UNIVERSIDADE LUSÍADA
LISBOA

Course Unit Program
Data Bases

Academic Year 2025/2026

1. Organic Unit

Faculty of Business and Economic Sciences

2. Course

Computer Engineering

3. Cycle

1st

4. Course Unit

Data Bases (L9017)

5. Scientific Area

6. Curricular Year

2nd

7. Type of Curricular Unit / Semester

2nd Semester

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8. Class type and workload (work time)

Theoretical classes:	
Practical classes:	
Theoretical-Practical Classes	30,00
Tutorial Guidance:	20,00

9. ECTS Credits

6,00

10. Scientific Area Coordinator

11. Regent

Prof. Doutor PEDRO RAMOS DOS SANTOS BRANDÃO

12. Assistants

13. Teaching Language

Portuguese

14. General Objectives

To successfully complete this course, students must demonstrate the following knowledge and skills:

1. Understand the purpose of relational database systems;
2. Understand the concepts of the relational database model;
3. Understand and know how to apply table normalization techniques;
4. Know how to use the entity-association model to design databases;
5. Know and know how to use relational operations with tables;

15. Specific Objectives

Students must first learn the theory of Normalization to represent information needs at the data support level in a logical diagram.
They must also understand how to implement this same model in a commercial relational database management system (SQL Server 2019).
To manage information, they must also learn to use the SQL language (ISO/IEC 9075:*) and know how to manipulate data structures and explore them through ad-hoc queries.

16. Skills to be acquired

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Model data using the entity-association model and transform the logical schema into relational tables.
Apply normalization techniques (1NF, 2NF, functional dependencies) to improve integrity and reduce redundancy.
Implement the database in an RDBMS (SQL Server) and manage basic structures (tables, keys, relationships).
Write and optimize SQL queries (joins, subqueries, aggregation) while respecting ACID properties in transactions.

17. Teaching Methodology

All content will be taught in theoretical-practical classes in which, following the theoretical presentation, implementations will be made in the laboratory.

18. Course Unit Program

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1. Relational Databases
1.1. Databases and Relational Database Management Systems (RDBMS)
1.2. Objectives of RDBMS
1.3. The relational model
1.3.1. Concept of relationship
1.3.2. Table concept
1.3.3. Key concept
1.3.4. Candidate keys and primary key
1.3.5. External keys

1.4. Table normalization
1.4.1. The normal forms
1.4.2. Hierarchy of normal forms
1.4.3. First normal form
1.4.4. Second normal form
1.4.5. Functional dependence
1.4.6. Mutually independent attributes

1.5. Designing Relational Databases
1.5.1. Entity-association model
1.5.2. Transforming associations into tables
1.5.3. Practical examples of modeling
1.6. Relational operations
1.6.1. Restriction, projection and product operations
1.6.2. Union, difference and intersection operations
1.6.3. Join and split operations
1.7. SQL Language
1.7.1. Relational databases and SQL language
1.7.2. Queries
1.7.3. JOIN operations
1.7.4. Aggregation and grouping functions
1.7.5. Subqueries and predicates
1.7.6. Transactions in SQL. ACID Properties-Atomicity, Consistency, Isolation, Durability
1.7.7. Database creation and access projects with SQL

2. Introduction to non-relational databases
2.1. Structured data and unstructured data
2.2. Big Data and the limits of the relational model
2.3. The concept of NoSQL
2.4. NoSQL vs Relational Databases
2.5. Key-value database model

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2.5.1. Model analysis

2.6.1. Model analysis
2.6.2. Implementing document databases with MongoDB

Laboratory:
- Creation of a virtual server; creating a SQL server on the virtual server.
- Development of the main practical classes in this laboratory.
- This point of the program is transversal to the entire semester.

19. Assessment Methods

Students, after theoretical and practical learning of both techniques and tools, will have to implement solutions to specific problems to be posed during classes.
Two written tests and one assignment will be considered.

20. Didactic Resources

Students will have their classes in a laboratory that will include access to a SQL Server 2017 server where they will be able to not only practice the subjects taught in class, but, through access outside of school hours, self-study and self-familiarization with the tools.
As well as computers with virtualization and an individual SQL server to implement the learnings.

21. Sustainability Objectives

SDG 4 Quality Education: Develops digital literacy and data modeling, normalization, and query skills, essential for computer engineering training.
SDG 5 Gender Equality: Promotes inclusive participation in laboratory activities and database projects, helping to reduce inequality in access and academic success.
SDG 9 Industry, Innovation, and Infrastructure: Provides training for the design and management of database systems that support robust, scalable, and secure digital infrastructure

22. Keywords

Database
Normalization
Relational SQL
Non-SQL

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23. Main Bibliography

Author(s): Gouveia, Feliz. (2014).
Title: Base de Dados
Edition: 2ª Year: 2021
Local: Lisboa
Publisher: FCA
ISBN Code: 978-972-722-901-7

Author(s): Preeti Rathi
Title: Sistemas de bases de datos: Conceptos y aplicaciones avanzadas
Edition: Year: 2024
Local:
Publisher: Ediciones Nuestro Conocimiento
ISBN Code: 978-6207696116

Author(s): Giamas, Alex, (2017)
Title: Mastering MongoDB
Edition: Year:
Local:
Publisher: Packt Publishing
ISBN Code:

24. Complementary Bibliography

Author(s): Juan Carlos Galván Martínez
Title: Base de Datos: Base de Datos Relacionales
Edition: Year: 2016
Local: Kindle Edition
Publisher: Amazon
ISBN Code:

Author(s): Gaspar, Drazena, Coric, Ivica,(2017)
Title: Bridging Relational and NoSQL Databases
Edition: Year:
Local:
Publisher: IGI Global
ISBN Code:

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Autor / Author	Prof. Doutor PEDRO RAMOS DOS SANTOS BRANDÃO
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