COURSE DATA

Data Subject	
Code	34150
Name	Lineal algebra and geometry I
Cycle	Grade
ECTS Credits	12.0
Academic year	2023 - 2024

Study (s)

Degree	Center	Acad. year	Period
1107 - Degree in Mathematics	Faculty of Mathematics	1	Annual
1935 - Double Degree Program in Mathematics-Telematics Engineering	Faculty of Mathematics	1	Annual
1936 - Double Degree Program in Mathematics-Telematics Engineering	Faculty of Mathematics	1	Annual

Subject-matter

Degree	Subject-matter	Character
1107 - Degree in Mathematics	1 - Mathematics	Basic Training
1935 - Double Degree Program in Mathematics-Telematics Engineering	1 - Primer curso	Obligatory
1936 - Double Degree Program in Mathematics-Telematics Engineering	1 - Primer curso	Obligatory

Coordination

Name	Department
COSME LLOPEZ, ENRIC	363 - Mathematics
MORETO QUINTANA, ALEXANDER	363 - Mathematics

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 (RD 1393/2007) // LEARNING OUTCOMES (RD 822/2021)

1107 - Degree in Mathematics

- Capacity for analysis and synthesis.
- Ability to work in teams.
- Learn autonomously.
- Possess and understand the mathematical knowledge.
- Expressing mathematically in a rigorous and clear manner.
- Reason logically and identify errors in the procedures.

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

LEARNING OUTCOMES (RD 1393/2007) // NO CONTENT (RD 822/2021)

GENERAL OBJECTIVES

Become familiar not only with calculator routines but mainly with the conceptual and abstract aspects of the subject.

They know the vocabulary, definitions and statements of propositios related to the subject descriptors and know how to expose and apply.

They know correctly reproduce facts and arguments and they are able to reinterpret formally similar situations.

They are able to recognize errors in faulty reasoning.

SOCIAL SKILLS:

Organizational skills and work planning.

Ability to work in teams.

Ability to learn autonomously.

Ability to think and argue logically and clearly.

Ability to express mathematically rigorous and clear.

Ability to analyze and critique of their own or other mathematical reasoning.

Documentation search capability to develop a topic related to the subject.

Ability to clearly expose contents of the subject, elaboration of their own or others.

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

WORKLOAD

ACTIVITY	Hours	% To be attended
Theory classes	60,00	100
Classroom practices	45,00	100
Other activities	15,00	100
Study and independent work	10,00	0
Preparation of evaluation activities	50,00	0
Preparing lectures	60,00	0
Preparation of practical classes and problem	45,00	0
TOTAL	**285,00**	

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

English version is not available

REFERENCES

Basic

- Referencia b1: Anton, H. (2003). Introducción al álgebra lineal, 3a edición México. Ed. Limusa

  Referencia b2: Burgos, J. (2006). Álgebra lineal y geometría cartesiana, 3a edición. Madrid: Ed. McGraw-Hill

Referencia b3: Castel
let, M. Llerena, I. (1991). Àlgebra lineal i geometría. Barcelona: Ed. Reverté

Referencia b4: Merino González, L. M. Santos Aláez, E. (2006). Álgebra lineal con métodos elementales. Madrid: Ed. Thomson

Referencia b5: 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/

Additional

- Referencia c1: Andrilli, S. Hecker, D. (1999). Elementary linear algebra. San Diego: Ed. Harcourt Brace Jovanovich

Referencia c2: Burgos, J. (1977). Curso de álgebra y geometría. Madrid: Ed. Alhambra

Referencia c3: Jacob, B. (1990). Linear algebra. New York: Ed. W. H. Freeman

Referencia c4: Liesen, J. - Mehrmann, V. (2015). Linear Algebra. Ed: Springer.

Referencia c5: Nicholson, W. K. (2021). Linear Algebra with Applications. Ed: Lyrix Open Textbook

Referencia c6: Robinson, Derek J. S. (1991). A course in linear algebra with applications. Singapore: Ed. World Scientific

Referencia c7: Spindler, K. (1994). Abstract algebra with applications (Volume I: Vector spaces and groups). New York: Ed. Marcel Dekker, Inc

Referencia c8: Strang, G. (2006). Linear algebra and its applications. Belmont, CA: Ed. Thomson, Brooks/Cole