270085 - PES - Software Engineering Project

**Coordinating unit:** 270 - FIB - Barcelona School of Informatics  
**Teaching unit:** 747 - ESSI - Department of Service and Information System Engineering  
**Academic year:** 2019  
**Degree:** BACHELOR'S DEGREE IN INFORMATICS ENGINEERING (Syllabus 2010). (Teaching unit Optional)  
**ECTS credits:** 6  
**Teaching languages:** Catalan

### Teaching staff

**Coordinator:**  
- Maria Jose Casañ Guerrero (mjcasany@essi.upc.edu)  
- Xavier Franch Gutiérrez (franch@essi.upc.edu)

**Others:**  
- Enric Mayol Sarroca (mayol@essi.upc.edu)  
- Jordi Piguillem Poch (jpiguillem@essi.upc.edu)  
- Xavier Burgués Illa (diafebus@essi.upc.edu)

### Prior skills

The subjects learned in the prerequisite courses

### Requirements

- Prerequisite AS  
- Prerequisite ER  
- Prerequisite GPS

### Degree competences to which the subject contributes

**Specific:**

CES1.1. To develop, maintain and evaluate complex and/or critical software systems and services.

CES1.3. To identify, evaluate and manage potential risks related to software building which could arise.

CES1.7. To control the quality and design tests in the software production

CES2.1. To define and manage the requirements of a software system.

CES2.2. To design adequate solutions in one or more application domains, using software engineering methods which integrate ethical, social, legal and economical aspects.

**Generical:**

G4. EFFECTIVE ORAL AND WRITTEN communication: To communicate with other people knowledge, procedures, results and ideas orally and in a written way. To participate in discussions about topics related to the activity of a technical informatics engineer.

G5. TEAMWORK: to be capable to work as a team member, being just one more member or performing management tasks, with the finality of contributing to develop projects in a pragmatic way and with responsibility sense; to assume compromises taking into account the available resources.
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Teaching methodology

It is a project-based course, and therefore essentially practical. The classes will be always in classroom laboratory with an expected number of 3 to 5 project teams per classroom. The project teams will be composed of 5 to 7 students, in order to allow implementing a non-trivial prototype.

The explanations of concepts needed (most at the first two weeks, but also at any time whenever necessary) will be in the same classroom. The teacher in the classroom, will act as tutor of the teams. Both presentations will be also provided in lab hours.

The project will start from a general idea and will try to reproduce a real project, with all its elements (deadlines, deliverables, project management, etc…). The methodology used will be agile, organized as an initial inception phase and then 4 development iterations. The technical issues that will be put into practice will come from the previous courses (IES, BD, ER, AS, GPS).

Learning objectives of the subject

1. To reinforce concepts already learned in previous courses through his practice in a project
2. Know how to put in practice the principles of project management
3. Knowing how to follow a method in a systematic and disciplined way
4. Know how to properly use tool support for project management and development
5. Learn to make project presentations to diverse audiences
6. Learn the technique of writing the project and other documents resulting from the work

Study load

<table>
<thead>
<tr>
<th>Total learning time: 150h</th>
<th>Hours large group:</th>
<th>0h</th>
<th>0.00%</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Hours medium group:</td>
<td>0h</td>
<td>0.00%</td>
</tr>
<tr>
<td></td>
<td>Hours small group:</td>
<td>60h</td>
<td>40.00%</td>
</tr>
<tr>
<td></td>
<td>Guided activities:</td>
<td>6h</td>
<td>4.00%</td>
</tr>
<tr>
<td></td>
<td>Self study:</td>
<td>84h</td>
<td>56.00%</td>
</tr>
</tbody>
</table>
## Content

### Presentation of the project

**Degree competences to which the content contributes:**

**Description:**
Description of the operation, statement, guide the project, making of project teams

### Background

**Degree competences to which the content contributes:**

**Description:**
Brief summary of the knowledge acquired in previous courses that is relevant for the project construction

### Development environment

**Degree competences to which the content contributes:**

**Description:**
Description of the development tools needed for the project

### Inception phase of the project

**Degree competences to which the content contributes:**

**Description:**
Development of the artifacts corresponding to the inception phase of the project

### Initial development phase of the project

**Degree competences to which the content contributes:**

**Description:**
Development of the artifacts corresponding to the two first development sprints of the project

### Final development phase of the project

**Degree competences to which the content contributes:**

**Description:**
Development of the artifacts corresponding to the last two sprints of the project
### Planning of activities

<table>
<thead>
<tr>
<th>Activity</th>
<th>Hours</th>
<th>Description</th>
<th>Specific objectives</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Starting the project</strong></td>
<td>2h</td>
<td>Read the material, form project teams and assign roles</td>
<td>2, 3</td>
</tr>
<tr>
<td><strong>Background</strong></td>
<td>6h</td>
<td>Make clear the knowledge necessary for the consecution of the project</td>
<td>1</td>
</tr>
<tr>
<td><strong>Configuration of the development environment</strong></td>
<td>8h</td>
<td>Become familiar with the tools</td>
<td>4</td>
</tr>
<tr>
<td><strong>Inception phase of the project</strong></td>
<td>34h</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Description:
The project teams develop the project with support from the tutor for questions and queries

