DPR 101 (01/02): Data Visualization for Political Research

Dr. Miles D. Williams

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Class Hours: MWF (Sec. 1 9:30-10:20am, Sec. 2 10:30-11:20am)
Class Room: Knapp Hall 105

Course Description

Is election fraud really a threat to democracy? Is war prevalent and getting more likely? What attitudes do people really have about issues like abortion and gun control? How will your fellow students vote in the next election and why? 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. We all have different life experiences, and there is no shortage of anecdotes and stories that we can muster to support our beliefs. 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, 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 political 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.

Class Schedule
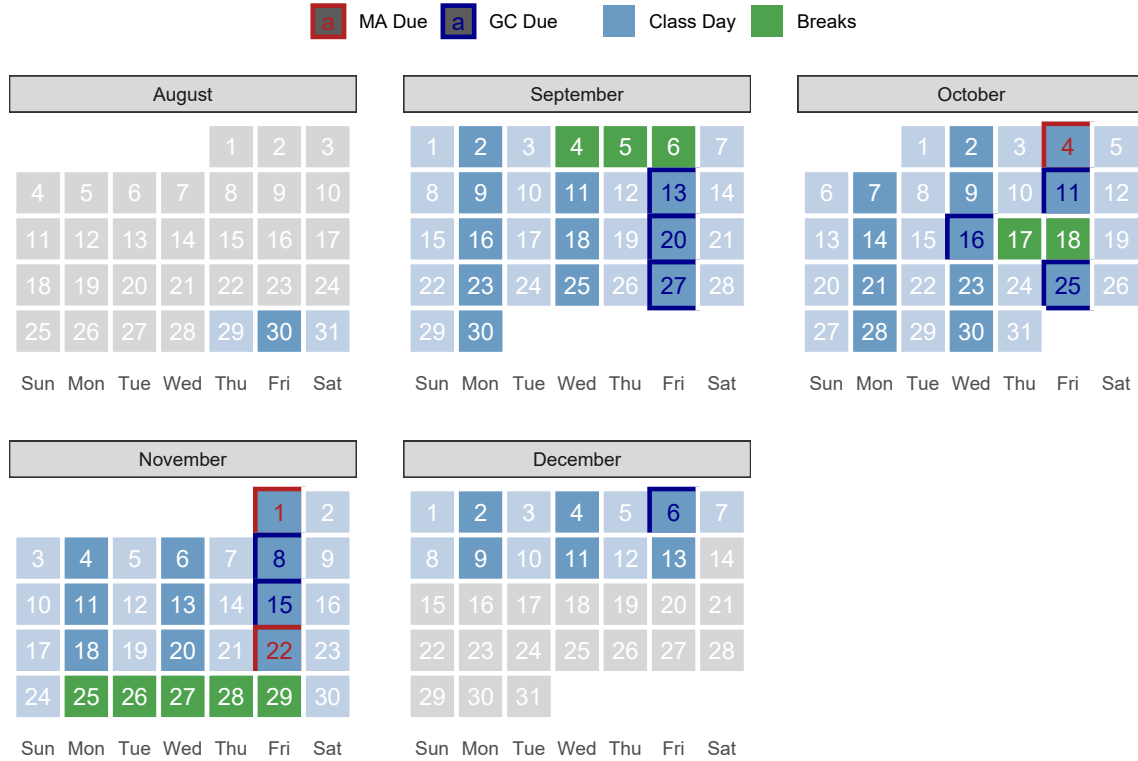
Notable dates: APSA (4-6 Sept.), Fall Break (17-18 Oct.), Thanksgiving (25-29 Nov.), Final Day of Instruction (13 Dec.)

Note: When "Discussion" is listed for a given day, the assigned readings are on Canvas. Unless otherwise indicated, due dates are by midnight. "GC" = Graph Challenge (due Wednesdays). "MA" = Main Assignment (due Fridays).

Getting Started

Week 01, 08/26 - 08/30: Welcome!

- Friday: Course Intro

Week 02, 09/02 - 09/06: What is Data Visualization?

