220005 - Fundamentals of Programming

Coordinating unit: 205 - ESEIAAT - Terrassa School of Industrial, Aerospace and Audiovisual Engineering
Teaching unit: 723 - CS - Department of Computer Science
Academic year: 2018
Degree: BACHELOR’S DEGREE IN AEROSPACE TECHNOLOGY ENGINEERING (Syllabus 2010). (Teaching unit Compulsory)
BACHELOR’S DEGREE IN AEROSPACE VEHICLE ENGINEERING (Syllabus 2010). (Teaching unit Compulsory)
ECTS credits: 6
Teaching languages: Catalan

Teaching staff
Coordinator: MARTA VATIUS VILA
Others: FATOS XHAFA XHAFA- MARTA VATIUS- JOSEFINA LOPEZ HERRERA

Degree competences to which the subject contributes

Specific:
1. A basic understanding of the use and programming of computers, operating systems, databases and computer programs with applications in engineering

Transversal:
2. 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.

Teaching methodology

- Theory sessions
- Laboratory sessions
- Tasks and self-study exercises

In the theory sessions the teachers will introduce new concepts
In the laboratory sessions the students will practice the new concepts using computers. There will be two different types of laboratory sessions:
Sessions in which the teacher guide students in analyzing data and solving problems by applying new concepts and techniques.
Exam sessions in which the students, using online tools, solve exams that will be evaluated
Students will also have to work by them-selves in order

Learning objectives of the subject

Develop the ability to use basic tools and techniques of programming: algorithms and programs.
Develop their ability to use abstraction in programming patterns to solve real problems.
Learn to design programs correctly: well-structured, efficient and readable.
Learn to design data structures representing the data involved in a given problem.
## Study load

<table>
<thead>
<tr>
<th></th>
<th>Hours large group:</th>
<th></th>
<th>Hours small group:</th>
<th></th>
<th>Self study:</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Total learning time</strong>: 150h</td>
<td></td>
<td></td>
<td>32h</td>
<td>21.33%</td>
<td>28h</td>
<td>18.67%</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>90h</td>
<td>60.00%</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### Content

<table>
<thead>
<tr>
<th>1. Basic programming concepts.</th>
<th><strong>Learning time:</strong> 26h</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Theory classes: 6h</td>
</tr>
<tr>
<td></td>
<td>Laboratory classes: 4h</td>
</tr>
<tr>
<td></td>
<td>Self study : 16h</td>
</tr>
</tbody>
</table>

**Description:**
1. Introduction to hardware and software.
2. Objects of the programs: variables and constants and types of data
3. Basic instructions: entry and exit, allocation, control.
4. Structure of a program

**Related activities:**
Type 1 activity, which corresponds to an individual evaluation test during the laboratory sessions.

<table>
<thead>
<tr>
<th>2. Sequences.</th>
<th><strong>Learning time:</strong> 26h</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Theory classes: 6h</td>
</tr>
<tr>
<td></td>
<td>Laboratory classes: 4h</td>
</tr>
<tr>
<td></td>
<td>Self study : 16h</td>
</tr>
</tbody>
</table>

**Description:**
1. Concept of sequences and their application to programming
2. Basic operations associated with sequential processing:
   - tour
   - close

**Related activities:**
Type 1 activity, which corresponds to an individual evaluation test during the laboratory sessions.

<table>
<thead>
<tr>
<th>3. Functions and actions</th>
<th><strong>Learning time:</strong> 32h</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Theory classes: 6h</td>
</tr>
<tr>
<td></td>
<td>Laboratory classes: 8h</td>
</tr>
<tr>
<td></td>
<td>Self study : 18h</td>
</tr>
</tbody>
</table>

**Description:**
1. Concepts of functions and actions
2. Concept of parameter and typology
3. Use of functions and actions in the programs

**Related activities:**
Type 1 activity, which corresponds to an individual evaluation test during the laboratory sessions.
### 4. Structured types

**Learning time:** 42h  
Theory classes: 8h  
Laboratory classes: 8h  
Self study: 26h

**Description:**  
1. Tables  
2. Sorting and search algorithms  
3. Other structured types

**Related activities:**  
Type 1 activity, which corresponds to an individual evaluation test during the laboratory sessions.

### 5. Descendant design

**Learning time:** 24h  
Theory classes: 6h  
Laboratory classes: 4h  
Self study: 14h

**Description:**  
1. Downward design of data  
2. Descent design of processes

**Related activities:**  
Type 2 activity, which corresponds to the development of a project in groups of two people.
### Planning of activities

<table>
<thead>
<tr>
<th>Activity</th>
<th>Hours</th>
<th>Description</th>
<th>Support materials</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ACTIVITY 1: THEORY SESSIONS</strong></td>
<td>68h</td>
<td>Previous and subsequent preparation of the sessions of theory and assistance</td>
<td>Book of the subject written by the professors and available in the virtual library of the UPC.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>to them.</td>
<td>Additional documentation accessible to the Atenea platform.</td>
</tr>
<tr>
<td><strong>ACTIVITY 2: PRACTICAL SESSIONS</strong></td>
<td>42h</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>ACTIVITY 3: LABORATORY EXAMS</strong></td>
<td>4h</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>ACTIVITY 4: MIDTERM EXAM</strong></td>
<td>5h</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>ACTIVITY 5: FINAL EXAM</strong></td>
<td>3h</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Description:**
- Previous and subsequent preparation of the sessions of theory and assistance to them.

**Support materials:**
- Book of the subject written by the professors and available in the virtual library of the UPC.
- Additional documentation accessible to the Atenea platform.
220005 - Fundamentals of Programming

Qualification system

Overall Grade = max (0.35 * Activitat4 + 0.45 * Activitat5, 0.8 * Activitat5) + 0.2 * Activitat3

The overall rating is calculated based on three activities described above for the course: activity 3 (laboratory checks) has a weight of 20% of total grade; while, written exams have a weight of 80%. To calculate the grade of the written exams it is considered the final exam (activity 5) incorporates all the contents of partial exam (activity 4) and therefore the grade of the activity 4 is considered only if it is higher than the activity 5. This system allows you to recover from a bad result in the midterm exam.

Regulations for carrying out activities

- Any of the control laboratory not performed, will be considered as non-marked
- In no case can any documentation or digital support be used in the partial or final test

Bibliography

Basic:


Complementary:

