820006 - I - Informatics

Coordinating unit: 295 - EEBE - Barcelona East School of Engineering
Teaching unit: 723 - CS - Department of Computer Science
Academic year: 2016

Degree:
- BACHELOR'S DEGREE IN BIOMEDICAL ENGINEERING (Syllabus 2009). (Teaching unit Compulsory)
- BACHELOR'S DEGREE IN ELECTRICAL 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 MECHANICAL ENGINEERING (Syllabus 2009). (Teaching unit Compulsory)
- BACHELOR'S DEGREE IN CHEMICAL ENGINEERING (Syllabus 2009). (Teaching unit Compulsory)
- BACHELOR'S DEGREE IN MATERIALS ENGINEERING (Syllabus 2010). (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)
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- BACHELOR'S DEGREE IN ELECTRICAL 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
None.

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.
Teaching methodology

This subject consists of two weekly presental 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>Study load</th>
<th>Hours large group: 30h</th>
<th>Hours medium group: 0h</th>
<th>Hours small group: 30h</th>
<th>Guided activities: 0h</th>
<th>Self study: 90h</th>
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<tbody>
<tr>
<td>Total learning time: 150h</td>
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This subject consists of two weekly presental 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.
# Content

## Chapter 1 - Basic concepts

<table>
<thead>
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<th>Description:</th>
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<th>Related activities:</th>
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<tbody>
<tr>
<td>Theoretical classes.</td>
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<table>
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<tr>
<th>Specific objectives:</th>
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<tr>
<td>0. Learn the basics of hardware and operating systems.</td>
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**Learning time:** 2h  
Laboratory classes: 2h

## Chapter 2 - Structured programming basics

<table>
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<tr>
<th>Description:</th>
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</table>
| Variables  
Data types  
Statements: assign, input, output  
Expressions, operators and precedence  
Variables, constants and data types.  
Algorithm structure.  
Elementary instructions: reading, writing, assigning. |

<table>
<thead>
<tr>
<th>Related activities:</th>
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</table>
| Theoretical classes.  
Practical classes  
Activity 1: Assessments with computer  
Activity 2: Written assessment  
Activity 3: Use of external libraries |

<table>
<thead>
<tr>
<th>Specific objectives:</th>
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</table>
| 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. |

**Learning time:** 16h  
Theory classes: 4h  
Laboratory classes: 4h  
Self study : 8h
### Chapter 3 - Compositions sequential, alternative and iterative

**Learning time:** 20h
- Theory classes: 4h
- Laboratory classes: 6h
- Self study: 10h

**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

**Learning time:** 14h
- Theory classes: 2h
- Laboratory classes: 4h
- Self study: 8h

**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

**Description:**  
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

**Description:**  
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

Description:
Documentation
Use

Related activities:
Theoretical classes
Activity 3: Use of external libraries

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.

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

Qualification system

The final note of the subject results from the following addition:
FN = 17,5% Lab1 + 17,5% Lab2 + 17,5% Lab3 + 30% Written exercise + 17,5% Library

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 continuous 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: