Course guide
240132 - 240132 - Informatics

Last modified: 02/05/2022

Unit in charge: Barcelona School of Industrial Engineering
Teaching unit: 723 - CS - Department of Computer Science.

Degree: BACHELOR'S DEGREE IN INDUSTRIAL TECHNOLOGY ENGINEERING (Syllabus 2010). (Compulsory subject).

Academic year: 2022 **ECTS Credits:** 4.5 **Languages:** Catalan

LECTURER

Coordinating lecturer: Tost Pardell, Daniela

Others: Dolors Ayala, Daniela Tost, Marc Vigo, Josep Vilaplana.

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 three hours a week of attended classes for the course are divided into one-hour lecture in large groups, and two hours of lab class in small groups. All classes will be face-to-face unless the pandemic situation prevents it.

LEARNING OBJECTIVES OF THE SUBJECT

1. This subject proposes an approach to computing in width. Assuming assumed the basics of programming, focuses on design issues and, using modules, introduces key issues using the computer programming language chosen as a binder.
2. Acquire the ability to analyze problems of some complexity, and applying techniques of structured analysis and design, performed with skill algorithms correct, legible, efficient and easy to maintain.
3. Knowing how to structure information and evaluate the various possible representations in a computer environment.
4. Being able to use abstract models for solving real problems.
5. Design of numerical applications.
6. Make a medium scale computer project.

STUDY LOAD

Type	Hours	Percentage
Hours large group	15,0	13.33
Hours medium group	30,0	26.67
Self study	67,5	60.00

Total learning time: 112.5 h

CONTENTS

Topic 1.Object-oriented design

Description:
Introduction and use of object-oriented design.

1. Inheritance, polymorphism.
2. Abstract data types.
3. Basic Design Patterns.

Related competencies :
CE3. Basic knowledge on the use and programming of computers, operative systems, data bases and computer software with an engineering application.

Full-or-part-time: 26h 30m
Theory classes: 4h
Laboratory classes: 8h
Self study : 14h 30m

Topic 2. Recursivity

Description:
Introduction and use of the recursive design.

Recursive design, completion and correctness.

Related competencies :
CE3. Basic knowledge on the use and programming of computers, operative systems, data bases and computer software with an engineering application.

Full-or-part-time: 24h
Theory classes: 3h
Laboratory classes: 6h
Self study : 15h

Topic 3. Data Structures

Description:
Introduction and use of some data structures.

1. We present some data structures and some application examples of them.
2. Data structures to be presented are stacks, lists, queues, trees or graphs.

Related competencies :
CE3. Basic knowledge on the use and programming of computers, operative systems, data bases and computer software with an engineering application.

Full-or-part-time: 20h
Theory classes: 3h
Laboratory classes: 6h
Self study : 11h

Topic 4. Iterators

Description:
Programming with iterators and iterables

* Generator functions
* Iterable classes
* Introduction to functional programming through iterators

Related competencies :
CE3. Basic knowledge on the use and programming of computers, operative systems, data bases and computer software with an engineering application.

Full-or-part-time: 20h
Theory classes: 2h
Laboratory classes: 4h
Self study : 14h

Topic 5.Utility Modules

Description:
Introduction and utilization of some existing modules in Python.
· Data analysis (pandas)
· Mathematical computations (numpy)
· Interactive aplications and games (pygame)
· Web applications (flask)

Related competencies :
CE3. Basic knowledge on the use and programming of computers, operative systems, data bases and computer software with an engineering application.

Full-or-part-time: 20h
Theory classes: 3h
Laboratory classes: 6h
Self study : 11h

GRADING SYSTEM

There will be a scored exercise during a laboratory class (NL grade) at a date that will be anounced at the beginning of the course. In addition, there will be a partial exam during the week reserved for this purpose in the middle of the semester (NP grade). The final exam will also be held (NE grade). The grade of the subject (NF) will be calculated from these grades:
NF = 0.15 * NL + 0.25 * NP + 0.60 * N
For the suspended student, the mark of the re-evaluation will replace NF.

EXAMINATION RULES.

The general rules of the School apply, including the prohibition of using any device (for example pen-drives or mobile phones) or application (for example e-mail or drives) that allows the exchange of information. The consultation of the python documentation and the libraries necessary for the resolution of the exam will be allowed.

BIBLIOGRAPHY

Basic:
- Downey, Allen. How to think like a computer scientist : learning with Python. Wellesley: Green Tea Press, 2002. ISBN 9781441419071.

Complementary:
- Chun, Wesley. Core Python programming. 2nd ed. Upper Saddle River: Prentice Hall, 2007. ISBN 0132269937.
- Guzdial, Mark. Introduction to computing & programming in Python : a multimedia approach [on line]. 4th ed. Upper Saddle River: Pearson : Prentice Hall, 2016 [Consultation: 16/04/2021]. Available on: https://ebookcentral.proquest.com/lib/upcatalunya-ebooks/detail.action?docID=5185706. ISBN 9781292109862.
- Langtangen, Hans Petter. Python scripting for computational science. 3rd ed. Berlin: Springer, 2008. ISBN 9783540739159.
- Pilgrim, M. Dive into Python 3 [on line]. 2nd ed. New York: Apress, 2009 [Consultation: 05/10/2022]. Available on: http://www.diveintopython3.net/. ISBN 9781430224150.

RESOURCES

Hyperlink:
- Diposit obert de material de l'assignatura. Resource

Other resources:
- http://wiki.python.org/moin/UsefulModules />- http://www.python.org/community/sigs/current/edu-sig/ />- ¿Introduction to Programming using Python¿, http://www.pasteur.fr/formation/infobio/python />- Manual d'emacs, http://www.gnu.org/software/emacs/manual/emacs.html