UNIVERSIDADE LUSÍADA
LISBOA

Course Unit Program
Introduction to Algorithms and Data Structures

Academic Year 2025/2026

1. Organic Unit

Faculty of Business and Economic Sciences

2. Course

Computer Engineering

3. Cycle

1st

4. Course Unit

Introduction to Algorithms and Data Structures (L9009)

5. Scientific Area

6. Curricular Year

1st

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

11. Regent

Prof. Doutor NUNO SOTERO ALVES DA SILVA

12. Assistants

13. Teaching Language

Portuguese

14. General Objectives

Knowledge of data structures and algorithms suitable for the problems at hand.

15. Specific Objectives

Knowledge of algorithms and respective complexity analysis for handling different data structures.

16. Skills to be acquired

At the end of the curricular unit, the student:
- Recognize the importance of algorithmic complexity and the choice of data structures;
- Identify the main algorithmic techniques and data structures;
- Implement algorithms and respective data structures.

17. Teaching Methodology

The theoretical and practical classes will be given in an interactive way, presenting algorithms for different data structures, with students being asked to make changes to meet new requirements, as well as developing solutions from scratch.
There are weekly assignments with mandatory delivery that count towards assessment, as well as two knowledge assessment tests.

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18. Course Unit Program

1. Introduction
1.1. Computer fundamentals
1.2. Language fundamentals
1.3. Algorithms and pseudocode
1.4. flowcharts

2. Basic elements of algorithms
2.1. Variables
2.2. data types
2.3. numeric expressions
2.4. fundamentals of logic
2.5. Selection
2.6. Repetition

3. Subprograms
3.1. Structuring of functions
3.2. Arguments, parameters and variables
3.3. Communication between functions

4. Composite Data Types
4.1. lists
4.2. tuples
4.3. sets
4.4. Dictionaries

5. Algorithms
5.1. Text Processing Algorithms
5.2. recursive algorithms
5.3. search algorithms
5.4. Complexity analysis of algorithms

19. Assessment Methods

During the semester, students will be assessed in accordance with the General Regulations for Continuous Assessment in force. The assessment evaluates the work carried out in the different activities and is mainly based on a combination of individual theoretical and practical written marks and practical group work.

20. Didactic Resources

Audiovisual media will be used, exploiting new technologies, multimedia supports and interactive presentations, namely:
Specific books and digital formats from the Online Knowledge Library (b-on);
Digital presentations (PowerPoint);
Computer, video projector, and the Moodle platform.
PyCharm, VS Code, Jupyter software.

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21. Sustainability Objectives

The sustainable development goals of the 2030 Agenda (United Nations) are met with regard to:
SDG 4 - Quality education: develops computational thinking, problem solving and digital literacy, which are essential to basic training in computer engineering;
SDG 5 - Gender equality: promotes an inclusive learning environment in technological areas, contributing to reducing disparities in participation and academic success;
SDG 9 - Industry, Innovation and Infrastructure: introduces principles of

22. Keywords

Algorithms
Data Structures
Linked Lists

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23. Main Bibliography

Author(s):	Richar E. Neapolitan		
Title:	Foundations of Algorithms		
Edition:	6ª	Year:	2025
Local:	Londres		
Publisher:	Jones and Bartlett Learning		
ISBN Code:	978-1-284-28283-2		

Author(s):	Cormen, T. H., Leiserson, C. E., Rivest, R. L., & Stein, C.		
Title:	Introduction to Algorithms		
Edition:	4ª	Year:	2022
Local:	New York		
Publisher:	MIT Press		
ISBN Code:	978-0-262-04630-5		

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

24. Complementary Bibliography

Author(s):	M. Goodrich, R. Tamassia, M Goldwasser		
Title:	Data Structures & Algorithms in Python		
Edition:	1ª	Year:	2013
Local:	London		
Publisher:	Wiley		
ISBN Code:	978-1-118-29027-9		

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

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Ficha técnica MIP / MIP Datasheet	
Título / Title	Course Unit Program 'INTRODUÇÃO AOS ALGORITMOS E ESTRUTURAS DE DADOS': Academic Year 2025/2026
Autor / Author	Prof. Doutor NUNO SOTERO ALVES DA SILVA
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