



UNIVERSIDADE LUSÍADA
LISBOA

Course Unit Program
Compilers

Academic Year 2024/2025

1. Organic Unit

Faculty of Business and Economic Sciences

2. Course

Computer Engineering

3. Cycle

1st

4. Course Unit

Compilers (L9023)

5. Scientific Area

6. Curricular Year

3rd

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. Doutora MARIA INÊS VASCONCELLOS FURTADO

12. Assistants

13. Teaching Language

Portuguese

14. General Objectives

Explore the theoretical and practical foundations of compilers, from the theoretical basis of Turing Machines to the implementation of lexical and syntactic analyzers.

15. Specific Objectives

By the end of the course, students should be able to understand and apply the principles of Turing Machines, understand the structure and phases of a compiler, design and specify programming languages, and implement basic lexical and syntactic analyzers.

16. Skills to be acquired

Develop practical skills in the construction of lexical and syntactic analyzers. Understand the theoretical foundations of programming languages and compilers. Analyze and discuss the importance of Turing Machines in the theory of computing and computability.

17. Teaching Methodology

- Theoretical-practical classes where the subject of study is presented and where several assignments and exercises are proposed to students to be solved within the class or through research afterwards.
- Tutorial classes where exercises are solved using PCs where the necessary tools are installed.



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18. Course Unit Program

- 1 Turing machines
 - 1.1 Introduction to Turing Machines
 - Definition, structure and basic operations.
 - 1.2 Church-Turing theorem
 - Implications and importance in computer theory.
2. The Structure of a Compiler
 - Overview of the phases of a compiler:
 - Lexical analysis, syntactic analysis, semantic analysis, code generation, optimization and assembly.
3. Programming languages
 - 3.1 Main characteristics of programming languages.
 - 3.2 Programming language classifications and paradigms.
4. Language Specification and Design
 - Formal definition of programming languages.
 - Methods for designing a programming language.
5. Phases of a Compiler
 - 5.1 Lexical analysis:
 - Role of lexical analysis in the compilation process.
 - 5.2 Building a lexical analyzer:
 - Use of deterministic finite automata (AFDs) and regular expressions.
6. Syntactic Analysis and Error Correction
 - 6.1 The role of syntactic analysis in the compiler.
 - 6.2 Building a syntactic analyzer:
 - Top-down and bottom-up parsing methods.
 - Treatment of syntactic errors.

19. Assessment Methods

- The theoretical-practical classes will be given in an interactive way presenting the subject matter and small exercises. In the practical classes students must solve exercises with tutoring, as well as develop solutions from scratch.
- Exercises / Assignments are required and contribute to the final evaluation, as well as two knowledge evaluation tests.
- Project divided into two parts.

20. Didactic Resources

Classes will be given, whenever possible, using visual presentations.
Students will be provided with illustrative examples of conventional and non-conventional models and problems, as well as supplementary information on the subjects taught.

21. Sustainability Objectives



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22. Keywords

Compilers
Formal Languages
Turing Machine

23. Main Bibliography

Author(s): Rui Gustavo Crespo
Title: Processadores de Linguagens
Edition: 2 Year: 2001
Local: Lisboa
Publisher: IST Press

Author(s): Pedro Reis Santos, Thibault Langlois
Title: Compiladores: da teoria à prática
Edition: 1 Year: 2014
Local: Lisboa
Publisher: FCA

Author(s): R. Sethi A. V. Aho and J. D. Ullman
Title: Compilers: Principles, Techniques, and Tools.
Edition: Year: 2006
Local: USA
Publisher: Pearson

24. Complementary Bibliography

Author(s): Susan Rodger and Thomas Finley
Title: JFLAP Version 7.1
Edition: Year:
Local: On-line
Publisher: <https://www.jflap.org/>

Author(s): Michael Sipser
Title: Introduction to the Theory of Computation
Edition: Year: 2005
Local: Course Technology
Publisher:



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Ficha técnica MIP / MIP Datasheet	
Título / Title	Course Unit Program 'COMPILADORES': Academic Year 2024/2025
Autor / Author	Prof. Doutora MARIA INÊS VASCONCELLOS FURTADO
Classificação / Classification	-
Descritores / Descriptors	-
Colaborador(es) / Colaborator(s)	-
Data Hora / Date Time	
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