

ANX-PR/CL/001-01

LEARNING GUIDE

SUBJECT

103000483 - Software Design

DEGREE PROGRAMME

10AM - Master Universitario En Ingenieria Del Software

ACADEMIC YEAR & SEMESTER

2023/24 - Semester 2

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1. Description

1.1. Subject details

Name of the subject	103000483 - Software Design
No of credits	4 ECTS
Type	Compulsory
Academic year of the programme	First year
Semester of tuition	Semester 2
Tuition period	February-June
Tuition languages	English
Degree programme	10AM - Master Universitario en Ingeniería del Software
Centre	10 - Escuela Técnica Superior De Ingenieros Informáticos
Academic year	2023-24

2. Faculty

2.1. Faculty members with subject teaching role

Name and surname	Office/Room	Email	Tutoring hours *
Nelson Medinilla Martinez (Subject coordinator)	5109	nelson.medinilla@upm.es	M - 16:00 - 18:00
Natalia Juristo Juzgado	5110	natalia.juristo@upm.es	M - 08:00 - 08:15

* The tutoring schedule is indicative and subject to possible changes. Please check tutoring times with the faculty member in charge.

3. Prior knowledge recommended to take the subject

3.1. Recommended (passed) subjects

The subject - recommended (passed), are not defined.

3.2. Other recommended learning outcomes

- Object Oriented Programming

4. Skills and learning outcomes *

4.1. Skills to be learned

CE12 - Concebir y realizar el diseño de los sistemas software asegurando atributos relevantes de calidad.

CG1 - Que los estudiantes sepan aplicar los conocimientos adquiridos y su capacidad de resolución de problemas en entornos nuevos o poco conocidos dentro de contextos más amplios (o multidisciplinares) relacionados con su área de estudio (RD)

CG10 - Capacidad de pensamiento creativo con el objetivo de desarrollar enfoques y métodos nuevos y originales

CG11 - Integración del conocimiento a partir de disciplinas diferentes, así como el manejo de la complejidad

CG14 - Conocimiento y comprensión de la informática necesaria para la creación de modelos de información, y de los sistemas y procesos complejos

CG18 - Capacidad de trabajar y comunicarse también en contextos internacionales

CG3 - Que los estudiantes sepan comunicar sus conclusiones y los conocimientos y razones últimas que las sustentan a públicos especializados y no especializados de un modo claro y sin ambigüedades (RD)

4.2. Learning outcomes

RA16 - The student will be able to evaluate any software system design.

RA14 - The student will be able to design a software system according to requirements, restrictions, quality standards, and developer criteria

RA15 - The student will be able to document each new design.

RA23 - Time organization capability SC13, SC14 K

RA22 - Observing capability SC13, SC14, CG10 C

RA27 - Negotiation skill SC13, SC14, CG18 C

RA25 - Communication skills in public SC13, SC14, CG3, CG18 S

RA24 - Conflict solving capability SC13, SC14, CG18 C

RA21 - Listening capability SC13, SC14, CG10 A

RA26 - Group work skill SC13, SC14, CG17 A

* The Learning Guides should reflect the Skills and Learning Outcomes in the same way as indicated in the Degree Verification Memory. For this reason, they have not been translated into English and appear in Spanish.

5. Brief description of the subject and syllabus

5.1. Brief description of the subject

The human factor is the most expensive and complex part of the software development process. For this reason, it is vital to increase the efficiency of developers, but this efficiency depends on the design of the software they develop. Put briefly, software design influences the efficiency of the human who builds and maintains it.

The Software Design course is directed towards how to design the software (backend) in a way that reduces the cost of the human factor in software development, facilitating three aspects:

work distribution; software modifiability; understanding of each part of the software. These aspects will be evaluated in the course.

The course is essentially practical; it is supported by a small and intense theoretical core: Almost Decomposable Systems, Information Hiding Principle, and Two-Dimensional Complexity.

Difficulties:

? Little or no abstract vision of the software in terms of diagrams (drawings) because the bulk of the student's previous preparation has been focused almost entirely on coding. However, the "Software Design" course designs (thinks) software through diagrams (UML) because it focuses on the structure and dynamics of the software system.

? Little or no conceptualization of the universe of objects, despite the fact that students code in Java. They think they know and handle objects because they program in Java. But it is not like that and the subject requires mastery

of the universe of objects.

? Finally, the third type of difficulty is connected to the previous one. Given the poor conceptualization of objects, the structured approach predominates (controls), which conceives software as functions that transform data, far removed from the object approach.

5.2. Syllabus

1. Software Engineering Two-dimensional Complexity
2. System Software Design Features
3. Object Oriented Review
4. Design and Dominion Patterns

6. Schedule

6.1. Subject schedule*

Week	Classroom activities	Laboratory activities	Distant / On-line	Assessment activities
1	Software Engineering Two-dimensional Complexity Duration: 02:00 Lecture			
2	Object Oriented Review Duration: 02:00 Lecture			
3	Workshop Duration: 02:00 Cooperative activities			
4	System Software Design Features Duration: 02:00 Lecture			
5	Workshop Duration: 02:00 Cooperative activities			
6	Workshop Duration: 01:00 Cooperative activities			Test Written test Continuous assessment Presential Duration: 01:00
7	Workshop Duration: 02:00 Cooperative activities			
8	Design and Dominion Patterns Duration: 02:00 Lecture			
9	Workshop Duration: 02:00 Cooperative activities			
10	Workshop Duration: 02:00 Cooperative activities			
11	Workshop Duration: 01:00 Cooperative activities			Test Written test Continuous assessment Presential Duration: 01:00
12	Workshop Duration: 02:00 Cooperative activities			

13	Workshop Duration: 02:00 Cooperative activities			
14	Workshop Duration: 02:00 Cooperative activities			
15				Oral presentation of the final work Group work Continuous assessment Presential Duration: 02:00
16				Test recoveries. Written test Continuous assessment Presential Duration: 02:00
17				

Depending on the programme study plan, total values will be calculated according to the ECTS credit unit as 26/27 hours of student face-to-face contact and independent study time.

* The schedule is based on an a priori planning of the subject; it might be modified during the academic year, especially considering the COVID19 evolution.

7. Activities and assessment criteria

7.1. Assessment activities

7.1.1. Assessment

Week	Description	Modality	Type	Duration	Weight	Minimum grade	Evaluated skills
6	Test	Written test	Face-to-face	01:00	20%	3 / 10	CE12 CG11
11	Test	Written test	Face-to-face	01:00	25%	3 / 10	CE12 CG11
15	Oral presentation of the final work	Group work	Face-to-face	02:00	55%	/ 10	CE12 CG10 CG11 CG14 CG18 CG1 CG3
16	Test recoveries.	Written test	Face-to-face	02:00	%	3 / 10	CE12 CG11

7.1.2. Global examination

No se ha definido la evaluacion sólo por prueba final.

7.1.3. Referred (re-sit) examination

Description	Modality	Type	Duration	Weight	Minimum grade	Evaluated skills
Global test	Individual work	Face-to-face	02:00	100%	5 / 10	CE12 CG10 CG11

7.2. Assessment criteria

The course applies a continuous evaluation through individual evaluation activities (45%) and final work as teamwork (55%).

To pass the course, two conditions are necessary: first, exceed the minimum mark in each test and also obtain 50% (5/10) of the total score (test + teamwork).

In case of not exceeding the minimum required grade, the test may be recovered in the ordinary call. The teamwork is unrecoverable.

8. Teaching resources

8.1. Teaching resources for the subject

Name	Type	Notes
Moodle	Bibliography	It contains or addresses the fundamental literature