

## SUBJECT TEACHING GUIDE

### G61 - Numerical Methods

Degree in Physics

Degree in Physics

Academic year 2023-2024

1. IDENTIFYING DATA					
Degree	Degree in Physics Degree in Physics			Type and Year	Compulsory. Year 3 Compulsory. Year 2
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	<a href="https://moodle.unican.es/">https://moodle.unican.es/</a>				
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	PEDRO RAMON LOPEZ GOMEZ				

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. SUBJECT PROGRAM

##### 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 method.
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	%
Final exam.	Laboratory evaluation	Yes	Yes	60,00
Short questions	Activity evaluation with Virtual Media	No	No	20,00
Short questions	Activity evaluation with Virtual Media	No	Yes	20,00
TOTAL				100,00
Observations				
The tests will be most likely in each student's laptop.				
The recoverable part of the continuous evaluation can be improved in the final exam.				
The extraordinary exam will have similar conditions to those of the ordinary one.				
Observations for part-time students				
Part time students can follow the regular course 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)