

Python for Management Science

Davide Radi

Course Syllabus



The poster features a red banner at the top with icons for a laptop, Python logo, charts, and data. Below the banner, the text reads 'Python for Management Science' in red. To the right, it says 'Dottorato in Economics, Management and Decision Making' in blue. The instructor's name 'Davide Radi' and title 'Full Professor' are listed, along with his affiliation at the University of Catania. The course dates are '17, 18, 19, 20, 23, 24, 25 Febbraio 2026' and the time is 'ore 15-18'. The location is 'Aula 1 - Dipartimento di Economia e Impresa, Corso Italia 55, Catania'. Logos for the University of Catania and the Department of Economics and Business are also present.

Python for Management Science

Dottorato in Economics, Management and Decision Making

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Professore ordinario di Metodi Matematici dell'Economia e delle Scienze Attuariali e Finanziarie presso l'Università Cattolica del Sacro Cuore di Milano.

17, 18, 19, 20, 23, 24, 25
Febbraio 2026
ore 15-18

Aula 1 – Dipartimento di
Economia e Impresa,
Corso Italia 55, Catania

PROMOSSO DA Università di Catania

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Strategie per orientare e promuovere un'attività Formativa Innovativa, Interdisciplinare, Internazionale
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Missione 4 • Istruzione e Ricerca

General Information

- **Doctoral Degree Program:** Economics, Management and Decision Making
- **Level:** Graduate / Advanced Undergraduate
- **Course Length:** 20 hours
- **Language of Instruction:** English
- **Software:** Spyder, Anaconda, Visual Studio Code

Course Description

This course offers a practical, hands-on approach to using Python for quantitative analysis and managerial decision-making. Students learn to develop interactive and event-driven

applications for decision support, integrating data analysis, optimization, machine learning, and artificial intelligence models. The course also covers the fundamentals of web technologies.

Learning Objectives

By the end of the course, students will be able to:

- Understand and apply the basics of object-oriented programming in Python
- Use Python for data analysis and manipulation in managerial contexts
- Design dashboards and web applications
- Understand and apply the basics of event-driven programming in Python
- Use of web technologies and data formats within event-driven Python applications
- Implement optimization, forecasting, and simple AI models
- Apply quantitative models to managerial decision-making problems

Prerequisites

- Basic mathematics (algebra, differential calculus)
- Introductory statistics
- No prior programming experience is required

Course Content

1. Introduction to Python (3 hours)

- Role of Python in Management Science
- Development environments (Spyder, Anaconda, Visual Studio Code)
- Variables, data types, and operators
- Control structures (if, elif, else, for, while)

2. Data Structures and Object-Oriented Programming (3 hours)

- Python data structures (lists, tuples, dictionaries, sets)
- Functions and modular programming
- Principles of object-oriented programming
- Classes, objects, attributes, and methods
- Encapsulation and code reuse
- Business-oriented class design examples

3. Data Analysis and Data Visualization with Python (2 hours)

- Numerical computing with NumPy
- Data manipulation with Pandas
- Data importing, cleaning, and transformation
- Descriptive statistics and aggregations
- Graphical data visualization: Matplotlib and Seaborn

4. Web Application Development with Python (3 hours)

- Introduction to web applications for decision support systems
- Overview of Python web frameworks (Flask / Streamlit)
- Design of interactive dashboards and web-based tools
- Connecting web interfaces to analytical models

5. Event-Driven Programming, Web Technologies and Data Formats (3 hours)

- Programming paradigms: procedural, object-oriented, event-driven
- Events, callbacks, and user interaction
- Event handling in Python web applications
- Integration of events with analytical and optimization models
- Overview of supporting web technologies

- Basics of HTML for web interfaces
- JSON as a standard data interchange format
- Introduction to relational databases and SQL
- Interaction between Python applications and databases

6. Decision Making and Interactive Decision Support Applications (3 hours)

- Linear optimization models
- Optimization with `scipy.optimize` and PuLP
- Event-driven optimization models
- Applications to production, logistics, and resource allocation

7. Statistics, Forecasting, AI Models and Machine Learning (3 hours)

- Statistical inference in Python
- Linear and multiple regression models
- Introduction to time series forecasting
- Artificial intelligence and machine learning: Basic concepts and applications
- Implementation using Python libraries (scikit-learn, TensorFlow/Keras overview)
- Introduction to neural networks and deep learning computing
- Elements of generative models and reinforcement learning

Teaching Methodology

- Lectures
- Hands-on laboratory sessions
- Case studies and project-based learning

References and Course Materials

- Lin J., Radi D., Tornieri F., Python per le Scienze Economiche e Sociali: Coding in preparazione alla Data Science, Giappichelli, 2025, ISBN 9791221117332.
- Instructor-provided materials (slides, notebooks, datasets)

