SSM
Scuola Superiore Meridionale

Course title:

Introduction to Python for Complex Systems

Duration [number of hours]**: 24**

PhD Program [MERC/MPS/SPACE]**: MERC**

Name and Contact details of unit organizer(s):

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Course Description [max 150 words]**:**

This Unit provides an introduction to the fundamentals of Python programming. The course starts with the core concepts of procedural programming and gradually advances toward the use of complex libraries for machine learning. After presenting the basic syntax and structure of Python as well as the main ideas of procedural programming, students will move to object-oriented programming, gaining a clear understanding of classes, inheritance, and polymorphism. Building on these foundations, the course will introduce essential Python libraries such as NumPy, pandas, and scikit-learn, with practical examples showing their most relevant functions and applications. The unit will conclude with a practical project in which students will integrate the concepts learned throughout the course to solve a case study.

Syllabus [itemized list of course topics]**:**

- Basics of PythonBasics of the programming language
- Control structures and functions
- Data structures
- Files, modules, and packages
- Object-oriented programming
- Scientific libraries
- Introduction to Machine Learning and advanced topics
- Integration and final project

Assessment [form of assessment, e.g., final written/oral exam, solutions of problems during the course, final project to be handed-in, etc.]**:**

Final project

Suggested reading and online resources:

“Learning Python” – Mark Lutz (O’Reilly)