

## Programming

Academic Year: ( 2024 / 2025 )

Review date: 24-01-2025

Department assigned to the subject: Computer Science and Engineering Department

Coordinating teacher: MONTERO MONTES, ALVARO

Type: Basic Core ECTS Credits : 6.0

Year : 1 Semester : 1

Branch of knowledge: Engineering and Architecture

## SKILLS AND LEARNING OUTCOMES

RA1.1 Knowledge and understanding of the scientific and mathematical principles underlying their branch of engineering.

RA1.4 Awareness of the wider multidisciplinary context of engineering.

RA2.1 The ability to apply their knowledge and understanding to identify, formulate and solve engineering problems using established methods.

RA5.2 The ability to combine theory and practice to solve engineering problems.

CB1 Students have demonstrated possession and understanding of knowledge in an area of study that builds on the foundation of general secondary education, and is usually at a level that, while relying on advanced textbooks, also includes some aspects that involve knowledge from the cutting edge of their field of study.

CB2 Students are able to apply their knowledge to their work or vocation in a professional manner and possess the competences usually demonstrated through the development and defence of arguments and problem solving within their field of study.

CG1 Ability to resolve problems with initiative, creativity decision-making and critical reasoning skills, and to communicate and transmit knowledge, skills and abilities in the Industrial Engineering area.

CG13 Basic knowledge of computer use and programming, operating systems, databases, and computer programs with engineering applications.

## OBJECTIVES

By the end of this subject, students will be able to have:

1. Knowledge and understanding of the programming foundations and computer systems underlying their branch of engineering.
2. Awareness of the wider multidisciplinary context of engineering.
3. The ability to apply their knowledge and understanding to identify, formulate and solve engineering problems using computer methods.
4. The ability to combine theory and practice to solve engineering problems using computer methods.

## DESCRIPTION OF CONTENTS: PROGRAMME

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The purpose of the course is to give students an overview on programming techniques. As programming language, it will be used a imperative programming language. Precisely, Python is the language used during the course.

## PROGRAMME:

## 1. Programming foundations

## Description:

This chapter introduces the essential components of computer programming and programming languages.

## Detailed contents:

- Basic architecture of computers
- Computer programming

- Programming paradigms
- Types of programming languages

## 2. Design of programs

### Description:

This chapter focuses on the internal design of programs, paying special attention to the concept of algorithm.

### Detailed contents:

- Computer algorithms
- Analysis of algorithms
- Data structures

## 3. Coding

### Description:

Acquiring knowledge on coding by using an imperative programming language.

### Detailed contents:

- Program data
- Operators
- Advanced data structures
- Program statements
- Subprograms

## 4. Testing and debugging

### Description:

Learning principles and techniques about testing, debugging and deploying computer programs.

### Detailed contents:

- Compilation-execution cycle
- Testing techniques
- Debugging techniques

## LEARNING ACTIVITIES AND METHODOLOGY

- Theoretical lectures: 1,5 ECTS

Lectures oriented to present the theoretical concepts on programming.

- Practical lectures: 1,5 ECTS

Classes in computer labs oriented to learn the use of an IDE and put into practice the syntax.

- Programming exercises: 2,0 ECTS

Problem-based learning. Programming different pieces of code with the purpose of understanding those conceptual, technical, and methodological principles that underlie structured programming.

- Individual study: 1,0 ECTS

Self-studying to prepare for partials and final exams

## ASSESSMENT SYSTEM

**% end-of-term-examination:** 30

**% of continuous assessment (assignments, laboratory, practicals...):** 70

- Programming Exam Set:10%

- Practice: 60%

- Final exam: 30%

There is a minimum mark required on the final exam of 5.0 of 10

## BASIC BIBLIOGRAPHY

- Peter Wentworth, Jeffrey Elkner, Allen B. Downey and Chris Meyers How to Think Like a Computer Scientist: Learning with Python 3, <https://media.readthedocs.org/pdf/howtothink/latest/howtothink.pdf>, 2018

- Stephenson, Ben The Python Workbook, Springer, 2014

## ADDITIONAL BIBLIOGRAPHY

- Allen B. Downey Think Python, O'Reilly Media, Inc., 2012
- Bill Lubanovic Introducing Python, O'Reilly Media, Inc., 2014
- George W. Gorsline. Computer Organization: Hardware Software., PRENTICE HALL INTERNATIONAL EDITIONS..
- Stephen D.Burd. System Architecture. Hardware and Software in Business Information Systems., BOYD AND FRASER PUBLISHINGCOMPANY..