

Linear Algebra

Calendar: 1st day semester

Contact Hours: T:30,0; PL:22,5; O:15,0

Scientific Area: Matemática

Learning outcomes of the curricular unit

To acquire some calculus techniques which are widely used in other curriculum units; among these techniques we highlight matrix techniques, linear systems of equations, determinants and their applications and also linear spaces and linear transformations

Syllabus

Matrices: Definition. Special matrices. Algebraic operations with matrices. Classification of matrices according to their properties. Linear combination of rows and columns of a matrix. Linear (in)dependence of rows and columns of a matrix. Equations involving matrices. Gauss elimination. Rank of a matrix. Inverse matrix and its properties.

Determinants: Definition. Sarrus rule. Determinant calculus via triangular factorization. Adjoint matrix. Solution of linear systems using Cramer's rule. Linear spaces Revisions of vector calculus.

Linear spaces: Linear combination, linear (in)dependence, generators, basis and dimension. Linear subspaces.

Linear transformations: Linear transformations and their properties. Kernel and image space. Generators, bases and dimension of kernel and image spaces.

Eigenvectors and eigenvalues: Characteristic polynomial. Calculus of eigenvectors and eigenvalues.

Inner product, cross product and mixed product: Definition and geometric interpretation. Properties.

Demonstration of the syllabus coherence with the curricular unit's objectives

The various calculus tools that a student should be able to manipulate on completing the curriculum unit are included in the syllabus

Teaching methodologies (including evaluation):

Theoretical classes with lecturing periods with application examples followed by small tasks to be done by the students in order to consolidate the contents previously taught. Practical classes dedicated to problem solving, individually or in small groups.

The assessment will have a component based on a final written exam and a component based on continuous assessment taking into account the participation of the students in class and some problem sheets to be submitted for marking in selected practical classes.