COM-480 **Data visualization**

Benzi Kirell

| Cursus | Sem. | Type |
|---|---|---|
| Computer science | MA1, MA3 | Opt. |
| Cybersecurity | MA1 | Opt. |
| Data Science | MA1, MA3 | Opt. |
| Data science minor | H | Opt. |
| Digital Humanities | MA1, MA3 | Opt. |
| Electrical Engineering | | Obl. |
| Electrical and Electronical Engineering | MA1, MA3 | Opt. |
| SC master EPFL | MA1, MA3 | Opt. |

| | |
|---|---|
| Language of teaching | English |
| Credits | 4 |
| Session | Winter |
| Semester | Fall |
| Exam | During the semester |
| Workload | 120h |
| Weeks | 14 |
| **Hours** | **4 weekly** |
| Courses | 2 weekly |
| Project | 2 weekly |
| **Number of positions** | |


## 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 progrmaming language such as C++, Python, Scala.
Familiarity with web-development (you already have a blog, host a webiste). 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 int he browser using HTM5 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 (15%)
- Process book (35%)

## Supervision

| | |
|---|---|
| Office hours | No |
| Assistants | No |
| Forum | No |

## Resources

### Bibliography

**Visualization Analysis and Design** by Tamara Munzner, CRC Press (2014). Fee 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

- https://moodle.epfl.ch/course/view.php?id=15487