- Monday: Kieran Healy, "Look at Data"
- Wednesday: APSA - *No class*
- Friday: APSA - *No class*

Part I: Tales of Election Fraud

Week 03, 09/09 - 09/13: Getting Started

- Monday: Read Introduction and R Basics in lecture notes
- Wednesday: Read Accessing Data and Making Your First Plot in lecture notes
- Friday: Read and discuss "No evidence of election fraud" *GC1 due Fri.*

Week 04, 09/16 - 09/20: Making a Plot

- Monday: Read 'ggplot()' Basics in lecture notes
- Wednesday: Keep reading 'ggplot()' Basics
- Friday: Read and discuss "The Butterfly Did It: The Aberrant Vote for Buchanan in Palm Beach County, Florida" *GC2 due Fri.*

Week 05, 09/23 - 09/27: Show the Right Numbers

- Monday: Read Showing the Right Numbers with 'ggplot()' Data Transformations in lecture notes
- Wednesday: Read Drawing Maps in the lecture notes
- Friday: Read The Myth of Voter Fraud, Resources on Voter Fraud Claims, Voter Fraud Map: Election Fraud Database, About the Election Fraud Database. *GC3 due Fri.*

Week 06, 09/30 - 10/04: Work on MA1

- Monday: Introduce MA1
- Wednesday: Work on MA1
- Friday: 1-on-1 check-ins *MA1 due Fri.*

Part II: Statistical Sightings of Better Angels

Week 07, 10/07 - 10/11: Wrangling Data

- Monday: Read Data Wrangling in lecture notes
- Wednesday: Keep reading Data Wrangling
- Friday: Discussion reading *GC4 due Fri.*

Week 08, 10/14 - 10/18: Refining Plots

- Day 1: Read Layering Complexity and Adding Labels and Text in lecture notes
- Day 2: Keep reading Layering Complexity…
- Day 3: Fall Break - *No class* *GC5 due Wed.*

Week 09, 10/21 - 10/25: Color Palettes and Themes

- Monday: Read Introducing '{coolorrr}' for Color Palettes in lecture notes
- Wednesday: Read 'ggplot()' Themes in lecture notes
- Friday: Discussion reading and introduce MA2 *GC6 due Fri.*

Week 10, 10/28 - 11/01: Work on MA2

- Monday: Work on MA2
- Wednesday: Work on MA2
- Friday: 1-on-1 check-ins *MA2 due Fri.*

Part III: What the Hell Happened?

Week 11, 11/04 - 11/08: Dealing with Survey Data

- Day 1: Read Tools for Working with Survey Data in lecture notes
- Day 2: Keep reading Tools…
- Day 3: Discussion reading   *GC7 due Fri.*

Week 12, 11/11 - 11/15: Upping the Complexity

- Monday: Read Dealing with Multiple Response Questions in lecture notes
- Wednesday: Read Showing Multifaceted Relationships in lecture notes
- Friday: Discussion reading and introduce MA3   *GC8 due Fri.*

Week 13, 11/18 - 11/22: Work on MA3

- Monday: Work on MA3
- Wednesday: Work on MA3
- Friday: 1-on-1 check-ins   *MA3 due Fri.*

Week 14, 11/25 - 11/29: Thanksgiving Break

No class

Part IV: Choose-your-own-adventure

Week 15, 12/02 - 12/06: Your Adventure Starts!

- Monday: Introduce MA4
- Wednesday: Pitch your ideas
- Friday: Friday discussion + course evals   *GC9 due Fri.*

Week 16, 12/09 - 12/13: MA4 Presentations

- Monday: Presentations
- Wednesday: Presentations
- Friday: Presentations

Due date for MA4 will be at the end of our scheduled final exam time, to be posted later

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 Posit Workbench (formerly 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 Posit Workbench (RStudio), which are free and open source. We will use the Posit Workbench 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 follow the instructions at one of the help pages below:

1. For Windows Users
2. For Mac Users

Many of the 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 Posit Workbench/RStudio on your laptop. Follow this guide.

Required Readings

In addition to reading some short pieces written by journalists, academics, and others available online, our primary "text" will be the DPR 101 lecture notes which I have published open access via Quarto. I've creatively called them *Data Visualization for Political Research*.

