

# Contents

|  |          |
|--|----------|
| <b>Syllabus</b>  | <b>1</b> |
| Data Visualization Module . . . . .                            | 1        |
| Lecture 1: Introduction to the course . . . . .                | 1        |
| Lecture 2: Nested model . . . . .                              | 1        |
| Lecture 3: Visual encoding . . . . .                           | 1        |
| Lecture 4: Common charts . . . . .                             | 2        |
| Lecture 5: Static plotting in Python . . . . .                 | 2        |
| Lecture 6: Geographical plotting in Python . . . . .           | 2        |
| Lecture 7: Visualize static networks in Python . . . . .       | 2        |
| Lecture 8: Interactive Views . . . . .                         | 2        |
| Lecture 9: Introduction to D3.js . . . . .                     | 2        |
| Lecture 10: SVG, General Update Pattern, Transitions . . . . . | 2        |
| Lecture 11: Interactions and Event Listeners . . . . .         | 3        |
| Lecture 12: Graphs Visualization . . . . .                     | 3        |

## Syllabus

### Data Visualization Module

#### Lecture 1: Introduction to the course

Introduction to the Data Visualization module; textbooks; definitions and terminology; visual perception; pre-attentive attributes; Gestalt principles

[21/02/2024] [[slides](#)]

reading material: Chapter 1 ([Munzner 2014](#))

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#### Lecture 2: Nested model

Analysis framework: nested model; data abstraction (what); common types of data; task abstraction (why)

[28/02/2024] [[slides](#)]

reading material: Chapter 2,3,4 ([Munzner 2014](#))

resources: Tamara Munzner, Visualization Analysis & Design class, 2021 [[video Chapter 2](#)]; [[video Chapter 3](#)]; [[video Chapter 4](#)]

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#### Lecture 3: Visual encoding

Visual encoding; marks and channels; color in visualization; color palette; color deficiency; color spaces

[06/03/2024] [[slides](#)]

reading material: Chapter 5: Marks and Channels, Chapter 10: Map Color and Other Channels ([Munzner 2014](#))

resources: [VizPalette](#) resources: Tamara Munzner, Visualization Analysis & Design class, 2021 [[video Chapter 5-a](#)]; [[video Chapter 5-b](#)] [[video Chapter 10-a](#)]; [[video Chapter 10-b](#)]; [[video Chapter 10-c](#)]

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## Lecture 4: Common charts

Visualize tabular data; common visual idioms and charts; scatterplot; (stacked) bar chart; streamgraph; dot/line chart; Gantt chart; slopegraph; heatmap; radial bar chart; star plot; radar plot; pie chart; coxcomb chart; parallel coordinates; dual-axis charts; Visual vocabulary

[13/03/2024] [[slides](#)]

**reading material:** Chapter 7: Arrange Tables ([Munzner 2014](#))

**resources:** [Visual Vocabulary resources](#): Tamara Munzner, Visualization Analysis & Design class, 2021 [[video Chapter 7-a](#)]; [[video Chapter 7-b](#)]

## Lecture 5: Static plotting in Python

Static plotting in Python; basic plotting in matplotlib; style and personalize plots; towards more advanced plotting in matplotlib; introduction to seaborn; rules of thumb in data visualization

[20/03/2024] [[slides-a](#)] [[slides-b](#)]

**resources:**

- matplotlib: [Examples](#) | [Tutorial](#) | [User guide](#)
- seaborn: [Gallery](#) | [Tutorial](#) | [API](#)

## Lecture 6: Geographical plotting in Python

The importance of spatial thinking; exploring spatial phenomena visually; how to create informative thematic cartography; main thematic cartography types and rules of thumbs; pitfalls of using spatial data in computational disciplines

[27/03/2024] [[slides](#)]

## Lecture 7: Visualize static networks in Python

Visualize static networks using NetworkX and Matplotlib

[03/04/2024]

## Lecture 8: Interactive Views

How to handle complexity; manipulate: change, select, navigate; facet: juxtapose, partition, superimpose; reduce: filter, aggregate, embed

[10/04/2024] [[slides](#)]

**resources:** Tamara Munzner, Visualization Analysis & Design class, 2021 [[video Chapter 11-12a](#)] [[video Chapter 11-12b](#)] [[video Chapter 13](#)] [[video Chapter 14](#)]

## Lecture 9: Introduction to D3.js

What is D3?; Observable 101; HTML, CSS, JavaScript; SVG & the DOM; D3 first steps; what makes a scatterplot?; scales; the Canvas; data joins; our 1st Scatterplot

[24/04/2024] [[slides-a](#)] [[slides-b](#)]

## Lecture 10: SVG, General Update Pattern, Transitions

SVG Path; D3 Path generators; bar charts; stack layouts; the general update pattern; enter, exit, update with join; transitions

[08/05/2024] [[slides-a](#)] [[slides-b](#)]

## Lecture 11: Interactions and Event Listeners

Data structures and visualization structures; interaction and event listeners; thinking in D3; how to keep learning

[15/05/2024] [[slides](#)]

## Lecture 12: Graphs Visualization

Interactive graph visualization; advanced examples

[22/05/2024] [[tutorial](#)]

Munzner, T. 2014. *Visualization Analysis and Design*. AK Peters Visualization Series. CRC Press.  
<https://books.google.it/books?id=dznSBQAAQBAJ>.