270083 - ER - Requirements Engineering

Coordinating unit:  
270 - FIB - Barcelona School of Informatics

Teaching unit:  
747 - ESSI - Department of Service and Information System Engineering

Academic year:  
2017

Degree:  
BACHELOR'S DEGREE IN INFORMATICS ENGINEERING (Syllabus 2010). (Teaching unit Optional)

ECTS credits:  
6

Teaching languages:  
Catalan

Teaching staff

Coordinator:  
- Maria Ribera Sancho Samso (ribera@essi.upc.edu)

Others:  
- Ernest Teniente Lopez (teniente@essi.upc.edu)
- Sergio Morales Garcia (smorales@essi.upc.edu)

Prior skills

- An overview of software engineering, and the role it plays in Requirements Engineering
- Basic elements of conceptual modeling in UML / OCL
- Organizations, economic environment, decision-making.
- English reading level.

Requirements

- Prerequisite IES
- Prerequisite EEE

Degree competences to which the subject contributes

Specific:

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

CSI3.5. To propose and coordinate changes to improve the operation of the systems and the applications.

CSI4.1. To participate actively in the specification of the information and communication systems.

Generical:

G6. SOLVENT USE OF THE INFORMATION RESOURCES: To manage the acquisition, structuring, analysis and visualization of data and information of the field of the informatics engineering, and value in a critical way the results of this management.
**270083 - ER - Requirements Engineering**

### Teaching methodology

The course will primarily (but not completely) be taught using the teaching method PBL (Problem Based Learning).

There is a class (conventional) two hours a week in which the teacher presents very general topics (eg what is the requirements engineering) or aspects that are not sufficiently covered by other activities. Almost half the class is devoted to discussion and work in small groups on issues raised by the teacher. Typically, the class also provides a good solution to the exercise of the previous week.

La second main activity of the course is the determination of the requirements of a particular software system. The teacher sketches a specific situation (different from one course to another), for which students have to determine and specify the requirements of a software system, using some methods and languages to be learned previously. This work is performed in group. The number of people and the composition of the group is defined at the beginning of the course (no more than five/six). Each group appoints a coordinator and a secretary. Each group meets at least once a week for two hours, the hours of laboratory classes. The group submits its work in five deliverables during the course, within limits fixed at the beginning of the course.

Before starting the meeting of the project groups, its members have posted what they have done during the week. Each meeting consists of three parts: The first part explains what each student has made during the week, the second consolidates the work done by members of the group, the third is planing what will be done in next week, and who will. At the end of each meeting, the Secretary publishes the minutes in the forum.

The third major activity is the course exercises. The teacher asks at least eight exercises during the course. Each student must submit (via Athena) his own solution to the exercises, within the specified deadline. The completion of the exercise requires learning new skills. The exercises are corrected soon, and if possible they will be discussed in class of the next week.

Note: The teaching method used in the course requires students to acquire new knowledge independently, using bibliographic sources that are normally in English. It is essential that the student has a sufficient level of English without much difficulty assimilating the literature (technical).

### Learning objectives of the subject

1. Understanding the need, objectives and contexts in which engineering requirements activities are performed.
2. Knowing defining the objectives of a project.
3. Knowing identifying stakeholders of a project.
4. Understanding what is the system context, the boundary of the system and the use cases.
5. Knowing defining a business process in a particular language.
6. Understanding the need to perform a detailed state of the art of the professional practice within the scope of a project.
7. Knowing performing a detailed state of the art of professional practice within the scope of a project.
8. Understanding what are the scenarios and use cases of a system and what are the relations among them.
9. Knowing defining the use cases of a system by using a particular template.
10. Knowing what are the software system requirements and into what types are classified.
11. Knowing the methods to specify the requirements and contexts in which they are useful.
12. Knowing what the conflicts of requirements engineering, how to analyze them and how to solve them.
13. Understanding the need for argumentation satisfaction of goals on a project.
14. Knowing performing argumentation satisfaction of goals.
15. Knowing writing the requirements specification by using a particular template.
16. Knowing the methods to validate the requirements and in which contexts they are useful.
17. Knowing validating a requirements specification through inspection.
18. Understanding the need of performing the conceptual schema.
19. Knowing developing the conceptual schema from the requirements of a project.
20. Knowing writing a conceptual schema in an executable language.
21. Understanding the relations among the artifacts of requirements engineering, and the need to keep the traceability and consistency.