Specific objectives:
1, 2, 3, 4, 6

Initial phase of development of the project

<table>
<thead>
<tr>
<th>Hours: 34h</th>
</tr>
</thead>
<tbody>
<tr>
<td>Theory classes: 0h</td>
</tr>
<tr>
<td>Practical classes: 0h</td>
</tr>
<tr>
<td>Laboratory classes: 16h</td>
</tr>
<tr>
<td>Guided activities: 0h</td>
</tr>
<tr>
<td>Self study: 18h</td>
</tr>
</tbody>
</table>

Description:
The project teams develop the project with support from the tutor for questions and queries

Specific objectives:
1, 2, 3, 4, 6

Final phase of the project

<table>
<thead>
<tr>
<th>Hours: 34h</th>
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<tbody>
<tr>
<td>Theory classes: 0h</td>
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</tr>
<tr>
<td>Laboratory classes: 16h</td>
</tr>
<tr>
<td>Guided activities: 0h</td>
</tr>
<tr>
<td>Self study: 18h</td>
</tr>
</tbody>
</table>

Description:
The project teams develop the project with support from the tutor for questions and queries

Specific objectives:
1, 2, 3, 4, 6

Submission of the inception phase

<table>
<thead>
<tr>
<th>Hours: 8h</th>
</tr>
</thead>
<tbody>
<tr>
<td>Guided activities: 2h</td>
</tr>
<tr>
<td>Self study: 6h</td>
</tr>
</tbody>
</table>

Description:
Documentation referring to the project scope, the stakeholders and initial planning

Specific objectives:
1, 2, 3, 4, 6

Initial presentation of the project

<table>
<thead>
<tr>
<th>Hours: 6h</th>
</tr>
</thead>
<tbody>
<tr>
<td>Guided activities: 2h</td>
</tr>
<tr>
<td>Self study: 4h</td>
</tr>
</tbody>
</table>
## Description:
Customer-oriented presentation, explaining the functionality of the software system to be built, on what platform, and who is the final user

### Specific objectives:
- 5

## Intermediate control the progression of the project

<table>
<thead>
<tr>
<th>Description:</th>
<th>Hours: 4h</th>
</tr>
</thead>
<tbody>
<tr>
<td>Evaluation of the two first project development sprints according to some predefined criteria</td>
<td>Guided activities: 2h</td>
</tr>
<tr>
<td></td>
<td>Self study: 2h</td>
</tr>
</tbody>
</table>

### Specific objectives:
- 1, 2, 3, 4, 6

## Final presentation of the project

<table>
<thead>
<tr>
<th>Description:</th>
<th>Hours: 6h</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engineer-oriented presentation, which should explain the technical content</td>
<td>Guided activities: 2h</td>
</tr>
<tr>
<td></td>
<td>Self study: 4h</td>
</tr>
</tbody>
</table>

### Specific objectives:
- 5

## Final delivery of the project

<table>
<thead>
<tr>
<th>Description:</th>
<th>Hours: 8h</th>
</tr>
</thead>
<tbody>
<tr>
<td>Delivery of the project final documentation and hands-on demonstration of a prototype</td>
<td>Guided activities: 2h</td>
</tr>
<tr>
<td></td>
<td>Self study: 6h</td>
</tr>
</tbody>
</table>

### Specific objectives:
- 1, 2, 3, 4, 6
In a project's course, what needs to be qualifies is the realization of the project itself. The project is developed as team work, but also the team members have assigned different tasks which demand to be evaluated individually. As a result, the final grade of every student is determined applying the following formula:

$$N_{\text{final}} = N_{\text{team}} \times \text{IndivFactor}$$

The project global grade $N_{\text{team}}$ includes the project ambition, the artifacts produced, the team management, the documentation and the presentations:

$$N_{\text{team}} = (0.6 \times \text{Artifacts} + 0.2 \times \text{ProjectManagement} + 0.2 \times (\text{Docum} + \text{Presentations})) \times \text{Ambition},$$

where:

- The grade Artifacts is computed as a weighted average of all the delivered artifacts. As the most important artifact, the software executable prototype represents the 50% of this grade.
- In ProjectManagement are included both human aspects (e.g., balanced share of the work, deadline achievement, etc.) and the efficient use of development tools (e.g., code repositori -git-, ...)
- In the documentation and presentation evaluation, are taken into account especially communicational aspects and the neatness of the work done
- The ambition measures the final complexity of the software produced. It is a multiplicative factor comprised among 0.8 and 1.2, determined by the teacher. In any event, this multiplicative factor cannot make the $N_{\text{team}}$ grade greater than 10.

The individual factor IndivFact is also a multiplicative factor among 0.8 and 1.2 (and similarly, cannot make $N_{\text{final}}$ grow beyond 10). This factor is obtained from the evaluation that the teacher makes about the participation of the student in the project development and the evaluation that the team mates make on this very participation. In really exceptional situations, IndivFact can be less than 0.8 for those students who have really very low participation in the project along the course.

The assessment of generic skills is given directly by some project factors:

Oral and Written Communication = (Docum + Presentations) $\times$ IndivFactor

Teamwork = ProjectManagement $\times$ IndivFactor

and has values A, B, C, D, according to:

- A if the score is greater than 8.4
- B if the score is between 7 and 8.4
- C if the score is between 5 and 6.9
- D if the score is less than 5
Bibliography

Basic:


Complementary:


Others resources:

Hyperlink

https://tree.taiga.io/

https://trello.com/

http://www.ibm.com/developerworks/rational/library/769.html#fig4

http://www.uml.org/

https://github.com/

https://bitbucket.org/

https://about.gitlab.com/

https://gradle.org/

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https://www.scrum.org/scrum-guide