

# 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** Ore-Attivita-frontale: 81.0

**For enrolled in** 2018/2019

**Taught in** 2019/2020

**Course year** 2

**Language** INGLESE

**Curriculum** PERCORSO COMUNE

**Location** Lecce

**Semester** Primo-Semestre

**Exam type** Orale

**Assessment** Voto-Finale

**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.

---

## 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

---

## OTHER USEFUL INFORMATION

### Office Hours

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

---

## 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.

---

## REFERENCE TEXT BOOKS

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