UNIVERSITÀ
DEGLI STUDI DI MILANO-BICOCCA

COURSE SYLLABUS

Information Technology and Programming Language Laboratory

2526-2-E1803M102

Learning objectives

The course aims to provide students with a general understanding of the issues related to technological innovation in financial companies and society, data and information management, the Internet, digital business models, business information systems and their organizational and management implications. It also aims to teach students to apply their newly acquired knowledge in business, formulating interpretations and independent judgments.

Learning Objectives (according to the Dublin Descriptors)

1. Knowledge and understanding

- Understand the theoretical principles and foundations of artificial intelligence and digital innovation, as well as their strategic, organizational, economic, and social impact on businesses and socio-economic systems.
- Acquire knowledge of the structure, functioning, and specific characteristics of relational databases, data warehouses, and data lakes, evaluating their role in decision-making processes and business decision support systems.
- Critically analyze digital business models and interpret the operational logic of information systems within organizations.
- Examine ongoing transformations in the financial services sector, with particular reference to the challenges and opportunities introduced by emerging technologies.
- Understand the organizational, managerial, ethical, and regulatory implications associated with the adoption of digital technologies.

2. Applying knowledge and understanding

- Design and develop innovative business models, integrating people, processes, and technologies in line with corporate strategic objectives.
- Formulate SQL queries aimed at analyzing and managing business data.
- Apply acquired knowledge to analyze complex business issues and propose effective operational solutions.

3. Making judgements

- Critically assess opportunities and risks associated with the adoption of digital technologies in various organizational contexts.
- Form independent judgments on ethical, social, and cybersecurity issues related to technological innovation.
- Adopt a critical, responsible, and informed approach in selecting and implementing technological solutions.

4. Communication skills

- Communicate effectively and professionally with both technical and managerial stakeholders, adapting language to different organizational contexts.
- Appropriately use technical and specialized language in academic, professional, and corporate settings.
- Promote dialogue and interdisciplinary collaboration among various business functions involved in technological innovation processes.

5. Learning skills

- Develop autonomous learning and continuous updating capabilities in relation to the evolution of digital technologies and information systems.
- Acquire study methodologies and analytical tools to successfully undertake advanced educational paths in the economic-management, IT, and technological fields.

Contents

The course "Informatica Generale e Laboratorio informatico" aims to provide students with a general understanding of the issues related to technological innovation in financial companies and society, data and information management, the Internet, digital business models, business information systems and their organizational and management implications.

Detailed program

*Introduction to the Role of Technology in Business *as a strategic lever and enabling factor for successful organizations in a competitive and constantly evolving environment.

New Digital Trends: analysis of digital transformation processes in companies and technological developments in the information society; organizational and strategic implications of emerging innovations.

Artificial Intelligence: historical overview and future prospects of AI, with a focus on the latest developments, including large language models and their applications in business processes.

From Data to Knowledge: systems and technologies for the organization, management, and analysis of data to support business decision-making; big data management and data analytics; introduction to SQL through practical exercises; presentation and discussion of case studies and data mining applications, with particular reference to the financial services sector.

Digital Markets and Platforms: Internet, e-business (e-finance), digital ecosystems, business networks (value networks and value webs), open banking, and digitalization processes; analysis of the FinTech phenomenon and its implications for the financial sector and intermediation.

New Media and Digital Marketing: strategies, tools, and channels for digital communication; offer personalization and customer experience; analysis of metrics and tools for monitoring online performance.

Introduction to Business Information Systems: architectures, components, and applications of information systems supporting companies' operational, tactical, and strategic activities, with a specific focus on information systems adopted in the financial sector.

Information Systems Development: methodologies, approaches, and tools for the analysis, design, and development of business information systems.

Computer Lab: the laboratory component aims to provide students with intermediate-level proficiency in using Microsoft Excel to solve typical business problems.

Prerequisites

The mathematical and logical knowledge acquired in high school.

Teaching methods

Informatica Generale - 42 hours

- 17 lessons of 2 hours each conducted in an in-person lecture format;
- 4 laboratory activities (on SQL language) of 2 hours each conducted in an interactive in-person format.

Laboratorio Informatico (Excel) - 12 hours

- 6 laboratory activities of 2 hours each conducted in an interactive in-person format.

Assessment methods

The assessment of learning includes a written test and, optionally, an additional oral examination. The written test, which includes multiple-choice questions and open-ended questions, will take place in the teaching labs (laboratori didattici) in order to evaluate the student's skills in using the SQL language to solve specific problems related to accessing relational databases and the Microsoft Excel application to solve simple computational problems.

The final exam consists of two sections.

Computer Science Section:

- 16 multiple-choice questions (1 correct answer out of 4), each worth 1 point (0 points for incorrect or missing answers). These questions will be randomly selected from a predefined list. Specifically, there will be three types of questions: 1) Data Science and Computer Science theory, 2) Python theory, 3) Python code interpretation (where a small code snippet is provided, and the output is requested).
- 1 open question worth a maximum of 8 points (0 points for a substantially or mostly incomplete response). The exercise requires writing a code snippet to perform a specific task (e.g., iterating over a list and removing all even numbers, finding the minimum in a numeric list).

- 1 SQL query worth a maximum of 8 points (0 points for a substantially or mostly incomplete response; please note that the query must be executable). The exercise (similar to the one presented in the "SQL Exercises - Example SQL question in the final exam" section) will present a database consisting of several tables and will require formulating a specific query (usually involving multiple tables).

This section awards the maximum achievable score in the exam.

Computer Lab Section (Excel):

- 3 additional multiple-choice questions (1 correct answer out of 4) on the contents of the Computer Lab (answering these questions requires the use of Excel). The questions will cover both theory and practice.

Errors or omissions in the Computer Lab section result in the following penalties applied to the score obtained in the General Computer Science section:

- 3 correct answers: no penalty
- 1 incorrect or missing answer: -1 point
- 2 incorrect or missing answers: -3 points
- 3 incorrect or missing answers: -5 points

The final grade is determined by the Computer Science section score minus any penalties from the Computer Lab section (e.g., 27 points in the General Computer Science section, -3 points in the Computer Lab section - i.e., 2 incorrect or missing answers - resulting in a total score of 24/30).

Textbooks and Reading Materials

- Joseph, Valacich, Andrea Carignani, Schneider Christoph, Vanessa Gemmo, and Federico Rajola. Sistemi informativi e trend digitali. Pearson Italia, 2019.
- The slides used in the classroom and other study materials available on e-Learning platform.

Semester

First semester.

Teaching language

Italian.

Sustainable Development Goals

INDUSTRY, INNOVATION AND INFRASTRUCTURE