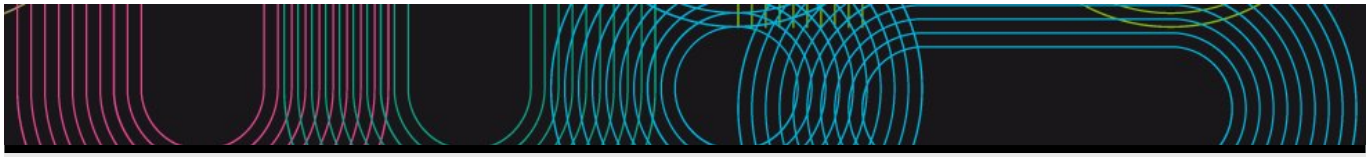

IDENTIFYING DATA				
Mathematics: Linear Algebra				
Subject	Mathematics: Linear Algebra			
Code	V05G300V01104			
Study programme	(*)Grao en Enxeñaría de Tecnoloxías de Telecomunicación			
Descriptors	ECTS Credits	Choose	Year	Quadmester
	6	Basic education	1st	1st
Teaching language	Spanish			
Department				
Coordinator	Martín Méndez, Alberto Lucio			
Lecturers	Faro Rivas, Emilio Martín Méndez, Alberto Lucio Prieto Gómez, Cristina Magdalena			
E-mail	amartin@dma.uvigo.es			
Web	http://faitic.uvigo.es/			
General description	The subject Álgebra Lineal is taught in the first quadmester of the first course of the Grado en Ingeniería de Tecnologías de Telecomunicación, with the main objective of providing students with a correct management of the elementary mathematical symbolism, the basic techniques of the matrix calculus and an introduction to the methods of resolution of problems that serve as a basis for subjects to study later. It will be paid special attention to the applications of Linear Algebra, as well as to the part of Numerical Analysis which is related to the subject.			

Competencies	
Code	
A3	CG3: The knowledge of basic subjects and technologies that capacitates the student to learn new methods and technologies, as well as to give him great versatility to confront and update to new situations
A4	CG4: The ability to solve problems with initiative, to make creative decisions and to communicate and transmit knowledge and skills, understanding the ethical and professional responsibility of the Technical Telecommunication Engineer activity.
A10	CE1/FB1: The ability to solve mathematical problems in Engineering. The aptitude to apply knowledge about linear algebra, geometry, differential geometry, differential and integral calculus, differential and partial derivatives equations; numerical methods, numerical algorithms, statistics and optimization

Learning aims	
Expected results from this subject	Training and Learning Results
FB1 Capacity for the resolution of the mathematical problems that can pose in the engineering. FB1.1 Aptitude to apply the knowledges on linear algebra, geometry and differential geometry. FB1.4 Aptitude to apply the knowledges on numerical and algorithmic methods numerical.	A10
CG3 Knowledge of basic materials and technologies which enable the student to learn new methods and technologies, and provide to him with a big versatility to adapt itself to new situations.	A3
CG4 Ability to solve problems. CG4.1 Ability to solve problems with initiative, decision-making and creativity. CG4.2 Ability to communicate and transmit knowledge, abilities and skills.	A4

Contents	
Topic	
Subject 1. Complex numbers.	Operations with complex numbers. Geometric concepts associated with complex numbers. Euler's formula and its consequences.

Subject 2. Systems of linear equations and matrices.	Solution of a system of linear equations. Systems of linear equations and vector equations. The matrix equation Ax=b. Sets of solutions of systems of linear equations. Operations with matrices. Inverse of a matrix. Block matrices. LU decomposition. Determinants. Rank of a matrix.
Subject 3. Linear transformations	Relations of linear dependence. Subspaces. Basis. Dimension. Rank of a system of vectors. Introduction to linear transformations. Matrix of a linear transformation. Composition of linear transformations.
Subject 5. Eigenvalues and eigenvectors.	Eigenvalues and eigenvectors. Eigenspace. Diagonalizable matrices.
Subject 6. Orthogonallity.	Real Euclidean inner product. Complex Euclidean inner product. Orthogonallity. Diagonalization by unitary similarity. Singular value decomposition. Matrix rank reduction. The method of least squares. Quadratic forms.

Planning

	Class hours	Hours outside the classroom	Total hours
Laboratory practises	2	2	4
Master Session	38	76	114
Troubleshooting and / or exercises	9	9	18
Troubleshooting and / or exercises	5	5	10
Long answer tests and development	2	2	4

*The information in the planning table is for guidance only and does not take into account the heterogeneity of the students.

Methodologies

	Description
Laboratory practises	Use of the computer tool *MATLAB.
Master Session	Explanation and development by the professor of the contents of the various items that make up the course.
Troubleshooting and / or exercises	Resolution by part of the professor of suitable exercises adapted to each topic and suitable exercises to reveal the relations of the topics between themselves. The student will have to also take part in the resolution of exercises in order to strengthen their knowledge.

