UNIVERSITÀ
DEGLI STUDI DI MILANO-BICOCCA

COURSE SYLLABUS

Introduction To Databases (blended)

2324-2-E4101B040

Learning objectives

The course is an introduction to the field of databases with a focus on relational databases. Database design methodologies will be illustrated. The relational model and the SQL language will be illustrated. It will be taught how queries can be used to calculate synthetic indicators starting from information stored in relational databases. The differences between structured, semi-structured, and unstructured data and the problems associated with their management will be introduced.

Contents

Course topics

- Introduction to relational databases
- The Client / Server paradigm
- Relational algebra and SQL language
- Analysis and extraction of information from existing databases
- Conceptual, logical, and physical design of databases
- Transaction support
- Structured, semi-structured, unstructured data

The teacher might make changes during the teaching activities. Any changes will be promptly indicated on this website.

Detailed program

- The Relational paradigm
- Primary Key and Foreign Key
- Client / Server paradigm
- Centralized data management
- Relational algebra (projection, selection, cartesian product, join)
- Boolean algebra
- SQL Language (Data Definition and Data Manipulation Language)
- Anatomy of an SQL query
- Group By clause and aggregation operators
- Nested Queries
- Calculation of indicators through SQL query
- Information Systems Lifecycle and Database Design
- Conceptual design
- Logical design
- Physical design
- ER Model
- Normalization
- Transactions and ACID properties
- Indexes
- Structured, semi-structured, unstructured data
- Web scraping

Prerequisites

None. It is highly suggested to have previously attended the "Informatica" course (or any equivalent) and passed the examination.

Teaching methods

- Lessons both live and recorded
- Blended E-Learning lessons (video, tests or other learning reinforcement activities, self assessment tests)
- Lab exercises
- Final lab activities and a simulation of the final test

Assessment methods

Students must be registered to take the learning verification (i.e., the exam). It is mandatory to register via "Student Services Online" by the official deadline. Registration usually closes 3 working days before the examination day.

How Learning Verification is performed

The learning verification of the Databases Course ("exam" from here on) is composed of a written test and a subsequent discussion/acceptance of the grade. The former is mandatory, the latter is optional (at the discretion of the teacher and the student).

The examination is the same for both attending and non-attending students.

The written test consists of approximately 9 closed-ended questions and 2 open-ended questions; The number and the types of questions may change. The duration of the written exam may change, averagely you can expect it takes one hour and a half.

For each closed-answer question you will be offered a set of possible answers and you will have to choose the correct answer (one and only one will be the correct answer, unless otherwise indicated in the assignment). Wrong answers will not result in penalties; correct answers will contribute to your final grade. Closed-ended questions will focus on theory topics or require completing a query or require identifying the output produced by a query. Other closed-ended questions may be added. A mock exam will be available at the end of the course, so students can take an exam simulation. The text of the simulation and thesolutions will be available on the course web site.

In the open-ended questions you may be asked to:

- Write a query in SQL language. You will not have a database (management system) for testing your query.
- Design the ER schema of a database.
- ... (other types of exercises focusing on topics presented in class)

Some exam papers of previous examinations (and the corresponding solutions) will be made available at the end of the course,

To pass the exam you will have to reache the "pass level", both in the closed-ended questions and in the open-ended questions. I.e., you will need to demonstrate adequate theory knowledge and be able to solve exercises (e.g., write an SQL query, design a data structure). During the exam, each student will have a personalized assignment (with questions that are partially or totally different from those of all other students). Regarding the ability to write SQL queries, you can use a simple test to check your preparation: if (at the end of the course) you need to look at the solutions to solve any of the exercises proposed during the tutorials, then you need to study and practice more.

Textbooks and Reading Materials

Study material

- The slides, exercises and all the material showed in class will be published on this website.
- Additional material may be shown during the course. The references will be published on this website.

Books

- Atzeni, P., Ceri, S., Paraboschi, S., Torlone, R. Databases. McGraw-Hill. Any edition of the book is ok.

Semester

Second half of the first semester.

Teaching language

Italian

Sustainable Development Goals

INDUSTRY, INNOVATION AND INFRASTRUCTURE