SUBJECT TEACHING GUIDE

G99 - Numerical Analysis II

Double Degree in Physics and Mathematics
Degree in Mathematics

Academic year 2023-2024

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
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Other lecturers	JOSE JAVIER SEGURA SALA MARIA DE UJUE ETAYO RODRIGUEZ PABLO EUDALDO BUSTAMANTE VEGA

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
2	TEMA 2 Least-Squares Solution to Linear Systems.
3	TEMA II Iterative Methods for Nonlinear systems 2.1 Newton's Methods 2.2 Broyden's Method
4	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
5	6 hours per week
6	The final exam consists of three parts. Part I and part II are related to the last three thematic blocks. Part I (without computer) gives a maximum of 2.5 points (25%). Part II (with a computer) with a maximum of 2.5 points (25%). Part III is optional with a maximum of 2.5 points (25%).

7. ASSESSMENT METHODS AND CRITERIA

Description	Type	Final Eval.	Reassessn	%
An exam with computational exercises to do before the second thematic block. It gives a maximum of 2.5 points (25%)	Laboratory evaluation	No	Yes	25,00
Final exam. Part I and part II are related to the last three thematic blocks. Part I (without computer) gives a maximum of 2.5 points (25%). Part II (with a computer) with a maximum of 2.5 points (25%). Part III is an optional make-up exam (related to E	Others	No	Yes	50,00
An exam with theoretical and practical exercises to do before the second thematic block. It gives a maximum of 2.5 points (25%)	Written exam	No	Yes	25,00
TOTAL				100,00

Observations

In the extraordinary call, the whole of the tests will have a value of 100%, being possible to substitute a fourth part (which will be indicated in the statements) by the grade obtained in the 'continuous evaluation test'.

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.