

## Programming

Academic Year: ( 2024 / 2025 )

Review date: 16-05-2024

Department assigned to the subject: Computer Science and Engineering Department

Coordinating teacher: FERNANDEZ MUÑOZ, JAVIER

Type: Compulsory ECTS Credits : 6.0

Year : 1 Semester : 1

## REQUIREMENTS (SUBJECTS THAT ARE ASSUMED TO BE KNOWN)

Basic knowledge of C++ language

## OBJECTIVES

The goal of this course is to introduce to the student in the concept of performance understanding its limits. From this concept, students will learn different techniques to build high performance programs using the C++ programming language as a vehicle.

## DESCRIPTION OF CONTENTS: PROGRAMME

1. High Performance Computing Fundamentals.
2. Programming languages and performance: link to native code
3. Memory management.
4. Polimorphism and Generic programming
5. Libraries and interoperability.
6. Code optimization.
7. Concurrent programming: threads and concurrency frameworks
8. Parallel programming and cluster programming
9. Applications performance analysis: sequential and multithread.
10. Real-Time programming

## LEARNING ACTIVITIES AND METHODOLOGY

## LEARNING ACTIVITIES

AF1: Theoretical presentations accompanied by electronic material, such as digital presentations.

AF2: E-learning activities.

AF3: Theoretical/practical classes.

AF4: Laboratory practices.

AF5: Tutoring sessions.

AF7: Individual work of the student.

AF9: Partial and final exams.

## METHODOLOGY

MD1: Lectures in class by the teacher with computer and audiovisual media support, in which the main concepts of the subject are developed and the bibliography is provided to complement the students' learning.

MD3: Resolution of practical cases, problems, etc ... raised by the teacher individually or in a group

MD4: Presentation and discussion in class, under the moderation of the teacher, of topics related to the content of the subject, as well as practical cases

MD5: Preparation of works and reports individually or in groups

MD6: Specific e-learning activities, related to the semi-face-to-face nature of the degree, including viewing recorded content, self-correction activities, participation in forums, and any other online

teaching mechanism

## TUTORSHIP

Students can ask for individual online tutorship.

## ASSESSMENT SYSTEM

<b>% end-of-term-examination:</b>	60
<b>% of continuous assessment (assignments, laboratory, practicals...):</b>	40

SE1: In class participation: 10%

SE2-3: Individual work performed during the course: 30%

SE4: Face to face exams: 60%

## BASIC BIBLIOGRAPHY

- Anthony Williams C++ Concurrency in Action. Practical Multithreading. 2nd Edition, Manning, 2019
- Bjarne Stroustrup Programming - Principles and Practice. 2nd Edition, Addison-Wesley, 2014
- Michael Voss, Rafael Asenjo, James Reinders Pro TBB: C++ Parallel Programming with Threading Building Blocks, APress, 2019

## ADDITIONAL BIBLIOGRAPHY

- Bjarne Stroustrup The C++ Programming Language. 4th Edition, Addison-Wesley, 2013
- Bjarne Stroustrup A Tour of C++. 2nd Edition., Addison-Wesley, 2018
- Gerassimos Barlas Multicore and GPU Programming: An Integrated Approach, Morgan-Kaufmann, 2014
- Kurt Guntheroth Optimized C++, O'Reilly, 2016
- Peter Gottschling Discovering Modern C++: An intensive course for scientists, engineers and programmers, Addison-Wesley, 2015

## BASIC ELECTRONIC RESOURCES

- CppReference . C++ Reference: <https://en.cppreference.com/w/>