In the past, I've assigned the following text as well:

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

Healy's book is an excellent resource, and I recommend getting a copy of his book if you can swing it.

Resources

The Instructor (that's me)

During my office hours, my door is always open! If you have any questions or concerns about the course, just drop by my office Monday or Wednesday between 11:30am and 1:20pm. No appointment necessary. If those hours don't work for you, we can work out a different time to meet.

You can also email me at williamsmd@denison.edu any time. I'll try to respond as quickly as possible, but if you email me after 5 pm, you may not get a response from me until the next workday. I have a little one at home, and evenings and weekends are family time.

Teaching Assistants

DPR hires teaching assistants each semester to provide you with extra help and tutoring. Contact information, hours, and locations for our TA are included below. Our TA is a great resource if you're having trouble with your code or are stuck on a problem.

Anna Laura Xavier Batista

- **email**: xavier_a1@denison.edu
- **hours**: Thursdays, 8-10pm
- **location**: Knapp Hall 208

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

We have a writing center! If you're unsure of the quality of your writing or need an extra set of eyes to help you edit and refine your work, these are the folks to see. They're way better than ChatGPT or whatever other LLM suits your fancy.

Multilingual Support (L2)

If English isn't your first language, Denison offers support for multilingual writers. If you want to make sure that your writing is on-point, make use of this resource. Again, it's way better than ChatGPT.

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 ◊ {coolorrr}

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		

Attendance and Participation **10%**

You should show up to class and participate! Because of the technical nature of some of our material, missing multiple days of class can leave holes in your skillset that make doing assignments down the road more difficult. We'll also have some class days dedicated to in-depth discussion of an academic article or other reading material. If you don't show up, you can't participate in the discussion or provide me with evidence that you even did the reading. As an incentive to show up (both physically and mentally) to class, 10% of your grade will come from attendance and participation. Your first unexcused absence will be a freebie. After that, you'll lose 1/2 of your attendance and participation grade per each of two subsequent unexcused absences. That means after 3 unexcused absences you'll lose your entire grade for attendance and participation. Also, if you just come to class, but don't engage, you'll lose 1/2 of your attendance and participation grade as well. [**Note**: *Participation does not only look like talking in class. If you don't feel comfortable or confident (but I hope you do!) speaking up, we'll do some work in groups as well. If you participate in your group, that counts as participation, too!*]

4 Main Assignments (MAs) **15% Each**

You'll have four main writing assignments to complete in this course. These will be anywhere from 700 to 1,200 words and usually include at least 4 data visualizations. The prompts for these assignments 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. Two of these assignments will be done in groups, one will be done individually, and for the final MA of the course it will be up to you whether you work in a group or go solo. For group assignments, grades will be given on a group rather than an individual basis. The final assignment includes a presentation component, which is graded as completed/not completed, and will factor in to the 15% for your final assignment grade.

*6 out of 9 Graph Challenges (GCs)* **4% 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 and asked to 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. There will be 9 GCs throughout the semester, but **you only need to complete 6** to get full credit. Which 6 you do is up to you. However (and here's the kicker), you can choose to complete all 9 challenges if you wish, and in exchange **I'll count only your best 6 submissions toward your final grade.** That seems like a pretty cool deal to me.

Post-a-Viz **6% Total**

This is a low stakes weekly assignment to post before class on Mondays. You're job is simple. Find a visualization out in nature, copy and paste it to Canvas, and write a short paragraph describing it. Did its creators make smart design choices? Is there anything that makes it interesting? Is it just terrible? This assignment will be graded based on completion (unless it's clear that you didn't try at all). On the Monday it's due, we'll spend about the first five minutes in class discussing 3-4 people's data viz selections which I will select at random (so you better come prepared to talk about what you posted).

