COURSE DATA

Data Subject	
Code	34665
Name	Mathematics I
Cycle	Grade
ECTS Credits	6.0
Academic year	2020 - 2021

Study (s)

Degree	Center	Acad. year	Period
1400 - Degree in Computer Engineering	School of Engineering	1	First term

Subject-matter

Degree	Subject-matter	Character
1400 - Degree in Computer Engineering	9 - Mathematics	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 aim is that the students will be able to apply the methods discussed to solve problems.

The course contents are: Sequences and Series, Linear Algebra, Geometry, which are divided into thematic units as listed in Section 6.

The general objectives of the course are:

• To manage with ease the elementary techniques of matrix algebra. In particular, to solve systems of linear equations and to know how to reduce a problem to a system of linear equations.

• To understand the concepts of sequence and series, and to study their convergence.

• To use geometric intuition to enrich mathematical knowledge, and vice versa, to take advantage of the vocabulary of mathematics to raise geometric vision.

• 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 content 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

We assume that the student has mastered a mathematical content equivalent to the Mathematics I of the Spanish Bachillerato. While completion of the Mathematics in second year would be desirable, it is not strictly necessary. All units start with the indicated level on Linear Algebra and Geometry, and cover the skills of the second year before proceeding any further. Nevertheless, the pace is strong; the student who has not completed second year high school mathematics must make a sustained daily effort to a

OUTCOMES

1400 - Degree in Computer Engineering

- G8 - Knowledge of basic subject areas and technologies that serve as a basis for learning and developing new methods and technologies, and of those which provide versatility to adapt to new situations.
- G9 - Ability to solve problems with initiative, decision making, autonomy and creativity. Ability to communicate and transmit the knowledge, skills and abilities of a computer engineer.
- 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.

LEARNING OUTCOMES

Learning outcomes:

• To understand well and use fluently basic math concepts.

• To solve engineering problems using advanced mathematical concepts.

• To understand the mathematical formalisms that may arise in engineering.

• To structure the way of solving engineering problems in mathematical form.

• To model physical phenomena using mathematical tools.

• To interpret the mathematical results when applied to the physical world.

Skills to be acquired:

• To be able to perform basic operations with numbers (real and complex) and matrices, and to simplify mathematical expressions (rational, irrational, trigonometric, exponential, logarithmic).

• To know how to discuss the existence of solutions of a system of linear equations and how to compute them.

• Ability to use logical-mathematical thinking. Use confidently 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 be able to distinguish which mathematical techniques may be used in a particular engineering situation and apply it.

In addition to the specific objectives mentioned above, the course will encourage the development of several generic skills, among which are included:

• Correct and clear statement (oral or written) of questions which have scientific content.

• Logical reasoning and critical ability.

• Promptness to ask what is not understood, or perhaps it is not clear enough, in an exposition by an expert.

• Being able to find connections with other disciplines of particular interest to him/her.

DESCRIPTION OF CONTENTS

1. Sequences and series

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

2. Matrices and linear equations

Sets of Linear Equations. Matrices. Gauss-Jordan Elimination. Determinants.

3. Basic Geometry

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

4. Matrix decomposition

LU decomposition. QR decomposition.

5. Linear maps

Introduction to linear maps. Eigenvalues and Eigenvectors. Matrix Diagonalization.

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.

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.

ADDENDUM COVID-19

This addendum will only be activated if the health situation requires so and with the prior agreement of the Governing Council

The teaching method for this subject will follow the teaching model approved by the Academic Committee of the GII / GIM degrees:

https://go.uv.es/catinfmult/ModeloDocenciaGIIGIM

Were facilities closed because of COVID-19, lectures will be replaced by synchronous sessions that will run according to the degree timetable. If such situation affects evaluation activities, they will be replaced by online methods by using the IT tools provided by the University. The weights for each activity will remain the same as specified in the teaching guide.