

SUBJECT TEACHING GUIDE

G691 - Advanced Data Bases

Degree in Computer Systems Engineering

Academic year 2024-2025

1. IDENTIFYING DATA					
Degree	Degree in Computer Systems Engineering			Type and Year	Optional. Year 4
Faculty	Faculty of Sciences				
Discipline	Subject Area: Advanced Databases Optional Module				
Course unit title and code	G691 - Advanced Data Bases				
Number of ECTS credits allocated	6	Term	Semester based (1)		
Web	https://moodle.unican.es/course/view.php?id=18022				
Language of instruction	Spanish	English Friendly	Yes	Mode of delivery	Face-to-face

Department	DPTO. INGENIERÍA INFORMÁTICA Y ELECTRÓNICA				
Name of lecturer	MARTA ELENA ZORRILLA PANTALEON				
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Office	Facultad de Ciencias. Planta: + 1. DESPACHO PROFESOR (1072)				
Other lecturers					

3.1 LEARNING OUTCOMES
- Know the evolution of database technologies and their current trends.
- Model driven design: from conceptual design to physical design
- Active databases and object-relational databases
- Semistructured databases
- Learn advanced issues in SQL standard
- Learn the basis of NoSQL movement and design databases under this paradigm.
- Distributed and scalable databases (Graph DB, temporal series, DB in memory, spatial DB so on).

4. OBJECTIVES

Overview of database technologies.
 Use of UML as a conceptual design language for DB.
 Delve into the relational and object-relational model (user-defined data types).
 Know the programmatic aspects of the SQL:2016 standard.
 Understand and use the SQL/temporal, SQL/OLAP, SQL/XML and SQL/JSON extensions.
 Understand the object model of the SQL:2016 standard and its practical use today.
 To become familiar with the term "big data" and the most commonly used NoSQL database technologies. Learn strategies for their design.
 Reasoned selection of the most appropriate database technology for each data management problem.

6. SUBJECT PROGRAM

CONTENTS

1	Present and future of data base technologies: Evolution in data management. New challenges. Maturity of technologies. Research lines in databases.
2	Principles of data modelling. Conceptual, logical and physical modelling. Conceptual design with UML. Transformation rules. Database standards.
3	Modelling active behaviour in databases. SQL Objectual, SQL Temporal, SQL OLAP, SQL Graph. Other aspects of Advanced SQL.
4	Semi-structured data. XML and XML Schemas. JSON and data bases. SQL/XML and SQL/JSON standard.
5	NoSQL: overview. Concepts. Pros and cons. Taxonomy: key-value, column family, graphs and document-oriented. Criteria design. NewSQL and federed databases vs NoSQL.
6	Other type of databases: spatial databases, GIS, databases for temporal series, real time databases, search engines and so on.

7. ASSESSMENT METHODS AND CRITERIA				
Description	Type	Final Eval.	Reassessn	%
Written exam of the three first units.	Written exam	No	Yes	20,00
Written exam of the rest of units	Written exam	No	Yes	20,00
Project: each student will design and implement a database in which will use the technologies explained in the semester.	Work	No	Yes	40,00
Participation in the classroom, discussion of articles and solving exercises	Others	No	Yes	20,00
TOTAL				100,00
Observations				
The course is passed if the weighted-sum of all assessments is greater than or equal to 5 out of 10. Otherwise, the student will have to carry out the final written exam, which will have a similar structure to the ones performed during the course (continuous evaluation).				
The learners will be able to do additional activities in order to raise their mark in one point out of ten.				
Observations for part-time students				
Part time students will be assessed according to: - written exam: 60 % - individual project: 40%				
The mark will be computed as the weighted sum of all assesments. The learners will be able to do additional activities in order to raise their mark in one point out of ten.				

8. BIBLIOGRAPHY AND TEACHING MATERIALS
BASIC
Elmasri, R., Navathe, S.B., Fundamentals of database systems. 7th edition. Pearson Education, 2017.
Eric Redmond. Seven Databases in Seven Weeks: A Guide to Modern Databases and the NoSQL Movement. 2012