# Introduction to Tools for Data Processing

## Prof. Mario Marangione

***COURSE AIMS AND INTENDED LEARNING OUTCOMES***

*Course Aims*

The course aims to provide students with the elements, basic concepts and theoretical and practical concepts of programming in the field of data science. The first part of the course focusses on the fundamentals of programming using the Python language. The second part of the course presents calculation techniques and application models that may be used to solve problems in the field of data science.

*Intended learning outcomes*

At the end of the course, students will have learnt the application areas of the main programming languages, will know the main constructs of Python and will have learnt some methodologies for the implementation of algorithms to be applied in the field of data science. They will also be able to understand the syntax, instructions and logic applied in the implementation of small portions of Python code.

***COURSE CONTENT***

The course aims to introduce students to concepts, logic and methods at the basis of programming languages. It will describe and classify the most common programming languages, by highlighting their differences and application fields. The course also explores some fundamental concepts of programming languages: expressions, instructions, variables, parameters, and functions. The Python language will provide an understanding of how programming works through a series of implementations and lab practical activities. The final part of the course will illustrate the data structures managed by a programming language and the SQL language to interact with tables and databases.

*Syllabus*

* Classification, description and fields of application of programming languages.
* Syntax and semantics of language
* Introduction to the Python programming language.
* Expressions, instructions, variables, language functions
* Database and SQL language
* Data Science with Python
* Manipulating data sets with Pandas
* Univariate statistical analysis with Python
* Processing of texts in natural language
* Learning algorithms and predictive analysis

***READING LIST***

Reference textbook:

* Mario Marangione, *Introduzione ai linguaggi di programmazione,* EDUCatt
* Dmitry Zinoviev, *Data Science con Python*, Apogeo
* Gabbrielli M., Martini S., *Linguaggi di Programmazione*, McGraw Hill

Lecture slides available on Blackboard.

Practical exercise slides available on Blackboard.

The reading list and any other supplementary reading will be provided during the course and made available on Blackboard.

***TEACHING METHOD***

Lessons will take place in the classroom and will include a theoretical and a practical part with applicative examples that can be put into practice by the students.

***ASSESSMENT METHOD AND CRITERIA***

The exam includes an oral test on theory and an assessment on portions of Python code. In particular:

1. a question will concern the evaluation and comment of a portion of Python code. In this phase students will have to recognize the constructs and the algorithm used, references to data science libraries, possible anomalies or not managed or considered use cases.

2. other questions will be on the theoretical topics covered in class whose discussion will be evaluated both considering the relevance of answers and appropriate use of technical vocabulary.

Each question will have an equal proportional weight in the final mark.

***NOTES AND PREREQUISITES***

*Prerequisites*

As it is an introductory course, there are no prerequisites to attend this course. However, students are expected to show intellectual interest and curiosity for the subject, as well as personal experience in the IT field.

*Tools*

Students will carry out the exercises with their own personal Windows or Mac computer where the application suitable for developing and executing code in Python and SQL will be installed together with the lecturer. Alternatively, students can use their own personal tablet or Chromebook device.

Further information can be found on the lecturer's webpage at http://docenti.unicatt.it/web/searchByName.do?language=ENG, or on the Faculty notice board.