



UNIVERSITÀ  
DEGLI STUDI DI MILANO-BICOCCA

## COURSE SYLLABUS

### Data Visualization

2122-2-F9201P206

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#### Aims

At the end of the course students will have acquired skills in analysis, evaluation and, to a lesser extent, development of complex and interactive data visualizations (infographics).

#### Contents

The course spans over two modules, which have different responsible professors (Cabitza and Schettini). One covers the methods, techniques and tools of data visualization (Cabitza) and the other one the essentials of visual design (Schettini) by which to design, and evaluate systems that enable the interactive analysis of data and the flexible optimization of reporting (both in an organizational domain and in data journalism). Cabitza's module is delivered also to students of the Master Degree in Data Science.

#### Detailed program

Module by Prof. Schettini

- Introduction to Visualization.
- Human Perception and Information Processing
- Data types

- Graphical perception (the ability of viewers to interpret visual
- (graphical) encodings of information and thereby decode information in graphs):
  - a. Signal Detection
  - b. Magnitude Estimation
  - c. Pre-Attentive Visual Processing
  - d. Using Multiple Visual Encodings
  - e. Gestalt Grouping
- Color for information display
- Examples and case studies
- Color management systems
- Picture visualization and fruition

Module by prof. Cabitza (Human Data Interaction)

- Introduction to the Human Data Interaction (Definitions, main concepts and methodologies)
- Data Transformation into sources of knowledge through visual representation.
- Requirements and heuristics for high-quality visualizations: dos and donts.
- Charts and standard views: relevance and appropriateness.
- Advanced and innovative tools for data visualization and advanced quantitative analysis.
- The evaluation of the quality of visualizations and infographics.
  - o Qualitative assessment: expert and heuristic;
  - o Quantitative assessment: user tasks; inferential statistical techniques.
  - o Validated psychometric questionnaires and their analysis and understanding.
- Elements of visual semiotics and social semiotics.

## **Prerequisites**

None

## **Teaching form**

Lectures with the support of slideware, discussion of practical cases through the forum, discussion of practical home-work projects.

The teaching activity will be delivered in presence, unless otherwise indicated, due to national and/or University indications due to the protracted COVID-19 emergency. In that case, face-to-face classes and lab lectures will be primarily synchronous (with strongly promoted participation) via WebEx or equivalent platform as indicated on the course website.

## **Textbook and teaching resource**

Yau, N. (2011). *Visualize this: the FlowingData guide to design, visualization, and statistics*. John Wiley & Sons.

Ware, C. (2012). *Information visualization: perception for design*. Elsevier.

Scientific articles and class pack provided by the lecturers.

## **Semester**

First Semester (September - January)

## **Assessment method**

No mid-term assessment. The part of data visualization held by Prof. Cabitza will be evaluated through a short written exam with closed questions and a group project in which the individual responsibilities for each section will be clear and explicit and in which students will be asked to apply methods and techniques learned in class to create and evaluate a complex infographic or a Web report with a series of related infographics.

The part of data visualization held by Prof. Schettini will be evaluated through a series of short exercises and papers related to the topics covered in class and that will compose a portfolio.

Both activities will be carried out in groups of up to three people and will be illustrated in an oral discussion meeting.

The two projects will have independent and complementary evaluations up to a maximum of 15 points each. Additional points (above 30/30) may be associated with small teaching activities or in-depth study of the topics covered in class and to be defined.

**Office hours**

By appointment

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