

# Course Name: Modern C++

**Number of hours:** 30

**Credits:** 10

## AIMS AND CONTENT

### Learning Outcomes

The students will learn the new syntax and philosophy of Modern C++ (releases C++11, -14, -17, -20) with hands on the code at every lesson, its application with modern SW development techniques and finally they will challenge themselves with an online assignment where they will put in practice what learnt.

### Syllabus/Content

Each of the following modules will be 3.0 hours each with theory and hands-on

1. Introduction 1: presentation of the course, basics of used tools (CMake, gitpod, git, Markdown, etc).
2. Introduction 2: refresh of C++98.
3. The basics 1: nullptr, auto, type aliases, initializer list, uniform initialization
4. The basics 2: range based loops, constexpr, scoped enums, override and final.
5. Advanced topics 1: lambda functions, STL containers, algorithms
6. Advanced topics 2: move semantics, smart pointers.
7. Advanced topics 3: multithread.
8. Advanced topics 4: new features in C++20
9. Language applied 1: hands on code.
10. Language applied 2: Critic discussion and correction of the code assignment.

## WHO

### Teachers:

Marco Accame (coordinator): [marco.accame@iit.it](mailto:marco.accame@iit.it)

Valentina Gaggero: [valentina.gaggero@iit.it](mailto:valentina.gaggero@iit.it)

Nicolò Genesio: [nicolo.genesio@iit.it](mailto:nicolo.genesio@iit.it)

## How

### Teaching Methods:

Slides with code examples, hand on code using gitpod or other environment (each student needs a laptop), open discussion and questions.

**Exam Description:**

An online assignment with some questions and / or development of a simple project using what learned during the course. The goal of the assignment is not to check if a student knows by heart some coding syntax, but to learn how to design and present a piece of work.

**Assessment Methods:**

To be admitted to the online assignment the student must have attended at least 7 lessons. The assessment is passed if the developed code compiles, produces reasonable results and a simple report is presented.

<b>WHERE AND WHEN</b>
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**Lesson Location**

IIT-CRIS (Center for Robotics and Intelligent Systems), Via San Quirico 19D, 16163 Genova, Italy

**Lesson Schedule**

1. Introduction 1: on **5 May 2025**, 1000-1300
2. Introduction 2: on **7 May 2025**, 1000-1300
3. The basics 1: on **8 May 2025**, ~~1000-1300~~ 1430-1730
4. The basics 2: on **12 May 2025**, 1000-1300
5. Advanced topics 1: on **14 May 2025**, 1000-1300
6. Advanced topics 2: on **15 May 2025**, 1000-1300
7. Advanced topics 3: on **19 May 2025**, 1000-1300
8. Advanced topics 4: on **21 May 2025**, 1000-1300
9. Language applied 1: on **22 May 2025**, 1000-1300
10. Language applied 2: on **29 May 2025**, 1000-1300

The assignment will be revealed during the course. The students will have some time to complete it and solutions will be critically discussed during the last day of the course.