820006 - I - Informatics

Coordinating unit: 295 - EEBE - Barcelona East School of Engineering
Teaching unit: 723 - CS - Department of Computer Science
Academic year: 2017

Degree:
BACHELOR'S DEGREE IN ELECTRICAL ENGINEERING (Syllabus 2009). (Teaching unit Compulsory)
BACHELOR'S DEGREE IN MECHANICAL ENGINEERING (Syllabus 2009). (Teaching unit Compulsory)
BACHELOR'S DEGREE IN CHEMICAL ENGINEERING (Syllabus 2009). (Teaching unit Compulsory)
BACHELOR'S DEGREE IN BIOMEDICAL ENGINEERING (Syllabus 2009). (Teaching unit Compulsory)
BACHELOR'S DEGREE IN ENERGY ENGINEERING (Syllabus 2009). (Teaching unit Compulsory)
BACHELOR'S DEGREE IN INDUSTRIAL ELECTRONICS AND AUTOMATIC CONTROL ENGINEERING (Syllabus 2009). (Teaching unit Compulsory)
BACHELOR'S DEGREE IN MATERIALS ENGINEERING (Syllabus 2010). (Teaching unit Compulsory)
BACHELOR'S DEGREE IN BIOMEDICAL ENGINEERING (Syllabus 2009). (Teaching unit Compulsory)
BACHELOR'S DEGREE IN ELECTRICAL ENGINEERING (Syllabus 2009). (Teaching unit Compulsory)
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BACHELOR'S DEGREE IN MECHANICAL ENGINEERING (Syllabus 2009). (Teaching unit Compulsory)
BACHELOR'S DEGREE IN CHEMICAL ENGINEERING (Syllabus 2009). (Teaching unit Compulsory)

ECTS credits: 6

Teaching languages: Catalan, Spanish, English

Teaching staff
Coordinator: Escudero Bakx, Gerard
Farreres De La Morena, Javier
Others: Professorat dels departaments CS i ESAII.

Opening hours
Timetable: Please see notice desk.

Prior skills
There are no previous capacities.

Requirements
No requirements.

Degree competences to which the subject contributes

Specific:
2. Understand the basics behind the use and programming of PCs, operating systems, databases and software with applications in engineering.

Transversal:
1. 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.
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Teaching methodology

This subject consists of two weekly presential classes in a large group, and a 2-hour weekly session in the laboratory. During the large group classes, theoretical explanations will be combined with examples and active solving of exercises by the students. During the laboratory sessions the students will follow the laboratory teacher proposed activities.

Learning objectives of the subject

At the end of the course, the student:
0. Learn the basics of hardware and operating systems.
1. Recognize and appropriately apply the iterative search and travel schemes in trouble small and medium size. For this:
   1. know the basic constituents of imperative languages: variables, types, expressions, statements.
   2. know the three basic algorithmic compositions and properties: sequential, alternative and iterative.
   3. Know and use the concept of data stream i their properties.
2. Can design and use functions. For this:
   1. Know and apply the parameterization.
3. Perform treatment programs sequences over:
   1. structured variables.
   2. files.
   3. input data.
4. It will be able to use external libraries own field of engineering. For this:
   1. Be familiar with standard software systems documentation.
   2. will be able to include and use the libraries in their programs.

Currently the programming language used as a base is a subset of Python, although the main aim is not in learning the details of language but in solving algorithmic problems and building structured programs.

Study load

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

<table>
<thead>
<tr>
<th>Chapter 1 - Basic concepts</th>
<th>Learning time: 2h</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Laboratory classes: 2h</td>
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</table>

**Description:**

**Related activities:**
Theoretical classes.

**Specific objectives:**
0. Learn the basics of hardware and operating systems.

<table>
<thead>
<tr>
<th>Chapter 2 - Structured programming basics</th>
<th>Learning time: 16h</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Theory classes: 4h</td>
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<tr>
<td></td>
<td>Laboratory classes: 4h</td>
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<tr>
<td></td>
<td>Self study : 8h</td>
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</tbody>
</table>

**Description:**
Variables
Data types
Statements: assign, input, output
Expressions, operators and precedence
Variables, constants and data types.
Algorithm structure.
Elementary instructions: reading, writing, assigning.

