ANX-PR/CL/001-01

LEARNING GUIDE

SUBJECT

103000484 - Software Architecture

DEGREE PROGRAMME

10AM - Master Universitario En Ingenieria Del Software

ACADEMIC YEAR & SEMESTER

2021/22 - Semester 2

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Learning guide

1. Description

1.1. Subject details

Name of the subject	103000484 - Software Architecture
No of credits	4 ECTS
Type	Compulsory
Academic year ot the programme	First year
Semester of tuition	Semester 2
Tuition period	February-June
Tuition languages	English
Degree programme	10AM - Master Universitario en Ingenieria del Software
Centre	10 - Escuela Tecnica Superior De Ingenieros Informaticos
Academic year	2021-22

2. Faculty

2.1. Faculty members with subject teaching role

Name and surname	Office/Room	Email	Tutoring hours *
Jaime Ramirez Rodriguez (Subject coordinator)	5112	jaime.ramirez@upm.es	Sin horario. The tutoring timetable is available at: https://docs.google.com/spreadsheets/d/151OJcTCG8xaD5YqJ2jEigZhFAPSFK5b66kMVSOjvaso/edit#gid=0

| Angelica De Antonio Jimenez | 5108 | angelica.deantonio@upm.es | Sin horario. The tutoring timetable is available at: https://docs.google. com/spreadsheets/ d/151OJcTCG8xaD 5YqJ2jEigZhFAPSF K5b66kMVSOjvaso/ edit#gid=0 |

* 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 design

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)

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

RA4 - To design the system according to the requirements, constraints, quality norms and organization goals.

RA6 - Ability to document the software architecture

RA5 - To apply the architectural concepts that are relevant in the architectural design

* 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 goal of the subject is to teach the basis of the software architectural design. For that purpose, it will be shown how the quality attribute requirements of the system can be satisfied by applying some tactics. In addition, architectural styles will be addressed and their relationship with quality attributes will be explained. Then, some representative architectural patterns will be explained showing how they can be reused to solve some design problems providing well proven solutions without the need of re-inventing the wheel. Throughout the course, application examples will be briefly described to illustrate the concepts.

5.2. Syllabus

1. Previous Concepts on Software Architecture

    1.1. What is Software Architecture?

    1.2. Architectural Views

    1.3. Software Architecture in the Development Process

2. Defining a Software Architecture

    2.1. Quality Attributes related to Software Architecture

    2.2. Achieving Quality Attributes through Tactics

    2.3. Architectural Styles

    2.4. Architectural Patterns

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6. Schedule

6.1. Subject schedule*

Week	Face-to-face classroom activities	Face-to-face laboratory activities	Distant / On-line	Assessment activities
1	**Presentación** Duration: 01:00 Lecture **Previous concepts on Software Architecture** Duration: 01:00 Lecture			
2	**2.1 Quality attributes related to software architecture** Duration: 01:00 Lecture **Practical exercises on topics that are being explained in classroom** Duration: 01:00 Cooperative activities			
3	**Practical exercises on topics that are being explained in classroom** Duration: 01:00 Cooperative activities **2.2 Achieving quality attributes through tactics** Duration: 01:00 Lecture			**Practical exercises on topics that are being explained in classroom** Group work Continuous assessment Not Presential Duration: 03:00
4	**2.2 Achieving quality attributes through tactics** Duration: 01:00 Lecture **Practical exercises on topics that are being explained in classroom** Duration: 01:00 Cooperative activities			
5	**1.2. Architectural views** Duration: 01:00 Lecture **Practical exercises on topics that are being explained in classroom** Duration: 01:00 Cooperative activities			

6	**Practical exercises on topics that are being explained in classroom** Duration: 01:00 Cooperative activities **2.3 Architectural styles** Duration: 01:00 Lecture			
7	**2.3 Architectural styles** Duration: 01:00 Lecture **Practical exercises on topics that are being explained in classroom** Duration: 01:00 Cooperative activities			**Practical exercises on topics that are being explained in classroom** Group work Continuous assessment Not Presential Duration: 05:00
8	**2.3 Architectural styles** Duration: 01:00 Lecture **Practical exercises on topics that are being explained in classroom** Duration: 01:00 Cooperative activities			
9	**Practical exercises on topics that are being explained in classroom** Duration: 01:00 Cooperative activities **2.4 Architectural patterns** Duration: 01:00 Lecture			**Practical exercises on topics that are being explained in classroom** Group work Continuous assessment Not Presential Duration: 05:00
10	**Practical exercises on topics that are being explained in classroom** Duration: 01:00 Cooperative activities **2.4 Architectural patterns** Duration: 01:00 Lecture			
11	**Presentations of the project proposals** Duration: 01:00 Additional activities **2.4 Architectural patterns** Duration: 01:00 Lecture			**Project** Group work Continuous assessment Not Presential Duration: 12:00
12	**2.4 Architectural patterns** Duration: 01:00 Lecture **Practical exercises on topics that are being explained in classroom** Duration: 01:00 Cooperative activities			**Project** Group work Continuous assessment Not Presential Duration: 20:00

