ANX-PR/CL/001-01
LEARNING GUIDE

SUBJECT
103000484 - Software Architecture

DEGREE PROGRAMME
10AM - Master Universitario En Ingenieria Del Software

ACADEMIC YEAR & SEMESTER
2019/20 - Semester 2
Index

**Learning guide**

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1. Description

1.1. Subject details

<table>
<thead>
<tr>
<th>Name of the subject</th>
<th>103000484 - Software Architecture</th>
</tr>
</thead>
<tbody>
<tr>
<td>No of credits</td>
<td>4 ECTS</td>
</tr>
<tr>
<td>Type</td>
<td>Compulsory</td>
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<tr>
<td>Academic year of the programme</td>
<td>First year</td>
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<tr>
<td>Semester of tuition</td>
<td>Semester 2</td>
</tr>
<tr>
<td>Tuition period</td>
<td>February-June</td>
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<td>Degree programme</td>
<td>10AM - Master Universitario En Ingenieria Del Software</td>
</tr>
<tr>
<td>Centre</td>
<td>10 - Escuela Tecnica Superior de Ingenieros Informaticos</td>
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<td>Academic year</td>
<td>2019-20</td>
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2. Faculty

2.1. Faculty members with subject teaching role

<table>
<thead>
<tr>
<th>Name and surname</th>
<th>Office/Room</th>
<th>Email</th>
<th>Tutoring hours *</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jaime Ramirez Rodriguez</td>
<td>5112</td>
<td><a href="mailto:jaime.ramirez@upm.es">jaime.ramirez@upm.es</a></td>
<td>Sin horario.</td>
</tr>
<tr>
<td>(Subject coordinator)</td>
<td></td>
<td></td>
<td>The tutoring</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>timetable is</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>available in</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td><a href="https://docs.google.com/spreadsheets/d/1X6Q8wz0cVfIKmv44pr7_iaefxVbny7PcHNT-ebMtc0/edit#gid=0">https://docs.google.com/spreadsheets/d/1X6Q8wz0cVfIKmv44pr7_iaefxVbny7PcHNT-ebMtc0/edit#gid=0</a></td>
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</tbody>
</table>

*The tutoring timetable is available in [link](https://docs.google.com/spreadsheets/d/1X6Q8wz0cVfIKmv44pr7_iaefxVbny7PcHNT-ebMtc0/edit#gid=0)
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
6. Schedule

6.1. Subject schedule*

<table>
<thead>
<tr>
<th>Week</th>
<th>Face-to-face classroom activities</th>
<th>Face-to-face laboratory activities</th>
<th>Other face-to-face activities</th>
<th>Assessment activities</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Presentación</td>
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</tr>
<tr>
<td></td>
<td>Previous concepts on Software</td>
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<tr>
<td></td>
<td>Architecture</td>
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</tr>
<tr>
<td></td>
<td>Lecture</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>2.1 Quality attributes related to software architecture</td>
<td>Duration: 01:00</td>
<td>Lecture</td>
<td>Practical exercises on topics that are being explained in classroom</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Group work</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Continuous assessment</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Duration: 03:00</td>
</tr>
<tr>
<td>3</td>
<td>2.2 Achieving quality attributes through tactics</td>
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<td>Practical exercises on topics that are being explained in classroom</td>
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<td></td>
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<td></td>
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<td>Group work</td>
</tr>
<tr>
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<td>Continuous assessment</td>
</tr>
<tr>
<td></td>
<td></td>
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<td>Duration: 05:00</td>
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<td>4</td>
<td>2.3 Architectural styles</td>
<td>Duration: 02:00</td>
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<td>Lecture</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>2.3 Architectural styles</td>
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<td>Lecture</td>
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<td>Week</td>
<td>Activity</td>
<td>Duration</td>
<td>Activity Type</td>
<td>Additional Activities</td>
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<td>2.4 Architectural patterns</td>
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<td>2.4 Architectural patterns</td>
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<td>Project</td>
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<td>10</td>
<td>2.4 Architectural patterns</td>
<td>02:00</td>
<td>Lecture</td>
<td>Project</td>
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<td></td>
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<td>Continuous assessment</td>
</tr>
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<td>11</td>
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<td>Lecture</td>
<td>Project</td>
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<td>13</td>
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<td>16</td>
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<td></td>
<td></td>
<td></td>
<td>Final examination</td>
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</table>

The independent study hours are training activities during which students should spend time on individual study or individual assignments.

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 subject schedule is based on a previous theoretical planning of the subject plan and might go through experience some unexpected changes along throughout the academic year.
7. Activities and assessment criteria

7.1. Assessment activities

7.1.1. Continuous assessment

<table>
<thead>
<tr>
<th>Week</th>
<th>Description</th>
<th>Modality</th>
<th>Type</th>
<th>Duration</th>
<th>Weight</th>
<th>Minimum grade</th>
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<td>/ 10</td>
<td>CE12</td>
</tr>
<tr>
<td>7</td>
<td>Practical exercises on topics that are being explained in classroom</td>
<td>Group work</td>
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<td>10%</td>
<td>/ 10</td>
<td>CE12</td>
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<td>9</td>
<td>Project</td>
<td>Group work</td>
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<td>CE12, CG1, CG3, CG14, CG18</td>
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<td>CE12, CG1, CG3, CG14, CG18</td>
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7.1.2. Final examination
7.1.3. Referred (re-sit) examination

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<thead>
<tr>
<th>Description</th>
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<th>Type</th>
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<th>Weight</th>
<th>Minimum grade</th>
<th>Evaluated skills</th>
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<tr>
<td>Project</td>
<td>Individual work</td>
<td>Face-to-face</td>
<td>00:00</td>
<td>100%</td>
<td>5 / 10</td>
<td>CE12, CG1, CG3, CG14, CG18</td>
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7.2. Assessment criteria

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

- Practical exercises: the student will have to do some practical exercises 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. This work will have to be reflected in a document. In addition, before delivering 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 exercises grade (PEG), the exam grade (EG) and project grade (PG) by means of the following formula:

\[ FG = 0.25 \times PEG + 0.25 \times EG + 0.5 \times PG \text{ if } PEG \geq 4 \text{ and } EG \geq 4 \text{ and } PG \geq 5 \]

\[ FG = 0 \text{ otherwise} \]
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.

8. Teaching resources

8.1. Teaching resources for the subject

<table>
<thead>
<tr>
<th>Name</th>
<th>Type</th>
<th>Notes</th>
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</thead>
<tbody>
<tr>
<td>Moodle site</td>
<td>Web resource</td>
<td><a href="http://moodle.upm.es/titulaciones/oficiales/course/view.php?id=2835">http://moodle.upm.es/titulaciones/oficiales/course/view.php?id=2835</a></td>
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