22. Knowing validating a conceptual schema through inspection.

### Study load

<table>
<thead>
<tr>
<th>Total learning time: 150h</th>
<th>Hours large group: 30h</th>
<th>20.00%</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Hours medium group: 0h</td>
<td>0.00%</td>
</tr>
<tr>
<td></td>
<td>Hours small group: 30h</td>
<td>20.00%</td>
</tr>
<tr>
<td></td>
<td>Guided activities: 0h</td>
<td>0.00%</td>
</tr>
<tr>
<td></td>
<td>Self study: 90h</td>
<td>60.00%</td>
</tr>
</tbody>
</table>
## Content

**Overview of requirements engineering**

Degree competences to which the content contributes:

**Project goals**

Degree competences to which the content contributes:

**Stakeholders**

Degree competences to which the content contributes:

**The system and its context**

Degree competences to which the content contributes:

**Scenarios and use cases**

Degree competences to which the content contributes:

**Software requirements**

Degree competences to which the content contributes:

**Satisfaction argument of goals.**

Degree competences to which the content contributes:

**Requirements engineering activities: Determination of requirements, documentation, negotiation and validation**

Degree competences to which the content contributes:

**Conceptual modeling in requirements engineering**

Degree competences to which the content contributes:
### Development of the conceptual schema

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

### Traceability of requirements engineering artifacts

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

### Validation of conceptual schemas

**Degree competences to which the content contributes:**
## Planning of activities

<table>
<thead>
<tr>
<th>Section</th>
<th>Hours</th>
<th>Theory classes: 2h</th>
<th>Practical classes: 0h</th>
<th>Laboratory classes: 2h</th>
<th>Guided activities: 0h</th>
<th>Self study: 6h</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Introduction</strong></td>
<td>10h</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Goals project</strong></td>
<td>10h</td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td><strong>E1</strong></td>
<td>0h</td>
<td></td>
<td></td>
<td></td>
<td>Guided activities: 0h</td>
<td>Self study: 0h</td>
</tr>
<tr>
<td><strong>Requirements</strong></td>
<td>10h</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>E2</strong></td>
<td>0h</td>
<td></td>
<td></td>
<td></td>
<td>Guided activities: 0h</td>
<td>Self study: 0h</td>
</tr>
</tbody>
</table>
## Introduction to requirements engineering

**Description:**
Exercise on satisfaction argument

**Specific objectives:**
13, 14

| Hours: 10h |
| Theory classes: 2h |
| Practical classes: 0h |
| Laboratory classes: 2h |
| Guided activities: 0h |
| Self study: 6h |

### Specific objectives:

4, 5

## Delivering state of the art

**Specific objectives:**

6, 7

| Hours: 0h |
| Guided activities: 0h |
| Self study: 0h |

## System, context, use cases

**Specific objectives:**

4, 5, 6, 7

| Hours: 10h |
| Theory classes: 2h |
| Practical classes: 0h |
| Laboratory classes: 2h |
| Guided activities: 0h |
| Self study: 6h |

## E3

**Description:**
Modeling business processes

**Specific objectives:**

5

| Hours: 0h |
| Guided activities: 0h |
| Self study: 0h |
### Determining requirements

**Description:**
Exercise on essential and real use cases

**Specific objectives:**
9, 10, 11

**Hours:** 10h
- Theory classes: 2h
- Practical classes: 0h
- Laboratory classes: 2h
- Guided activities: 0h
- Self study: 6h

### E4

**Description:**
Exercise on essential and real use cases

**Specific objectives:**
8, 9

**Hours:** 0h
- Guided activities: 0h
- Self study: 0h

### Negotiating requirements

**Description:**
Preliminary delivery on requirements specification

**Specific objectives:**
12

**Hours:** 10h
- Theory classes: 2h
- Practical classes: 0h
- Laboratory classes: 2h
- Guided activities: 0h
- Self study: 6h

### D1

**Description:**
Preliminary delivery on requirements specification

**Specific objectives:**
2, 3, 4, 8, 9, 10, 15

**Hours:** 0h
- Guided activities: 0h
- Self study: 0h
## Validation requirements

**Description:**
Exercise on validation requirements

**Specific objectives:**
16, 17

**Hours:** 10h  
- Theory classes: 2h  
- Practical classes: 0h  
- Laboratory classes: 2h  
- Guided activities: 0h  
- Self study: 6h

## E5

**Description:**
Exercise on validation requirements

**Specific objectives:**
16, 17

**Hours:** 0h  
- Guided activities: 0h  
- Self study: 0h

## Recap on requirements

**Specific objectives:**
2, 3, 4, 8, 9, 10, 13, 14, 15, 16, 17, 21, 22

**Hours:** 9h  
- Theory classes: 1h  
- Practical classes: 0h  
- Laboratory classes: 2h  
- Guided activities: 0h  
- Self study: 6h

## Q1

**Description:**
Questionnaire on basic concepts of requirements engineering. The questionnaire will be answered online within the class. Each student must bring a laptop or similar to access and respond to the questionnaire.

