backgrounds and levels of college preparation, including multilingual writers. Should a multilingual writer need writing assistance that exceeds the abilities of consultants, the writer can be referred to the Coordinator for Multilingual Learning, Kaly Thayer (thayerk@denison.edu). Writing Center consultations will take place in person in in the Atrium level of the Library; please visit the Writing Center's page (https://my.denison.edu/campus-resources/writing-center) on MyDenison for specific information regarding hours of availability and how to schedule an appointment. The Writing Center strongly recommends signing up for appointments in advance.

Multilingual Support (L2)

Students who use English in addition to other languages are welcome to use the resources available at the Multilingual Learning Office. Kaly Thayer, the Assistant Director of Multilingual Learning, and Anna Adams, the English Language Support Specialist, as well the student consultants

who work with them, are trained and experienced in helping students address the different issues that arise when working in more than one language. If English is not your first or only language, please consider utilizing this resource, which is available to ALL Denison students. Ms. Thayer, Ms. Adams, and the student consultants offer a variety of support for L2 students, including consulting with you about your written language (grammar, syntax, word-choices), strategies to manage your reading assignments, assistance with class conversation and presentations, and help devising ways to develop and effectively use all your skills in English. You can set up an appointment via MyDenison - Campus Resources - Multilingual Learning, or by emailing the Multilingual Learning Office directly at englishhelp@denison.edu.

Reporting Sexual Assault

Essays, journals, and other coursework submitted for this class are generally considered confidential pursuant to the University's student record policies. However, students should be aware that University employees are required by University policy to report allegations of discrimination based on sex, gender, gender identity, gender expression, sexual orientation or pregnancy to the Title IX Coordinator or a Deputy Title IX Coordinator. This includes reporting all incidents of sexual misconduct, sexual assault and suspected abuse/neglect of a minor. Further, employees are to report these incidents that occur on campus and/or that involve students at Denison University whenever the employee becomes aware of a possible incident in the course of their employment, including via coursework or advising conversations. There are others on campus to whom you may speak in confidence, including clergy and medical staff and counselors at the Wellness Center. More information on Title IX and the University's Policy prohibiting sex discrimination, including sexual harassment, sexual misconduct, stalking and retaliation, including support resources, how to report, and prevention and education efforts, can be found at: https://denison.edu/campus/title-ix .

R Resources & Cheat Sheets

How to Google R Stuff ◊ `{tidyr}` ◊ `{dplyr}` ◊ `{ggplot2}` ◊ `{rmarkdown}` ◊ R color cheatsheet ◊ `{paletteer}`

Course Policy

The course policy and requirements are detailed below. It all basically boils down to: (1) show up to class, (2) learn some stuff, and (3) don't cheat or trick me into believing you've accomplished 2.

Grading Policy

Grades at Denison are based on a standard 4.0 scale. You can read more about Denison's grading system here. Generally, a 90 corresponds to an A−, an 80 to a B−, etc.

Grading Scale		
A+: 98%+	A: 92%	A-: 90%
B+: 88%	B: 82%	B-: 80%
C+: 78%	C: 72%	C-: 70%
D+: 68%	D: 62%	D-: 60%
F: below 60		

Code Glossary **10pts**

We're going to be using statistical programming software in this class, which means you're going to need to learn how to code. There's no expectation that you have any coding experience prior to taking this course, but whether you have or haven't coded before, taking notes and building a repository of code that you can draw on in future work is essential. That's why I want you not only to take notes in class as we write code but also to build a code repository that includes examples of different kinds of data viz and how to process the data used to make them. The good news is, you won't have to come up with these examples on your own. If you code along with me in class, you'll have a complete code glossary by the end of the semester. This will be due April 23, and I'll check in with you periodically to make sure you're keeping on pace.

4 Main Assignments **15pts Each**

You'll have four main writing assigments to complete in this course. These will be anywhere form 700 to 1,200 words and usually include at least 4 data visualizations. The prompts for these assigments will be made available during the course. These involve wrangling some political data, describing trends with figures, and a written summary (with your figures included in-text) of what you find.

8 Data Challenges **3pts Each**

These are intended to be a fun and challenging way to practice some data wrangling and data viz skills. You'll be given data or a data-frame (you'll learn what that is in the course) and make a graph that tells a story from the data better than what could be communicated by just looking at the data on its own. You'll get the necessary data for these at least 5 days in advance of when they are due. These will be graded using a mastery-based approach. That means that if you completed the challenge successfully, that's awesome! You mastered the skills necessary to do the challenge and you get the full 3pts. But if you complete the challenge and it doesn't quite cut it, that's okay. You can try again (and again) until you nail it. Once you do, you'll get the full 3pts. Until then, you'll get 1pt as a place-holder.

