**240015 - Fundamentals of Informatics**

**Coordinating unit:** 240 - ETSEIB - Barcelona School of Industrial Engineering  
**Teaching unit:** 723 - CS - Department of Computer Science  
**Academic year:** 2017  
**Degree:**  
- BACHELOR'S DEGREE IN MATERIALS ENGINEERING (Syllabus 2010). (Teaching unit Compulsory)  
- BACHELOR'S DEGREE IN INDUSTRIAL TECHNOLOGY ENGINEERING (Syllabus 2010). (Teaching unit Compulsory)  
- BACHELOR'S DEGREE IN CHEMICAL ENGINEERING (Syllabus 2010). (Teaching unit Compulsory)  
**ECTS credits:** 6  
**Teaching languages:** Catalan, Spanish

### Degree competences to which the subject contributes

**Specific:**  
1. Basic knowledge on the use and programming of computers, operative systems, data bases and computer software with an engineering application.

### Teaching methodology

The module is based on 2 weekly classroom hours, in big groups (G), and two weekly laboratory hours, in small groups (P), in which more applied concepts are developed.

### Learning objectives of the subject

1. Applying fundamental concepts of computer programming.  
2. Demonstrating skills in using basic programming tools and techniques.  
3. Solving problems by means of developing small and medium scale programmes at an industrial level.  
4. Using abstract models to solve real problems.

### Study load

| Total learning time: 150h | Hours large group: | 30h | 20.00%  
|--------------------------|-------------------|-----|---------|  
|                          | Hours medium group: | 30h | 20.00%  
|                          | Hours small group: | 0h | 0.00%  
|                          | Guided activities: | 0h | 0.00%  
|                          | Self study: | 90h | 60.00%  


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## Content

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<th>Topic 1. Working environment</th>
<th>Learning time: 10h</th>
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<td>Laboratory classes: 4h</td>
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<td>Self study: 6h</td>
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**Description:**
- Basic laboratory tools.
- ETSEIB's computer system. Available resources.
- Basic use of Linux's graphic interface.
- Use of shell's interface. Basic commands.
- Emacs' text editor.
- Use of Python's interpreter.

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<th>Topic 2. Introduction to programming</th>
<th>Learning time: 50h</th>
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<td>Theory classes: 10h</td>
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<td>Laboratory classes: 10h</td>
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<td>Self study: 30h</td>
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**Description:**
- Fundamental programming elements.
- Algorithm, programme and programming language (Python).
- Types, variables, expressions, assignments.
- Sequential compositions, conditional and iterative.
- Functions, headers, parameters, body, call.
- Files and entry/exit.

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<th>Topic 3. Data structure</th>
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<td>Laboratory classes: 10h</td>
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<td>Self study: 30h</td>
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**Description:**
- Native Python's structural types.
- Strings.
- Lists.
- Tuples.
- Dictionaries.
- Representation of vectors and matrices.
Planning of activities

LABORATORY'S DELIVERABLE EXERCISES

**Hours:** 40h
- Laboratory classes: 10h
- Self study: 30h

**Description:**
These activities are a continuous evaluation. They will take place in the Laboratory classrooms and consist in solving problems with an increasing difficulty, by means of Python's programming. They can be individual or in group 2/3 people.

FINAL EXAM

**Hours:** 2h
- Self study: 2h

**Description:**
Activity to gather all acquired knowledge during the semester. Individual activity.

Qualification system

The subject's qualification will be determined by the final exam's mark (60%), and by the evaluation of at least 3 deliverable laboratory exercises (40%).

"Reevaluation": The mark obtained in the "revaluation" exam will be used as the final exam's mark, i.e., with a weight of 60%. The laboratory mark obtained in the last semester matriculated (fall or spring) will be used as laboratory mark in the "reevaluation".

**Topic 4. Programme design**

**Learning time:** 40h
- Theory classes: 10h
- Laboratory classes: 6h
- Self study: 24h

**Description:**
- Introduction to structured programming and targeted to objects.
- Sequential treatment schemes: itinerary and search.
- Documentation and testing programmes.
- Programming targeted to objects, classes and methods. Modules, environments.
- Programmes' performance and programmes' optimisation.
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Bibliography

Basic:


Complementary:


Others resources:

Hyperlink

Swaroop C.H., "A Byte of Python"
http://www.swaroopch.com/notes/Python

Zeller, "Python programming"

Manual de referència de Python
http://docs.python.org/

"Introduction to Programming using Python"
http://www.pasteur.fr/formation/infobio/python

Manual d’emacs