The following figure provides a summary of my grading strategy and philosophy. For each assignment you submit, I'll evaluate it on a discrete scale from 0 to 5 (except Post-a-Viz, which will just be based on completion). 5 = "Perfection!" and 0 = "Missing" (e.g., you didn't turn anything in). Your points then get mapped to a percentage point grade for a given assignment according to what I call a "Grace Curve." This means the linkages between my evaluation of your work on the 0-5 scale and your actual grade are not one-to-one. 5 out of 5 = 100% (an "A+"), but 4 out of 5 = 93% (still an "A") and 3 out of 5 = 85% (a "B"), and so on. If you do some simple math, you know that 4 out 5 should actually be 80% and 3 out of 5 should be 60% if I didn't apply the Grace Curve. My grading strategy gives me a simple scale to evaluate your work, but it also ensures that you get some benefit of the doubt. Did you completely bomb an assignment? My instinct is to give you a 1 out of 5, which would normally give you only 20% for your final grade on said assignment. That seems too harsh. My scale adjusts for my disappointment in the quality of your work and gives you 60% (a "D-") instead. That's still a poor grade, but not one that would be impossible to recover from.

What Points mean on the Grading Scale
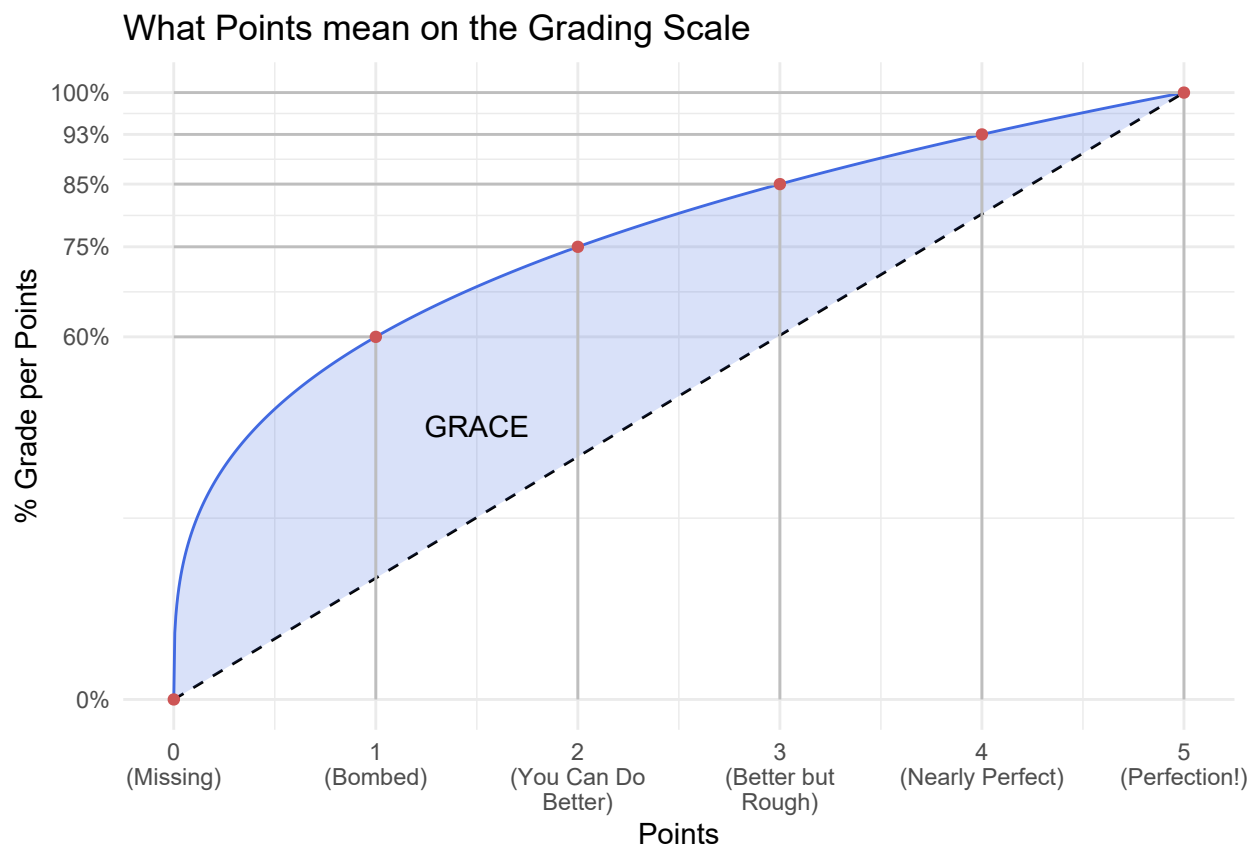
6% (Post a Viz)