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13	**2.4 Architectural patterns** Duration: 01:00 Lecture **Practical exercises on topics that are being explained in classroom** Duration: 01:00 Cooperative activities			**Project** Group work Continuous assessment Not Presential Duration: 20:00
14	**Oral presentations of the projects** Duration: 02:00 Additional activities			**Project** Group work Continuous assessment Not Presential Duration: 09:00
15				**Exam** Written test Continuous assessment Presential Duration: 02:00
16				
17				**Final Exam** Written test Final examination Presential Duration: 01:00

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. Continuous assessment

Week	Description	Modality	Type	Duration	Weight	Minimum grade	Evaluated skills
3	Practical exercises on topics that are being explained in classroom	Group work	No Presential	03:00	5%	0 / 10	CE12
7	Practical exercises on topics that are being explained in classroom	Group work	No Presential	05:00	10%	0 / 10	CE12
9	Practical exercises on topics that are being explained in classroom	Group work	No Presential	05:00	10%	0 / 10	CE12
11	Project	Group work	No Presential	12:00	10%	5 / 10	CE12 CG1 CG3 CG14 CG18
12	Project	Group work	No Presential	20:00	10%	5 / 10	CE12 CG1 CG3 CG14 CG18
13	Project	Group work	No Presential	20:00	10%	5 / 10	CE12 CG1 CG3 CG14 CG18
14	Project	Group work	No Presential	09:00	20%	5 / 10	CG1 CG14 CG18 CE12 CG3
15	Exam	Written test	Face-to-face	02:00	25%	4 / 10	CE12

7.1.2. Final examination

Week	Description	Modality	Type	Duration	Weight	Minimum grade	Evaluated skills
17	Final Exam	Written test	Face-to-face	01:00	100%	5 / 10	CE12 CG1 CG3 CG14 CG18

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7.1.3. Referred (re-sit) examination

Description	Modality	Type	Duration	Weight	Minimum grade	Evaluated skills
Project	Individual work	Face-to-face	00:00	100%	5 / 10	CE12 CG1 CG3 CG14 CG18

7.2. Assessment criteria

Throughout the semester, in order to pass the course, the student will have to do the following assignments:

- Practical assignments: the student will have to do some practical assignments where he/she will have to apply the concepts, techniques and principles explained in the classroom.
- Final exam: the student will have to do a final exam where he/she will show that he/she has acquired the basic concepts explained in the classroom.
- Project: the student will have to propose a project and an architectural solution for it. The result of this work will have to be reflected in a document. In addition, before submitting this document, the student will have to do an oral presentation in classroom where the preliminary results of his/her work will be summarized.

The final grade (FG) will be calculated from the practical assignments grade (PAG), the exam grade (EG) and project grade (PG) by means of the following formula:

$FG=0.25*PAG+0.25*EG+0.5*PG$ if $EG>=4$ and $PG>=5$

$FG = 0$ otherwise

Where all the grades take value between 0 and 10

When failed, in the extra exam period the final grade will be obtained from the grade of a research work or project.

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8. Teaching resources

8.1. Teaching resources for the subject

Name	Type	Notes
Moodle site	Web resource	http://moodle.upm.es/titulaciones/oficiales/course/view.php?id=2835
Bass, L. et al. (2013) Software Architecture in Practice. Addison-Wesley, Boston, MA, third edition	Bibliography	
Buschmann, F. et al. (1996) Pattern-Oriented Software Architecture: A System of Patterns, volume 1 de Software Design Patterns. John Wiley & Sons.	Bibliography	
Taylor, R. N. et al. (2009) Software Architecture: Foundations, Theory and Practice. John Wiley & Sons.	Bibliography	
Bachmann, F. et al. (2007) Modificability Tactics. Inf. Téc. CMU/SEI-2007-TR-002, Software Engineering Institute - Carnegie Mellon University, Pittsburg, PA, USA.	Bibliography	
Gorton I. (2006) Essential Software Architecture. Springer-Verlag.	Bibliography	