**Specific objectives:**
1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17

**Hours:** 1h  
- Guided activities: 1h  
- Self study: 0h

## D2

**Hours:** 0h  
- Guided activities: 0h  
- Self study: 0h
### Description:
Final delivery of the requirements specification

### Specific objectives:
2, 3, 4, 8, 9, 10, 11, 13, 14, 15, 16, 17

<table>
<thead>
<tr>
<th>Conceptual modeling in requirements engineering</th>
<th>Hours: 10h</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Theory classes: 2h</td>
</tr>
<tr>
<td></td>
<td>Practical classes: 0h</td>
</tr>
<tr>
<td></td>
<td>Laboratory classes: 2h</td>
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<tr>
<td></td>
<td>Guided activities: 0h</td>
</tr>
<tr>
<td></td>
<td>Self study: 6h</td>
</tr>
</tbody>
</table>

### Specific objectives:
18, 20, 21

<table>
<thead>
<tr>
<th>E6</th>
<th>Hours: 0h</th>
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<tbody>
<tr>
<td>Description:</td>
<td>Exercise on the executable OCL</td>
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<tr>
<td>Specific objectives:</td>
<td>20</td>
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</table>

<table>
<thead>
<tr>
<th>The structural scheme</th>
<th>Hours: 10h</th>
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</thead>
<tbody>
<tr>
<td>Theory classes: 2h</td>
<td>Theory classes: 2h</td>
</tr>
<tr>
<td>Practical classes: 0h</td>
<td>Practical classes: 0h</td>
</tr>
<tr>
<td>Laboratory classes: 2h</td>
<td>Laboratory classes: 2h</td>
</tr>
<tr>
<td>Guided activities: 0h</td>
<td>Guided activities: 0h</td>
</tr>
<tr>
<td>Self study: 6h</td>
<td>Self study: 6h</td>
</tr>
</tbody>
</table>

### Specific objectives:
19, 20

<table>
<thead>
<tr>
<th>E7</th>
<th>Hours: 0h</th>
</tr>
</thead>
<tbody>
<tr>
<td>Description:</td>
<td>Exercise making structural scheme</td>
</tr>
<tr>
<td>Specific objectives:</td>
<td>19, 20</td>
</tr>
</tbody>
</table>
## The scheme behavior

**Description:**
Preliminary delivery of conceptual schema of the project

**Specific objectives:**
19, 20

### Hours:
- Theory classes: 2h
- Practical classes: 0h
- Laboratory classes: 2h
- Guided activities: 0h
- Self study: 6h

## D3

**Description:**
- Theory classes: 2h
- Practical classes: 0h
- Laboratory classes: 2h
- Guided activities: 0h
- Self study: 0h

## Validating conceptual schema

**Specific objectives:**
20, 21, 22

### Hours:
- Theory classes: 2h
- Practical classes: 0h
- Laboratory classes: 2h
- Guided activities: 0h
- Self study: 6h

## E8

**Description:**
Exercise on schema validation

**Specific objectives:**
21, 22

### Hours:
- Guided activities: 0h
- Self study: 0h
# Recap subject

**Hours:** 9h  
- Theory classes: 1h  
- Practical classes: 0h  
- Laboratory classes: 2h  
- Guided activities: 0h  
- Self study: 6h  

**Specific objectives:**  
18, 19, 20, 21, 22

# Completion of the final delivery of the conceptual scheme

**Hours:** 10h  
- Theory classes: 0h  
- Practical classes: 0h  
- Laboratory classes: 0h  
- Guided activities: 0h  
- Self study: 10h  

**Specific objectives:**  
19, 20, 22

# D4

**Hours:** 0h  
- Guided activities: 0h  
- Self study: 0h

**Description:**  
Final delivery of conceptual schema

**Specific objectives:**  
19, 20, 21, 22

# Q2

**Hours:** 1h  
- Guided activities: 1h  
- Self study: 0h

**Description:**  
Questionnaire on basic concepts of conceptual modeling in requirements engineering. The questionnaire will be answered online within the class. Each student must bring a laptop or similar to access and respond to the questionnaire.

**Specific objectives:**  
18, 19, 20, 21, 22
Qualification system

In addition to the mark of the course, there will be a grade for the generic competence assigned to the course, with values A, B, C, D, where:
· A indicates that the competence has been accomplished with a level of excellence
· B indicates that the competence has been accomplished with the desired level
· C indicates that the competence has been accomplished with a sufficient level
· D indicates that the competence has not accomplished

This grade comes from the evaluation of the first assignment of the group (Context analysis).

Bibliography

Basic:


Complementary: