esade

TEACHING GUIDE - 2025-2026

Intermediate Python programming & a glimpse into AI applications

UGRA_015141

Departments	Data, Analytics, Technology and Artificial Intelligence (DATA), Dept. of Operations, Innovation & Data Sciences
Teaching Languages	English
ECTS	2
Teacher responsible	Carles Roger Riera Molina - carles.riera1@esade.edu

Course Goals

This is a specialized elective designed for undergraduate students pursuing a Bachelor's degree in Management with a minor in Data Analytics. This course aims to equip students with the skills to leverage Python, a powerful programming language, for effective data manipulation.

The course primarily focuses on two robust Python libraries, NumPy and Pandas, which are instrumental in handling and analyzing complex datasets. The objective is to enable students to utilize Python as a versatile alternative to Excel for various data operations, including file merging, pivot table creation, and data grouping.

In addition to these, the course also introduces students to the fundamentals of data visualization, providing them with the tools to create basic plots. By the end of this course, students will have a solid foundation in Python for data manipulation, equipping them with the skills to transform raw data into actionable insights.

This course is a stepping stone towards becoming proficient in data analytics and will provide a competitive edge in the evolving field of data science.

Previous knowledge

Basic Python knowledge including:

1. - Data types (stings, lists, tuples, dicts, ...)
2. - If else statements
3. - Loops (for and while)
4. - Functions
5. - Imports
6. - Basic use of libraries
7. - Knowledge of Jupyter notebooks

Prerequisits

Information Systems I
Information Systems II

Recomended courses

Information Systems I
Information Systems II

Teaching methodology

To achieve the objectives, this course will be based on lectures, class discussions, and practice. Lectures and in-class exercises will represent 50% of the workload. The assignments and the preparation exams will represent the other 50% of the workload.

Lecture/Discussion. During theoretical lessons, we will introduce the basic concepts for each topic. These sessions will be devoted to the presentation and discussion of frameworks, concepts, and theories.

Practice. In Practice sessions, students will work with different practical exercises. In-class exercises will help to interiorize and reflect the concepts, and discussed in theory class. Exercises will be in Python.

What do we expect from you in class?

In lectures, we expect students to participate in questions and discussions.

In practical sessions, we expect that students solve the different exercises included in the notebooks. Some of the work will be handed in as homework for the students to complete individually.

A learning area will be available on the Moodle webpage, where you will find instructions for the sessions, communications, bibliography, etc. Slides for the different sessions will also be posted here before.

Solving coding problems is an activity that is usually done in teams. Your classmates can help to solve your doubts, find errors in your solution, and suggest different ideas and solutions. To facilitate this exchange, a dedicated Forum will be opened in Moodle for students to share their doubts.

Description

Course contribution to program

The subject serves as a bridge between management and data analytics, two fields that are increasingly intertwined in today’s data-driven business environment. By teaching students how to manipulate and analyze data using Python, it equips them with a valuable skill set that is highly sought after in various industries.

In the context of management, working with data is essential for making

informed decisions, identifying trends, and driving business strategy. This course enables students to handle large datasets, perform complex operations, and visualize data - tasks that go beyond the capabilities of traditional tools like Excel.

This subject lays a solid foundation in Python programming, which is a key tool in data science. The focus on NumPy and Pandas libraries provides students with practical skills they will use in advanced data analysis business activities.

Overall, this subject enhances the academic program by integrating technical data skills with management principles. It prepares students for a future where data analytics will play an important role in management and decision-making processes.

Short description

This course is another step into the world of data analytics. The subject will dive into Python, the standard coding language for data scientists. It will explore two Python libraries - NumPy and Pandas. Think of it as learning to use Excel but on steroids! Students will learn to merge files, create pivot tables, group data, and make some plots.

Bibliography

Wes McKinney, Python for Data Analysis, 3rd Edition, O'Reilly Media, Inc. (Book)

Content

#	Topic
1	Introduction to Numpy. Students will learn to use NumPy for basic statistics, data analysis, basic plotting, extracting business insights, and solving computational social science problems.
2	Mastering in Pandas. Students will learn how to select and filter relevant information from large and complex datasets, join several data sources, group data using distinct aggregation methodologies, display the analysis results graphically
3	Understanding Data Visualization Tools. In this module, students will learn how to create various types of plots using flexible visualization libraries, organize multiple plots into panels, and design low-cognitive visualizations that support data-driven decision-making.
4	Introduction to Modeling for Data Analysis. Students will learn how to perform basic data analysis by building and applying foundational models, such as linear models, to interpret and understand data.

Assessment

Tool	Assessment tool	Category	Weight %

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Attendance and punctuality	Class participation	Ordinary round	10.00%
Individual or team exercises	Sessions preparation	Ordinary round	10.00%
Individual or team exercises	Assignment 1	Ordinary round	20.00%
Individual or team exercises	Assignment 2	Ordinary round	30.00%
Written and/or oral exams	Final exam	Ordinary round	30.00%
Written and/or oral exams	Retake exam	Retake	100.00%

PROGRAMS

- BBA20-Bachelor of Business Administration (BBA) (Undergraduates: Business)
  - BBA20 Year 3 (Optative)
  - BBA20 Year 4 (Optative)
- BBA23-Bachelor of Business Administration (BBA) (Undergraduates: Business)
  - BBA23 Year 4 (Optative)
  - BBA23 Year 3 (Optative)
- GBD23-Double Degree in Business Administration and Law (Undergraduates: Law)
  - GBD23 Year 3 (Optative)
  - GBD23 Year 1 (Optative)
  - GBD23 Year 4 (Optative)
  - GBD23 Year 2 (Optative)
  - GBD23 Year 5 (Optative)
- GBD25-Double Degree in Business Administration and Law (Undergraduates: Law)
  - GBD25 Year 2 (Optative)
  - GBD25 Year 5 (Optative)
  - GBD25 Year 3 (Optative)
  - GBD25 Year 1 (Optative)
  - GBD25 Year 4 (Optative)
- GDL20-Double Degree in Law and Global Governance, Economics and Legal Order (Undergraduates: Law)
  - GDL20 Year 5 (Optative)
  - GDL20 Year 3 (Optative)
  - GDL20 Year 1 (Optative)
  - GDL20 Year 4 (Optative)
  - GDL20 Year 2 (Optative)
- GDL23-Double Degree in Law and Global Governance, Economics and Legal Order (Undergraduates: Law)
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  - GDL25 Year 4 (Optative)
- GED20-Bachelor in Law (Undergraduates: Law)
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  - GED20 Year 3 (Optative)
  - GED20 Year 1 (Optative)
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  - GED25 Year 3 (Optative)

GED25 Year 1 (Optative)

GED25 Year 4 (Optative)

GED25 Year 2 (Optative)

GEL19-Bachelor of Global Governance, Economics and Legal Order (Undergraduates: Law)

GEL19 Year 3 (Optative)

GEL19 Year 1 (Optative)

GEL19 Year 4 (Optative)

GEL19 Year 2 (Optative)

GEL23-Bachelor of Global Governance, Economics and Legal Order (Undergraduates: Law)

GEL23 Year 1 (Optative)

GEL23 Year 4 (Optative)

GEL23 Year 2 (Optative)

GEL23 Year 3 (Optative)

GEL25-Bachelor of Global Governance, Economics and Legal Order (Undergraduates: Law)

GEL25 Year 1 (Optative)

GEL25 Year 4 (Optative)

GEL25 Year 2 (Optative)

GEL25 Year 3 (Optative)