Lisbon School of Economics & Management
Universidade de Lisboa

U LISBOA
UNIVERSIDADE DE LISBOA

DATA VISUALISATION

Academic Year: 2025/2026

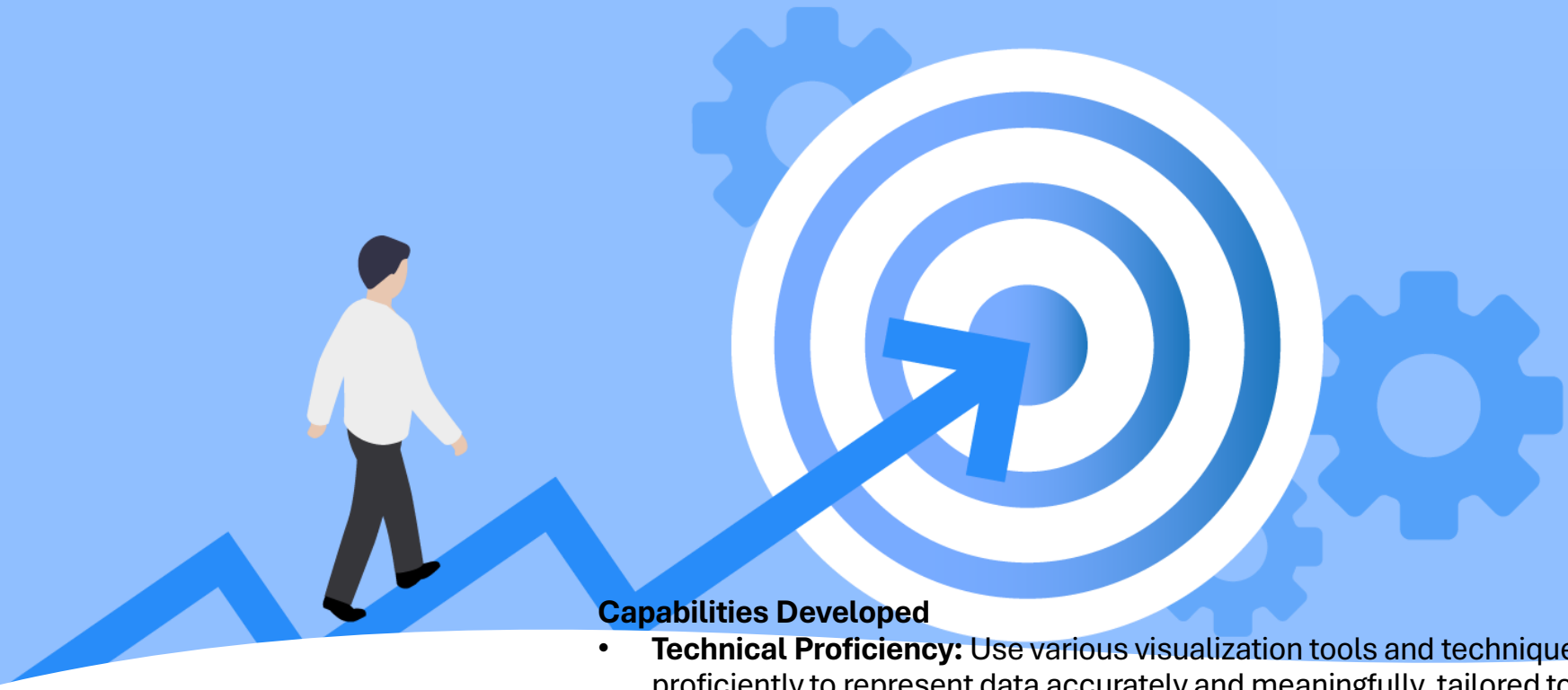
Introduction

- Learning Objectives
- Program
- Bibliography
- Evaluation rules
- Professors

Course Objectives

The student should obtain the following skills:

- **LO1 Master the Principles of Data Visualization**
- **LO2 Apply Visualization Tools and Techniques**
- **LO3 Translate Data into Decision-Making Insights**
- **LO4 Evaluate Data Quality and Integrity**
- **LO5 Communicate Data Insights Effectively**
- **LO6 Ethical Considerations in Data Representation**



Capabilities Developed

Capabilities Developed

- **Technical Proficiency:** Use various visualization tools and techniques proficiently to represent data accurately and meaningfully, tailored to specific audiences.
- **Analytical Thinking**: Synthesize complex data points, identify trends, and draw insights that can inform strategic decisions.
- **Decision-Making Support:** Integrate data-driven insights into decision-making scenarios, enhancing the ability to back decisions with solid data evidence.
- **Communication Skills:** Develop the capability to present data-based recommendations compellingly and understandably for stakeholders at all levels.
- **Problem-Solving Skills**: Approach problems with a data-centric mindset, utilizing visualization to clarify and address complex issues effectively..

