**Data visualization**

**Cursus**  
<table>
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<tr>
<th>Cursus</th>
<th>Sem.</th>
<th>Type</th>
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<tbody>
<tr>
<td>Cybersecurity</td>
<td>MA1, MA3</td>
<td>Opt.</td>
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<tr>
<td>Data Science</td>
<td>MA1, MA3</td>
<td>Opt.</td>
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<tr>
<td>Génie électrique et électronique</td>
<td>MA1, MA3</td>
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<td>Humanités digitales</td>
<td>MA1, MA3</td>
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<td>Informatique</td>
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<td>Mineur en Data science</td>
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<tr>
<td>SC master EPFL</td>
<td>MA1, MA3</td>
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**Language**  
English  

**Credits**  
4  

**Session**  
Winter  

**Semester**  
Fall  

**Exam**  
During the semester  

**Workload**  
120h  

**Weeks**  
14  

**Hours**  
4 weekly  

**Lecture**  
2 weekly  

**Project**  
2 weekly  

**Number of positions**  

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**Remarque**  
pas donné en 2019-20  

**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 (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

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

Notes/Handbook

Lecture notes

Websites

- https://www.kirellbenzi.com

Moodle Link