



UNIVERSITÀ  
DEGLI STUDI DI MILANO-BICOCCA

## SYLLABUS DEL CORSO

### Laboratorio di Informatica I

2223-1-E3001Q074

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#### Aims

Acquire the conceptual basis of computer programming, and fundamental notions about the typical structure of digital computers, and about operating systems.

Acquire the ability to design and implement, in the C language, data structures and algorithms for solving problems in scientific fields, and in a more general setting.

#### Contents

The notions of algorithm, and of computational cost of an algorithm.

Basics of imperative programming: data structures and flow control.

Basic notions on the functional structure of computers and on operating systems.

The representation of data; errors and approximations in numerical computations.

Strategies for algorithm design.

#### Detailed program

The notions of algorithm, and of computational cost of an algorithm.

The functional structure of digital computers. Nature and functions of operating systems.

Representation of data. The binary notation. Representation of integers and of real numbers. Floating-point representation. Approximation and errors.

Principles of imperative programming. Variables and types, primitive instructions, control structures (sequence, choice, iteration). Functions and parameter passing. Examples in C. Structured types: arrays, matrices\*, \* records. Dynamic data types: linked lists, trees. Examples in C.

Pseudorandom sequences and application to simulation problems.

Strategies for the design of data structures and algorithms. Examples of relevant algorithms.

Programming paradigms (imperative, functional, logic, object-oriented). Interpreted languages and software environments for scientific computation.

## **Prerequisites**

Basic notions of propositional logic. Basic notions of mathematics (functions and relations, simple combinatorics).

## **Teaching form**

Lectures (2 CFU), laboratory activity (2 CFU).

Lectures are given in Italian.

## **Textbook and teaching resource**

Notes prepared by the teacher, exercises with commented solutions, published on the course site.

1. JG Brookshear, SG Kochan, *Fondamenti di informatica e programmazione in C*, Pearson, 2014.
2. BW Kernighan, DM Ritchie, *Il linguaggio C*, seconda edizione, Pearson, 2004.

## **Semester**

Second semester.

## **Assessment method**

The exam includes a written part and an oral part, both mandatory.

Written exam: the student will have to write a program in C, which solves a given problem.

Oral exam: discussion about the written exam, and questions on the content of the course.

## **Office hours**

Luca Bernardinello: on appointment.

Federico Nati: on appointment.

## **Sustainable Development Goals**

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