Course Syllabus

Session 1: Introduction to Data Visualization
- Importance of Data Visualization in Business Analytics
- History and Evolution of Data Visualization
- Cognitive Aspects of Visual Perception: How we process and interpret visual data
- Key Principles of Effective Data Visualization (Clarity, Accuracy, Efficiency)
- Common Mistakes and Misleading Visuals

Session 2: Types of Data and Visualization Techniques
- Overview of Data Types (Qualitative vs Quantitative; Structured vs Unstructured)
- Types of Visualizations: Charts, Graphs, Maps, and Infographics
- Choosing the Right Visualization for Different Data Types
- Data-to-Ink Ratio, Simplicity, and Visual Aesthetics
- Hands-on Lab: Creating Basic Visualizations with Excel/Google Sheets

Session 3: Tools for Data Visualization: Tableau and Power BI
- Introduction to Tableau: Interface, Functions, and Visualization Options
- Introduction to Power BI: Data Integration and Dashboard Creation
- Data Cleaning and Preparation for Visualization
- Hands-on Lab: Building Dashboards and Interactive Reports using Tableau and Power BI
- Case Study: Real-World Business Dashboards and Storytelling with Data

Session 4: Advanced Data Visualization Techniques
- Time Series, Geospatial, and Network Visualizations
- Visualizing Big Data and Real-Time Data
- Advanced Features in Tableau and Power BI
- Hands-on Lab: Creating Geospatial Maps and Complex Visuals with Tableau/Power BI
- Case Study: Advanced Analytics and Visualization for Strategic Decision-Making

Session 5: Visualization with Python: Matplotlib, Seaborn, Plotly
- Introduction to Data Visualization Libraries in Python
- Creating Static and Interactive Visualizations in Python
- Data Wrangling and Preparation for Python Visualizations
- Hands-on Lab: Building Advanced Plots and Interactive Visuals using Python
- Case Study: Analyzing Complex Datasets with Python

Session 6: Storytelling with Data and Ethical Considerations
- Communicating Data Insights Effectively to Different Audiences
- Crafting Narratives with Data Visualizations for Business Decisions
- Ethical Issues in Data Visualization (Bias, Misrepresentation, and Data Privacy)
- Final Group Project: Presenting a Visual Story with Real-World Business Data
- Discussion: The Future of Data Visualization in Business

Bibliography

Main sources:

- **Slides and document in Fenix**

Accessment

- **Exam**: 50%
- **Classes**: 10%
- **Group Project** : 40%

Deadlines

(May be subject to change: Confirm in the worksheet)

Class Participation (10%): Based on engagement in class discussions and hands-on labs.
Group Project (40%): Teams will be assigned a Big Data problem to solve using analytics tools. They must present their findings and recommendations.
Final Exam (50%): A combination of theoretical and practical questions assessing students' understanding of the topics covered in class.

What I expect from students

- Classes must be complemented with individual study hours.
- Act with ethics towards work and others.
- Learn and participate in class activities with enthusiasm
- Be respectful
  - *listen | share airtime |open mind |use of personal devices only when required or during breaks*
- Be Responsible:
  - *Arrive on time | follow class activities | help others (but do not do their work) | integrate your colleagues in the group work*
- Be a problem solver
  - *ask questions | Share ideas |embrace the struggle of learning | Stay positive!*

AI Support

- You have many tools that may be used (Chat-GPT, gemini.google.com, scispace.com, ...)
- But must be used ethically

- Use to learn
- Evaluate

- **Carlos J. Costa**, PhD
- Associate Professor with Habilitation

- **Saeed Angorani,** DBA
- Teaching assistant