Algebra

Code: 103814
ECTS Credits: 6

Degree	Type	Year	Semester
2501233 Aeronautical Management	FB	2	1

Contact

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Teaching groups languages

You can check it through this link. To consult the language you will need to enter the CODE of the subject. Please note that this information is provisional until 30 November 2023.

Teachers

Martin Hernan Campos Heredia

Prerequisites

There is no specific prerequisite but a certain mastery of elementary mathematics is recommended: arithmetic operations, numbering systems, polynomials etc.

Objectives and Contextualisation

This is a basic subject. The main objectives are to equip the students with the ability to work with complex numbers, to operate with vectors and arrays and to solve systems of linear equations.

Competences

- Apply specific software for solving problems in the aeronautical sector.
- Communication.
- Personal attitude.
- Personal work habits.
- Thinking skills.
- Use knowledge of the fundamental principles of mathematics, economics, information technologies and psychology of organisations and work to understand, develop and evaluate the management processes of the different systems in the aeronautical sector.
- Work in teams.

Learning Outcomes

1. Analyse linear applications and make changes of basis.
2. Communicate knowledge and findings efficiently, both orally and in writing, both in professional situations and with a non-expert audience.
3. Critically assess the work done.
4. Develop critical thought and reasoning.
5. Develop curiosity and creativity.
6. Develop independent learning strategies.
7. Develop scientific thinking skills.
8. Develop systemic thinking.
9. Develop the ability to analyse, synthesise and plan ahead.
10. Interpret graphic representations of data.
11. Manage time and available resources. Work in an organised manner.
12. Operate with matrices and calculate ranks and determinants.
13. Use basic mathematical language to understand the texts that use it.
14. Use mathematics software.
15. Work cooperatively.
16. Work independently.

Content

1. Complex numbers and zeros of polynomials
2. Systems of linear equations, matrices and determinants
3. Vector spaces
4. Linear transformations
5. Eigenvectors and eigenvalues. Diagonalization

Methodology

The central part of the learning process is the work of the student. The teacher's mission is to help the student in this task by providing information, showing the sources and directing, as far as possible, the steps so that the learning process can be carried out efficiently. In line with these ideas, and in accordance with the objectives of the subject, the development of the course will be based on the following activities:

1. Theory lectures: The scientific and technical knowledge of the subject necessary for the resolution of problems will be presented in the form of master classes.
2. Problem lectures / Seminars / Supervised activities: These classes will work on the scientific and technical knowledge exposed in the theory classes. This are practical classes where the basic techniques mentioned in the abilities will be developed, mainly based on the resolution of practical exercises.

The students interested can work on some proposed problems, individually or in groups, in an autonomous way and with the support of the teachers of the subject.
In some sessions the written delivery of the proposed problems will be requested, perhaps using Virtual Campus tools. This delivery will be evaluated and will contribute to the final grade of the course.

The use of CAS (Computer Algebra System) will be proposed as a means of solving some problems.

Annotation: Within the schedule set by the centre or degree programme, 15 minutes of one class will be reserved for students to evaluate their lecturers and their courses or modules through questionnaires.

Activities

Title	Hours	ECTS	Learning Outcomes
Type: Directed			
Exercises	20	0.8	1, 3, 2, 7, 8, 6, 9, 5, 4, 13, 11, 12, 16, 14
Theory	30	1.2	1, 7, 8, 9, 4, 13, 10, 12, 14
Type: Supervised			
Problem solving	15	0.6	3, 2, 6, 5, 11, 15, 16
Type: Autonomous			
Problem solving	75	3	1, 3, 7, 8, 6, 9, 5, 4, 13, 11, 10, 12, 16, 14

Assessment

Continuous evaluation through the delivery of exercises (30%), two partial exams carried out during the lectures (30% + 40%) with a final exam (70%) for students who do not pass the continuous evaluation. To be able to apply the continuous evaluation it will be necessary that in each partial test the note on ten is superior or equal to three.

To participate in the recovery, students must have been previously evaluated in a set of activities the weight of which equals a minimum of two thirds of the total grade of the subject or module. Therefore, the students will obtain the *"Not Evaluable"* qualification when the evaluation activities carried out have a weight lower than 67% in the final grade.

The delivery of exercises is mandatory. The students will obtain the grade of *"Not Evaluable"* when the number of deliveries is less than 80% of the scheduled deliveries.

Without prejudice to other disciplinary measures deemed appropriate, and in accordance with current academic regulations, any irregularities committed by the student that could lead to a variation of the grade of an evaluation act will be scored with a zero. Therefore, copying or allowing to copy a practice or any other evaluation activity will involve suspending with a zero, and if it is necessary to pass it to pass, the whole subject will be suspended. The evaluation activities qualified in this way and by this procedure will not be recoverable, and therefore the subject will be suspended directly without the opportunity to recover it in the same academic year.

Repeating students must do the same assessment activities as new students.

Honors may only be awarded to students who have obtained a final grade equal to or greater than 9. A maximum of 5% of students enrolled may be granted.

This subject does not provide for the single assessment system.

Assessment Activities

Title	Weighting	Hours	ECTS	Learning Outcomes
Exercise delivery	30%	2	0.08	1, 3, 2, 9, 4, 13, 11, 10, 12, 16
First partial exam	30%	2	0.08	1, 3, 2, 7, 8, 6, 9, 5, 4, 13, 11, 10, 12, 15, 16, 14

Recovery exam	70%	4	0.16	1, 3, 2, 7, 8, 6, 9, 5, 4, 13, 11, 10, 12, 15, 16, 14
Second partial exam	40%	2	0.08	1, 3, 2, 7, 8, 9, 4, 13, 11, 12

Bibliography

- David C. Lay. *Álgebra Lineal y sus aplicaciones*, tercera edición, Pearson Educación, Mexico, 2007, ISBN: 978-970-26-0906-3
- Enric Nart, Xavier Xarles. *Notes d'àlgebra lineal*, segona edició, Materials 130, UAB, Bellaterra, 2003, ISBN: 84-490-2325-4

Software

- Sagemath: https://www.sagemath.org
- Maxima: https://maxima.sourceforge.io
- WxMaxima: https://wxmaxima-developers.github.io/wxmaxima/index.html