

27000 - Linear algebra

Syllabus Information

Academic year: 2023/24

Subject: 27000 - Linear algebra

Faculty / School: 100 - Facultad de Ciencias

Degree: 453 - Degree in Mathematics

ECTS: 13.5

Year: 1

Semester: Annual

Subject type: Basic Education

Module:

1. General information

We study linear algebra from a concrete viewpoint through several algorithms that compute with matrices, as well as from an abstract viewpoint through vector spaces and linear transformations. The common thread is the classification of matrices with respect to different equivalence relations that appear among them in a natural way.

The approaches and objectives of this module are aligned with the Sustainable Development Goals (SDGs) of the United Nations 2030 Agenda; the learning activities could contribute to some extent to the achievement of the goals 4 (quality education), 5 (gender equality), 8 (decent work and economic growth), and 10 (reducing inequality).

2. Learning results

- Operate with vectors, bases, subspaces and linear transformations.
- Solve systems of linear equations.
- Classify matrices and linear transformations according to different criteria.
- Study of eigenvalues and eigenvectors. Diagonalisation and canonical forms of matrices.
- Diagonalise quadratic forms. Compute the signature.
- Classify normal operators in Euclidean and unitary spaces.

3. Syllabus

1. Systems of linear equations and matrices.
2. Vector spaces.
3. Linear transformations.
4. Determinants.
5. Diagonalisation.
6. Bilinear, quadratic and Hermitian forms.
7. Euclidean and unitary spaces.
8. Operators in Euclidean and unitary spaces.
9. Canonical forms.

4. Academic activities

Master classes: 105 hours.

Problem solving: 30 hours.

Study: 195 hours.

Assessment tests: 7.5 hours.

5. Assessment system

The course will be divided into four parts, with corresponding tests P1, P2, P3 and P4. The score for each test will be computed out of 25 points, so that the total add up to 100 points. The final grade will simply be the sum of the scores obtained in P1, P2, P3 and P4, divided by 10. It will not be necessary to reach a minimum score in any of the tests. Once a particular score has been obtained in a test, either in the continuous assessment or in the first global exam, it will be retained until the second global

exam, and the highest of the scores obtained will prevail at all times.

Continuous assessment. Three continuous assessment tests will be carried out along the course: the P1 test, which will take place in the middle of the first semester, the P2 test, which will be held in the January session (being an annual course, the January session is not official but rather part of the continuous assessment), and the P3 test, which will take place in the middle of the second semester. The subject may be passed through continuous assessment without the need to take the official exam sessions.

Official exam sessions. The global exam will consist in each case in the possibility of taking P1, P2, P3 and P4 independently. The P4 test will be held for the first time within the first global exam, and will not be part of the continuous assessment.