Course guides
230901 - APR - Algorithms and Programming

Unit in charge: Barcelona School of Telecommunications Engineering
Teaching unit: 701 - DAC - Department of Computer Architecture.

Degree: BACHELOR'S DEGREE IN ELECTRONIC ENGINEERING AND TELECOMMUNICATION (Syllabus 2018).
(Compulsory subject).

Academic year: 2021 ECTS Credits: 6.0 Languages: Catalan, Spanish

LECTURER
Coordinating lecturer: Rodriguez Luna, Eva
Others: Otero Calviño, Beatriz
Rodriguez Luna, Eva

DEGREE COMPETENCES TO WHICH THE SUBJECT CONTRIBUTES

Specific:
CE2. (ENG) GREELEC: coneixements bàsics sobre l’ús i programació dels ordinadors, sistemes operatius, bases de dades i programes informàtics amb aplicació a l'enginyeria. (Mòdul de dormació bàsica).

Transversal:
CT4. (ENG) GREELEC: TREBALL EN EQUIP: ser capaç de treballar com a membre d'un equip interdisciplinar, ja sigui com un membre més o realitzant tasques de direcció, amb la finalitat de contrinuir a desenvolupar projectes amb pragmatisme i sentit de la responsabilitat, assumint compromisos tenint en compte els recursos disponibles.

Basic:
CB2. (ENG) GREELEC: Que els estudiants sàpiguen aplicar els coneixements adquirits al seu treball o vocació d'una forma professional i tinguin les competències que solen demostrar-se per mitjà de l'elaboració i defensa d'arguments i la resolució de problemes dins de la seva àrea d'estudi.
CB3. (ENG) GREELEC: Que els estudiants tinguin la capacitat de reunir i interpretar dades rellevants (normalment dins de la seva àrea d'estudi) per emetre judicis que incloguin una reflexió sobre temes rellevants de caire social, científic o ètic.

TEACHING METHODOLOGY

MD1 Expositive method / Master class
MD2 Participative expositive class
MD3 Laboratory session
MD4 Cooperative work
MD5 Autonomous work
MD6 Problems/projects based learning

LEARNING OBJECTIVES OF THE SUBJECT

1. To be capable of using algorithmic techniques for solving mathematical problems of small and medium-sized complexity.
2. To develop (write, test and debug) computer programs that solve problems of small and medium-sized difficulty using the Python programming language.
3. Proper usage of the programming environment: edition, compilation, execution and debugging tools for the development and correction of programs.
4. Work in group. Definition of the tasks to be accomplished, equitable distribution of the tasks, and integration of the work carried out. Management of conflicts.
STUDY LOAD

<table>
<thead>
<tr>
<th>Type</th>
<th>Hours</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hours small group</td>
<td>26.0</td>
<td>17.33</td>
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<tr>
<td>Hours large group</td>
<td>39.0</td>
<td>26.00</td>
</tr>
<tr>
<td>Self study</td>
<td>85.0</td>
<td>56.67</td>
</tr>
</tbody>
</table>

Total learning time: 150 h

CONTENTS

**Topic 1. Basic programming concepts**

**Description:**

**Full-or-part-time:** 22h 40m
- Theory classes: 9h
- Laboratory classes: 2h
- Self study: 11h 40m

**Topic 2. Basic algorithmic.**

**Description:**
Basic mathematical and computational algorithms. Conditional sentences. Iterative sentences.

**Full-or-part-time:** 27h
- Theory classes: 6h
- Laboratory classes: 4h
- Self study: 17h

**Topic 3. Functions**

**Description:**
Functions’ calls. Recursive design. Specific Python modules.

**Full-or-part-time:** 30h 20m
- Theory classes: 6h
- Laboratory classes: 6h
- Self study: 18h 20m
**Topic 4. Structured data types**

**Description:**
Representation of data structures using native Python types: Lists, Tuples, Dictionaries.
Data structures design.

**Full-or-part-time:** 28h 30m
Theory classes: 7h 30m
Laboratory classes: 4h
Self study: 17h

**Topic 5. Algorithms of structured types**

**Description:**
Basic algorithms: routing, search, insertion and extraction.
Advanced problems: queues, stacks, access to concrete positions of structured types (magic square).

**Full-or-part-time:** 31h 30m
Theory classes: 7h 30m
Laboratory classes: 6h
Self study: 18h

**Topic 6. Files and input/output.**

**Description:**
Manipulation (creation/edition).
Traverse.

**Full-or-part-time:** 10h
Theory classes: 3h
Laboratory classes: 4h
Self study: 3h

**GRADING SYSTEM**

Final_mark = MAX(0.6*Final_test, 0.4*Final_test+0.2*Partial_test)+0.4*Lab_mark
Lab_mark = 0.5*Lab_test+0.5*Project

**BIBLIOGRAPHY**

**Basic:**