



UNIVERSITÀ  
DEGLI STUDI DI MILANO-BICOCCA

## COURSE SYLLABUS

### Foundations of Computer Science

2122-1-F9101Q001

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#### Aims

At the end of the course, the students will understand how to query a database, and how to infer the implicit structure of a database from its tables.

Moreover, the students will be able to write and debug some simple programs in Python, to manage and analyze datasets consisting of a few interconnected tables, such as those usually available at kaggle.com (CSV, TSV, JSON formats). This part will be taught with the Jupyter Notebook.

Finally, the students will be able to query a relational database using SQL, both via a dedicated interface and from a Python program.

#### *Knowledge and understanding*

This course provides basic knowledge and understanding on:

- Data bases
- SQL
- Programming in Python
- Jupyter notebooks
- Managing tabular datasets with Pandas

#### *Ability to apply knowledge and understanding*

At the end of the course the students will be able to:

- Write SQL queries
- Write Python notebooks to manage datasets
- Write Python notebooks to analyze and clean datasets

## **Contents**

Organizing raw datasets: file system, delimited files.

Introduction to data bases. Relational Data Model and SQL. Select ... From ... Where.

Introduction to programming with Python. Explorative programming. Managing tabular data.

Introduction to testing and debugging.

## **Detailed program**

1. Organizing raw datasets
2. files, directories, types of files
3. main command-line commands
4. delimiter-separated values
5. Introduction to data bases.
6. The Relational Data Model.
7. SQL: Select ... From ... Where on a table.
8. Querying two or more tables.
9. Introduction to programming in Python.
10. Arrays, lists, dictionaries
11. Loops
12. Organization of a program: functions
13. Modules and libraries
14. Explorative programming. Managing tabular data.
15. The Jupyter Notebook
16. Pandas
17. Introduction to testing and debugging.

## **Prerequisites**

Basic knowledge of any programming language

## **Teaching form**

Lectures and exercises with a PC.

This course is taught in Italian.

## **Textbook and teaching resource**

Downey, Pensare in Python (<https://github.com/AllenDowney/ThinkPythonItalian>)

Downey, Think Python (<http://greenteapress.com/wp/think-python-2e/>)

VanderPlas, Python Data Science Handbook (<https://jakevdp.github.io/PythonDataScienceHandbook/>)

Allulli, Nanni. Fondamenti di Basi di Dati

## **Semester**

First

## **Assessment method**

The exam consists of 2 parts: a written exam (with open questions) on the data bases topics, and a small group (max 3 people) project, with an oral discussion, on the Python topics.

The grading of the written exam is based on the correctness and the completeness of the answers. The written exam consists of writing 4 SQL queries, where each query corresponds to an open-ended question.

The grading of the project is based on the individual contribution that is displayed during the oral discussion and on the fitness of the project to perform the required analysis.

The final grade is 1/3 of the written exam and 2/3 of the project.

There are no in-progress exams.

## **Office hours**

Please reserve a meeting via email.

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