Syllabus

This years course structure

Part I

Introduction to Programming with Python

In the first part, an introduction to the basic concepts of programming in Python is provided. Students will learn the Python syntax, data types, as well as how to implement loops, functions, and object classes in Python. We will introduce core Python libraries, too, including NumPy and Pandas. Once these concepts are understood, we will learn how they can be used to solve problems.

Lectures

Welcome and Introduction (I)
Basics of Python syntax, variables, data types

Control Structures for Your Code (II)
String methods, comparisons, conditional statements, loops

Building Reusable Functions (III)
Functions, arguments, return values, scope, classes

Handling Data in more than one Dimension (IV)
Tuples, lists, sets, dictionaries, and basic I/O

Handling Errors and Strings (V)
Exceptions, try-except blocks, debugging

Part II

Data Science with Python

In the second part, we will cover basic data science tools in Python referring to data manipulation, descriptive and explorative analysis as well as visualization. At the end, an outlook will be provided on the next steps in Python, including statistical analysis and machine learning.

Lectures

Using Modules and Packages (VI)
Standard libraries, random numbers and how to use them

NumPy and Pandas for Scientific Computing (VII)
Data manipulation with Pandas, array operations with NumPy

Plotting Data (VIII)
Matplotlib, Seaborne based on hand-on examples

First steps into A.I. (IX)
A brief intro to machine learning concepts

Part III

Programming Projects

In the third part, students will be assigned mini projects in Python where they can apply their new knowledge in groups on a project of their choice. Each group will present their results and get feedback at the end of the semester.

Lectures

Your first Project I (X)
Choose your project that ties together concepts from the course

Your first Project II (XI)
Progress your group-project under assistance

Your first Project III (XII)
Finalize your group-project with your team

Presentations and Discussion (XIII)
Present your group's work and the learnings you have made