Universidad Zaragoza

Year : 2020/21

26918 - Computational Physics

Syllabus Information

Academic Year: 2020/21
Subject: 26918 - Computational Physics
Faculty / School: 100 - Facultad de Ciencias
Degree: 447 - Degree in Physics
ECTS: 6.0
Year: 2
Semester: Second semester
Subject Type: Compulsory
Module: ---

1.General information

1.1.Aims of the course

1.2.Context and importance of this course in the degree

1.3.Recommendations to take this course

2.Learning goals

2.1.Competences

2.2.Learning goals

2.3.Importance of learning goals

3.Assessment (1st and 2nd call)

3.1.Assessment tasks (description of tasks, marking system and assessment criteria)

4.Methodology, learning tasks, syllabus and resources

4.1.Methodological overview

The learning process designed for this course is based on the following:

- Theory lectures: One hour per week, where the elementary ideas of Physics, Mathematicas and Programing will be explained.
- Problems lectures: Code implementation of topics from theory lectures will be discussed. One hour per week
- Programming lectures: Students will use these lectures to write the code corresponding to Theory and Problems lectures, including its compilation and running.
- Tutoring sessions: The corresponding hours will be fixed depending on the schedule

4.2.Learning tasks

This course includes the following activities: theory lectures, problems lectures, programming lectures and tutoring sessions.

4.3.Syllabus

Differential Equations
Partial Derivatives in Differential Equations
Random numbers

Arbitrary random distributions

Statistical analysis and error computation

Advanced statistical analysis

Brownian motion

Ising Model

Elementary principles from Statistical Mechanics

Monte Carlos simulations

Advanced simulation of Ising Model

Simulated Annealing

Complex Networks

Neural Networks

4.4.Course planning and calendar

In-person lectures calendar and work presentations

The distribution, based on the course credits, of planned activities is the following:

1. Theory-problems lectures: One hour per week for theory and one hour for problems
2. Programming lectures: Two hours per week in a single session
3. Exams: Theory exam; practical exam, preparation of previously (one week before the exam) proposed programming problem. One hour session in a programming classroom for Programming problem testing and brief code modification.

Key dates

Theory and problems lectures take place during the second semester of second year of Physics Degree.

Programming lectures will be homogenously distributed during that period.

Examination sessions: Examination sessions by mean of a written global test are determined by Science Faculty Deanship and are published in the Science Faculty web page.

4.5.Bibliography and recommended resources