

PSYCH 490.003

Spring 2025 ■ TTh 9:05a-10:20a

2025-01-07

Spring 2025 ■ TTh 9:05-10:25 AM



Figure 1: ChatGPT/Dall-E-3 model response to ‘an image of “a picture paints a thousand words”’ on 2024-09-19

Themes

If a picture’s worth a thousand words (Wikipedia contributors 2024), what exactly does it say? This course will focus on the psychology of data visualization—how to read, critique, and generate meaningful figures that inform but don’t mislead. We’ll take inspiration from recognized classic figures and unpack what makes them exemplary. We’ll critique figures that

deliberately or inadvertently mislead or confuse. We'll learn what 150 years of vision science, the foundation of experimental psychology, has to say about data visualization. And we'll learn how to build our own reproducible figures using Python, R, and JavaScript. No prior programming experience is required.


Instructor

Rick O. Gilmore, Ph.D.
Professor of Psychology
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Schedule an appointment: <https://doodle.com/mm/rickgilmore/book-a-time>

Lab web site: <https://gilmore-lab.github.io>

Teaching Assistant

 Under construction

TBD

Meeting time & location

Tuesday & Thursday, 9:05-10:20 am 207 [Thomas Building](#)

Canvas site

We will use Canvas to submit assignments and grade them. The Canvas site may be found here:

Most of the course content will be found on this site.

Course structure

This is a discussion-focused course. On most days we will discuss readings assigned prior to class. On many days, we will work together or individually on the assigned [exercises](#), the final project, or another assignment.

Schedule

January 13-17

Surveying the landscape

Tuesday, January 14

Course introduction

- [Slides](#)

Thursday, January 16

Making (sense of) data

- Required:
 - Stevens (1946)
- [Slides](#)

January 20-24

Who visualizes data and why

Tuesday, January 21

Visualization in business, industry, & government

Thursday, January 23

Visualization in science

January 27-31

Understanding figures

Tuesday, January 28

Data types

- In-class exercise on [data creation](#).

Thursday, January 30

Figure types

February 3-7

From perception to cognition

Tuesday, February 04

From stimulus to sensation

Thursday, February 06

From sensation to perception

February 10-14

From cognition to understanding

Tuesday, February 11

Thursday, February 13

February 17-21

Storytelling with data

Tuesday, February 18

Thursday, February 20

February 24-28

Critiquing figures

Tuesday, February 25

Thursday, February 27

March 3-7

Exploring data with spreadsheets

Tuesday, March 04

Thursday, March 06

March 10-14 *Spring Break*

March 17-21

Introduction to R

Tuesday, March 18

Why R we doing this?

Thursday, March 20

March 24-28

Exploring data with R

Tuesday, March 25

Gathering & cleaning data

Thursday, March 27

Making plots with ggplot2

March 31 - April 4

Introduction to Python

Tuesday, April 01

Thursday, April 03

April 7-11

Exploring data with Python

Tuesday, April 08

Thursday, April 10

April 14-18

Making plots with JavaScript

Tuesday, April 15

Thursday, April 17

April 21-25

Final Project Preparation

Tuesday, April 22

Thursday, April 24

April 28 - May 2

Student Projects

Tuesday, April 29

Thursday, May 01

Student Evaluation

Elements

Component	Description	Points
Attendance	You will receive 1 point for each class you attend up to a maximum of 40.	40
Exercises	There will be eight (8) exercises that you must work on. Each exercise is worth 10 points. The top four (4) count toward your final grade.	40
Final project	You will complete a final project , either on your own, or with a small group of 3 or less. Your final project is worth 40 points.	40
	TOTAL POINTS POSSIBLE	120
Extra Credit	If you submit more than four exercise write-ups, you may earn up to 10 extra credit points.	

Grading Scheme

Percent	Points	Grade
94+	113	A
90-93	108-112	A-
87-89	104-107	B+
84-86	100-103	B
80-83	96-99	B-
77-79	92-95	C+
70-76	84-91	C
60-69	72-93	D
<59	<=71	F

Important deadlines

This page summarizes some of the key deadlines in the course.

Date	What's due/happening
2024-09-06	Exercise 01
2024-09-20	Exercise 02
2024-09-20	Exercise 03
2024-10-04	Exercise 04
2024-10-14	Exercise 05
2024-10-18	Final project proposal due
2024-11-01	Exercise 06
2024-11-08	Exercise 07
2024-11-22	Final Project Presentation Schedule Survey
2024-12-06	Exercise 08
2024-12-18	Final project writeup due

Course policies

Academic Integrity

Students with questions about academic integrity should visit <http://www.la.psu.edu/current-students/undergraduate-students/education/academic-integrity>.

