



DPI-851M: Data and Information Visualization

Fall 2023

Faculty: Hong Qu	Faculty Assistant: Rosita Scarfo
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Class Days/Time: Monday and Wednesday 12:00PM -1:15PM Wexner 332	Friday workshop (optional) 1:30PM -2:45PM Littauer 230

Office Hours Schedule	
Faculty	Day / Time (ET)
Hong Qu	Mondays 2pm-3pm Fridays 1:30pm - 2:30pm

Course Description

This course focuses on building creative and technical skills to transform data into visual reports for the purpose of engendering a shared understanding. Students will learn to use software to ingest, organize, and visualize data, with an emphasis on applying design principles to produce clear, elegant graphs and dashboards that capture the essence of an insight, message, or recommendation distilled from the data.

Students will become familiar with exploratory and explanatory data visualization techniques for data storytelling. Additionally, students will work together on team projects to develop their creative and technical skills as well as to learn from their peers. We will be using data from real-world sources and applications for our in-class exercises and group projects.

Learning Objectives

- Students should know how to select the appropriate software and chart types to model and visualize data for research projects based on the intended audiences
- Through class tutorials, lab exercises and projects, students should become comfortable with thinking visually and producing visual reports and interactive charts and dashboards
- Students should demonstrate confidence in their ability to prepare data and draw from design principles to communicate and persuade using storytelling with data

Prerequisites

None

Course Structure

Weekly Class Sessions			
Monday and Wednesday (in class)	Rest of the week (homework)		
<div style="border: 1px solid black; padding: 10px; width: fit-content; margin: auto;"> <p>Class session 2 x 75'</p> <p>Studio session 75'</p> </div>	Watch and Read tutorials	Readings	Assignments and Project
	20'-30'	15' - 45'	45' - 90'
	Group Projects		

Assignments and Projects

There will be weekly data visualization exercises to learn and practice your software skills; each exercise will have a standard and an optional advanced level of difficulty.

Additionally, every student will be required to join a group to work on data visualization projects.

Late assignments will be **penalized by 20% per day** after the deadline. Note, please don't wait until the last minute to start working on assignments, because the teaching team will be overwhelmed with questions and requests for assistance on Mondays and Tuesdays and we might not be able to help you. Try to get as much done as possible by Sundays, even though the assignments are due the following Tuesdays. Thanks for your cooperation and understanding in this regard.

Class Attendance

Attendance is mandatory, though you may be excused for up to 1 absence if you inform the teaching team of any hardship before class. Attendance in the optional workshop is highly recommended for students who would like additional practice to further develop their technical skills.

Grading

Every student must demonstrate confidence and proficiency with encoding and representing data as visual artifacts that convey meaningful information, insights, and arguments. Additionally, students can choose among tracks to develop specialized skills in data analysis, visual design, or technical tools.

Attendance	10%
Participation	20%
Assignments	40%
Group project	30%

Course Organization, Materials, and Access

Textbooks (all readings are available for free digitally through Harvard)

Required

Sleeper, Ryan. [*Practical Tableau: 100 Tips, Tutorials, and Strategies from a Tableau Zen Master*](#). 1 edition. Beijing: O'Reilly Media, 2018. [[Ebook](#)]

Knaflic, Cole Nussbaumer, [*Storytelling with Data*](#), 2015.

Cairo, A. (2013). [*The functional art :an introduction to information graphics and visualization*](#) (1st edition). New Riders.

Wexler, Steve, Shaffer, Jeffrey, & Cotgreave, Andy. (2017). [*The big book of dashboards*](#). Wiley.

Few, Stephen. [*Now You See It: Simple Visualization Techniques for Quantitative Analysis*](#). 1st edition. Oakland, Calif: Analytics Press, 2009.

Recommended

Wexler, S. (n.d.). [*The Big Picture: How to Use Data Visualization to Make Better Decisions--Faster*](#). McGraw-Hill Education.

Yau, Nathan. [*Data Points: Visualization That Means Something*](#). Indianapolis, IN: John Wiley & Sons, Inc, 2013.

Cairo, Alberto. (2016). [*The Truthful Art: Data, Charts, and Maps for Communication*](#). New Riders.

Software

[Excel](#)

[Google Sheets](#)

[Tableau](#)

[Flourish](#)

[Datawrapper](#)

[ArcGIS StoryMaps](#)

[Python](#)

[ChatGPT](#)

Academic Integrity

We expect you to adhere to the [Harvard Honor Code](#) at all times.

