esade

TEACHING GUIDE - 2025-2026

Data Visualization and Decision-Making

UGRA_016270

Departments	Data, Analytics, Technology and Artificial Intelligence (DATA), Dept. of Operations, Innovation & Data Sciences
Teaching Languages	English
ECTS	4
Teacher responsible	Ana Heredero Lázaro - ana.heredero@esade.edu

Course Goals

- Develop proficiency in creating standalone data visualizations using Python and relevant libraries.
- Understand the principles of programming and apply them to build interactive user interfaces for data visualization applications.
- Enhance design and narrative skills to create effective data visualizations for various business contexts, such as reporting, cultural transformation, and internal selling.
- Gain practical experience in developing data visualization products through hands-on assignments and case studies.
- Learn to design data visualizations that support effective decision-making processes while considering cognitive biases and stakeholder interests.
- Acquire storytelling techniques to communicate data insights effectively and drive action within organizations.

Prerequisits

- Python programming, including the ability to write functions, conditional statements, and loops.
- Basic with at least one Python data visualization library (e.g., Seaborn, Matplotlib) and the ability to create basic plots and charts.
- Comfort working with Python development environments such as Jupyter Lab or Google Colab.
- Basic understanding of data manipulation and analysis using Python libraries like NumPy and Pandas.
- Exposure to fundamental statistical concepts and techniques used in data analysis.
- Experience with an Integrated Development Environment (IDE) such as VSCode for creating Python modules

Teaching

The course will employ a blend of theoretical lectures, practical

methodology

demonstrations, hands-on assignments, and group discussions to facilitate learning and engagement. The instructor will provide a solid foundation in data visualization principles, reactive programming concepts, and decision-making frameworks through interactive lectures and real-world examples.

Students will have ample opportunities to apply their learning through individual and group assignments that simulate real-world data visualization challenges. These assignments will encourage students to think critically, design creatively, and develop practical skills using industry-standard tools and techniques.

Case studies will be used extensively throughout the course to illustrate complex concepts and provide students with exposure to real-world data visualization scenarios. Group discussions and critiques will foster a collaborative learning environment where students can learn from each other's perspectives and experiences.

Online resources, including readings, tutorials, and forums, will be made available to support students' learning outside of class.

Throughout the course, the instructor will provide regular feedback and guidance to help students refine their skills and develop their own unique approaches to data visualization and decision-making.

Description

Short description

This course is designed for students with a basic foundation in Python programming and data visualization who want to take their skills to the next level. The course focuses on developing standalone data visualizations, interactive applications designing effective visualizations for decision-making in real-world business contexts.

Through a series of hands-on assignments and case studies, students will learn advanced techniques in data visualization design, narrative storytelling, and cognitive bias mitigation. They will gain experience with industry-standard tools like Streamlit for building interactive dashboards and will explore the organizational and human factors that influence data-driven decision making.

By the end of the course, students will be equipped with the skills and knowledge needed to create compelling, purposeful data visualizations that drive insights and actions in real-world settings. They will be able to think critically about the role of data visualization in organizations and design visualizations that effectively support decision-making processes while being aware of potential pitfalls and biases.

This course is ideal for data scientists, analysts, and other professionals who want to enhance their data visualization and communication skills to make a greater impact in their organizations.

Bibliography

Tamara Munzner, Visualization Analysis and Design, A K Peters/CRC Press, 978-1466508910 (Book)

, Streamlit documentation (Website)

Activities

Teamwork

Create best-practice and bias-exploiting decision-making tools for a real-world case study. Evaluate and discuss the impact on decision-making outcomes.

Project development and presentation

Students will be assigned multiple datasets, each with related business questions. They must develop data visualizations designed to answer those questions. The visualizations will be anonymously shared, and students will answer questions from them.

Content

#	Topic
1	Fundamentals of Data Visualization. This module explores the history and role of data visualization within data science teams. It introduces the concept of data visualization as a product and emphasizes a user-centric design approach. Students will learn basic visual design principles and apply them to create visualizations that effectively answer business questions. The module also covers the importance of response time as a key metric for data-intensive products.
2	User Interface design. Stundents will use Streamlit to develop interactive interfaces, understand the architecture of Python-to-HTML frameworks, and explore available widgets. The module also covers basic HTML, state management, and connecting to services in response to user actions.
3	Data in Real World. This module explores how organizations function as cognitive systems that process data to create value. It presents case studies on recommender system performance and customer-facing products. Students will learn about the challenges of balancing multiple metrics, handling stakeholder interests, and the importance of storytelling in data visualization. The module aims to provide insights into the complexities of real-world data applications.
4	Data-Driven Decision Making. This module focuses on designing data visualizations to support effective decision-making. Students will learn about cognitive biases that can influence decision-making processes and how visualizations can mitigate or amplify these biases. The module also covers storytelling techniques for communicating data insights effectively. Through a group assignment, students will create contrasting decision-making tools to demonstrate the impact of best practices and bias exploitation on decision

#	Topic
4	outcomes.

Assessment

Tool	Assessment tool	Category	Weight %
Individual or team exercises	Individual development of data visualizations designed to answer business questions. Feedback and improvement proposals based on the response time of other students when interpreting the visualizations. Evaluation mode: Individual.	Retake and ordinary round	30.00%
Group project	Group project. Create decision-making tools for a real-world case study. Present tools, gather feedback, and analyze the results.	Retake and ordinary round	30.00%
Attendance and punctuality	Attendance. In accordance with ESADE regulations, attendance is mandatory for this course. Students who fail to attend 80% of the course will not be allowed to pass and will be required to sit the retake exam.	Ordinary round	0.00%
Written and/or oral exams	Final exam. A minimum score of 4/10 is required to pass the course	Ordinary round	40.00%
Written and/or oral exams	Retake exam. A minimum score of 5/10 is required to pass the course	Retake	70.00%

PROGRAMS

DBAI21-Double Degree in Business Administration and Artificial Intelligence for Business (Undergraduates: Business)

DBAI21 Year 3 (Mandatory)

DBAI21 Year 1 (Mandatory)

DBAI23-Double Degree in Business Administration and Artificial Intelligence for Business (Undergraduates: Business)

DBAI23 Year 1 (Mandatory)

DBAI23 Year 3 (Mandatory)