Post a Viz **6pts Total**

This is a low stakes weekly assigment to post before class on Mondays. You're job is simple. Find a visualization out in nature, post it to Canvas with its source url, and write a paragraph describing it. Did its creators make smart display choices? Is there anything that makes it interesting? Is it just terrible? This assigment will be graded based on completion (unless it's clear that you didn't try at all).

$$
\begin{aligned}
6pts &\text{ (Post a Viz)} \\
10pts &\text{ (Code Glossary)} \\
4 \times 15pts = 60pts &\text{ (Main Assigments)} \\
\underline{+8 \times 3pts = 24pts} &\text{ (Data Challenges)} \\
100pts &\text{ (Total Assigments)}
\end{aligned}
$$

Wait! What about attendance? You're all young adults. I expect you to come to class and participate. But I won't be taking attendance (at least not formally). If you can't make it to class for some reason, then you can't make it to class. But if you start missing class regularly, your grade will start to suffer. It won't suffer because you're losing "participation" points. It'll suffer because you're missing out on information provided in class that's necessary for completing data challenges, doing your main assignments, and building your code glossary.

E-mail Policy

I have a simple email policy, and it is targeted at achieving one goal: **maximizing your and my work-life balance**. The policy is this:

> I promise a timely response to **relevant** emails I receive between **9:00 AM** and **5:00 PM** Monday to Friday.

You may not think professors have lives (but we in fact do, and I like to live mine outside of normal working hours). That doesn't mean I expect students to abide by chrono-normative standards.[1] But, this does mean that if you email me outside of these windows, I may not respond until the next 9-5 workday.

Make-Up Assigment Policy

There are **NO** make-ups for missed assignments. Don't bother asking. But, if you anticipate having troubles making a due-date and notify me ***in advance***, we can work out a solution.

Second Chances Policy

The data challenges have built-in second-chances. That means if your submission didn't show that you clearly mastered the skills necessary to do the challenge well, you can try again. The main assignments are a different story. With these, you have one chance. But only one chance should be necessary. There are days in class specifically carved out to work on these. This gives you every opportunity to ask me questions, have me take a look at your writing and data viz, and check your overall write-up before you submit it. Take advantage of these opportunities for feedback *before* you submit. You won't get a second chance after.

[1] By this, I simply mean classic societal expectations about working vs. leisure hours.

Attendance Policy

Come to class. Attendance is not part of your grade, but poor attendance will lead to poor grades.

Computer-based Excuses

Excuses for late or missed assignments based on CD, flash drive, or hard drive errors are **not acceptable**. The Denison network and server is reliable and accessible. If you use your Google Drive and the RStudio server, all your work will be backed up and easy to access.

Late Assigments

We have a lot of work to do in this class. So turn in your work when it's due. This is meant to help you. I love to procrastinate just as much as anyone else—but if you procrastinate in this course, you will drown. As incentive for keeping on top of your assignments, each day your assignment is late and unexcused (including weekends and holidays) you will lose 5 percent from your final grade for that assignment. There will be no exceptions made for work that is submitted only minutes after a deadline. If something is due by midnight on a Friday (12:00 AM), the moment the clock strikes 12:01 AM your assignment is a day late and you will automatically lose 5% from your grade.

The exception to this rule is if a student and I have worked out an arrangement for submitting an assignment at a later date.

Electronic Submission

You will submit all of your assignments electronically via Canvas.

Academic Dishonesty Policy

Don't cheat. Just don't do it.

It should go without saying, but ***plagiarism*** is also a form of cheating and it includes:

