

SUBJECT TEACHING GUIDE

G691 - Advanced Data Bases

Degree in Computer Systems Engineering

Academic year 2023-2024

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=12158				
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: + 3. DESPACHO PROFESORES (3055)				
Other lecturers					

3.1 LEARNING OUTCOMES
- Know the evolution of data base technologies and their current trends.
- Model driven design: from conceptual design to physical design
- Create and manage active data bases.
- Learn different programatic issues in SQL standard
- Desing and manage temporal data bases and use SQL/OLAP extension
- Know object data base fundamentals.
- Design semi-structured data models and manage them according to SQL/XML and SQL/JSON.
- Learn the basis of NoSQL movement and design data bases under this paradigm.
- Know the basis of specific-domain data base technologies (DB for temporal series, DB in memory, spatial DB so on).

4. OBJECTIVES

Overview of database technologies.
 Delve into the relational model and, in particular, in the design and programming of active databases.
 Knowing 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.
 Understand 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 data bases.
2	Conceptual design with UML. Relational data model review. Design of active databases. SQL. SQL\Temporal, SQL\OLAP. Advanced aspects of SQL
3	Object data bases Object-oriented model. Object Persistence. SQL Standard. ODMG standard. Comparison of object-oriented and object-relational managers.
4	Semi-structured data. XML and XML Schemas. XQuery and XPath. XML, 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 federated data bases vs NoSQL.
6	Other type of data bases: spatial data bases, GIS, data bases for temporal series, real time data bases, search engines and so on.

7. ASSESSMENT METHODS AND CRITERIA

Description	Type	Final Eval.	Reassessn	%
Written exam of the two 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 data base in which will use the technologies explained in the semester.	Work	No	Yes	30,00
Students in small groups will describe a BD technology not addressed in the semester. They will write a report and explain its content in the classroom.	Work	No	Yes	10,00
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: 30%
- team project: 10 %

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