UNIVERSITÀ
DEGLI STUDI DI MILANO-BICOCCA

# COURSE SYLLABUS

# C++ Programming

**2021-3-E3101Q133**

## Aims

At the end of the course, the student will be able to design and develop modular and maintainable programs. It will also be able to apply modern C++ programming techniques to develop high performance and graphic applications, and managing resources correctly. The acquired skills will enable the student to address and understand complex C++ applications.

## Contents

The course aims to give the student the necessary knowledge to face the development of C ++ applications in a correct way and to address the problems related to resource management . To this end, through the intensive use of case studies, the critical issues and difficulties inherent to the C++ language and the techniques best suited to address them will be shown. A cross-platform framework for the development of C ++ graphical applications will also be presented.

## Detailed program

Introduction to C++.
Basic concepts of C++ programming
- data types, pointers, reference, scoping
- casting,

C ++ as an object-oriente programming language
- classes, constructors and destructors, overloading, friend methods
- inline, constness

Advanced C ++ programming concepts

- operator overloading
- virtual methods, abstracts, polymorphism
- inheritance

Generic programming
- template
- iterators

The Standard library (STL)
- The container classes
- The algorithms
- Functors
- Multithreading

Use of external libraries
- Static libraries
- Dynamic libraries
- The OpenMP library

The new C ++ 11, C ++ 14 standards

GUI applications
- QT Creator development environment
- Development of graphical interfaces
- Event management
- The Qt libraries, QTWidgets

## Prerequisites

Basic programming language skills

## Teaching form

Teaching given in Italian.

Lectures, exercises, and practice labs.

During the Covid-19 emergency period, the method of teaching delivery is changed. Lessons, exercises, and laboratory sessions will be moslty delivered remotely with video recordings and with live videoconferencing events.

## Textbook and teaching resource

Bjarne Stroustrup, The C++ Programming Language - Special Edition, Addison Wensley.

Bruce Eckel, Thinking in C++ vol. 1 e vol. 2, Prentice Hall (available online)

Peter Van Weert, Marc Gregoire, C++ Standard Library Quick Reference, Apress

Lee Zhi Eng, Qt5 C++ GUI Programming Cookbook, Packt Publishing

Handouts

## Semester

Third year, first semester

## Assessment method

During the Covid-19 emergency period, oral exams will only be online. They will be carried out using the WebEx platform and on the e-learning page of the course there will be a public link for access to the examination of possible virtual spectators.

The assessment includes a project and an oral.

The project serves to verify the acquisition of practical skills and problem solving with the development of a solution to a problem assigned. The project's text is published one month before the exam session and the students have three weeks for its delivery. The evaluation of the project is the basis of the final evaluation.

The oral exam consists in a discussion of the developed solution. There are also theoretical questions on the concepts presented in class. The evaluation of the oral exam allows to increase (or decrease) the evaluation obtained in the project.

There are no ongoing tests.

## Office hours

By appointment