Students are encouraged to work together to do homework problems. What is important is a student's eventual understanding of homework problems, and not how that is achieved. The honor principle applies to homework in the following way. What a student turns in as a homework solution is to be his or her own understanding of how to do the problem. Students must state what sources they have consulted, with whom they have collaborated, and from whom they have received help. The solutions you submit must be written by you alone. Any copying (electronic or otherwise) of another person's solutions, in whole or in part, is a violation of the Honor Code.

If you have any questions as to whether some action would be acceptable under the Academic Honor Code, please speak to me.

Guidance on using Generative AI

You may use generative AI throughout this class. It can be tremendously helpful for exploring design principles, research findings, coding, and troubleshooting data visualization. If you do use it in your class work, please write a note describing how you use it (including the prompts you used), what you learned, and, optionally, reflect on how you might have **missed** an opportunity to **learn by doing, practicing, or being creative** on your own if had you done the work yourself **without** assistance from generative AI.

Accessibility & Accommodations for Student Learning

Harvard Kennedy School is committed to the full inclusion of students with disabilities so they can be a part of the full HKS experience. In accordance with Section 504 of the Rehabilitation Act of 1973, the Americans with Disabilities Act (ADA), and the Americans with Disabilities Act Amendments Act (ADAAA), HKS provides accommodations, services, and support to students with documented disabilities on an individual, case-by-case basis. Please let me or the teaching team know if there is anything we can do to accommodate and support your full participation in the class. Additional resources can be found in [HKS Disability Resources](#).

Supporting Student Wellness

Being a student myself, I identify with the stress, pressure, and intensity of academic endeavors. In the best moments, we appreciate how [Confucius said](#): "Isn't it a pleasure to study and practice what you have learned?" Yet, we are often deluged with material and assignments that can feel overwhelming and burdensome.

I encourage every student to practice self-care. We should communicate genuinely with classmates and the teaching team to foster a supportive class community based on mutual understanding and strive to build up our collective fortitude. Beyond the classroom, Harvard's resources for wellness can be found on this [student support page](#).

Supporting an Inclusive Classroom

Every member of the Harvard community brings unique life experiences and perspectives into our classrooms and campus life. As schoolmates, we enrich each other's academic and social experiences by being appreciative of and learning from everyone's distinctive contributions. In this class, I hope we keep an open mind and heart towards each other, to grow together in this learning community as students, citizens, and friends in virtue as [Aristotle expounded](#). Please speak up to express your ideas and share your personal experiences related to anything we cover in class as we journey together seeking veritas as experienced by diverse persons and communities. Please reach out to me directly if you have ideas or concerns for enhancing our inclusive community. Additionally HKS has an excellent office of [diversity, inclusion and belonging](#).

Harvard Library Resources

[Visualization Support](#) - Jess Cohen-Tanugi - library-viz@harvard.edu

[Digital Mapping and GIS Support](#) - maps@harvard.edu


[Harvard Center for Geographic Analysis](#)

Course Schedule


Class Meetings, Readings, and Assignments


Please note that the specifics of this Course Syllabus is subject to change, and you will be responsible for abiding by any such changes. All changes will be communicated to you via email, course announcement, and/or Canvas.


Readings and Assignments with due dates are in Canvas.


UNIT	WEEK 1 Design Principles and Excel		Time
Design Principles and Excel	Pre-class Work		(est.)
	Due before class		60'
	 Readings <ul style="list-style-type: none"> • <i>The Big Book of Dashboards</i> <ul style="list-style-type: none"> ◦ Chapter 1: Data Visualization: A Primer • Berinato, Scott. "Visualizations That Really Work." Harvard Business Review, June 1, 2016. • Stewart, Matthew. "The Power of Visualization - Towards Data Science." Medium, May 15, 2019. • <i>The Big Picture: How to Use Data Visualization to Make Better Decisions—Faster</i> <ul style="list-style-type: none"> ◦ Chapter 3: How and When to Use Color 		
	Class Sessions		
		Lecture 1 Introduction to Design Excel data and graphs	75'
	Asynchronous Exercise		
		Lab 1 Structuring and Cleaning Data Exercises	60'


