

COM-480

**Data visualization**

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<b>Cursus</b>	<b>Sem.</b>	<b>Type</b>
Computational and Quantitative Biology		Opt.
Computational biology minor	E	Opt.
Computer science	MA2, MA4	Opt.
Cybersecurity	MA2, MA4	Opt.
Data Science	MA2, MA4	Opt.
Data science minor	E	Opt.
Digital Humanities	MA2, MA4	Opt.
Electrical Engineering		Opt.
Electrical and Electronical Engineering	MA2, MA4	Opt.
Financial engineering	MA2, MA4	Opt.
Learning Sciences		Opt.
Minor in digital humanities, media and society	E	Opt.
Minor in statistics	E	Opt.
SC master EPFL	MA2, MA4	Opt.
Statistics	MA2, MA4	Opt.

Language of teaching	English
Credits	6
Session	Summer
Semester	Spring
Exam	During the semester
Workload	180h
Weeks	14
<b>Hours</b>	<b>4 weekly</b>
Courses	2 weekly
Project	2 weekly
<b>Number of positions</b>	

**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-250 Algorithms I (BA)

CS-401 Applied data analysis (MA)

### Recommended courses

CS-486 Interaction design (MA)  
CS-214 Software construction (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%)

### Resources

#### Bibliography

**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.  
**The Truthful Art: Data, Charts, and Maps for Communication** by Cairo, Alberto. Royaume-Uni, New Riders, (2016).  
**Data Visualisation: A Handbook for Data Driven Design** by Kirk, Andy. Royaume-Uni, SAGE Publications, (2019).

### Ressources en bibliothèque

- [Find the references at the Library](#)

### Notes/Handbook

Lecture notes

### Moodle Link

- <https://go.epfl.ch/COM-480>