

Course Unit	Programming	Field of study	Informatics
Bachelor in	Biomedical Technology	School	School of Technology and Management
Academic Year	2023/2024	Year of study	2
Type	Semestral	Semester	1
Level	1-2	ECTS credits	6.0
Code	9600-752-2105-00-23		
Workload (hours)	162	Contact hours	T - TP 60 PL - TC - S - E - OT - O -

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, Bruno Miguel Cavaleiro Reis, Sandra Luisa Pereira Goncalves

### Learning outcomes and competences

At the end of the course unit the learner is expected to be able to:

1. Design a solution, build an algorithm and implement a C program that meets the objectives sought to problems of small/medium complexity;
2. Apply basic knowledge of imperative programming, in C language, such as structure a program in functions, understand passing parameters by value and process arrays.

### Prerequisites

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

### Course contents

Introductory concepts: computer languages; the programming process; basics of algorithms. The C language: elementary data types, declaration of variables, definition of constants, operations, statements and conversions of types; standard input and output; the If, If-else and Switch selection statements, the While, Do-while and For loops; definition and use of functions; function arguments passed by value; vectors and multi-dimensional arrays; strings; pointers.

### Course contents (extended version)

1. Introductory concepts:
  - computer programming;
  - programming languages;
  - development of a program;
  - basics on algorithms;
  - the C language.
2. Elementary data types:
  - data types, declaration of variables;
  - concept of constant, definition of symbolic constants;
  - arithmetic operations, statements, assignments, conversions of types;
  - statements to read and write in the console.
3. Testing and conditions:
  - conditions and logical values;
  - logical operators and relational operators;
  - conditional statements if and if-else, switch statement.
4. Loops:
  - the while statement;
  - the do-while statement;
  - the for statement.
5. Functions:
  - concept of function and structure of a C function;
  - parameters passed by value;
  - local/global, internal/external and automatic/static variables;
6. Vectors:
  - declaration and automatic initialization of vectors;
  - passing vectors to a function;
  - processing of vectors;
  - multi-dimensional arrays.
7. Strings:
  - Automatic declaration and initialization of strings;
  - Write and read on strings;
  - Passing strings to functions;
  - Main functions to manipulate strings.
8. Pointers:
  - Declaration and automatic initialization of pointers;
  - Using pointers in arrays;
  - Pointers operations;
  - Passing arrays to functions using pointers;
  - Passing arguments by value and by reference;
  - Function pointers

### Recommended reading

1. Paulo Gouveia, "Linguagens de Programação – Textos de Apoio", Escola Superior de Tecnologia e Gestão de Bragança, 2006.
2. Luís Damas, "Linguagem C", Tecnologias de Informação, FCA, 1999.
3. António Rocha, "Introdução à Programação Usando C", Tecnologias de Informação, FCA, 2006.
4. R. Johnsonbaugh, and M. Kalin, "C for Scientists and Engineers", Prentice-Hall, 1997.
5. Brian W. Kernighan e Dennis M. Ritchie, "The C Programming Language", Prentice-Hall, 1988.

### Teaching and learning methods

The teaching method used in lecture classes is the expository method, which makes possible the transmission of knowledge in a continuous and less time consuming manner. Practical classes are mostly based on the active method, enhancing the activity of students through the resolution of practical exercises. Students are also required to perform practical assignments outside the classes.

**Assessment methods**

1. Alternative 1 - (Regular, Student Worker) (Final, Supplementary)
  - Intermediate Written Test - 30% (C Programming)
  - Intermediate Written Test - 30% (C Programming)
  - Final Written Exam - 40% (C Programming)
2. Alternative 2 - (Regular, Student Worker) (Supplementary, Special)
  - Final Written Exam - 100%

**Language of instruction**

Portuguese, with additional English support for foreign students.

**Electronic validation**

Luis Manuel Alves	Tiago Miguel Ferreira Guimaraes Pedrosa	Joana Andrea Soares Amaral	José Carlos Rufino Amaro
09-10-2023	25-10-2023	31-10-2023	04-11-2023