**Related activities:**
Theoretical classes.
Practical classes
Activity 1: Assessments with computer
Activity 2: Written assessment
Activity 3: Use of external libraries

**Specific objectives:**
1. Recognize and appropriately apply the iterative search and travel schemes in trouble small and medium size. For this:
   1. know the basic constituents of imperative languages: variables, types, expressions, statements.
### Chapter 3- Compositions sequential, alternative and iterative

**Description:**
- Concept of sequence
- Alternatives (if ... elif ... else)
- Iteratives (for, while)
- Iterative schemes

**Related activities:**
- Theoretical classes.
- Practical classes
- Activity 1: Assessments with computer
- Activity 2: Written assessment
- Activity 3: Use of external libraries

**Specific objectives:**
1. Recognize and appropriately apply the iterative search and travel schemes in trouble small and medium size. For this:
   - 2. know the three basic algorithmic compositions and properties: sequential, alternative and iterative.
   - 3. Know and use the concept of data stream i their properties.

### Chapter 4 - Functions and parameters

**Description:**
- Input parameters
- Output parameters
- Design with functions

**Related activities:**
- Theoretical classes
- Practical classes
- Activity 1: Assessments with computer
- Activity 2: Written assessment
- Activity 3: Use of external libraries

**Specific objectives:**
2. Can design and use functions. For this:
   - 1. Know and apply the parameterization.
### Chapter 5 - Structured Types

**Learning time:** 39h  
Theory classes: 9h  
Laboratory classes: 8h  
Self study: 22h

<table>
<thead>
<tr>
<th>Description:</th>
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</table>
| String treatment  
| Homogeneous and heterogeneous lists treatment  
| Dictionaries  
| Files and databases  |

**Related activities:**  
Theoretical classes  
Practical classes  
Activity 1: Assessment with computer 2 and 3  
Activity 2: Written assessment

**Specific objectives:**  
1. Recognize and appropriately apply the iterative search and travel schemes in trouble small and medium size.  
For this:  
3. Know and use the concept of data stream and their properties.  
3. Perform treatment programs sequences over:  
   1. structured variables.  
   2. files and databases.

### Chapter 6 - Sequential Treatment Schemas

**Learning time:** 36h  
Theory classes: 8h  
Laboratory classes: 6h  
Self study: 22h

<table>
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<tr>
<th>Description:</th>
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| Concept of travel and search  
| Troubleshooting  |

**Related activities:**  
Theoretical classes  
Practical classes  
Activity 1: Assessments with computer  
Activity 2: Written assessment

**Specific objectives:**  
1. Recognize and appropriately apply the iterative search and travel schemes in trouble small and medium size.  
For this:  
3. Know and use the concept of data stream and their properties.  
3. Perform treatment programs sequences over:  
   1. structured variables.  
   2. files and databases.  
   3. input data.
Chapter 7 - External Libraries

Learning time: 23h
  Theory classes: 3h
  Self study : 20h

Description:
  Documentation
  Use

Related activities:
  Theoretical classes

Specific objectives:
  4. It will be able to use external libraries own field of engineering. For this:
     1. Be familiar with standard software systems documentation.
     2. Will be able to include and use the libraries in their programs.

Qualification system

The final note of the subject results from the following addition:
FN = 20% Lab1 + 25% Lab2 + 25% Lab3 + 30% Written exercise

FN: final note; Labn: partial assessment exercises number n

There is no final reassessment

Regulations for carrying out activities

· All activities are part of the continous assessment model of the subject. Therefore, students repeating this subject will
  not be allowed to save any part of their notes for the following term.
· If a student does not hand over an activity, it will be considered as non marked.
· Students will be allowed to consult a reference card of the programming language during the partial and final
  assessment exercises.

Bibliography

Basic:
  Wentworth, Peter; Elkner, Jeffrey; Downey, Allen B.; Meyers, Chris. How to think like a computer scientist : learning with
  Python 3 [on line]. Openbookproject.net, 2012 [Consultation: 08/06/2016]. Available on:
  <http://openbookproject.net/thinkcs/python/english3e/>.

Complementary:
  ISBN 9781590282410.