

## SUBJECT TEACHING GUIDE

G666 - Software Design

Degree in Computer Systems Engineering

Academic year 2018-2019

1. IDENTIFYING DATA					
Degree	Degree in Computer Systems Engineering			Type and Year	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	<a href="http://moodle.unican.es/">http://moodle.unican.es/</a>				
Language of instruction	Spanish	English Friendly	No	Mode of delivery	Face-to-face

Department	DPTO. INGENIERÍA INFORMÁTICA Y ELECTRÓNICA				
Name of lecturer	PABLO SANCHEZ BARREIRO				
E-mail	p.sanchez@unican.es				
Office	Facultad de Ciencias. Planta: + 1. DESPACHO PROFESOR (1069)				
Other lecturers	DIEGO GARCIA SAIZ				

### 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 a set of architectural patterns works and she will be able to use them.

The student will be able to analyse strengths and weaknesses of each design pattern in a given context.

#### 6. COURSE ORGANIZATION

##### CONTENTS

1	Unit 1. Software Design Foundations  Modularity. GRASP & SOLID Principles. Design by Contract. Aspect-Oriented Techniques.
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.
4	Unit 4. Architectural Patterns for Enterprise Systems  Layered Architectures. Client-Server Architectures. Layer Distribution in Enterprise Systems. Business Layer Patterns. Service Layer Patterns. Presentation Patterns. Persistence Patterns. Introduction to Microservices.
5	Unit 5. Software Design Metrics  Design stability. Object-Oriented Metrics. Concern-Oriented Metrics.

## 7. ASSESSMENT METHODS AND CRITERIA

Description	Type	Final Eval.	Reassessn	%
Final Test	Written exam	Yes	Yes	50,00
Mid-term test on design patterns	Laboratory evaluation	No	Yes	50,00
TOTAL				100,00
Observations				
<p>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 mark is not reached, the subject will be failed. In these case, the final mark will be the minimum between the weighted average and 4.9. When an student reaches this minimum mark in an activity, that activity will be considered as passed and the student will not have to repeat it in the future. It is possible to get some extra points to be included in the final mark by accomplishing some optional tasks.</p> <p>Instructors might perform some extra checks during the semesters in order to verify the authority of the assignments delivered by the students. Plagiarism is not allowed and it will imply that the subject will fail the subject. In addition, it will be notified to the Faculty Council so that the adequate disciplinary actions can be adopted.</p> <p>Students are allowed to use any kind of documents, including slides, exercises, assignments, books or personal notes during the test. Laptops, smartphones, tablets, smart watches and any other kind of electronic devices with wireless communication are not allowed during the tests.</p>				
Observations for part-time students				
Attendance to classroom lectures is not strictly required (although recommended), so part-time students can follow these courses, taking into account that they should learn several issues by themselves.				

## 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.

Martin Fowler. "Patterns of Enterprise Application Architecture". Addison-Wesley Professional. Spetiembre 2002.