Course Overview: Applied Python for Data Analysis

This three-day course provides a practical introduction to Python for data analysis, with a strong emphasis on hands-on learning and real-world applications. Participants will develop core programming skills, learn how to work with data efficiently, and gain experience in applying modern analytical techniques.

The course balances conceptual understanding with practical exercises and guided projects. Throughout the programme, participants will also receive guidance on how to incorporate artificial intelligence tools into their analytical workflows in a responsible and effective manner.

By the end of the course, participants will be able to write clear, reusable Python code, explore and visualise data, and independently carry out small-scale data analysis projects.

Learning Goals

By completing this course, participants will be able to:

- Understand and use core Python programming concepts
- Perform basic statistical analyses using Python
- Manage, clean, and structure datasets
- Create informative data visualisations
- Apply advanced techniques such as resampling and principal component analysis (PCA)
- Design and implement data analysis projects
- Integrate AI tools into their analytical workflows to improve efficiency and documentation
- Develop good coding practices for reproducibility and collaboration

Prerequisites

No prior programming experience is required. Participants are expected to have a basic understanding of statistics (for example, means, distributions, and correlations) and confidence in working with numerical or tabular data. Some familiarity with general data analysis concepts will be helpful, but it is not essential for successful participation in the course.

Software Requirements

- All participants should bring a laptop with the following installed in advance:
- Python (latest stable version recommended)
- Visual Studio Code (VS Code)
- Internet access for installing additional packages during the course

Guidance on setting up the working environment will be provided before the course begins.

Course Structure and Preliminary Timetable

Each day combines short lectures, guided demonstrations, and practical exercises. Time is reserved for discussion, questions, and individual support.

Day 1: Introduction to Python and Basic Statistics

Morning

- Course introduction and setup
- Introduction to Python and VS Code
- Variables, data types, and basic operations
- Writing and running simple scripts

Afternoon

- Control structures (loops and conditionals)
- Working with numerical data
- Introduction to basic statistics in Python
- Practical exercises and small analysis tasks
- Introduction to AI-assisted coding workflows

Day 2: Data Handling, Visualisation, and Advanced Methods

Morning

- Working with datasets (loading, cleaning, filtering)
- Introduction to common data analysis libraries
- Data structures for analysis
- Hands-on data manipulation exercises

Afternoon

- Data visualisation principles and tools

- Creating and customising plots
- Introduction to resampling methods
- Principal Component Analysis (PCA)
- Applied exercises and short projects
- Using AI tools for data exploration and documentation

Day 3: Applied Data Project

Morning

- Introduction to project work
- Selecting a project (prepared examples or own data/problem)
- Project planning and workflow design
- Initial data exploration

Afternoon

- Independent project development
- One-to-one support and feedback
- Project refinement and presentation
- Group discussion and reflection
- Next steps and further learning resources

Approach

The course is highly practical and interactive. Each topic is supported by worked examples and guided exercises. Participants are encouraged to experiment, ask questions, and apply concepts to their own interests.

AI tools will be introduced as supportive instruments for coding, debugging, documentation, and exploration, with an emphasis on good practice and critical evaluation.