Penn State defines academic integrity as the pursuit of scholarly activity in an open, honest and responsible manner. All students should act with personal integrity, respect others dignity, rights and property, and help create and maintain an environment in which all can succeed through the fruits of their efforts (Faculty Senate Policy 49-20). Sanctions for academic misconduct can include a grade of F for the course as well as other penalties.

Unless you are told otherwise, you must complete all course work entirely on your own, using only sources that have been permitted by your instructor, and you may not assist other students with papers, quizzes, exams, or other assessments. If I allow you to use ideas, images, or word phrases created by another person (e.g., from Course Hero or Chegg) or by generative technology, such as ChatGPT, you must identify their source.

When you complete assignments, remember the **ABCs** to avoid plagiarism: **A**lways place copied information within quotation marks, include information about the quoted or paraphrased source in a **B**ibliography, and **C**ite the source in the body (in the text) of your paper immediately after the quoted or paraphrased information. When in doubt, cite in the text and include the source in a bibliography.

Students with questions about academic integrity should ask me or the TA before submitting work.

Students facing allegations of academic misconduct may not drop/withdraw from the affected course unless they are cleared of wrongdoing (see G-9: Academic Integrity). Attempted drops

will be prevented or reversed, and students will be expected to complete course work and meet course deadlines. Students who are found responsible for academic integrity violations face academic outcomes, which can be severe, and put themselves at jeopardy for other outcomes which may include ineligibility for Dean's List, pass/fail elections, and grade forgiveness. Students may also face consequences from their home/major program and/or The Schreyer Honors College.

Absences or late assignments

Absence from class

Your absence from class may be excused under unusual circumstances such as (a) an interview for graduate school or a job, (b) illness, (c) religious observance, (d) the death of a family member, or (e) any other event recognized by the university as a valid excuse for absence from class.

If you must miss class, you must contact the instructor and the TA **in advance**.

Up to three (3) excused absences will be permitted.

Late exercises

Exercises submitted after the published deadlines will not be eligible for full credit unless the instructor has given specific permission.

Late final projects

Final projects submitted after the published deadline will not be eligible for full credit unless the instructor has given specific permission.

Accommodation for persons with disabilities

Penn State welcomes students with disabilities into the University's educational programs. Please refer to the information provided by Student Disability Resources (SDR) at <http://equity.psu.edu/student-disability-resources/> for information about the procedures required to obtain reasonable accommodations in this course. Students should discuss SDR-approved accommodations with their instructor as early in the semester as possible, even if they have taken another course with the instructor. Please note: students are not required to provide their instructor with information about the nature of their condition.

Penn State students are also welcome to contact other units for assistance with personal concerns that interfere with academic progress, including: Counseling and Psychological Services (CAPS; <http://studentaffairs.psu.edu/counseling/>), the Office of Student Affairs (<http://studentaffairs.psu.edu/>).

<http://studentaffairs.psu.edu/>), Career Services (<http://studentaffairs.psu.edu/career/>), the Center for Women Students (<http://studentaffairs.psu.edu/womenscenter/>), the LGBTQA Student Resource Center (<http://studentaffairs.psu.edu/lgbtqa/>), the Office of Sexual Misconduct Prevention and Response (<http://titleix.psu.edu/>), Penn State Educational Equity (<http://equity.psu.edu/>), the Multicultural Resource Center (<http://equity.psu.edu/mrc/>), and University Health Services (<http://studentaffairs.psu.edu/health/>).

Nondiscrimination Statement

The Pennsylvania State University is committed to equal access to programs, facilities, admission and employment for all persons. It is the policy of the University to maintain an environment free of harassment and free of discrimination against any person because of age, race, color, ancestry, national origin, religion, creed, service in the uniformed services (as defined in state and federal law), veteran status, sex, sexual orientation, marital or family status, pregnancy, pregnancy-related conditions, physical or mental disability, gender, perceived gender, gender identity, genetic information or political ideas.

Discriminatory conduct and harassment, as well as sexual misconduct and relationship violence, violates the dignity of individuals, impedes the realization of the University's educational mission, and will not be tolerated.

Direct all inquiries regarding the nondiscrimination policy to:

Suzanne C. Adair Associate Vice President for Equal Opportunity and Access Office of Equal Opportunity and Access The Pennsylvania State University 328 Boucke Building University Park, PA 16802-5901 Email: sca917@psu.edu Tel (814) 863-0471

Diversity Statement

This classroom is a place where you will be treated with respect. All members of this class are expected to contribute to a respectful, welcoming and inclusive environment for every other member of the class.

Penn State is committed to creating an educational environment which is free from intolerance directed toward individuals or groups and strives to create and maintain an environment that fosters respect for others as stated in Policy AD29 Statement on Intolerance.