10% (Attendance and Participation)

Tallying Your Grade: $4 \times 15\% = 60\%$ (Main Assigments)

$\underline{+6 \times 4\% = 24\%}$ (Graph Challenges)

100% (Total Assignments)

E-mail Policy

I promise to respond to your emails as quickly as I can Monday-Friday between 9-5, but sometimes it may take me bit to get back to you. I have a baby boy at home, and I like spending time with him. So if you email me in the evening, I probably won't see your email until the next day. And if you email me on the weekend, I probably won't see your email until Monday morning. I say this to give you some reassurance and to hopefully avoid panic on your part if I don't get back to you immediately. Like heart surgery, your education is important; but unlike heart surgery, your education is not an emergency. Try to remember that.

Make-Up Assignment 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. Otherwise, you have this syllabus which alerts you when assignments are due. Plan ahead!

Second Chances Policy

You have exactly one chance to complete your assignments, and only one chance should be necessary. There are days in class specifically carved out to work on your MAs, and my door is always open during office hours. You also have access to DPR TAs and the Writing Center. There are so many resources at your disposal as you complete your work in this class. Take advantage of them, and you won't need a second chance.

Attendance Policy

Attendance is part of your grade (see "Grading Policy"). However, sometimes life happens. There's an emergency, you get sick, you're an athlete and you have to be out of town, etc. Your on the cusp of full adulthood, so I'm leaving it up to you to tell me if you feel an absence is justified and won't count against your grade. All I ask is that you do me the courtesy of telling me **in advance** of your absence and your justification. After the fact is too late (except in the case of a true and immediate emergency).

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 from any computer on campus.

Late Assignments

Turn in your work on time. We have a lot of ground to cover in this class. So turn in your work when it's due. This is meant to help you, and me. I love to procrastinate just as much as anyone else—but if you procrastinate in this course, you will drown. And if you procrastinate this forces me to procrastinate in getting a grade back to you. I want to give you timely feedback on your work, which I can't do if you don't turn your work in on time.

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 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.[1] 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.**

Academic Dishonest and Generative AI

Remember the previous section where I said you shouldn't cheat? That also applies to GenAI (Generative Artificial Intelligence) tools like ChatGPT. ***But***, there's some nuance to my attitude about GenAI and academic dishonesty. GenAI is a powerful tool, and it's a tool that you need to learn to use well because, let's face it, a lot of other people are using it, too. I want to be very clear that *I am okay if you use GenAI tools to help you with your work.* I've started using ChatGPT to help me with some aspects of my own research and programming. It would be unfair for me to hold you all to a different standard than I hold myself.

So, here's my policy on using GenAI: You can use it, but I want you to be honest about it, and I DO NOT want you to use it uncritically or unthinkingly. What does this look like? **Do not** copy and paste responses or output from tools like ChatGPT and pass them off as your own. **Do** use ChatGPT if you get stuck and need help (just make sure you tell me about it, and that you add your own thoughts, writing, and ideas into the mix as well).

Ultimately, I hope this policy strikes a realistic balance between honesty and exploration of the potential uses of GenAI and ensuring your own "sweat equity" (effort) goes into your course work as well. I want you to be honest if and when you use GenAI because I'm genuinely curious about its applications. I'm still learning how to use it, too, and I hope that we all can learn how to use it better *together*. Further, I want you to use it critically and thoughtfully because it doesn't work perfectly. While it's powerful (and shockingly so), it is not all-powerful. You need to put in plenty of your own work as well.

You'll probably see a wide variety of attitudes toward GenAI from different faculty on campus. Some attitudes will differ from mine. As instructors, we're still trying to figure out the best policy. Have patience with us!

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