Watch a brief introduction to the course at: https://youtu.be/frwl-YVtmrs

Instructor

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Office Hours: Thursdays, 3-5pm and by appointment.

Course meetings & format

This is a blended online course. We will meet 9 times in the classroom. During the weeks of 10/15, 10/29, and 11/5 there will be no in-class meetings. Instead on 10/15 there will be an “remote online live web conference” with a Tableau expert. On 10/29 and 11/5 you’ll work on learning how best to use the tools of data visualization through structured lessons and assignments that I’ve created for you. This is designed to allow you to work and practice creating visualizations at your own pace. There is no class on 11/26 for Thanksgiving.

Thursdays from 6:00pm – 9:00pm
September 17 – December 10
Location: KMC 4-90

IMPORTANT: This is a hands-on course. You will also need to have your computer (Mac or PC) up to date to install, Tableau 9.0 Desktop software (provided free to students in the class). Also, some knowledge of basic programming (in any language) will be helpful, but not required. We will use several tools to refine our data and create, edit, alter, and display their
visualizations. The primary tools we will be using in this class include: Tableau 9.0 Desktop and Excel. In addition, there will be opportunities to learn how to create visualizations in R, Google Charts, and D3. To learn these tools we will begin working with very small data sets. Since this is not a class on data analysis or models, you’ll be expected to apply your prior knowledge learned about business analytics to the creation of beautiful data displays (using big or small data).

**Course description**

**What is data visualization?**

*Visualization is a kind of narrative, providing a clear answer to a question without extraneous details.*  
--Ben Fry

This course is an introduction to the principles and techniques for data visualization. Visualizations are graphical depictions of data that can improve comprehension, communication, and decision making.

*Visualization is a graphical representation of some data or concepts.*  
--Colin Ware

In this course, students will learn visual representation methods and techniques that increase the understanding of complex data and models. Emphasis is placed on the identification of patterns, trends and differences from data sets across categories, space, and time.

**How does design of information support meaning and knowledge making?**

*Understanding is a path, not a point. It’s a path of connections between thought and thought; patterns over patterns, it is relationships.*  
--Richard Saul Wurman
The ways that humans process and encode visual and textual information will be discussed in relation to selecting the appropriate method for the display of quantitative and qualitative data. Graphical methods for specialized data types (times series, categorical, etc.) are presented. Topics include charts, tables, graphics, effective presentations, multimedia content, animation, and dashboard design.

The goal of effective visuals is to communicate information to maximize readability, comprehension, and understanding. Information visualization is a combination of many disciplines. Principles are drawn from statistics, graphic design, cognitive psychology, information design, communications, and data mining.

Throughout the course, several questions will drive the design of data visualizations some of which include: Who’s the audience? What’s the data? What’s the task?

**Course topics**

1. Design principles for charts and graphs
2. Common tools for creating data visualizations (Excel, PowerPoint, and Google Visualization API)
3. The process creating visualizations and selecting the appropriate visual display
4. Hands on with Tableau
5. Designing effective digital presentations
6. Telling stories with data
7. Visualization as exploration
8. Visualizing categorical data
9. Visualizing time series data
10. Visualizing multiple variables
11. Visualizing geospatial data
12. Dashboard design
13. Web-based visualizations
14. Interactive visualizations and motion
Learning outcomes

• Present data with visual representations for your target audience, task, and data;
• Experiment with and compare different visualization tools;
• Create multiple versions of digital visualizations using various software packages;
• Identify appropriate data visualization techniques given particular requirements imposed by the data;
• Apply appropriate design principles in the creation of presentations and visualizations; and
• Analyze, critique, and revise data visualizations.

Course requirements and grading

Assignments (40%)

There will be 4 individual assignments due during the first half of the semester. Each assignment is worth 10% of your grade. The assignments will require you to work with data and use various technologies to create data visualizations.

Assignment 1
Assignment 2
Assignment 3
Assignment 4

Online Lessons and Exercises (15%)

There will be one online lesson and exercise for each of the three online classes.

Week 5 (remote live online meeting)
Week 7 (self-paced)
Week 8 (self-paced)
Individual Project & Group Project Pitch (15%)

The project is a demonstration of your knowledge and fluency with data visualization techniques and tools. The individual project is an opportunity for you to create a series of data visualizations based on your selected data source. You will create at least 4 visualizations based on your defined audience, data, and tasks. You will present visualizations to the class and pitch an idea for a group project based on your initial work.

Project Due: 11/5
Project Presentation & Pitch: 11/12

Group Project (30%)

The group project is a demonstration of you and your team’s effort, knowledge, and ability to tell an interesting story with data. The group project will be a presentation using data visualizations to tell a story to your audience.

Refined project proposal
Examples to share during in-class critique
Final project and presentation

Project Due: 12/3

Attendance, class participation, teamwork, collaboration, and class preparation.

Students are expected to attend all classes, participate regularly in the large class discussion, and small group discussions. Part of this course involves working with others and seeking feedback from your peers on your in-class exercises. A large portion of the class requires you to actually work with data and visualization tools to create visual displays. There are regular exercises and assignments to help you practice and learn the appropriate techniques. These exercises are short but frequent. **PLEASE BRING YOUR FULLY CHARGED LAPTOPS TO CLASS.**
Required readings, articles, videos, and data


Yau, N. (2013). Data Points: Visualization that means something. Indianapolis: O'Reilly. Available at the NYU Bookstore

NYU Classes
All articles, videos, and data will be on NYU Classes > Data Visualization > Lessons.