Mandated Reporting Statement

Penn State's policies require me, as a faculty member, to share information about incidents of sex-based discrimination and harassment (discrimination, harassment, sexual harassment, sexual misconduct, dating violence, domestic violence, stalking, and retaliation) with Penn State's Title IX coordinator or deputy coordinators, regardless of whether the incidents are stated to me in person or shared by students as part of their coursework. For more information

regarding the University's policies and procedures for responding to reports of sexual or gender-based harassment or misconduct, please visit <http://titleix.psu.edu>.

Additionally, I am required to make a report on any reasonable suspicion of child abuse in accordance with the Pennsylvania Child Protective Services Law.

Zoom

At some point in the semester, I may decide to use Zoom to allow students who are unable to attend class in person to participate.

While you are on Zoom, keep in mind that this is a classroom environment and others should be treated with respect. Please keep your microphone muted unless you want to ask a question or interact with someone. If your microphone is not muted, the entire class will be able to hear what is going on in your environment. As an instructor, I personally like to see people's faces. As a participant, I am more involved when I have my camera on. I realize, however, that there are many reasons why you might not want to turn on your camera such as poor internet connection, joining via phone, or other privacy concerns. It is your choice as to whether you would like to have the camera on or not.

Values

Penn State Principles

The Pennsylvania State University is a community dedicated to personal and academic excellence. The Penn State Principles were developed to embody the values that we hope our students, faculty, staff, administration, and alumni possess. At the same time, the University is strongly committed to freedom of expression. Consequently, these Principles do not constitute University policy and are not intended to interfere in any way with an individual's academic or personal freedoms. We hope, however, that individuals will voluntarily endorse these common principles, thereby contributing to the traditions and scholarly heritage left by those who preceded them, and will thus leave Penn State a better place for those who follow.

I will respect the dignity of all individuals within the Penn State community.

The University is committed to creating and maintaining an educational environment that respects the right of all individuals to participate fully in the community. Actions motivated by hate, prejudice, or intolerance violate this principle. I will not engage in any behaviors that compromise or demean the dignity of individuals or groups, including intimidation, stalking, harassment, discrimination, taunting, ridiculing, insulting, or acts of violence. I will demonstrate respect for others by striving to learn from differences between people, ideas, and opinions and by avoiding behaviors that inhibit the ability of other community members to feel safe or welcome as they pursue their academic goals.

I will practice academic integrity. Academic integrity is a basic guiding principle for all academic activity at Penn State University, allowing the pursuit of scholarly activity in an open, honest, and responsible manner. In accordance with the University Code of Conduct, I will practice integrity in regard to all academic assignments. I will not engage in or tolerate acts of falsification, misrepresentation or deception because such acts of dishonesty violate the fundamental ethical principles of the University community and compromise the worth of work completed by others.

I will demonstrate social and personal responsibility. The University is a community that promotes learning; any behaviors that are inconsistent with that goal are unacceptable. Irresponsible behaviors, including alcohol or drug abuse and the use of violence against people or property, undermine the educational climate by threatening the physical and mental health of members of the community. I will exercise personal responsibility for my actions and I will make sure that my actions do not interfere with the academic and social environment of the University. I will maintain a high standard of behavior by adhering to the Code of Conduct and respecting the rights of others.

I will be responsible for my own academic progress and agree to comply with all University policies. The University allows students to identify and achieve their academic goals by providing the information needed to plan the chosen program of study and the necessary educational opportunities, but students assume final responsibility for course scheduling, program planning, and the successful completion of graduation requirements. I will be responsible for seeking the academic and career information needed to meet my educational goals by becoming knowledgeable about the relevant policies, procedures, and rules of the University and academic program, by consulting and meeting with my adviser, and by successfully completing all of the requirements for graduation.

Penn State Values

Integrity: We act with integrity and honesty in accordance with the highest academic, professional, and ethical standards.

Respect: We respect and honor the dignity of each person, embrace civil discourse, and foster a diverse and inclusive community.

Responsibility: We act responsibly, and we are accountable for our decisions, actions, and their consequences.

Discovery: We seek and create new knowledge and understanding, and foster creativity and innovation, for the benefit of our communities, society, and the environment.

Excellence: We strive for excellence in all our endeavors as individuals, an institution, and a leader in higher education.

Community: We work together for the betterment of our University, the communities we serve, and the world.

References

- Stevens, S S. 1946. “On the Theory of Scales of Measurement.” *Science (New York, N.Y.)* 103 (June): 677–80. <https://doi.org/10.1126/science.103.2684.677>.
- Wikipedia contributors. 2024. “A Picture Is Worth a Thousand Words.” https://en.wikipedia.org/wiki/A_picture_is_worth_a_thousand_words; Wikimedia Foundation, Inc.