Numerical Methods for Large Systems of Equations

ECTS: 3 ECTS

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UNIVERSITY WHERE THE COORDINATOR IS: UDC

HAVE YOU GIVEN PERMISSION TO RECORD YOUR CLASSES? Yes

SUBJECT CONTENTS:

1. Introduction.

2. Storage of large sparse matrices.

3. Descen methods.

4. Linear systems preconditioning.

5. Krylov methods.

6. Methods for computing eigenvalues and eigenvectors.

7. Methods for nonlinear systems.

8. Other methods.

METHODOLOGY:

- Lecture.

- Interactive class: problem seminars.

- Problem resolution.

- Personalized attention.

LANGUAGE: Spanish

IS IT COMPULSORY TO ATTEND CLASSES? Students can attend via conference system.

BIBLIOGRAPHY:

Basics:

- Yousef Saad. Iterative Methods for Sparse Linear Systems. SIAM, Philadelphia, 2003.

- Henk A. van der Vorst. Iterative Krylov Methods for Large Linear Systems. Cambridge University Press, 2003.

Complementary:

- Gene H. Golub, Charles F. Van Loan. Matrix Computations. The Johns Hopkins University, Baltimore, MD, 2013.

- Wolfgang Hackbusch. Iterative Solution of Large Sparse Systems of Equations. Springer, 2016.

- Patrick Lascaux, Robert Théodor. Analyse numérique matricielle appliquée à l'art de l'ingénieur. Masson, París, 1986.

- Gérard Meurant. Computer Solution of Large Linear Systems. North Holland, 1999.

SKILLS

Basics:

CG3: To be able to integrate knowledge in order to state opinions using information that even incomplete or limited, include reflecting on social and ethical responsibilities linked to the application of their knowledge.

CG5: To have the appropriate learning skills to enable them to continue studying in a way that will be largely self-directed or autonomous, and also to be able to successfully undertake doctoral studies.

Specific:

CE4: To be able to select a set of numerical techniques, languages and tools, appropriate to solve a mathematical model.

Numerical Simulation speciality:

CS2: To adapt, modify and implement software tools for numerical simulation.

WILL YOU BE USING ANY VIRTUAL PLATFORM? No.

WILL YOU BE USING ANY SPECIFIC SOFTWARE? No.

CRITERIA FOR THE FIRST ASSESSMENT OPPORTUNITY:

- Final exam: 50%

- Code implementation: 20-30%

- Short exams on the implemented codes: 30-20%

CRITERIA FOR THE SECOND ASSESSMENT OPPORTUNITY:

Same criteria as for the first opportunity.