SUBJECT TEACHING GUIDE

G665 - Development of Information Systems

First Degree in Computer Systems Engineering

Academic year 2026 - 2027

1. IDENTIFYING DATA					
Degree	First 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)	
Knowledge Field	Computer and systems engineering				
Web	https://moodle.unican.es/course/view.php?id=17966				
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
E-mail	marta.zorrilla@unican.es
Office	Facultad de Ciencias. Planta: + 3. DESPACHO PROFESORES (3055)
Other lecturers	

4. OBJECTIVES

Specifiy, 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.
Master the SQL language (standard SQL2023)
Know the threats and vulnerabilities of information systems and, in particular, in databases and how to mitigate them.

6. SUBJECT PROGRAM

CONTENTS

1	Analysis and design of operational information systems
1	Unit 1: Introduction. Life cycle of information systems. Database design phases : conceptual design, logical design and physical design. Techniques, data models and tools.
1	Unit 2. Conceptual design: Requirements. Entity-relationship. UML.
1	Unit 3. Logical design: Transformation rules from EER to relational model. Normalization
1	Unit 4. Physical design. Files. Tables and contraints. Views. Indexes. Transactions and levels of isolation. Query optimization.
2	Analysis and design of decisional information systems
2	Unit 5: Introduction to data warehousing. OLTP vs OLAP. Architecture and tools.
2	Unit 6: Dimensional design. Life cycle of a BI/DW system. Dimensional design: fact tables and dimensions. Degenerate dimensions. Transactional fact tables vs. snapshot tables. Bridge tables. Mini-dimensions.
2	Unit 7. Analytical SQL ETL processes. SQL for ETL. Aggregation functions. Window functions
3	Implementation of database applications
3	Unit 8. Security in Information systems: Introduction. Threats. Elements to securize. Security in DBMSs. Security in database applications.
3	Unit 9: Enterprise application architecture. Introduction. Patterns. Persistence layer. Persistence frameworks

7. ASSESSMENT METHODS AND CRITERIA

Description	Type	Final Eval.	Reassessment	%
Block #1 exam: questions and exercises. Lab exam	Written exam	No	Yes	40,00
Block #2 and #3 exam: questions and exercises. Lab exam	Written exam	Yes	Yes	30,00
Individual project: design and building of a database and its persistence layer	Work	No	Yes	15,00
Final exam: tests, questions and exercises. Lab exam	Written exam	Yes	Yes	0,00
The laboratory exam will be held on the faculty's computers, with exclusive access to the online help for the database management system. The exam will consist of exercises similar to those covered during the course, with an emphasis on best practices in	Laboratory evaluation	Yes	Yes	15,00
TOTAL				100,00

Observations

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.

The evaluation in July will be:
- Final exam: 70%
- Individual project: 30%

Observations for part-time students

Part time students will be assessed according to:
- Final exam: 85%
- Individual project: 15%

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

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