

SUBJECT TEACHING GUIDE

G665 - Development of Information Systems

Degree in Computer Systems Engineering

Academic year 2022-2023

1. IDENTIFYING DATA					
Degree	Degree in Computer Systems Engineering			Type and Year	Optional. Year 3
Faculty	Faculty of Sciences				
Discipline	Subject Area: Software Engineering Mention in Software Engineering				
Course unit title and code	G665 - Development of Information Systems				
Number of ECTS credits allocated	6	Term	Semester based (2)		
Web	https://moodle.unican.es/course/view.php?id=12136				
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	ALFONSO DE LA VEGA RUIZ				

3.1 LEARNING OUTCOMES
- Design and development of information systems with relational back-end using the database life cycle: conceptual, logical and physical design
- Design and management of data warehouses
- Development of the persistence layer of an Information System with relational backend
- Security in Information Systems with relational backend

4. OBJECTIVES

Specify, design and implement relational databases and multidimensional data bases.
 Use of data models and CASE tools for conceptual, logical and physical design.
 Master the key concepts of relational database technology (physical and logical data independence, transaction concept, indexing and efficiency, etc.)
 Acquire the basics of dimensional model and OLAP technology .
 Know common patterns for the enterprise application development and, in particular, design and implement the persistence layer.
 Define and programme tests for evaluating the robustness of the persistence layer and data base implemented according to requirements.
 Master the SQL language (standard SQL2011)
 Know the threats and vulnerabilities of information systems and, in particular, in databases and how to mitigate them.

6. COURSE ORGANIZATION

CONTENTS	
1	Topic 1: Analysis and design of information systems
2	Unit 1: Introduction. Life cycle of information systems. Database design phases : conceptual design, logical design and physical design. Techniques, data models and tools.
3	Unit 2. Conceptual design: Requirements. Entity-relationship. UML. OCL.
4	Unit 3. Logical design: Transformation rules from EER to relational model. Transformation rules from UML to relational model.
5	Unit 4. Physical design. Files. Tables and constraints. Views. Indexes. Transactions and levels of isolation. Query optimization. Refactoring
6	Topic 2: Implementation of database applications
7	Unit 5: Enterprise application architecture. Introduction. Patterns. Persistence layer. Persistence frameworks
8	Unit 6. Security in Information systems: Introduction. Threats. Elements to securize. Security in DBMSs. Security in database applications.
9	Unit 7. Testing. Type of tests: database, performance, security, back-up. Design and creation of testing cases. Techniques and tools.
10	Topic 3: Analysis and design of data warehouses
11	Unit 8: Introduction to data warehousing. OLTP vs OLAP. Architecture and tools.
12	Unit 9: Multidimensional design. Life cycle. Fact and dimension tables. Star and snowflake models. Support for dimensional databases in SQL:2016

7. ASSESSMENT METHODS AND CRITERIA

Description	Type	Final Eval.	Reassessn	%
Partial written exam: questions and exercises	Written exam	No	Yes	35,00
Partial written exam: questions and exercises	Written exam	No	Yes	20,00
Lab exam: SQL	Laboratory evaluation	No	Yes	15,00
Individual project: design and building of a database and its persistence layer	Work	No	Yes	30,00
Final exam: tests, questions and exercises	Written exam	Yes	Yes	0,00
TOTAL				100,00
Observations				
<p>Final mark will be computed as weighted-sum of all learning activities. Qualification can be increased up to 1 point by performing activities during the semester, as long as the final mark is higher than 4,5.</p> <p>The evaluation in July will be: - Written exam: 55% - Lab exam: 15% - Individual project: 30%</p>				
Observations for part-time students				
<p>Part time students will be assessed according to: - Written exam: 55% - Lab exam: 15% - Peer project: 30%</p> <p>Qualification can be increased up to 1 points by performing activities during the semester, as long as the final mark is higher than 4,5</p>				

8. BIBLIOGRAPHY AND TEACHING MATERIALS

BASIC

Elmasri, R., Navathe, S.B., Fundamentals of database systems. Pearson Education, 2017.

Alejandro Vaisman, Esteban Zimányi. Data warehouse systems : design and implementation. Springer, cop. 2014. ISBN: 978-3-642-54654-9