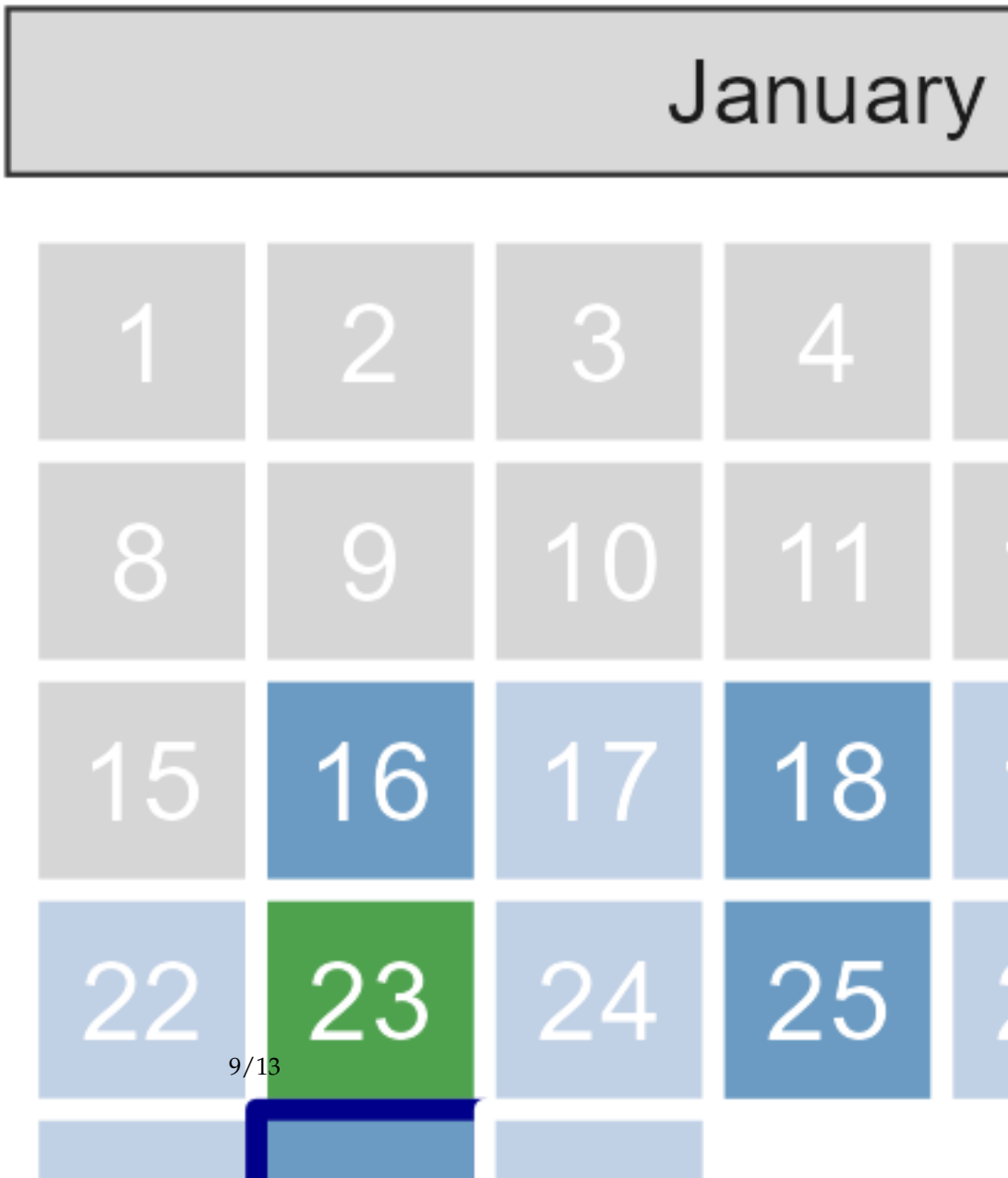
1. Copying or paraphrasing the ideas of others without citation or attribution.
2. Copying or paraphrasing the ideas of ***other students in the class***.

I've had to deal with students plagiarizing before. It's painful for me and it puts a blight on the record of the student. It's not only cheating, it's stealing.

When in doubt about whether something constitutes cheating, consult Denison's Code of Academic Integrity.[2] Be advised that this same Code of Academic Integrity requires that instructors notify the Associate Provost of cases of academic dishonesty. **Any incidence of academic dishonesty will result in failure of the course and referral to the Denison judicial process.**

[2] Of course, if you have to ask yourself if something counts as cheating, then it probably is...

Class Schedule


January
1
2
3
4
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Getting Started

Week 01, 01/16 - 01/20: Intro to Data Viz

M Syllabus day and course intro.

W Read: Healy Ch. 1 + Tufte Ch. 1 & Ch. 2. In-class: We'll talk about what makes a good data visualization.

F Read: Eight graphs that tell the story of U.S. economic inequality; Congressional polarization; Polarization across 9 countries. In-class: Visit from our TA + intro to RStudio.

Week 02, 01/23 - 01/27: R + RStudio

M **NO CLASS. MLK Day Observed**

W Read: Healy Ch. 2.; Top 50 ggplot2 visualizations. In-class: RMarkdown, packages, and reading data.

W Read: Social lobying; QAnnon beliefs; Aid skeptical. In-class: The nitty gritty details of knitting documents.

