ANX-PR/CL/001-01
LEARNING GUIDE

SUBJECT
103000547 - Software Engineering Economics

DEGREE PROGRAMME
10AM - Master Universitario en Ingenieria del Software

ACADEMIC YEAR & SEMESTER
2019/20 - Semester 1
Index

Learning guide

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1. Description

1.1. Subject details

<table>
<thead>
<tr>
<th>Name of the subject</th>
<th>103000547 - Software Engineering Economics</th>
</tr>
</thead>
<tbody>
<tr>
<td>No of credits</td>
<td>6 ECTS</td>
</tr>
<tr>
<td>Type</td>
<td>Optional</td>
</tr>
<tr>
<td>Academic year of the programme</td>
<td>First year</td>
</tr>
<tr>
<td>Semester of tuition</td>
<td>Semester 1</td>
</tr>
<tr>
<td>Tuition period</td>
<td>September-January</td>
</tr>
<tr>
<td>Tuition languages</td>
<td>English</td>
</tr>
<tr>
<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>
</tr>
<tr>
<td>Academic year</td>
<td>2019-20</td>
</tr>
</tbody>
</table>

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>June Amillo Gil (Subject coordinator)</td>
<td>1317</td>
<td><a href="mailto:june.amillo@upm.es">june.amillo@upm.es</a></td>
<td>M - 16:00 - 17:00 or By appointment</td>
</tr>
</tbody>
</table>

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

3.1. Skills to be learned

CE13 - Tener una visión de los distintos aspectos específicos y emergentes de la ingeniería del software, y profundizar en algunos de ellos

CE14 - Comprender lo que pueden y no pueden conseguir las prácticas actuales de ingeniería del software, y sus limitaciones y su posible futura evolución.

CG5 - Organización y planificación

3.2. Learning outcomes

RA3 - Explains which are the Software Engineering limits and frontiers, and the base of new tendencies and developments and advanced topics and their possible application

RA58 - Development of a business case for a software project

RA2 - Facing a real problem, chooses an appropriate Software Engineering solution, analyzing its viability, what can and cannot be achieved from the current state of development of the selected solution, and what is expected to advance in the future

RA18 - Given a real problem, the student chooses the most appropriate software engineering solution, analyzing the solution feasibility, what can and cannot be achieved through the current status of the chosen solution, and what it can advance in the future.

* 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.
4. Brief description of the subject and syllabus

4.1. Brief description of the subject

The goal of this course is twofold. Firstly, it introduces the basic concepts and techniques used in financial analysis to assess the economic value of a project. Secondly, it provides with the needed tools to make informed financial decisions on engineering projects. The course has a practical orientation and it is based on a collection of case studies drawn from real-world engineering situations with particular emphasis on those applications found in software engineering practice.

4.2. Syllabus

1. The Time Value of Money
   1.1. Compounding and discounting
   1.2. Nominal and effective interest rates
   1.3. Composite cash flows
   1.4. Bond and stock valuation
2. Value based decision making
   2.1. Project analysis and figures of merit
   2.2. Net present value
   2.3. Mutually exclusive alternatives
   2.4. Equivalent annual value
   2.5. IRR and incremental analysis
   2.6. ROI and Benefit/Cost analysis
3. Generating a project cash flow
   3.1. What to discount
   3.2. Equity cash flow
   3.3. Cash flows and inflation
   3.4. Effects of Depreciation and Taxes
   3.5. Free cash flow and the cost of capital
3.6. Review case study

4. Project Financing
   4.1. Equity Financing
   4.2. Debt and Equity Financing
   4.3. Adjusted Present Value
   4.4. The CAP Model and The Cost of Equity
   4.5. Estimating the Cost of Equity
   4.6. The Cost of Capital

5. Assessing Project Risk
   5.1. Scenario Analysis
   5.2. Sensitivity Analysis
   5.3. Break-even Analysis

6. Understanding Financial Statements
   6.1. The Three Basic Financial Statements
   6.2. Using Ratios to Make Business Decisions
## 5. Schedule

