



UNIVERSIDADE LUSÍADA
LISBOA

Course Unit Program
Data Bases

Academic Year 2024/2025

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;
6. Understand and know how to use the SQL language to create, query and m

15. Specific Objectives

Students must learn, on the one hand, the theory of Normalization, so that they can represent in a logical diagram the information needs at the data support level.

They will also need to know how to implement this same model in a commercial relational database management system (SQL Server 2019).

To handle information, you must also learn how 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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At the end of the course, students should be able to model, implement and explore a relational database. They must also be able to modify the structure of a database to adapt to new requirements emerging from their own use.

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
 - 1.3.6. Integrity constraints
 - 1.3.7. Domain restrictions
 - 1.3.8. Entity integrity
 - 1.3.9. Referential integrity
 - 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
 - 1.4.7. Third normal form
 - 1.4.8. Boyce/Codd normal form
 - 1.4.9. Fourth normal form
 - 1.4.10. Fifth normal form
 - 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



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- 2.3. The concept of NoSQL
- 2.4. NoSQL vs Relational Databases
- 2.5. Key-value database model
 - 2.5.1. Model analysis
 - 2.5.2. Implementing key-value databases with Couchbase Server
- 2.6. Column-Oriented Database Model
 - 2.6.1. Model analysis
 - 2.6.2. Implementing column-oriented databases with Cassandra
- 2.7. Document database model
 - 2.7.1. Model analysis
 - 2.7.2. Implementing document databases with MongoDB
- 2.8. Graph-based database model
 - 2.8.1. Model analysis
 - 2.8.2. Graph-based database implementation with Neo4js

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

- 4. Quality Education
- 5. Gender Equality
- 9. Industry, Innovation and Infrastructure

22. Keywords

Database
Normalization
Relational SQL
Non-SQL



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23. Main Bibliography

Author(s): Gouveia, Feliz. (2014).
Title: Fundamentos das Base de dados
Edition: Year:
Local: Lisboa
Publisher: FCA

Author(s): Silberschatz, Abraham, Korth, Henry F. & Sudarshan, S. (2011).
Title: Database System Concept
Edition: Sixth Edition Year:
Local:
Publisher: McGrawHill

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

24. Complementary Bibliography

Author(s): Nenad , Jukic, Vrbsky ,Susan & Nestorov, Svetlozar.(2014).
Title: Database Systems: Introduction to Databases and Data Warehouses
Edition: Year:
Local:
Publisher: Pearson

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



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Ficha técnica MIP / MIP Datasheet	
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