SUBJECT TEACHING GUIDE

G666 - Software Design

Degree in Computer Systems Engineering
First Degree in Computer Systems Engineering

Academic year 2024-2025

1. IDENTIFYING DATA					
Degree	Degree in Computer Systems Engineering First Degree in Computer Systems Engineering			Type and Year	Optional. Year 4 Optional. Year 4
Faculty	Faculty of Sciences				
Discipline	Subject Area: Software Engineering Mention in Software Engineering				
Course unit title and code	G666 - Software Design				
Number of ECTS credits allocated	6	Term		Semester based (1)	
Web	http://moodle.unican.es/				
Language of instruction	Spanish	English Friendly	Yes	Mode of delivery	Face-to-face

Department	DPTO. INGENIERÍA INFORMÁTICA Y ELECTRÓNICA
Name of lecturer	DIEGO GARCIA SAIZ
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Other lecturers	PABLO SANCHEZ BARREIRO

3.1 LEARNING OUTCOMES
- To know the most popular techniques for structuring, designing and analysing software.
- To be able to use the most popular notations, strategies and tools for software analysis and design.
- To be able to use design patterns to provide optimal solutions to software design problems.
- To be able to use the most popular object-oriented design and modelling techniques, including advanced issues of UML.

4. OBJECTIVES
The student will be able to use correctly the GRASP and SOLID principles during the elaboration of a software design.
The student will be able to use the Design By Contract technique.
The student will be able to understand how a set of design patterns works and she will be able to use them.
The student will be able to understand how architectural patterns work and she will be able to use some of them.
The student will be able to analyse strengths and weaknesses of each design pattern in a given context.

6. SUBJECT PROGRAM	
CONTENTS	
1	Unit 1. Software Design Foundations Modularity. GRASP & SOLID. Design by Contract.
2	Unit 2. Software Design Patterns. Definition of Design Pattern, Antipattern and Refactorization. GoF Design Patterns. Non GoF Design Patterns. Dependency Injection. Lambda expressions.
3	Unit 3. Design and Implementation of Software Architectures Review of the Concept of Architecture. Architectural Views. Architectural Description Languages. Software Architecture Evaluation. Software Architectural Patterns: Layered Architectures, Client-Server Architectures, Publish-Subscribe, Pipes and Filter, Service-Oriented Architectures, Microservices.
4	Unit 4. Architectural Patterns for Enterprise Systems Layered Architectures. Layer Distribution in Enterprise Systems. Business Layer Patterns. Domain-Driven Design. Persistence Layer Patterns. Service Layer Patterns. Presentation Layer Patterns.
5	Unit 5. Non Object-Oriented Software Paradigms Functional Programming. Aspect-Oriented Programming. Reactive Programming.

7. ASSESSMENT METHODS AND CRITERIA

Description	Type	Final Eval.	Reassessn	%
Test on Architectures for Enterprise Information Systems.	Laboratory evaluation	Yes	Yes	50,00
Mid-term test on design patterns	Laboratory evaluation	No	Yes	50,00
TOTAL				100,00

Observations

The final grade for this subject will be computed as the weighted average of different activities . Some of these activities has a minimum mark. If this minimum mark is not reached for just a single activity, the whole subject will be failed. In these cases, the final mark will be the minimum between the weighted average of all the activities and 4.9.

When an student reaches the minimum mark for an activity, that activity will be considered as passed and the student will not have to repeat it in the future.

Instructors might perform some extra checks during the semester in order to verify the authorship of the assignments delivered by the students. Plagiarism is not allowed and it implies failing the subject. In addition, plagiarism will be notified to the Faculty Council so that the adequate disciplinary actions can be adopted.

All test will imply the use of computers. During tests, students are allowed to use any kind of documents, including slides, exercises, assignments, books or personal notes.

Observations for part-time students

Attendance is only required for making tests. Therefore, part-time students are allowed to attend to the subject as better fit in with their needs. Part time students might choose for a evaluation strategy where their final mark is fully determined by a single test.

All test dates will be announced during the first two weeks of the semester, so that part-time students can have enough time to make the proper arrangements they might need in order to attend these tests.

8. BIBLIOGRAPHY AND TEACHING MATERIALS

BASIC

Erich Gamma, Richard Helm, Ralph Johnson y John Vlissides. □Design Patterns: Elements of Reusable Object-Oriented Software□. Marzo 2000.