Course guide

330219 - TP - Programming Technologies

Unit in charge: Manresa School of Engineering
Teaching unit: 750 - EMIT - Department of Mining, Industrial and ICT Engineering.

Degree: BACHELOR'S DEGREE IN ICT SYSTEMS ENGINEERING (Syllabus 2010). (Compulsory subject).

Academic year: 2022  ECTS Credits: 6.0  Languages: Catalan

LECTURER

Coordinating lecturer: MARTA ISABEL TARRÉS PUERTAS

Others:

DEGREE COMPETENCES TO WHICH THE SUBJECT CONTRIBUTES

Specific:
1. Ability to understand and master the basic concepts of discrete mathematics, logic, algorithms and computational complexity as well as its application to the automatic processing of information through computer systems and the application to solving problems of engineering

2. (ENG) El coneixement de les estructures de dades més habituals i la capacitat d'usar-les de forma escaient en problemes reals. La capacitat de dissenyar estructures de dades específiques quan els problemes així ho requereixin.
3. The ability to analyze, design and maintain computer applications as well as knowledge of the principles and tools of software engineering and its application.
4. Knowledge and ability to use existing tools and instrumentation for the analysis, design, development and verification of electronic, computer and communications systems.

Transversal:
5. EFFICIENT ORAL AND WRITTEN COMMUNICATION - Level 1. Planning oral communication, answering questions properly and writing straightforward texts that are spelt correctly and are grammatically coherent.
6. EFFECTIVE USE OF INFORMATION RESOURCES - Level 1. Identifying information needs. Using collections, premises and services that are available for designing and executing simple searches that are suited to the topic.
7. SELF-DIRECTED LEARNING - Level 1. Completing set tasks within established deadlines. Working with recommended information sources according to the guidelines set by lecturers.

TEACHING METHODOLOGY

The subject is structured in two classes of two hours per week. Of these four weekly contact hours, one is dedicated to presenting the main contents in an expository way, the second to solving problems on demand from the student body and the remaining two to solving practical problems in the computer laboratory.

The student is told weekly the study and problem solving tasks that are necessary for him to do. It is advisable to do these jobs, at least partially, working as a team. Periodically, the progress of each individual student is evaluated.

The subject also incorporates a program development project of a medium size that has to be worked on as a team.
LEARNING OBJECTIVES OF THE SUBJECT

After passing this subject the student must:
1. Know how to plan oral communication, respond appropriately to the questions asked and write basic level texts with spelling and grammar correction.
2. Know how to identify one’s own information needs and use the collections, spaces and services available to design and execute simple searches appropriate to the thematic field.
3. To be able to carry out the tasks entrusted in the scheduled time, working with the indicated sources of information, in accordance with the guidelines set by the teaching staff.
4. To be able to apply the fundamental algorithmic procedures to solve problems using high-level languages.
5. Know the most common data structures and be able to use them as necessary in real problems of moderate complexity.
6. Be able to design specific data structures of medium complexity.
7. Know the concept of computational complexity and be able to calculate the complexity in time and space for the worst case of simple algorithms.
8. Know the principles and some tools for verification and validation of software and be able to apply them to real problems.
9. Be able to write simple technical reports, also in a third language, and present them orally.

STUDY LOAD

<table>
<thead>
<tr>
<th>Type</th>
<th>Hours</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Self study</td>
<td>90.0</td>
<td>60.00</td>
</tr>
<tr>
<td>Hours small group</td>
<td>30.0</td>
<td>20.00</td>
</tr>
<tr>
<td>Hours large group</td>
<td>30.0</td>
<td>20.00</td>
</tr>
</tbody>
</table>

Total learning time: 150 h

CONTENTS

(ENG) TEMA 1: Classes d'objectes

Description:
Classes and Objects

Full-or-part-time: 45h
Theory classes: 10h
Laboratory classes: 10h
Self study: 25h

(ENG) TEMA 2: Recursivitat

Description:
Recursivity

Specific objectives:
Recursivity

Full-or-part-time: 23h
Theory classes: 4h
Laboratory classes: 4h
Self study: 15h
## (ENG) TEMA 3: Estructures de dades

**Description:**
Stack and BST

**Specific objectives:**
Stack and BST

**Full-or-part-time:** 45h  
Theory classes: 10h  
Laboratory classes: 10h  
Self study: 25h

## (ENG) TEMA 4: Introducció a l'enginyeria del software

**Description:**
UML

**Full-or-part-time:** 23h  
Theory classes: 4h  
Laboratory classes: 4h  
Self study: 15h

## (ENG) TEMA 5: Complexitat algorítmica

**Description:**
Algorithm complexity

**Full-or-part-time:** 14h  
Theory classes: 2h  
Laboratory classes: 2h  
Self study: 10h

## ACTIVITIES

### (ENG) ACTIVITAT 1: EXAMEN

**Full-or-part-time:** 2h  
Theory classes: 2h

### (ENG) ACTIVITAT 2: ESTUDI DE CONTINGUTS

**Full-or-part-time:** 25h  
Self study: 25h

### (ENG) ACTIVITAT 3: CLASSE EXPOSITIVA

**Full-or-part-time:** 12h  
Theory classes: 12h
ACTIVITAT 4: CLASSE DE PROBLEMES

Full-or-part-time: 12h
Theory classes: 12h

ACTIVITAT 5: CLASSE DE LABORATORI

Full-or-part-time: 41h
Laboratory classes: 26h
Self study: 15h

ACTIVITAT 6: RESOLUCIÓ DE PROBLEMES

Full-or-part-time: 30h
Self study: 30h

ACTIVITAT 7: PROJECTE

Full-or-part-time: 28h
Theory classes: 4h
Laboratory classes: 4h
Self study: 20h

GRADING SYSTEM

The qualification is made based on 3 elements:
1. The evaluation of the autonomous work of the student (A). This component contains both the progress made in the theoretical and practical aspects. Its measurement is carried out on the basis of compulsory exercises delivered during the course.
2. The evaluation of the project (P). It is carried out from a face-to-face delivery of the project in progress that may involve a public presentation and the preparation of a report.
3. The final evaluation (F). It is done through a final exam that is global in nature and integrates all the knowledge and skills acquired during the course.

From these elements the final grade is calculated with the following weightings:

Final = 0.35A + 0.25P + 0.40F

EXAMINATION RULES.

The activities will be carried out following the uses and customs of academic work and, in particular, the following guidelines will be respected:
1. Those activities that are explicitly declared as individual, whether in person or not, will be carried out without any collaboration from other people.
2. The dates, formats and other delivery conditions that are set will be mandatory.
3. The use of the computer laboratory will be reserved exclusively for academic activities and in no case may abuse be made.
BIBLIOGRAPHY

Basic:

Complementary: