HARVARD Kennedy School

DPI-851M: Data and Information Visualization
Fall 2021

Faculty: Hong Qu	Faculty Assistant: Rosita Scarfo
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Class Days/Time: Monday and Wednesday 9:00-10:15pm Belfer 200 Starr Aud (HKS) Friday workshop (optional) 9:00AM-10:15AM Wexner 332	Course Assistants: Damarcus Bell Sunghea Khil Pablo Pena

Office Hours Schedule	
Faculty & Teaching Fellows	**Day / Time (ET)**
Hong Qu	**TBA**

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 (synchronous)	**Rest of the week** (asynchronous)	
Class Session 75'	Watch tutorials	Readings	Exercises
	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.

Class Participation

Attendance is mandatory, though you may be excused for up to 2 absences if you inform the teaching team of any hardship.

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

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.

Recommended

Few, Stephen. *Now You See It: Simple Visualization Techniques for Quantitative Analysis*. 1st edition. Oakland, Calif: Analytics Press, 2009.Jones, Ben. *Communicating Data with Tableau: Designing, Developing, and Delivering Data Visualizations* 1 edition. Sebastopol, CA: O'Reilly Media, 2014. [Ebook, data files]

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

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.

Software

Excel
Google Sheets
Tableau
Flourish
Datawrapper
ArcGIS StoryMaps

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.

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 supp

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 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

Course Schedule

Class Meetings, Readings, and Assignments

(see the HKS Academic Calendar for dates)

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.

UNIT	WEEK 1 Design Principles and Excel	Time
Design Principles and Excel	Asynchronous Pre-class Work	*(est.)*
	Due before class	60'

	📖 **Readings**
	
	 ● *The Big Book of Dashboards*
	  ○ 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.
	 ● *The Big Picture: How to Use Data Visualization to Make Better Decisions—Faster*
	  ○ Chapter 3: How and When to Use Color	

	Synchronous Class Sessions	
	Lecture 1 Introduction to Design **Excel data and graphs**	75'
	Asynchronous Exercise	
	Lab 1 Data and Design in Excel Exercises	60'
Recommended Material	Few, Stephen. *Now You See It: Simple Visualization Techniques for Quantitative Analysis*	Optional

	● Chapter 1 Information Visualization ● Chapter 3 Thinking with our eyes Ware, Colin. *Visual Thinking for Design*. 1 edition. Amsterdam: Morgan Kaufmann, 2008.	

UNIT	WEEK 2 Chart Types	Time
Chart Types	Asynchronous Pre-class Work	*(est.)*
	Due before class	60'
	📖 **Readings** ● *The Big Picture: How to Use Data Visualization to Make Better Decisions—Faster* 　○ 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. *Data Points: Visualization That Means Something* 　● Chapter 4 Exploring Data Visually	
	Required: Pre-class questions	
	Synchronous 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	Optional

UNIT	WEEK 3 Storytelling with Data	Time
Storytelling with Data	Asynchronous Pre-class Work	*(est.)*
	Due before class	60'
	📖 **Readings** ● [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	
	Synchronous 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](#)	Optional

UNIT	WEEK 4 Exploratory Data Analysis	Time
Exploratory Data Analysis	Asynchronous Pre-class Work	*(est.)*
	Due before class	100'
	📖 **Readings** ● Jones, Ben. *Communicating Data with Tableau: Designing, Developing, and Delivering Data Visualizations* ● [Chapter 2 Introduction to Tableau](#)	

	● Yau, Nathan. Data Points: Visualization That Means. Indianapolis, IN: John Wiley & Sons, Inc, 2013. ● Chapter 4 Exploring Data Visually		
	Required: Pre-class questions		
	Synchronous Class Sessions		
		Lecture 4 No Class Presidents' Day	0'
	Asynchronous Exercise		
		Lab 4 Data Preparation Exercise	60'
Recommended Material	An Introductory Look at Exploratory Data Analysis on Adobe Experience Platform		Optional

UNIT	WEEK 5 User Centered Design		Time
User Centered Design	Asynchronous Pre-class Work		*(est.)*
	Due before class		100'
	📖 **Readings** ● Junk Charts. "Junk Charts Trifecta Checkup: The Definitive Guide." ● Kowitz, Braden. "GV Guide to Design Critique." Medium, December 4, 2015. ● Yau, Nathan. *Data Points: Visualization That Means Something* ● Chapter 6 Designing for an Audience		
	Required: Pre-class questions		
	Synchronous Class Sessions		
		Lecture 5 User Centered Design	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	Asynchronous Pre-class Work		*(est.)*
	Due before class		100'
	📖 **Readings**		

	- 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 No Class Wellness Day	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	Synchronous Class Sessions	
	Lecture 7 Group project presentations	75'
Recommended Material	Reynolds, Garr. *Presentation Zen: Simple Ideas on Presentation Design and Delivery*. Voices That Matter. Berkeley, CA: New Riders Pub, 2008.	Optional