



UNIVERSITÀ
CATTOLICA
del Sacro Cuore

Data Science and Management

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Course aims and intended learning outcomes

Data science is a rapidly growing field: in an era characterized by huge data availability, knowing how to handle data and how to extract knowledge from it, in order to take strategic decisions, is becoming a critical skill in both business and non-business scenarios.

The course will teach students (without assuming any prior background or programming skill) how to represent information through a relational database, how to extract knowledge from it using SQL and how to develop a simple data-driven Web application using a low code development platform.

Furthermore, students will learn how to do basic exploratory data analysis and data visualization and how to apply basic machine learning classification methods to real problems using the Python programming language.

At the end of the course, students:

- will be able to design a relational database to satisfy the information needs of an organization;
- will be able to develop a simple Web database application using a RAD tool such as Zoho Creator;
- will be able to extract knowledge from a relational database by performing SQL queries;
- will be familiar with the basics of the Python programming language;
- will be able to do basic exploratory data analysis and data visualization using Python and the libraries Pandas and Matplotlib;
- will be able to apply basic machine learning classification methods to real data using the Scikit-learn library;
- will be aware of some of the social implications related to the massive adoption of Artificial Intelligence and Machine Learning techniques.

Course content

COURSE CONTENT

DATA, INFORMATION AND RELATIONAL DATABASES

- The concept of data, information, database, DBMS
- The relational model: how information is represented through relations
- Designing and modeling databases to meet the information needs of an organization (logical design)

KNOWLEDGE EXTRACTION IN SQL

- Turning raw data into insights: extract information from the organization's database
- Aggregate data to build reports and understand trends

INTRODUCTION TO COMPUTING AND ALGORITHMS

- What is an algorithm?
- Variables, operators, statements and flow control, functions (in Python)



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MACHINE LEARNING

- What is machine learning?
- The Machine Learning approach Vs. the algorithmic approach
- Practical examples of Machine Learning classification / prediction problems solved using Python Scikit-learn

LOW-CODE DEVELOPMENT PLATFORMS

- The rise of the citizen developer
- Introduction to Low-code development platforms
- How to create a simple, data-driven, business application without coding

MACHINE LEARNING AND ARTIFICIAL INTELLIGENCE: THE SOCIAL IMPLICATIONS

- The following topics will be introduced and briefly discussed:
- Risks for privacy
- Living in a filter bubble
- Can we rely on decisions made by opaque algorithms?

Reading list

Copies of the slides used in class and class notes. The books to be used as references will be indicated during the course.

Teaching method

Lectures, computer laboratory lessons.

Assessment method and criteria

All students will be graded based on a written final exam and a project work assignment (students can do the assignment individually or in a group). The compulsory assignment needs to be submitted and approved within given deadlines to be allowed to take the final exam and it will be discussed and presented after the written exam.

Students need to get at least a 18/30 grade for both the final exam and the assignment (both the work submitted and the discussion/presentation will be considered); the final grade is then computed as a weighted average of project assignment (35%) and final exam (65%).

Notes and prerequisites

Information on office hours available on the instructor's personal page at <http://docenti.unicatt.it/>.