Recommended Material	Few, Stephen. <i>Now You See It: Simple Visualization Techniques for Quantitative Analysis</i> Ware, Colin. Visual Thinking for Design . 1 edition. Amsterdam: Morgan Kaufmann, 2008.	Optional
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UNIT	WEEK 2 Chart Types	Time	
Chart Types	Pre-class Work	(est.)	
	Due before class	60'	
	 Readings <ul style="list-style-type: none"> • <i>The Big Picture: How to Use Data Visualization to Make Better Decisions—Faster</i> <ul style="list-style-type: none"> ○ Chapter 2: Why Do We See So Many Bar Charts? ○ Chapter 4: What Charts You Should Know and Love (and Sometimes Loathe) • Financial Times - Chart Doctor Visual Vocabulary • Yau, Nathan. <i>Data Points: Visualization That Means Something</i> <ul style="list-style-type: none"> • Chapter 4 Exploring Data Visually • From Data to Viz 		
	Required: Pre-class questions		
	Class Sessions		
		Lecture 2 Selecting Chart Types	75'
	Asynchronous Exercise		
		Lab 2 Tableau chart types	60'
Recommended Material	Our World in Data – All Charts https://ourworldindata.org/charts Datawrapper River https://app.datawrapper.de/river/	Optional	

UNIT	WEEK 3 Storytelling with Data	Time	
Storytelling with Data	Pre-class Work	(est.)	
	Due before class	60'	
	 Readings <ul style="list-style-type: none"> • Telling Stories with Data in 3 Steps • Kopf, Anne Quito, Dan. "Designers and Statisticians Disagree on What Makes a Good Information Graphic." Quartz. 		
	Required: Pre-class questions		
	Class Sessions		
		Lecture 3 Storytelling with Data	75'
	Asynchronous Exercise		
	Lab 3 Tableau Dashboards	60'	
Recommended Material	Storytelling with Data: A Data Visualization Guide for Business Professionals Tableau Viz Gallery https://public.tableau.com/en-gb/s/viz-gallery	Optional	

UNIT	WEEK 4 Exploratory Data Analysis	Time	
Exploratory Data Analysis	Pre-class Work	(est.)	
	Due before class	100'	
	 Readings <ul style="list-style-type: none"> • Jones, Ben. <i>Communicating Data with Tableau: Designing, Developing, and Delivering Data Visualizations</i> <ul style="list-style-type: none"> • Chapter 2 Introduction to Tableau • Yau, Nathan. <i>Data Points: Visualization That Means</i>. Indianapolis, IN: John Wiley & Sons, Inc, 2013. <ul style="list-style-type: none"> • Chapter 4 Exploring Data Visually 		
	Required: Pre-class questions		
	Class Sessions		
		Lecture 4 Data mining for insights	0'
	Asynchronous Exercise		
	Lab 4 Data Preparation Exercise	60'	
Recommended Material	An Introductory Look at Exploratory Data Analysis on Adobe Experience Platform Advanced exploratory data analysis (EDA) with Python	Optional	

UNIT	WEEK 5 User Centered Design	Time	
User Centered Design	Pre-class Work	(est.)	
	Due before class	100'	
	 Readings <ul style="list-style-type: none"> • Berinato, S. (2016, June 1). Visualizations That Really Work. Harvard Business Review; hbr.org. https://hbr.org/2016/06/visualizations-that-really-work • Junk Charts. "Junk Charts Trifecta Checkup: The Definitive Guide." • Kowitz, Braden. "GV Guide to Design Critique." Medium, December 4, 2015. • Yau, Nathan. <i>Data Points: Visualization That Means Something</i> <ul style="list-style-type: none"> • Chapter 6 Designing for an Audience 		
	Required: Pre-class questions		
	Class Sessions		
		Lecture 5 User Centered Design and humanizing data to promote equality	0'
	Asynchronous Exercise		
	Lab 5 Design Critique and Peer Feedback	60'	
Recommended Material	Four User-Centered Strategies for Designing Useful Data Visualizations	Optional	

UNIT	WEEK 6 Visualizing Geospatial Data	Time	
Visualizing Geospatial Data	Pre-class Work	(est.)	
	Due before class	100'	
	 Readings <ul style="list-style-type: none"> • Heer, Jeffrey, Michael Bostock, and Vadim Ogievetsky. "A Tour through the Visualization Zoo." ACM Queue 8 (January 1, 2010): 20. • Get Started Mapping with Tableau • Create interactive maps with Datawrapper 		
	Synchronous Class Sessions		
		Lecture 6 Geospatial visualization data formats and design	0'
	Asynchronous Exercise		
	Lab 6 Designing Maps	60'	
Recommended Material	80 Data Visualization Examples Using Location Data and Maps	Optional	

UNIT	WEEK 7 Group Project Presentations	Time
Group Project Presentations	Class Sessions	
		Lecture 7 Group project presentations
Recommended Material	Reynolds, Garr. Presentation Zen: Simple Ideas on Presentation Design and Delivery . Voices That Matter. Berkeley, CA: New Riders Pub, 2008.	Optional