DTC-SAP-374 Introduction to Algorithms & Models of Computation

SEMESTER: Spring

CREDITS: 6 ECTS (lecture 3 credits + laboratory 3 credits)

LANGUAGE: English

DEGREES: SAPIENS program

Course overview

This course provides a comprehensive introduction to the core concepts of algorithms and computational theory. The curriculum covers a wide range of topics, from basic algorithm design and analysis to the study of formal languages and computational complexity.

Prerequisites

- Programming fundamentals (Python basics strongly recommended).

Course contents

Theory:

- Module 1: Introduction to algorithms.
- Module 2: Design patterns.
- Module 3: Complexity.
- Module 4: Data structures.
- Module 5: Sorting algorithms.
- Module 6: Trees.
- Module 7: Advanced techniques.

Laboratory:

- Lab 1: Revisiting programming basic concepts.
- Lab 2: Recursion and Backtracking.
- Lab 3: Complexity.
- Lab 4: Lists.
- Lab 5: Stacks and Queues.
- Lab 6: Sorting.
- Lab 7: Trees.

- Lab 8: Heaps.
- Lab 9: Red-black trees.
- Lab 10: Greedy algorithms.
- Lab 11: Dynamic programming.

Textbook

- Introduction to Algorithms. T. H. Cormen, C. E. Leiseron, R. L. Rivest & C. Stein. The MIT Press, 4th Ed., 2022.

Grading

The following conditions must be accomplished to pass the course:

- A minimum grade in the ordinary or/and extraordinary final exam of 5 over 10.
- A minimum grade in the practice part of 5 over 10.
- A minimum grade of 5 over 10.

The overall grade is obtained as follows:

- Final exam (50%)
- Midterms (20%)
- Final project (15%)
- Labs (15%)