UNIVERSITÀ
DEGLI STUDI DI MILANO-BICOCCA

COURSE SYLLABUS

Data Bases

2526-2-E3101Q103

Aims

Knowledge and understanding
The student will acquire fundamental knowledge of database management systems (DBMS), the relational data model, and the phases of conceptual, logical, and physical database design.

Applying knowledge and understanding
The student will be able to model and design a database, implement it using a relational DBMS, and formulate complex queries using the SQL language.

Making judgements
The student will develop the ability to evaluate the correctness and efficiency of a database design and its associated queries, as well as to identify potential issues or areas for improvement.

Communication skills
The student will be able to describe and justify design choices and implemented queries using correct and appropriate technical terminology.

Learning skills
The course will provide the student with the foundational knowledge needed to independently consolidate and further develop skills in database design and querying, preparing them for more advanced courses in the field of information systems.

Contents

To introduce basic concepts in the data base topics. Data bases are considered the "bedrock" of modern business, and are the core technology in practically every application of ICT. The skills provided by the course concern three different areas:

Models for databases, both at the conceptual level (the Entitiy Relationship model) and at the Data Base Management System logical level (Relational model).
Languages for querying and updating a data base, specifically, SQL and Query by Example.
Methodologies for data base design, both the conceptual phase and the logical phase.

Detailed program

1. Introduction to data bases and Data Base Management Systems. The data base as an organizational and technological issue.
2. Relational Model, Relations, Attributes, Domains, Integrity constraints, Keys, referential integrity.
3. Relational Algebra, Select, Project, Natural Join, Cartesian Product, Theta-Join
4. SQL, Data Description Language and Data Manipulation Language, syntax and semantics of commands.
5. Entity Relationship model, Entities, Relationships, Attributes, IS-A relations, Generalizations, Cardinalities, Identifiers. Conceptual Database Design
6. Logical Database Design, Transformation Phase and Translation Phase from ER model to relational model.

Prerequisites

Set theory and propositional calculus, as taught in high schools.

Teaching form

The teaching includes a part of theoretical lectures conducted in the in-person delivery and in-person interactive mode that will be held in the classroom, a part of exercises in the in-person delivery and in-person interactive mode that will be held in the classroom, and a part of exercises in the in-person delivery and in-person interactive mode that will be held in the classroom and/or laboratory and will require the use of one's own PC (or the one available at the University's computer labs).

Textbook and teaching resource

P.Atzeni Ceri, Paraboschi, Torlone, Basi di Dati – Modelli e linguaggi di interrogazione – terza edizione, McGraw-Hill, 2009
D. Braga, M. Brambilla, A. Campi - Eserciziario di Basi di Dati Progetto Leonardo Bologna.
L. Cabibbo, R. Torlone, C. Batini - Basi di dati, Progetti ed esercizi svolti, Pitagora Editrice Bologna.

slides and other materials provided by professors.

Semester

second semester

Assessment method

Written with open questions on all major topics inherent in the course: ER model, conceptual design, relation model, relational algebra, SQL, logical design. There are two exemptions to be taken during the year.

First written test (exemption).
Entity model Relation and conceptual design
Relational model

Second written test (exemption).
SQL language
Relational algebra
Logical design

- The minimum grade of the individual parts must be at least 15/30. The final grade is the average of the grades of the two parts (exemptions). The exam is passed if the average is 18/30 or higher. If the exam grade is positive (major equal to 18),
- the grade is algebraically added to the score obtained from the optional laboratory test (max 3 points).

Typically, more than 85% of the students pass the exam through the midterm tests or in the June and July tests.

Office hours

Following the class lessons and by appointment (R. Schettini and P. Napoletano)

Sustainable Development Goals