High Performance Computing

Academic Year: (2020 / 2021) **Review date: 08-07-2020**

Department assigned to the subject:

Coordinating teacher: GARCIA BLAS, FRANCISCO JAVIER

Type: Compulsory ECTS Credits : 3.0

Year : 2 Semester : 1

REQUIREMENTS (SUBJECTS THAT ARE ASSUMED TO BE KNOWN)

Computer Architecture, Operating Systems

OBJECTIVES

1. Ability to understand and apply advanced concepts in high performance computing and numerical methods for solving engineering problems.

2. Ability to analyze and design high performance computing applications.

3. Ability to apply high performance computing techniques to engineering problems.

DESCRIPTION OF CONTENTS: PROGRAMME

1. Principles of high performance computing.
2. Design and analysis of high throughput computing applications.
3. Parallel programming paradigms: message passing, shared memory, data-parallel.
4. Performance analysis and optimization of parallel applications.
5. Trends in High Performace Computing.

LEARNING ACTIVITIES AND METHODOLOGY

AF1. Theory classes. Oriented towards specific competences of the subject, they will allow to teach the students the concepts they should know. Before the classes, the students will have in advance course materials and bibliography to study and to deeply understand the course topics.

AF4. Classes in computer labs. The course includes mandatory projects, that will be made in groups.

AF7. Student self-study. Oriented to acquire self-organization capacities and to be able to plan individual work and the learning process. It might include exercises, extra lectures, and studying the course contents.

ASSESSMENT SYSTEM

The course evaluation will asses the level of coverage of the learning objectives. It will take into account all the student work, individually or in group.

SE2: Assignments 75%
The evaluation will be done in a continuous manner and will include the following activities:
- Programming assignments and reports will account for 50% of the grade.

SE3: Final exam 25%
The final exam will account for 25% of the grade and will cover the whole course content.

The minimum grade for passing the class is 5 on a scale from 0 to 10.

% end-of-term-examination:	50
% of continuous assessment (assigments, laboratory, practicals…):	50

BASIC BIBLIOGRAPHY

- B. Wilkinson, M. Allen Parallel Programming Techniques and Applications Using Networked Workstations and Parallel Computers, Prentice Hall, 1999.

- Bradford Nichols, Dick Buttlar, Jacqueline Proulx Farrell PThreads Programming, O'Reilly, 1997.

- D. Kirk, W. Hwo Programming Massively Parallel Processors: A Hands-on Approach, Morgan Kaufmann, 2010

- D.E. Culler, J.P. Singh, with A. Gupta Parallel Computer Architectures: a Hardware/Software Approach, Morgan Kaufmann Pub.,1999.

- G.R. Andrews Multithreaded, Parallel, and Distributed Programming, Addison Wesley, 2000..

- P.S. Pacheco Parallel Programming with MPI, Morgan Kaufmann Pub.,1997..

- R. Chandra, R. Menon,L. Dagum et al. Parallel Programming in OpenMP, Morgan Kaufmann Pub., 2000..