



Guía docente

205204 - HPCAE - Computación de Altas Prestaciones para la Ingeniería Aeroespacial

Última modificación: 19/04/2023

Unidad responsable: Escuela Superior de Ingenierías Industrial, Aeroespacial y Audiovisual de Terrassa

Unidad que imparte: 748 - FIS - Departamento de Física.

Titulación: GRADO EN INGENIERÍA EN TECNOLOGÍAS AEROESPACIALES (Plan 2010). (Asignatura optativa).
GRADO EN INGENIERÍA EN TECNOLOGÍAS INDUSTRIALES (Plan 2010). (Asignatura optativa).
GRADO EN INGENIERÍA EN VEHÍCULOS AEROESPACIALES (Plan 2010). (Asignatura optativa).

Curso: 2023

Créditos ECTS: 3.0

Idiomas: Inglés

PROFESORADO

Profesorado responsable: Manel Soria

Otros:

CAPACIDADES PREVIAS

Good programming skills in C (preferably) or Fortran. Basic knowledge of interpreted languages such as Matlab or Python. Familiarity with Linux operating systems.

METODOLOGÍAS DOCENTES

The course will be developed through theoretical lectures and hands-on sessions where the students will implement fragments of high performance computing codes for aerospace applications, and study the practical behaviour of new and classic parallel computers.

OBJETIVOS DE APRENDIZAJE DE LA ASIGNATURA

Understand the need of high performance computing for aerospace engineering applications.

Understand the different computer architectures currently in use for high performance computing.

Understand why only some algorithms can run in parallel.

Understand the different parallel programming models.

Acquire hands-on experience in parallel programming using OpenMP.

Acquire hands-on experience in parallel programming using MPI.

HORAS TOTALES DE DEDICACIÓN DEL ESTUDIANTADO

Tipo	Horas	Porcentaje
Horas aprendizaje autónomo	45,0	60.00
Horas grupo grande	30,0	40.00

Dedicación total: 75 h



CONTENIDOS

Module 1: Introduction to high performance computing for aerospace engineering applications

Descripción:

- * Motivations
- * Limitations of the sequential processors
- * Examples of problems in need of high performance computing
- * Introduction to parallel computer architectures
- * Shared memory model and distributed memory model

Actividades vinculadas:

Case study one: parallel algorithms for image processing
Case study two: genetic algorithms for optimization
Case study three: interplanetary trajectory analysis

Dedicación: 25h

Grupo grande/Teoría: 10h
Aprendizaje autónomo: 15h

Module 2: OpenMP and MPI

Descripción:

- * Description of the standards
- * Hello world example

Dedicación: 25h

Grupo grande/Teoría: 10h
Aprendizaje autónomo: 15h

Module 3: Guided project

Descripción:

- * The students will select the topic of their project in agreement with the professor.

Dedicación: 25h

Grupo grande/Teoría: 10h
Aprendizaje autónomo: 15h

SISTEMA DE CALIFICACIÓN

Class participation and class exercises: 30%

Assignment: 30%

Project: 40%

Students with a grade below 5.0 in the project, or the assignments, or the classroom participation, will be able to take an additional written exam covering all the subject, that will take place the date fixed in the calendar of final exams. The grade obtained in this test will range between 0 and 10, and will replace that of the part or parts below 5.0 only in case it is higher, up to a maximum of 5.0 points.