

# COMPUTER ENGINEERING (LM55)

(Lecce - Università degli Studi)

## Teaching DATABASE

GenCod A003129

**Owner professor** Mario Alessandro BOCHICCHIO

**Teaching in italian** DATABASE

**Teaching** DATABASE

**SSD code** ING-INF/05

**Reference course** COMPUTER ENGINEERING

**Course type** Laurea Magistrale

**Credits** 9.0

**Teaching hours** Front activity hours: 81.0

**For enrolled in** 2018/2019

**Taught in** 2019/2020

**Course year** 2

**Language** ENGLISH

**Curriculum** PERCORSO COMUNE

**Location** Lecce

**Semester** First Semester

**Exam type** Oral

**Assessment** Final grade

**Course timetable**  
<https://easyroom.unisalento.it/Orario>

## BRIEF COURSE DESCRIPTION

The aim is to provide the basics about the main database theories, techniques and tools to design / implement databases and database applications.

Topics:

- Database, relational databases, NoSQL and NewSQL;
- DataBase Management Systems;
- Relational Model and Relational Algebra;
- SQL: data definition and manipulation;
- Basics of Human-Computer Interaction and interface design for DB;
- Architectural aspects: Clients, Servers, Peers, Devices, IoT, ...
- Big data, data lakes, data analytics, machine learning, AI;

## REQUIREMENTS

Good knowledge of Object Oriented Languages (at least 1), techniques and tools. Elements of computer networks and Web technologies.

## COURSE AIMS

### Acquired skills

Students will be able to design and understand data models, to create and manage databases and to design and implement data-centric applications.

## TEACHING METHODOLOGY

### Teaching method

Frontal lessons and lectures, for theoretical aspects, will be followed by participatory learning sessions and hands-on sessions to reinforce the comprehension and to acquire the abilities relevant to the field of database design.

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## ASSESSMENT TYPE

### Students evaluation

- Written test: on all aspects covered by the program
- Oral Test:
  1. All theoretical aspects covered by the program
  2. Presentation and discussion of a project

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## OTHER USEFUL INFORMATION

### Office Hours

By appointment; contact the instructor by email or at the end of class meetings.

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## FULL SYLLABUS

### Fundamental of Database Systems, Elmasri-Navathe: 7th edition

Chapters:

- 1: Databases and Database Users
- 2: Database System Concepts and Architecture
- 3: Data Modeling Using the Entity–Relationship (ER) Model
- 4: The Enhanced Entity–Relationship (EER) Model
- 5: The Relational Data Model and Relational Database Constraints
- 6: Basic SQL
- 7: More SQL: Complex Queries, Triggers, Views, and Schema Modification
- 8: The Relational Algebra and Relational Calculus
- 8.1: Unary Relational Operations: SELECT and PROJECT
- 8.2: Relational Algebra Operations from Set Theory
- 8.3: Binary Relational Operations: JOIN and DIVISION
- 8.4: Additional Relational Operations
- 8.5: Examples of Queries in Relational Algebra
- 9: Relational Database Design by ER- and EER-to-Relational Mapping
- 10: Introduction to SQL Programming Techniques
- 11: Web Database Programming Using PHP
- 12: Object and Object-Relational Databases
- 14: Basics of Functional Dependencies and Normalization for Relational Databases
- 14.1: Informal Design Guidelines for Relation Schemas
- 14.2: Functional Dependencies
- 14.3: Normal Forms Based on Primary Keys
- 14.4: General Definitions of Second and Third Normal Forms
- 14.5: Boyce-Codd Normal Form
- 16: Disk Storage, Basic File Structures, Hashing, and Modern Storage Architectures
- 17: Indexing Structures for Files and Physical Database Design
- 20: Introduction to Transaction Processing Concepts and Theory
- 21: Concurrency Control Techniques

- **Teaching material:** more concepts on requirement elicitation and database application design and implementation, multidimensional analysis, datawarehouse, big data, big data management, database security, database administration, NoSQL, NewSQL, distributed databases.

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## REFERENCE TEXT BOOKS

R. Elmasri, S. Navathe, Fundamental of Database Systems, 7a edizione, Pearson ed.