# Data visualization

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<thead>
<tr>
<th>Cursus</th>
<th>Sem.</th>
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<td>Computational biology minor</td>
<td>E</td>
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<tr>
<td>Computer science</td>
<td>MA2, MA4</td>
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<td>Cybersecurity</td>
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<td>SC master EPFL</td>
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<td>Statistics</td>
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**Contact**
- Language: English
- Credits: 6
- Session: Summer
- Semester: Spring
- Exam: During the semester
- Workload: 180h
- Weeks: 14
- Hours: 4 weekly
- Lecture: 2 weekly
- Project: 2 weekly
- Number of positions: 2 weekly

**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 Interaction design (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%)

Resources
Bibliography
Visualization Analysis and Design by Tamara Munzner, CRC Press (2014). Free online version at EPFL.

Ressources en bibliothèque
- Data Visualisation / Kirk
- Visualization Analysis and Design / Munzner
- Interactive Data Visualization for the Web / Murray
- The Truthful Art / Cairo

Notes/Handbook
Lecture notes

Moodle Link
- https://go.epfl.ch/COM-480