**Data visualization**

**Vuillon Laurent Gilles Marie**

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**Summary**

Understanding why and how to present complex data interactively in an effective manner has become a crucial skill for any data scientist. In this course, you will learn how to design, judge, build and present your own interactive data visualizations.

**Content**

**Tentative course schedule**

**Week 1:** Introduction to Data visualization Web development  
**Week 2:** Javascript  
**Week 3:** More Javascript  
**Week 4:** Data Data driven documents (D3.js)  
**Week 5:** Interaction, filtering, aggregation (UI/UX). Advanced D3 / javascript libs  
**Week 6:** Perception, cognition, color Marks and channels  
**Week 7:** Designing visualizations (UI/UX) Project introduction Dos and don’ts for data-viz  
**Week 8:** Maps (theory) Maps (practice)  
**Week 9:** Text visualization  
**Week 10:** Graphs  
**Week 11:** Tabular data viz Music viz  
**Week 12:** Introduction to scientific visualisation  
**Week 13:** Storytelling with data / data journalism Creative coding  
**Week 14:** Wrap-Up

**Keywords**

Data viz, visualization, data science

**Learning Prerequisites**

**Required courses**

- CS-305 Software engineering (BA)  
- CS-250 Algorithms (BA)  
- CS-401 Applied data analysis (MA)

**Recommended courses**

- EE-558 A Network Tour of Data Science (MA)  
- CS-486 Human computer interaction (MA)  
- CS-210 Functional programming (BA)

**Important concepts to start the course**
Being autonomous is a prerequisite, we don't offer office hours and we won't have enough teaching assistants (you've been warned!). Knowledge of one of the following programming language such as C++, Python, Scala. Familiarity with web-development (you already have a blog, host a website). Experience with HTML5, Javascript is a strong plus for the course.

Learning Outcomes
By the end of the course, the student must be able to:

• Judge visualization in a critical manner and suggest improvements.
• Design and implement visualizations from the idea to the final product according to human perception and cognition
• Know the common data-viz techniques for each data domain (multivariate data, networks, texts, cartography, etc) with their technical limitations
• Create interactive visualizations in the browser using HTML5 and Javascript

Transversal skills

• Communicate effectively, being understood, including across different languages and cultures.
• Negotiate effectively within the group.
• Resolve conflicts in ways that are productive for the task and the people concerned.

Teaching methods
Ex cathedra lectures, exercises, and group projects

Expected student activities

• Follow lectures
• Read lectures notes and textbooks
• Create an advanced data-viz in groups of 3.
• Answer questions assessing the evolution of the project.
• Create a 2min screencast presentation of the viz.
• Create a process book for the final data viz.

Assessment methods

• Data-viz (35%)
• Technical implementation (15%)
• Website, presentation, screencast (25%)
• Process book (25%)

Supervision

Office hours No
Assistants No
Forum No

Resources

Bibliography

Data visualization
Visualization Analysis and Design by Tamara Munzner, CRC Press (2014). Free online version at EPFL. Interactive Data Visualization for the Web by Scott Murray O'Reilly (2013) - D3 - Free online version.

Ressources en bibliothèque
- Visualization Analysis and Design / Munzner
- Interactive Data Visualization for the Web / Murray

Notes/Handbook
Lecture notes

Websites
- https://www.kirellbenzi.com

Moodle Link