Personalized attention

Methodologies	**Description**
Troubleshooting and / or exercises	Students will have the opportunity to attend personal tutoring in the professor's office in the hours established, as announced at the beginning of the course and published on the course web page. The professor will personally help students in order to clarify the doubts that they may have about the contents of the subject or the problems solved. He also personally attend students who have questions about exercises sought by themselves.
Laboratory practises	Students will have the opportunity to attend personal tutoring in the professor's office in the hours established, as announced at the beginning of the course and published on the course web page. The professor will personally help students in order to clarify the doubts that they may have about the contents of the subject or the problems solved. He also personally attend students who have questions about exercises sought by themselves.
Master Session	Students will have the opportunity to attend personal tutoring in the professor's office in the hours established, as announced at the beginning of the course and published on the course web page. The professor will personally help students in order to clarify the doubts that they may have about the contents of the subject or the problems solved. He also personally attend students who have questions about exercises sought by themselves.
Tests	**Description**
Troubleshooting and / or exercises	Students will have the opportunity to attend personal tutoring in the professor's office in the hours established, as announced at the beginning of the course and published on the course web page. The professor will personally help students in order to clarify the doubts that they may have about the contents of the subject or the problems solved. He also personally attend students who have questions about exercises sought by themselves.

Assessment

	Description	Qualification

Troubleshooting and / or exercises	Following the guidelines specific to the degree program, two systems of assessment will be offered: continuous evaluation and evaluation at the end of the quadmester. In the case of continuous evaluation planning will be in the following way: Four one hour testing, designed to assess competencies A3, A4 and A10: 1. Test of item 1 (week 3 approximately). 2. Test of items 2 and 3 (week 10 approximately). 3. Test of items 4 and 5 (week 14 approximately). 4. Exercise for solving by small groups and in an individual way (week 14 approximately). Each of these tests will have an evaluation of 1,10 points. In adittion, 6% of the rating will be obtained by means of tasks to deliver in the classroom	50
Long answer tests and development	An individual test of two hours of items 1, 2, 3, 4, 5 and 6.	50

Other comments on the Evaluation

Continuous evaluation:

It will be considered that a student has opted by the continuous evaluation when, after knowing the qualification obtained in the first test of an hour, he accept to take part in the elaboración of the groups of work. In this case, the final qualification for a student is given by the formula

N = (1/2) x T + (1/2) x E

where T is the qualification, between 0 and 10, obtained as the weighted average of the qualifications of the five tests of an hour and where E is the qualification, between 0 and 10, obtained in the test of two hours. In this mode, it is considered that a student has successfully completed the course when N is greater than or equal to 5. Before the completion or delivery of each test, the date and procedure for the review of the qualifications obtained will de indicated; these qualifications will be open to the students in a reasonable period of time. The tests are not recoverable, in other words, if a student cannot present himself to realize them in the day stipulated, the professor does not have obligation to repeat them.

Qualifications obtained in the evaluables tests will be valid only for the academic course in which they are realized.

Evaluation at the end of the quadmester:

Students who do not choose continuous evaluation may be submitted to an examination, which will not necessarily be the same as the single test of two hours of items 1, 2, 3, 4, 5 and 6 of the students that follow the continuous evaluation, which will be evaluated on 10 points. In this mode, it is considered that a student has successfully completed the course when the qualification of the examination is greater than or equal to 5.

Recovery in July:

The day of the test of recovery, students who have chosen continuous evaluación will be able to opt, if they wish it and before seeing it, for a test where the note is obtained as

N = (1/2) x T + (1/2) x D

where T is the qualification, between 0 and 10, obtained as the weighted average of the qualifications of the five tests of an hour and where D is the qualification, between 0 and 10, obtained in a three-hour maximum test of items 1, 2, 3, 4, 5 and 6. In this mode, it is considered that a student has successfully completed the course when NR is greater than or equal to 5.

In case of not choosing this option, or if they do not qualify to choose it because they have not participated in the continuous evaluation, the recovery examination, not necessarily the same as that taken by the students who have chosen the above mentioned option, will be also a three-hour maximum test of items 1, 2, 3, 4, 5 and 6. In this case, the test will be evaluated on 10 points and it will be considered that a student has successfully completed the course when the qualification of the test

is greater than or equal to 5.

Qualification of Not Present:

A student will be deemed not present if he does not opt for continuous evaluation and, at most, he appears to the first individual test of one hour. Otherwise he shall be deemed present and he shall be granted the corresponding qualification.

Sources of information

D. C. Lay, **Álgebra lineal y sus aplicaciones**, 3ª,
D. Poole, **Álgebra lineal: Una introducción moderna**, 2º,
L. Merino; E. Santos, **Álgebra lineal con métodos elementales**, 1ª,

Recommendations

Subjects that continue the syllabus

Physics: Analysis of Linear Circuits/V05G300V01201
Physics: Fields and Waves/V05G300V01202
Mathematics: Calculus II/V05G300V01203
Mathematics: Probability and Statistics/V05G300V01204
Digital Signal Processing/V05G300V01304
Computer Networks/V05G300V01403

Subjects that are recommended to be taken simultaneously

Mathematics: Calculus I/V05G300V01105