![ipb INSTITUTO POLITÉCNICO DE BRAGANÇA]

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| Course Unit | Programming Laboratory | Field of study | Computer Science | |
| Bachelor in | Informatics Engineering | School | School of Technology and Management | |
| Academic Year | 2022/2023 | Year of study | 1 | Level | 1-1 | ECTS credits | 6.0 |
| Type | Semestral | Semester | 1 | Code | 9119-706-1103-00-22 | |

| Workload (hours) | 162 | Contact hours | T | - | TP | - | PL | 60 | TC | - | S | - | E | - | OT | - | O | - |
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T - Lectures; TP - Lectures and problem-solving; PL - Problem-solving, project or laboratory; TC - Fieldwork; S - Seminar; E - Placement; OT - Tutorial; O - Other

| Name(s) of lecturer(s) | Luís Manuel Alves, Davide Emanuel da Silva Dias, Maria João Tinoco Varanda Pereira, Nelson Alexandre Perdigao Figueiredo |
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### Learning outcomes and competences

At the end of the course unit the learner is expected to be able to:
1. Implement algorithms and data structures in an imperative programming language;
2. Design, implement, test and debug programs written in C, using imperative programming techniques;
3. Analyze and explain the behavior of programs written in C;
4. Modify and optimize programs written in C;
5. Develop the skills to work as a team when solving small scale computational problems.

### Prerequisites

Before the course unit the learner is expected to be able to:
Not applicable.

### Course contents

Installation and exploration of the Integrated Development Environment (IDE); declaration of variables of the different elementary data types; implementation of control structures; implementation of functions with and without arguments; use of the math.h and string.h library functions; declaration and use of vectors and multidimensional arrays; use of functions for manipulation of data files; declaration and implementation of structures; dynamic memory allocation.

### Course contents (extended version)

1. Installation, presentation and exploration of the Integrated Development Environment (IDE).
2. Declaration of variables of the different elementary data types.
3. implementation of control structures.
4. implementation of functions with and without arguments.
5. use of the math.h and string.h library functions.
6. declaration and use of vectors and multidimensional arrays.
7. use of functions for manipulation of data files.
8. declaration and implementation of structures.
9. dynamic memory allocation.
10. Coding of a project based on modular programming.

### Recommended reading

1. Luís Damas, "Linguagem C", Tecnologias de Informação, FCA, 1999.
2. Pedro Guerreiro, "Elementos de Programação com C", Tecnologias de Informação, FCA, 2006.
3. António Rocha, "Introdução à Programação Usando C", Tecnologias de Informação, FCA, 2006.
4. Brian W. Kernighan e Dennis M. Ritchie, "The C Programming Language", Prentice-Hall, 1988.
5. R. Johnsonbaugh, and M. Kalin, "C for Scientists and Engineers", Prentice-Hall, 1997.

### Teaching and learning methods

Laboratory classes where students develop a team project throughout the semester. In line with this project, students solve small programming problems on the computer or perform longer programmer assignments with the help of a formal guideline. Students complete their training through individual or group work, done outside the classroom.

### Assessment methods

1. Alternative 1 - (Regular, Student Worker) (Final, Supplementary)
    - Projects - 60% (Final project)
    - Final Written Exam - 40% (component with a minimum score of 7 out of 20)
2. Alternative 2 - (Regular, Student Worker) (Supplementary, Special)
    - Final Written Exam - 100% (includes supplementary exercises designed to replace the final project classification)

### Language of instruction

1. Portuguese
2. English

### Electronic validation

| Luís Manuel Alves | José Luís Padrão Exposto | Luísa Maria Garcia Jorge | Paulo Alexandre Vara Alves |
|---|---|---|---|
| 31-10-2022 | 31-10-2022 | 31-10-2022 | 01-11-2022 |