SUBJECT TEACHING GUIDE

G42 - Linear Algebra I

Double Degree in Physics and Mathematics
Degree in Mathematics
Degree in Mathematics
Academic year 2022-2023

1. IDENTIFYING DATA					
Degree	Double Degree in Physics and Mathematics Degree in Mathematics			Type and Year	Core. Year 1 Core. Year 1
Faculty	Faculty of Sciences				
Discipline	Subject Area: Basic Mathematics Basic Module				
Course unit title and code	G42 - Linear Algebra I				
Number of ECTS credits allocated	6	Term		Semester based (1)	
Web					
Language of instruction	Spanish	English Friendly	Yes	Mode of delivery	Face-to-face

Department	DPTO. MATEMATICAS, ESTADISTICA Y COMPUTACION
Name of lecturer	JESUS JAVIER JIMENEZ GARRIDO
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Other lecturers	

3.1 LEARNING OUTCOMES
- To revisit the concepts of analytic geometry and of linear equations system solving , in the new, advanced framework of Linear Algebra and Euclidean and Affine Geometry

4. OBJECTIVES
Assimilate the abstract notion of vector space and obtain the ability to recognize this structure in the most significant examples, in particular, vector spaces of functions, polynomials, sequences, on finite fields, etc. Understand the notion of linear dependence, base, dimension and coordinates, and the ability to carry out and recognize base changes.
Understand the relationships between vector spaces via linear maps and their fundamental properties. Characterize the special linear applications by their behavior with respect to the linear dependence and the kernel and image subspaces.
Know the notion of determinant. Assimilate the properties of the determinants and their different applications.
Understand the problem of the normal form of an endomorphism and its applications to solving systems of linear differential equations and recurrence equations.
Solve problems in the context of the geometry associated with a vector space, the dot product and the notion of distance.

6. COURSE ORGANIZATION	
CONTENTS	
1	VECTOR SPACES. The notion of vector space. Vector subspaces. Linear combinations. Linear independence. Bases. Dimension. Sum and direct sum of subspaces.
2	LINEAR APPLICATIONS AND MATRICES. Definition. Kernel and image. Composition of linear applications. Isomorphisms. Matrices. Matrix associated to a linear application. Rank. Determinants. Homomorphism space.
3	ENDOMORPHISM THEORY. Eigenvalues and eigenvectors. Eigenspaces. Characteristic polynomial. Geometric and algebraic multiplicity of an eigenvalue. Generalized Eigenspaces. Jordan form. Companion matrix. Minimum polynomial. Cayley-Hamilton theorem. Rational form.

7. ASSESSMENT METHODS AND CRITERIA				
Description	Type	Final Eval.	Reassessn	%
Throughout the course there will be a minimum of two and a maximum of four written tests/tasks.	Others	No	Yes	40,00
Global Exam	Written exam	Yes	Yes	60,00
TOTAL				100,00
Observations				
None				
Observations for part-time students				
None				

8. BIBLIOGRAPHY AND TEACHING MATERIALS
BASIC
Apuntes de la asignatura: "Álgebra Lineal I" Javier Jiménez Garrido