



# FOUNDATIONS OF COMPUTER SCIENCE F - O

ING-INF/05 - 9 CFU - 2° Semester

## Teaching Staff

### CONCETTO SPAMPINATO

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### ISAAK KAVASIDIS

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## LEARNING OBJECTIVES

The course covers the fundamental concepts of computer science: digital information representation, computer architectures, operating systems, algorithms, programming languages, on compilers and interpreters and on structured programming and programming in C language. In particular, the development of C programs for the management of complex data structures (libraries, archives, etc.).

## COURSE STRUCTURE

Lectures, hands-on exercises and laboratory.

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## DETAILED COURSE CONTENT

### Fundamentals of algorithms and programs

- Automatic information processing. Algorithms and programs. Programming languages. Code Design. Structured programming. Flowcharts and pseudocode.

### Information Representation

- Coding systems. Numbering systems and conversion algorithms. Full and floating point arithmetic. Representation of multimedia data.

### Computer Architecture:

- Computer components: central memory, central unit, basic operation of the computer (machine cycle). Peripheral devices and memories.

### Computer networks and the Internet

- Local networks. Geographical networks. Network protocols. Overview of the Internet and the most widespread network applications.

## **Operating Systems**

- Programming Environment. Compilers vs. interpreters. Architecture and functionality of an Operating System. Process management. Memory management. File system.

## **The C programming language: syntax and semantics**

- Instruction set. Control structures. Data types in C: int, char, float, double, arrays and strings, structures. The C pointer. Functions.

## **Sorting and searching algorithms**

- Sequential and binary search. Sorting algorithms.

## **Data structures**

- Dynamic data structures. Dynamic allocation of memory. Stacks, Queues and Trees. Example codes.

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## **TEXTBOOK INFORMATION**

- Bellini, A. Guidi - "Linguaggio C - guida alla programmazione", 4a ed. McGraw-Hill
  - D. Sciuto, G. Buonanno, L. Mari, , "Introduzione ai sistemi informatici" 5a ed. McGraw-Hill
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