



UNIVERSIDADE LUSÍADA
LISBOA

Course Unit Program
Advanced Programming

Academic Year 2024/2025

1. Organic Unit

Faculty of Business and Economic Sciences

2. Course

Computer Engineering

3. Cycle

1st

4. Course Unit

Advanced Programming (L9018)

5. Scientific Area

6. Curricular Year

2nd

7. Type of Curricular Unit / Semester

2nd Semester



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8. Class type and workload (work time)

Theoretical classes:

Practical classes:

Theoretical-Practical Classes 30,00

Tutorial Guidance: 20,00

9. ECTS Credits

6,00

10. Scientific Area Coordinator

Prof. Doutor VÍTOR EMANUEL DE MATOS LOUREIRO DA SILVA PEREIRA

11. Regent

Prof. Doutor JOÃO JOSÉ AMARO AMADOR LEITÃO

12. Assistants

13. Teaching Language

Portuguese

14. General Objectives

The program aims to provide a solid foundation in imperative and object-oriented programming in C/C++. Students will learn to define and implement classes, apply inheritance, polymorphism and design patterns. Introduces good programming practices, use of modern tools such as Git and IDEsL. The objective is to prepare students to develop robust and efficient software, using current methodologies and techniques.

15. Specific Objectives

The program focuses on imperative and object-oriented programming in C/C++, covering data types, operators, flow control, as well as inheritance, polymorphism and design patterns. Prioritizes the use of modern tools such as Git and IDEs, promotes good programming practices and introduces basic modeling in UML. The objective is to enable students to develop robust software, applying design principles and mastering current development techniques.

16. Skills to be acquired

The student is expected to acquire skills in C/C++ programming with a focus on data types, operators, flow control, pointers, dynamic memory allocation. Master advanced concepts such as inheritance, polymorphism, templates and application of design patterns. Use Git, IDEs to develop and debug code, implement unit tests and follow good programming practices.



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17. Teaching Methodology

The methodology combines theoretical classes for conceptual foundations with laboratory practices, ensuring direct application of concepts. It is focused on practical projects and regular reviews to consolidate learning, encouraging the resolution of real problems in object-oriented programming.

18. Course Unit Program

1. Fundamentals of Imperative Programming in C/C++:
 - Primitive and structured data types.
 - Operators and expressions.
 - Declaration, initialization and scope of variables.
 - Flow control: choice and iteration instructions.
 - Functions: definition, prototypes and calls.
 - Memory manipulation: pointers and pointer arithmetic.
 - Dynamic memory allocation.
2. Introduction to Object Oriented Programming in C++:
 - Fundamental notions of classes and objects.
 - Definition and implementation of classes.
 - Information encapsulation and abstraction.
 - Constructors and destroyers.
 - Operator overload.
3. Advanced Object-Oriented Programming Techniques:
 - Inheritance and composition.
 - Polymorphism and abstract classes.
 - Templates (generic classes and functions).
 - Exception handling.
 - Introduction to design patterns (Singleton, Factory, Observer).
4. Essential Tools and Good Practices:
 - Use of standard libraries (STL).
 - Introduction to Git and version control.
 - Use of modern IDEs and basic configuration of the development environment.
 - Basic notions of unit testing.

19. Assessment Methods

The assessment, consisting of 2 tests, follows the General Knowledge Assessment Regime.

20. Didactic Resources

Projector;
Personal computer;
Copiler and CLion IDE.

21. Sustainability Objectives

This UC can promote sustainability by teaching efficient programming practices that optimize the use of computational resources.
(4 and 8)



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22. Keywords

Object Oriented Programming;
C++.

23. Main Bibliography

Author(s): Bjarne Stroustrup
Title: Programming: Principles and Practice Using C++
Edition: 3 Year: 2024
Local:
Publisher: Addison-Wesley Professional

Author(s): Donald Evan
Title: C++ For Object Oriented Programming
Edition: 1 Year: 2024
Local:
Publisher: Edição do Autor

Author(s): Stanley Lippman, Josée Lajoie, Barbara Moo
Title: C++ Primer
Edition: 5 Year: 2012
Local:
Publisher: Addison-Wesley Professional

24. Complementary Bibliography

Author(s): Herb Sutter, Andrei Alexandrescu, John Fuller
Title: C++ Coding Standards: 101 Rules, Guidelines, and Best Practices
Edition: 1 Year: 2004
Local:
Publisher: Addison-Wesley Professional

Author(s):
Title:
Edition: Year:
Local:
Publisher:



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