COURSE DATA

DATA SUBJECT

Code: 34150
Name: Lineal algebra and geometry I
Cycle: Undergraduate Studies
ECTS Credits: 12
Academic year: 2025-26

STUDY (S)

Degree	Center	Acad. year	Period
1107 - Degree in Mathematics	Facultat de Ciències Matemàtiques	1	Annual
1935 - Double Degree Program in Mathematics-Telematics Engineering	Facultat de Ciències Matemàtiques	1	Annual
1936 - Double Degree Program in Mathematics-Telematics Engineering	Facultat de Ciències Matemàtiques	1	Annual

SUBJECT-MATTER

Degree	Subject-matter	Character
1107 - Degree in Mathematics	Mathematics	BASIC
1935 - Double Degree Program in Mathematics-Telematics Engineering	Primer curso	COMPULSORY
1936 - Double Degree Program in Mathematics-Telematics Engineering	Primer curso	COMPULSORY

COORDINATION

MORETO QUINTANA ALEXANDER

COSME LLOPEZ ENRIC

SUMMARY

The contents of this course are essential for the further development of other materials, both of the area of algebra and other areas of knowledge of mathematics.

Some of the first linear algebra contents will be known to students who have studied mathematics in high school. However, the program of the subject starts from the minimum prior knowledge. Such previous knowledge is also needed for other subjects in the first year and will work on them in the course Basic Mathematics.

These skills are:

Basic concepts and terminology sets.
The sum and product operations on the sets of natural numbers, integers, rational and real, with its basic operations.

It should be noted that in order to facilitate learning and make accessible content, while retaining the highest degree of generality as possible, since this is considered necessary, we shall begin giving the definition of field as a direct generalization of the algebraic properties of the field of real (or rational) numbers for the sum and product operations, all well known to students. And they also indicate that, in the development of content, the field that will be considered by reference is the field of real numbers though, unless otherwise indicated any restrictions, all of which are valid for an arbitrary field.

PREVIOUS KNOWLEDGE

RELATIONSHIP TO OTHER SUBJECTS OF THE SAME DEGREE

There are no specified enrollment restrictions with other subjects of the curriculum.

OTHER REQUIREMENTS

For the development of some of the descriptors of this subject you need to know and how to use contents contained in the subject Mathematics Basic.

COMPETENCES / LEARNING OUTCOMES

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Ability to work in teams.

Capacity for analysis and synthesis.

Capacity of abstraction and modeling.

Expressing mathematically in a rigorous and clear manner.

Knowing the time and the historical context in which occurred the great contributions of women and men in the development of mathematics.

Learn autonomously.

Possess and understand the mathematical knowledge.

Reason logically and identify errors in the procedures.

DESCRIPTION OF CONTENTS

1. Systems of Linear equations and matrices.

2. Vector space. Bases. Subspaces. Equations.

3. Linear maps. Coordinate matrices. Isomorphism theorems

4. Ranks. Linear group. Equivalence of matrices.

5. Endomorphisms. Similarity. Eigenvalues and eigenvectors.

6. bilinear Forms. coordinates matrices. Congruence.

7. Escalar product. Euclidean vector spaces. Orthogonal group. Orthogonal congruence

8. Affine space. Reference Systems. Coordinates. Affine varieties. Equations. Relative positions

9. Affine maps. Coordinate matrices. The affine group.

10. Affine Euclidean space. Metrics. Distances between varieties. Movements of an affine Euclidean space.

WORKLOAD

PRESENCIAL ACTIVITIES

Activity	Hours
Theory	60,00
Other activities	15,00
Classroom practices	45,00
Total hours	**120,00**

NON PRESENCIAL ACTIVITIES

Activity	Hours
Attendance at other activities	0,00
Individual or group project	0,00
Independent study and work	25,00
Preparation of lessons	105,00
Preparation for assessment activities	50,00
Resolution of case studies	0,00
Total hours	**180,00**

TEACHING METHODOLOGY

The work will consist of theoretical classroom attendance at lectures by the professor responsible for teaching the subject.

The practical classroom work will consist in assisting the kinds of problems in which, under the direction of teacher, students will solve, individually or in groups, proposed by the teacher.

With such assistance, should be ensured accurate information to achieve the expected levels of competence.

Periodically, completed some basic information objective, the teacher will pose a voluntary basis, students work individually made, with a deadline set delivery. The teacher, in addition to correcting them assess progress in using the language of the subject.

EVALUATION

The grade obtained in the exams will account for 80% of the final grade. The seminar grade will account for 10% and participation for 10%.

To pass, it will be necessary to obtain a minimum score of 4 out of 10 in the exam.

There will be a midterm exam in the first examination session.

In the second examination session, the evaluation system will be the same. The participation and seminar grades will not be recoverable for the second session.

REFERENCES

- Anton, H. (2003). Introducción al álgebra lineal, 3a edición México. Ed. Limusa
- Burgos, J. (2006). Álgebra lineal y geometría cartesiana, 3a edición. Madrid: Ed. McGraw-Hill
- Castellet, M. Llerena, I. (1991). Àlgebra lineal i geometría. Barcelona: Ed. Reverté
- Merino González, L. M. Santos Aláez, E. (2006). Álgebra lineal con métodos elementales. Madrid: Ed. Thomson
- Moretó, A. (2020). Un curso de Álgebra Lineal y Geometría I. (https://alexmoqui.wordpress.com/2020/03/31/un-curso-de-algebra-lineal-y-geometria-i/)

Complementary references:

- Andrilli, S. ¿ Hecker, D. (1999). Elementary linear algebra. San Diego: Ed. Harcourt Brace Jovanovich
- Burgos, J. (1977). Curso de álgebra y geometría. Madrid: Ed. Alhambra

- Jacob, B. (1990). Linear algebra. New York: Ed. W. H. Freeman
- Liesen, J. - Mehrmann, V. (2015). Linear Algebra. Ed: Springer.
- Nicholson, W. K. (2021). Linear Algebra with Applications. Ed: Lyrix Open Textbook
- Robinson, Derek J. S. (1991). A course in linear algebra with applications. Singapore: Ed. World Scientific
- Spindler, K. (1994). Abstract algebra with applications (Volume I: Vector spaces and groups). New York: Ed. Marcel Dekker, Inc
- Strang, G. (2006). Linear algebra and its applications. Belmont, CA: Ed. Thomson, Brooks/Cole