27007 - Numerical Analysis I

Información del Plan Docente

Academic Year	2016/17
Academic center	100 - Facultad de Ciencias
Degree	453 - Degree in Mathematics
ECTS	9.0
Course	
Period	Annual
Subject Type	Compulsory
Module	---

1.Basic info

1.1.Recommendations to take this course

1.2.Activities and key dates for the course

2.Initiation

2.1.Learning outcomes that define the subject

2.2.Introduction

This course is aimed to introduce the students in the algorithms for the approximated solution of the mathematical problems that arise in linear algebra and mathematical analysis, from a theoretical as well as a practical point of view. More in particular, the numerical solution of linear systems, the approximated computation of eigenvalues and eigenvectors of a matrix and the solution of nonlinear systems are included in the course. The practical implementation of the studied algorithms in a scientific program language (Fortran and Python) is addressed.

3.Context and competences

3.1.Goals

3.2.Context and meaning of the subject in the degree

3.3.Competences

3.4.Importance of learning outcomes

4.Evaluation

The evaluation consists on:

1. Active participation in magistral and problems sessions (10%).
2. A written test in January-February and a written test in June (90%).
3. Active participation in practical sessions (required to pass the course, but with no influence in the final calification).

Universidad Zaragoza

27007 - Numerical Analysis I

5.Activities and resources

5.1.General methodological presentation

The learning process for this course is based on the following methodology:

Lectures.

Practical classes (exercises, discussions) in small groups.

Computer practices in small groups.

Individual tutoring.

Student's work.

5.2.Learning activities

In order to help the student achieve the goals of the course, the following learning activities are proposed:

Exposition of the theory and some practical exercises by the teacher.

Exposition of the solution of exercises and theoretical questions by the students in small group classes and discussion about them.

Individual study of exercises and theoretical questions by the students.

Programation in a computer language of the algorithms studied in the course.

5.3.Program

1. Direct methods for the numerical solution of linear systems.
2. Iterative methods for the solution of linear systems.
3. Approximated computation of eigenvalues and eigenvectors.
4. Numerical methods for the solution of nonlinear systems.

5.4.Planning and scheduling

The scheduling for the classes and activities of the course is set by the Faculty every academic year. It can be seen at the web page of the Facultad de Ciencias.

5.5.Bibliography and recomended resources

- Notes of the course (available at Moodle platform)
- Burden, Richard L.. Análisis numérico / Richard L. Burden, J. Douglas Faires . - 6a ed.,rev. México [etc.] : International Thomson, cop. 1998
- Gasca, Mariano. Cálculo numérico : resolución de ecuaciones y sistemas / Mariano Gasca Zaragoza : Librería Central, 1987
- Gasca, Mariano. Cálculo numérico : unidad didactica 1 / preparada por Mariano Gasca González. - [6a. ed.] Madrid : Universidad Nacional de Educación a Distancia, 1991

27007 - Numerical Analysis I

- Quarteroni, Alfio. Méthodes numériques : algorithmes, analyse et applications / Alfio Quarteroni, Riccardo Sacco, Fausto Saleri Milan : Springer, 2007
- Stoer, Joseph. Introduction to numerical analysis / J. Stoer, R. Bulirsch ; translated by R. Bartels, W. Gautschi, and C. Witzgall . 3rd ed. New York [etc] : Springer, 2002
- Watkins, David S.. Fundamentals of matrix computations / David S. Watkins . - 2nd ed. New York [etc.] : John Wiley & Sons, cop. 2002

At the web page of the course in the Anillo Digital Docente de la Universidad (https://moodle2.unizar.es/add/), there is more information and teaching material.