SUBJECT TEACHING GUIDE

G99 - Numerical Analysis II

Double Degree in Physics and Mathematics
Degree in Mathematics

Academic year 2020-2021

1. IDENTIFYING DATA					
Degree	Double Degree in Physics and Mathematics Degree in Mathematics			Type and Year	Compulsory. Year 4 Compulsory. Year 3
Faculty	Faculty of Sciences				
Discipline	Subject Area: Computational Mathematics Module: Compulsory Subjects				
Course unit title and code	G99 - Numerical Analysis II				
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	MARIA CECILIA POLA MENDEZ
E-mail	cecilia.pola@unican.es
Office	Facultad de Ciencias. Planta: + 3. DESPACHO (3009)
Other lecturers	

3.1 LEARNING OUTCOMES
- To solve linear and nonlinear systems of equations. To derive and to apply numerical methods for determining matrix eigenvalues and eigenvectors.
- To implement some of the algorithms.
- To get knowledge to compare several methods.
- To interpret results appropriately.

4. OBJECTIVES

To introduce the key concepts and algorithms in numerical linear algebra , including direct and iterative methods for solving simultaneous linear equations, methods for nonlinear systems, least squares problems and methods for computing eigenvalues and eigenvectors,

6. COURSE ORGANIZATION

CONTENTS	
1	TEMA I Numerical Solutions of Linear Systems 1.1 Direct Methods. Triangular Systems. LU Factorization Methods. Cholesky Method. QR Factorization. 1.2 Inverses and Determinant 1.3 Vector Norms and Matrix Norms 1.4 Conditioning 1.5 Iterative Methods for Large Problems 1.6 Least-Squares Solution to Linear Systems.
2	TEMA II Iterative Methods for Nonlinear systems 2.1 Newton's Methods 2.2 Broyden's Method
3	TEMA III Numerical Matrix Eigenvalue Problems 3.1 Localization of Eigenvalues 3.2 Conditioning 3.3 The Power Method and Some Simple Extensions 3.4 The QR Algorithm 3.5 Reduction to Hessenberg and Tridiagonal Forms
4	6 hours per week
5	The final exam consists of two parts. Part I (without computer) gives a maximum of 2.5 points (25%). Part II (solving problems with a computer) with a maximum of 3.5 points (35%) .

7. ASSESSMENT METHODS AND CRITERIA

Description	Type	Final Eval.	Reassessn	%
An exam whith theoretical and computational exercises to do before the third lecture. It gives a maximum of 4 points (40%)	Others	No	Yes	40,00
The final exam consists of two parts. Part I (without computer) gives a maximum of 2.5 points (25%). Part II (with a computer) with a maximum of 3.5 points (35%).	Others	No	Yes	60,00
TOTAL				100,00

Observations

Students who wish to substitute the first test (proposed during the lecture period) may take a make-up exam (with a maximum value of 4 points) after the final exam.

Observations for part-time students

Part-time students will follow the same testing requirements as other candidates,

8. BIBLIOGRAPHY AND TEACHING MATERIALS

BASIC

1. B. N. DATTA, Numerical Linear Algebra and Applications. Brooks/Cole Publixhing Compañy. (1995).
2. C.T. KELLEY, Solving Nonlinear Equations with Newtos's Method. SIAM. 2003.