F Read: Religion and culture wars; Companies punishing Rs for Jan. 6. Do: Follow prompt on Canvas for editing and knitting your first R Markdown file. In-class: Make your first figure!

Unit 1 — Cross-sectional Data

Week 03, 01/30 - 02/03: Making Plots

M Read: Healy Ch. 3. In-class: How ggplot works + tidy data.

W In-class: Mappings and layers. Do: Tidy data task on Canvas.

F In-class: More on mapping aesthetics + saving your work.

First graph challenge due on Canvas Sunday 09.18 by midnight.

Week 04, 02/06 - 02/10: Displaying Multiple Variables

M In-class: Exploring state-level data with joins and filters.

W Read: Healy Ch. 4; this, this, and this on color in figures. In-class: Visualizing state-level data with colors and different data types.

F Read: R color cheatsheet, check out this and this resource for generating palettes (and see this one for accommodating colorblindness). Do: Use the palette picker to bring to class FOUR palettes picked out — 1) one five value qualitative palette, 2) one divergent palette, 3) one sequential (i.e., low to high), and 4) one for just two groups (just pick two colors manually from the R color cheatsheet that would work well).

Second graph challenge due on Canvas Sunday 09.25 by midnight.

Week 05, 02/13 - 02/17: Maps & Small Multiples

M Read: Healy Ch. 7. In-class: Plotting data on maps.

W In-class: Small multiples and `{geofacets}`. See a fun example here.

F In-class: Work day.

Third graph challenge due on Canvas Sunday 10.02 by midnight.

Unit 2 — Survey Data

Week 06, 02/20 - 02/24: Survey Data + Reading & Manipulating

M Read: Survey codebook and design statement (tbd); also read about survey research in Johnson and Reynolds (tbd – in Canvas readings). In-class: Intro to using `{socsci}`.

W Read: Armaly, Buckley and Enders, paying special attention to the "Data and Measurement" section. In-class: Making indices and showing them.

F Read: Weitz-Shapiro and Winters. In-class: More on indices.

MA1 due on Canvas Friday 10.07 by midnight.

Week 07, 02/27 - 03/03: Displaying 1 Variable + "Graph Tables"

M Read: Healy Ch. 5. In-class: Making "graph tables" with `{socsci}`.

W Read: Healy Ch. 8. In-class: Refining your plots.

F Work Day!

Fourth graph challenge due on Canvas Sunday 10.16 by midnight.

Week 08, 03/06 - 03/10: Graph Finishing

M **No Class.** Fall break!

W Work Day!

F Work Day!

Unit 3 — Longitudinal Data

Week 09, 03/13 - 03/17: Temporal Data, Gathering, & Aggregating

M Read: Can we trust measures of democracy? And read about 7 different types of temporal data visualizations. In-class: Using `{democracyData}` to explore tends in democracy.

W Read: Temporal visualizations of employment and minimum wage. In-class: Shifting between time and groups, and aggregating and adjusting for baselines.

F **No Class.** I will be at a conference.

MA2 due on Canvas Friday 10.28 by midnight.

Week 10, 03/20 - 03/24: Manipulating & Joining

M In-class: Add demography for countries using `{pwt10}`.

W In-class: Labeling in time.

F In-class: Choosing case studies.

Fifth graph challenge due on Canvas Sunday 11.06 by midnight.

Week 11, 03/27 - 03/31: Visualizing Multiple Trends

M In-class: Groups and multiple facets.

W In-class: Groups and multiple facets continued.

F In-class: Animated plots for multiple trends with `{gganimate}`.

Unit 4 — Choose Your Own Adventure

Week 12, 04/03 - 04/07: Finding & Pitching

M In-class: Review data available — I'll provide a list.

W In-class: Pitch your project in 5 min.

F In-class: Pitch your project in 5 min. continued.

MA3 due on Canvas Friday 11.18 by midnight.

Week 13, 04/10 - 04/14: Thanksgiving

No Class (Thanksgiving) If you feel like it, spend this time either working ahead and/or reviewing past material. But by all means, **take a break, too!**

Week 14, 04/17 - 04/21: Descriptives & Explanations.

M Lab Work.

W Lab Work.

F Lab Work + MA4 presentations.

Sixth graph challenge due on Canvas Sunday 12.04 by midnight.

Week 15, 04/24 - 04/28: Descriptives & Explanations Cont.

M Lab Work

W Lab Work

F Lab Work

Week 16, 05/01 - 05/05: Finals Week

M Reflections and course evaluations.

MA4 due on Canvas Thursday 12.15 by 11:00 am.