SUBJECT TEACHING GUIDE

G61 - Numerical Methods

Degree in Physics

Academic year 2020-2021

1. IDENTIFYING DATA					
Degree	Degree in Physics			Type and Year	Compulsory. Year 3
Faculty	Faculty of Sciences				
Discipline	Subject Area: Advanced Mathematics for Science Central Module				
Course unit title and code	G61 - Numerical Methods				
Number of ECTS credits allocated	6	Term		Semester based (1)	
Web					
Language of instruction	Spanish	English Friendly	No	Mode of delivery	Face-to-face

Department	DPTO. MATEMATICAS, ESTADISTICA Y COMPUTACION
Name of lecturer	CARLOS BELTRAN ALVAREZ
E-mail	carlos.beltran@unican.es
Office	Facultad de Ciencias. Planta: + 1. DESPACHO CARLOS BELTRAN ALVAREZ (1040)
Other lecturers	FATIMA LIZARTE LOPEZ

3.1 LEARNING OUTCOMES
- Learn the theory, practice and implementation of the most basic computational tools for Scientific Computation: solving systems of equations, interpolation, derivation and integration, ODE solving.
- The student is expected to learn how to process the results of numerical programs taking care of rounding errors
- Know and understand some basic mathematical techniques for the solution of different problems , both from a theoretical and experimental point of view,

4. OBJECTIVES

The goal is that the students learn the techniques which allow to analyse a physical problem from its numerical simulation, understanding the errors intrinsic to the process. He/she must also get familiar with the solution to some concrete problems, the most basic ones, related to interpolation, system solving, derivatives, integrals, numerical linear algebra and ODE solving.

6. COURSE ORGANIZATION

CONTENTS	
1	Introduction to the problems of numerical calculus and its applications, with practical examples
2	Lagrange interpolation: computation and applications
3	Numerical derivatives, different formulae for the first and second derivative. Numerical integration: Mid-point, Trapezoid and Simpson's rule (simple and composite).
4	Non linear equation solving: bisection, Newton's mehtod.
5	Numerical solution of ODE systems. Euler's method, Runge-Kutta method, applications
6	Final exam

7. ASSESSMENT METHODS AND CRITERIA

Description	Type	Final Eval.	Reassessn	%
A mid-term exam.	Laboratory evaluation	No	Yes	50,00
Final exam.	Laboratory evaluation	Yes	Yes	0,00
A mid-term exam.	Laboratory evaluation	No	Yes	50,00
TOTAL				100,00

Observations
No material is allowed in the exams, except agreement with the professor.
Observations for part-time students
Part time students can follow the regular curse or just present to the final exam.

8. BIBLIOGRAPHY AND TEACHING MATERIALS

BASIC

Apuntes de la asignatura proporcionados por el profesor, tanto en versión documento como en versión web (Moodle)