



GENERAL INFORMATION

Data of the subject	
Subject name	Databases
Subject code	DTC-IMAT-222
Main program	Grado en Ingeniería Matemática e Inteligencia Artificial
Involved programs	Grado en Ingeniería Matemática e Inteligencia Artificial [Second year]
Credits	7,5 ECTS
Type	Obligatoria (Grado)
Department	Department of Telematics and Computer Sciences

Teacher Information	
Teacher	
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DESCRIPTION OF THE SUBJECT

Contextualization of the subject
Prerequisites
Python programming
Basic computer operation.
Algebra (set theory)

Course contents

Contents
1. Introduction to databases
1. Structured vs. unstructured data.



2. Data recovery and ingestion. Acquisition, Ingest, ETL.
3. Introduction to databases. Types of databases.
4. Data architectures: data lakes, data warehouse, data marts.
2. Relational databases
 1. Introduction to the entity-relationship model, relational and normalisation.
 2. Relational databases. SQL
 3. Relational algebra and calculus.
 4. Query optimisation and benchmarking.
3. Introduction to non-relational databases
 1. Types of non-relational databases
 2. Scalability
4. Document databases. MongoDB
 1. MongoDB. Characteristics, use and management.
 2. CRUD. Queries. Operators.
 3. Indexes and benchmarking
5. Graph and Memory based databases.
 1. Introduction to Neo4J.
 2. Basic Neo4J queries and functions
 3. Introduction to Redis.
6. Cloud databases
 1. Use case examples. Relational and non-relational Cloud Services.
 2. Visualisation services in the cloud.
 3. Data architectures.

EVALUATION AND CRITERIA

Evaluation activities	Evaluation criteria	Weight
<ul style="list-style-type: none">• Partial exam: 20%• Final: 50%	<p>Partial exam (20%): written exam on paper oriented to understand the theoretical concepts of databases, including data architectures, the different types of structured, unstructured and semi-structured data, relational databases, including relational model (and relational database design), relational algebra and calculus, SQL (queries) and some definitions of non-relational databases.</p> <p>Final exam (50%): written exam on paper containing the same content of the intermestral exam and extending it with additional concepts (and queries) related to non-relational databases (especially document databases, with mongoDB).</p>	70 %
Weekly assignments (15%)	<p>Weekly assignments (15%): In addition to the functionality and the results obtained, the code style used in the assignments and the quality of the reports requested will be assessed.</p>	15 %



Final project (15%)	Final project (15%): Project containing the use of different types of databases explored in the course. In addition to the functionality, the design used in the project and the application of the course contents will be evaluated.	15 %
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Grading

The grade for the ordinary exam will be as follows:

50% for the final exam of the course

20% the inter-semester exam

15% for the project

15% for the weekly practicals

The grade for the extraordinary exam will be as follows:

70% the final exam of the subject (the inter-semester exam is not taken into account)

15% for the project

15% for the weekly practicals

A mark greater than or equal to 5 must be obtained by applying the above weightings, taking into account the following restrictions:

It will be compulsory to obtain a mark greater than or equal to 5 in the final exam of the subject in both ordinary and extraordinary exams in order to pass the subject.

It will be compulsory to obtain a mark greater than or equal to 5 in the average obtained between the project and the weekly practicals in both extraordinary and ordinary exams in order to pass the subject. In other words, $(\text{project_grade} + \text{average_practicals}) / 2 \geq 5$. In the event of not achieving this minimum grade in the ordinary exams, both the project and the practicals can be handed in again in the extraordinary exams.

A mark of at least 4 in both the project and the average of the practicals will be required to pass the course.

WORK PLAN AND SCHEDULE

Activities	Date of realization	Delivery date
Reading and study of the theoretical contents, notes and code provided by the teacher.	After and before each class	
Final Project.	After studying all the non-relational databases	During the final exams
Exams	March, May, June	
Weekly assignments	Before, during and after the assignment class	Approximately 1 week after publication in moodle

BIBLIOGRAPHY AND RESOURCES

Basic References

Moodle

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