Optional readings

See course bibliography for a complete list.


Required software

The major graphics tools we will be using in this course for creating visualizations are Excel and Tableau. You must have both applications installed. You must have a computer you can bring to class. You must have a computer that allows you to install additional software (you should administrator access to your computer).

- Microsoft Excel and PowerPoint
- Tableau 9.0 (student version): [http://www.tableausoftware.com/products/desktop/download](http://www.tableausoftware.com/products/desktop/download) and a Tableau public account (FREE. Student access codes will be given in class)
- Vector Graphics Editor: Adobe Illustrator CS5 or later or you can use a free open source vector graphic tool such as Inkscape ([http://inkscape.org/](http://inkscape.org/))

Optional software for advanced exercises

- Dreamweaver / HTML editor

Course Schedule

The outline of course topics and dates is presented below. All readings, assignments, videos, etc. will be presented in NYU Classes for each week. There will video tutorials and exercises that you are require to complete at home during the online weeks.
<table>
<thead>
<tr>
<th>Week</th>
<th>Topics</th>
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<tbody>
<tr>
<td>1 - 9/17</td>
<td>• Introduction to the course and data visualization&lt;br&gt;• Telling stories with data&lt;br&gt;• Basic design principles principles for charts and graphs&lt;br&gt;• Common tools for creating data visualizations</td>
</tr>
<tr>
<td>2 - 9/24</td>
<td>• Application of design principles.&lt;br&gt;• Introduction to Tableau&lt;br&gt;• Data tasks for data visualization</td>
</tr>
<tr>
<td>3 - 10/1</td>
<td>• The process creating visualizations and selecting the appropriate visual display&lt;br&gt;• Representing data in basic display types&lt;br&gt;• Visualizing categorical &amp; time series data</td>
</tr>
<tr>
<td>4 - 10/8</td>
<td>• Visualizing multiple variables.&lt;br&gt;• Statistical displays</td>
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<tr>
<td>5 - 10/15</td>
<td>Live remote online class (no class meeting)&lt;br&gt;• Guest speaker from Tableau&lt;br&gt;• Introduction to the individual and final project</td>
</tr>
<tr>
<td>6 - 10/22</td>
<td>• Math and data&lt;br&gt;• Showing change instead of raw numbers&lt;br&gt;• Summary statistics in your visualizations&lt;br&gt;• Showing parts of the whole&lt;br&gt;• Visualizing geospatial data&lt;br&gt;• Annotations and pre-attentive attributes</td>
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### Recording of Classes

Class lectures will be recorded automatically using MediaSite. The links will be posted to NYU Classes when they are available.

### Resources

#### Data Sources

- [Gapminder](#)
- [Flowing Data](#)
- [Information Aesthetics](#)
- [Visual Complexity](#)
- [Census.gov](#)
Examples of Visualizations and References

- Hans Rosling’s Ted Talk
- Yau’s Flowing Data website: http://book.flowingdata.com
- Harvard’s data visualization course: http://www.dataviscourse.org/
- Good. http://www.good.is
- Perceptual Edge. http://www.perceptualedge.com/
- Design IQ. http://www.perceptualedge.com/files/GraphDesignIQ.html
- Nike +: http://yesyesno.com/nike-city-runs
- Traffic in Lisbon: http://www.visualcomplexity.com/vc/project_details.cfm?id=728&index=728&domain=
- Student Loan Debt: http://www.newyorkfed.org/studentloandebt/
• Small multiples of unemployment by sector: http://hci.stanford.edu/jheer/files/zoo/
• Olympic Athletes: http://www.nytimes.com/interactive/2012/08/05/sports/olympics/the-100-meter-dash-one-race-every-medalist-ever.html
• American Time Usage (BLS): http://www.nytimes.com/2009/08/02/business/02metrics.html?_r=0
• Growth of Target: http://projects.flowingdata.com/target/
• Tufte on exploring multiple forms of display: http://www.youtube.com/watch?v=Th_1azZAYOY&noredirect=1 [0:00 - 4:00]
• Facebook World Map - Produced by Facebook intern, Paul Butler. http://gigaom.com/2010/12/14/facebook...
• Rich Blocks, Poor Blocks - http://www.richblockspoorblocks.com/
• "Flight Patterns" by Aaron Koblin - http://www.aaronkoblin.com/work/fligh...
• "We Feel Fine Project" by Jonathan Harris and Sep Kamvar - http://wefeelfine.org/
• "Every McDonald's in the US" by Stephen Von Worley - http://www.datapointed.net/2009/09/di...
• "Colours in Culture" by informationisbeautiful.net - http://www.informationisbeautiful.net...
• DATAVISUALIZATION.CH: http://selection.datavisualization.ch/

Course Bibliography

Arikan, B. Retrieved from http://burak-arikan.com/


Harris, J. We feel fine: An exploration of human emotion in six different movements. Retrieved from http://wefeelfine.org/

Herman, I., Melançon, G. & Marshall, S. Graph Visualization and Navigation in Information Visualization: a Survey.


