COURSE DATA

Data Subject	
Code	34834
Name	Mathematics I
Cycle	Grade
ECTS Credits	6.0
Academic year	2022 - 2023

Study (s)

Degree	Center	Acad. year	Period
1407 - Degree in Multimedia Engineering	School of Engineering	1	First term

Subject-matter

Degree	Subject-matter	Character
1407 - Degree in Multimedia Engineering	7 - Matemáticas	Basic Training

Coordination

Name	Department
ESTEBAN ROMERO, RAMON	5 - Algebra
TENT JORQUES, JOAN FRANCESC	363 - Mathematics

SUMMARY

The course Mathematics I is part of the scientific background to be acquired by all students of engineering before entering fully into the specifics of the degree.

Given the extent of the subject and the very limited number of hours, the course will be mainly practical: the goal is that the student is able to apply the methods discussed to solve problems.

The contents of the course are: sequences and series, linear algebra, geometry, which are divided into thematic units listed in paragraph 6.

The general objectives of the course are:
• To leverage the geometric intuition to enrich mathematical knowledge, and vice versa, make the vocabulary of mathematics to raise geometric vision.
• To understand the concepts of sequence and series, and to study their convergence.
• To handle with ease the elementary techniques of matrix algebra. Solving systems of linear equations and raise them know.

• To underestand the concept of linear map and to represent linear maps by matrices.

• To perform some simple applications of interest in engineering, building on the basic contents of the course.

PREVIOUS KNOWLEDGE

Relationship to other subjects of the same degree

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

Other requirements

It is assumed that the student masters the High School Mathematics I.
While having completed High School Mathematics II would be desirable, it is not strictly necessary. All units start at the level of the Baccalaureate first year's Linear Algebra and Geometry and cover knowledge of the second year before going deeper into them.

However the pace is strong; the student who has not completed high school Mathematics II should make a continuous effort from the first day to acquire the basic skills quickly.

OUTCOMES

1405 - Grado en Ingenieria Multimedia

- G6 - Know the basic subject areas and technologies that serve as a basis to learn and develop new methods and technologies and those that provide versatility to adapt to new situations.
- B1 - Ability to solve the mathematical problems that may arise in engineering. Ability to apply knowledge of linear algebra, differential and integral calculus, numerical methods, numerical algorithms, statistics and optimisation.
- B3 - Be able to understand and master the basics of discrete mathematics, logic, algorithmic and computational complexity, and their application to solve engineering problems.
- MM28 - Be able to solve problems with initiative, decision-making and creativity and to communicate and transmit the knowledge, abilities and skills of a multimedia engineer.

LEARNING OUTCOMES

Learning outcomes:

• To understand and to maste of basic concepts in mathematics
• To solve engineering problems by applying advanced mathematical concepts
• To understand the mathematical formalisms that may arise in engineering
• To structure solving engineering problems mathematically
• To model physical phenomena using mathematical tools
• To interpret the mathematical results applied to the physical world

Skills to be acquired:

• Confidence to perform basic operations with numbers (real and complex) and matrices, and to simplify mathematical expressions (rational, irrational, trigonometric, exponential, logarithmic).
• Knowledge of how to discuss the existence of solutions of a system of linear equations and to calculate them.
• Capacity of logical-mathematical thought. Using mathematical language and develop geometric intuition.
• To understand the concepts of sequence and series of real or complex numbers and to study their convergence.

• To become familiar with basic matrix decompositions and to understand their applications.

• To understand the concept of linear map and to represent linar maps by matrices.
• To distinguish and apply mathematical techniques in specific situations of Engineering.

In addition to the specific objectives mentioned above, during the course of the development of several generic skills, among which will be promoted include:
• Correct and understandable statement (oral or written) of questions of scientific content.
• Logical reasoning and critical ability.
• Confidence to ask what is not understood or is not clear in the statement of an expert.
• Discover connections with other disciplines of interest of each student.

DESCRIPTION OF CONTENTS

1. Sequences and series

Complex numbers. Sequences and series of real or complex numbers. Convergence of sequences and series.

2. Linear equations and Matrices

Systems of linear equations. Matrices and the Gauss-Jordan diagonalisation process. Determinants of matrices.

3. Basic Geometry

Vectors. Linear dependence and independence. Bases. Scalar product, norm and angle between vectors. Gram-Schmidt process.

4. Matrix decomposition

LU decomposition. QR decomposition.

5. Linear maps

Introducción a las aplicaciones lineales. Valores y vectores propios. Diagonalización.

WORKLOAD

ACTIVITY	Hours	% To be attended
Theory classes	30,00	100
Classroom practices	30,00	100
Study and independent work	20,00	0
Preparation of evaluation activities	15,00	0
Preparing lectures	20,00	0
Preparation of practical classes and problem	35,00	0
TOTAL	**150,00**	

TEACHING METHODOLOGY

In the theoretical classes, the lecturer will gradually introduce mathematical concepts and their use mainly through examples. They will also explain the standard procedures for solving problems related to the topic.
Practical classes will be aimed at the student, through his work, internalize explained in lectures. The way to achieve the active participation of students may vary according to the size of groups, ranging from exercises in small groups, when the number permitted, the execution of periodic inspections, when the number is excessive.

EVALUATION

The evaluation will take place following the “adapted traditional” model:

The final exam will be mainly practical and will count 50 %.

The remaining 50 % will be obtained by ongoing evaluation. At least two tests will be made and the ongoing work of the student will be assessed through the active participation in the classroom. Students who have taken the continuous assessment activities and all controls that have proposed and teachers have achieved in each of these tests the minimum grade 4 and at the end of the course have obtained in the continuous assessment part a note greater than or equal to 5 have the option not to take the final exam and use this note as a final grade for the course.

If for some cause, the continued evaluation of a student has not been able to taken complete, the weight given will decrease by increasing the weight of the exam, respecting the 75% maximum agreed by the School. In the case where the grade of the final exam is greater than the grade obtained by continuous assessment, the weight of the final exam will be 75% in the grade for the course.

The continuous assessment will be assessed again in the second call for examination and will form part of this exam, so the grade obtained in the exam in the second call will be the final grade of the course.

In any case, the evaluation of this subject will be done in compliance with the University Regulations in this regard, approved by the Governing Council on 30th May 2017 (ACGUV 108/2017)

REFERENCES

Basic

- L. Gascón, A. Pastor, V. del Olmo, D. García-Sala, Análisis Matemático I. Un curso de cálculo para Informática. Ed. Tébar, Madrid, 2000
- L. Merino, E. Santos, Álgebra lineal con métodos elementales. Thomson, Madrid, 2006
- R. Bru, J.-J. Climent, J. Mas, A. Urbano, Álgebra lineal, Ed. Universitat Politècnica de València, València, 1998
- Anthony Croft, Robert Davison, Mathematics for engineers: a modern interactive approach, Addison-Wesley, 1999
- C. Neuhauser, Matemáticas para ciencias, Prentice-Hall, Madrid, 2004
- K. Weltner, S. John, W. J. Weber, P. Schuster, J. Grosjean, Mathematics for Physicists and Engineers, Springer-Verlag, Berlin , 2014

Additional

- Alan Jeffrey, Mathematics for Engineers and Scientists, Chapman Hall, 2005.
- A.D. Polyanin, A.V. Manzhirov, Handbook of Mathematics for Engineers and Scientists, Chapman Hall, 2007.