

## **IMPERATIVE PROGRAMMING**

Degree in Computer Systems

Degree in Computer Systems

Degree in Electrical and Computer Engineering

Degree in Engineering and Development of Digital Games

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Code: 10120

Main Scientific Area: Computer Science

Lecturer: Nuno Miguel Feixa Rodrigues

Language of Instruction: Portuguese

Regime: S1

Contact Hours: 60h Total Workload: 100h

ECTS: 6,0

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### **Objectives**

This curricular unit consists of the fundamental concepts of the imperative programming paradigm, covering algorithms and data structures, as well as structured programming. The students should be able to understand and analyze problems and plan and develop structured solutions using an algorithmic language and perform their implementation in the C programming language.

They should be able to understand the codification, compilation, and execution process.

Also, they should be able to use conditional and cyclic structures, arrays, strings as well as pointers.

Code quality and structuring will be emphasized.

### **Learning Outcomes**

Students should be able to analyze problems and implement solutions in an imperative programming language (C programming language) supported by flowcharts and algorithms. They should be able to understand the codification, compilation, and execution process.

Also, they should be able to use conditional and cyclic structures, arrays, strings as well as pointers.

### **Course Contents**

- 1- Programming Logic: Generic aspects
- 2 - Algorithms, flowcharts pseudocode
- 3 - Programming fundamental elements structures
- 4 - Simple sequence algorithms
- 5 - Control structures: Conditional cyclic structures.
- 6 - Functions, procedures recursion
- 7 - Complex data types
- 8 - Search sort algorithms
- 9 - Pointers memory management (Heap Stack)

### **Recommended Bibliography**

- Brian Kernighan e Dennis Ritchie. "C Programming Language", 2nd Edition, 1988. ISBN 978-0131103627.

- António Rocha. "Estruturas de Dados e Algoritmos em C", 3ª Edição, FCA, 2014. ISBN 978-9727227693.
- João Neto. "Programação – Algoritmos e Estruturas de Dados", 3ª Edição, Escolar Editora, 2014. ISBN 978-9725924242.
- Stephen G. Kochan. "Programming in C", 4th ed., Addison-Wesley Professional, 2014. ISBN 978-0321776419.
- Jeffrey McConnell. "Analysis of Algorithms", 2nd ed., Jones Bartlett Learning, 2007. ISBN 978-0763707828.

### **Learning and Teaching Methods**

The syllabus was defined with the aim to give to the students the ability to learn models for algorithms representation and, subsequently, learn an imperative programming language (language C).

The presentation, exploration, and implementation of algorithm representation techniques are addressed in section 1 of the program syllabus. The remaining points are dedicated to learning the programming language (language C).

### **Assessment Methods**

The assessment includes a theoretical-practical component (TC), in the form of an evaluation test in the classroom, and a practical component (PC), which consists in the preparation and individual defense of a practical work that includes a program, coded in C language, to solve a particular problem.

Calculation of the Final Grade:

The final grade (NF) of the course is given by the following formula:  $NF = 40\% \cdot CT + 60\% \cdot CP$

The minimum mark in any of the components (theoretical-practical (TC) and practical (PC)) is 9.0 values.

The assessment of the practical component is not allowed in any of the extra assessment periods.

The grad in the examination only replaces the grad in the theoretical-practical component.

A minimum of 9.0 marks in the exam is required.

### **ATTENTION:**

Only in the Medical and Informatics Engineering course (EIM), the assessment is integrated into the new pedagogical methodology 50-10. In this case, the practical component (PC) includes 15% of the final mark obtained in the 50-10 project.