Linear Algebra

Calendar: 1st semester

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

Scientific Area: MI

Learning outcomes of the curricular unit
To acquire some calculus techniques which are widely used in other curricular units; among these techniques we highlight matrix techniques, representation of linear equation systems and their resolution, determinants and their applications as well as 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. Matrix equations. Gauss elimination. Rank of a matrix. Matrix Inverse 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 syllabus allow the student to learn differentiation and integration techniques of functions of one variable.

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 be done through a final written exam or, alternatively by student option, by two written tests each one contributing 50% to the final assessment.

Demonstration of the coherence between the teaching methodologies and the learning outcomes.
The teaching methodology, rather focused on problem solving, fulfills the purpose of giving the students the ability of applying calculus techniques that will be useful in other contexts.