

SUBJECT TEACHING GUIDE

G2261 - Numerical Methods

Degree in Physics

Academic year 2025-2026

1. IDENTIFYING DATA					
Degree	Degree in Physics			Type and Year	Compulsory. Year 2
Faculty	Faculty of Sciences				
Discipline					
Course unit title and code	G2261 - Numerical Methods				
Number of ECTS credits allocated	6	Term	Semester based (2)		
Knowledge Field	Physics and astronomy				
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				
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Office	Facultad de Ciencias. Planta: + 1. DESPACHO (1040)				
Other lecturers	DAVID IGNACIO ALCANTARA GARCIA				

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	Midterm exam where the contents studied to the date will be evaluated
5	Non linear systems of equations solving: bisection, multivariate Newton's method
6	Numerical solution of ODE systems. Euler's method, Runge-Kutta method, applications
7	Final exam

7. ASSESSMENT METHODS AND CRITERIA				
Description	Type	Final Eval.	Reassessn	%
Midterm exam	Written exam	No	Yes	40,00
Final exam	Written exam	Yes	Yes	60,00
TOTAL				100,00
Observations				
<p>Assessment tests are expected to take place on the students' own computers.</p> <p>In the final exam, students will have the opportunity to recover half of their midterm exam grade. This will be done by assigning the highest of two quantities to the final course grade:</p> <p>The grade obtained by weighting the final exam at 60% and the midterm exam at 40%.</p> <p>The grade obtained by weighting the final exam at 80% and the midterm exam at 20%.</p> <p>The extraordinary exam session will have the same conditions as the ordinary exam session.</p>				
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)