### 5.1. 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>Chapter 1: Duration: 02:00 Lecture</td>
<td>Case study Duration: 02:00</td>
<td>Laboratory assignments</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Chapter 1: Duration: 02:00 Lecture</td>
<td>Case study Duration: 02:00</td>
<td>Laboratory assignments</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Chapter 1: Duration: 02:00 Lecture</td>
<td>Case study Duration: 02:00</td>
<td>Laboratory assignments</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Chapter 2: Duration: 02:00 Lecture</td>
<td>Case study Duration: 02:00</td>
<td>Laboratory assignments</td>
<td>Assessment: Problem-solving test Continuous assessment and final examination Duration: 02:00</td>
</tr>
<tr>
<td>5</td>
<td>Chapter 2: Duration: 02:00 Lecture</td>
<td>Case study Duration: 02:00</td>
<td>Laboratory assignments</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Chapter 2: Duration: 02:00 Lecture</td>
<td>Case study Duration: 02:00</td>
<td>Laboratory assignments</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Chapter 2: Duration: 02:00 Lecture</td>
<td>Case study Duration: 02:00</td>
<td>Laboratory assignments</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Chapter 3: Duration: 02:00 Lecture</td>
<td>Case study Duration: 02:00</td>
<td>Laboratory assignments</td>
<td>Assessment: Problem-solving test Continuous assessment and final examination Duration: 02:00</td>
</tr>
<tr>
<td>9</td>
<td>Chapter 3: Duration: 02:00 Lecture</td>
<td>Case study Duration: 02:00</td>
<td>Laboratory assignments</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Chapter 3: Duration: 02:00 Lecture</td>
<td>Case study Duration: 02:00</td>
<td>Laboratory assignments</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Chapter 4: Duration: 02:00 Lecture</td>
<td>Case study Duration: 02:00</td>
<td>Laboratory assignments</td>
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</tr>
<tr>
<td>12</td>
<td>Chapter 4: Duration: 02:00 Lecture</td>
<td>Case study Duration: 02:00</td>
<td>Laboratory assignments</td>
<td></td>
</tr>
</tbody>
</table>
Chapter 4
Duration: 02:00
Lecture

Case study
Duration: 02:00
Laboratory assignments

Chapter 5
Duration: 02:00
Lecture

Case study
Duration: 02:00
Laboratory assignments

Chapter 5
Duration: 02:00
Lecture

Case study
Duration: 02:00
Laboratory assignments

Chapter 6
Duration: 02:00
Lecture

Case study
Duration: 02:00
Laboratory assignments

Assessment
Problem-solving test
Continuous assessment and final examination
Duration: 02:00

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.
6. Activities and assessment criteria

6.1. Assessment activities

6.1.1. 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>
<th>Evaluated skills</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>Assessment</td>
<td>Problem-solving test</td>
<td>Face-to-face</td>
<td>02:00</td>
<td>25%</td>
<td>0 / 10</td>
<td>CE14, CG5, CE13</td>
</tr>
<tr>
<td>8</td>
<td>Assessment</td>
<td>Problem-solving test</td>
<td>Face-to-face</td>
<td>02:00</td>
<td>25%</td>
<td>0 / 10</td>
<td>CG5</td>
</tr>
<tr>
<td>12</td>
<td>Assessment</td>
<td>Problem-solving test</td>
<td>Face-to-face</td>
<td>02:00</td>
<td>25%</td>
<td>0 / 10</td>
<td>CG5</td>
</tr>
<tr>
<td>16</td>
<td>Assessment</td>
<td>Problem-solving test</td>
<td>Face-to-face</td>
<td>02:00</td>
<td>25%</td>
<td>0 / 10</td>
<td>CG5</td>
</tr>
</tbody>
</table>

6.1.2. Final examination

<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>
<th>Evaluated skills</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>Assessment</td>
<td>Problem-solving test</td>
<td>Face-to-face</td>
<td>02:00</td>
<td>25%</td>
<td>0 / 10</td>
<td>CE14, CG5, CE13</td>
</tr>
<tr>
<td>8</td>
<td>Assessment</td>
<td>Problem-solving test</td>
<td>Face-to-face</td>
<td>02:00</td>
<td>25%</td>
<td>0 / 10</td>
<td>CG5</td>
</tr>
<tr>
<td>12</td>
<td>Assessment</td>
<td>Problem-solving test</td>
<td>Face-to-face</td>
<td>02:00</td>
<td>25%</td>
<td>0 / 10</td>
<td>CG5</td>
</tr>
<tr>
<td>16</td>
<td>Assessment</td>
<td>Problem-solving test</td>
<td>Face-to-face</td>
<td>02:00</td>
<td>25%</td>
<td>0 / 10</td>
<td>CG5</td>
</tr>
</tbody>
</table>

6.1.3. Referred (re-sit) examination

No se ha definido la evaluación extraordinaria.
6.2. Assessment criteria

First assessment 25% second assessment 25% Final assessment 50%

7. Teaching resources

7.1. Teaching resources for the subject

<table>
<thead>
<tr>
<th>Name</th>
<th>Type</th>
<th>Notes</th>
</tr>
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<tbody>
<tr>
<td>Tockey, Steve. Return on Software.</td>
<td>Bibliography</td>
<td></td>
</tr>
<tr>
<td>Addison-Wesley, 2005.</td>
<td></td>
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