

**COURSE DATA****DATA SUBJECT****Code:** 34743**Name:** Mathematics I**Cycle:** Undergraduate Studies**ECTS Credits:** 6**Academic year:** 2025-26**STUDY (S)**

Degree	Center	Acad. year	Period
1401 - Degree in Chemical Engineering	Escola Tècnica Superior d'Enginyeria	1	First quarter
1934 - Double Degree Program in Chemistry-Chemical Engineering	Facultat de Química	1	First quarter

**SUBJECT-MATTER**

Degree	Subject-matter	Character
1401 - Degree in Chemical Engineering	Mathematics	BASIC
1934 - Double Degree Program in Chemistry-Chemical Engineering	Primer curso	COMPULSORY

**COORDINATION**

MOYA PEREZ JUAN ANTONIO

MACIA JUAN OSCAR

**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. The course serves as a foundation for more advanced mathematical concepts studied in Mathematics II and III. Given the extent of the material, 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: Linear Algebra, Geometry, Differential and integral calculus of one real variable and Statistics, which are divided into thematic units as listed in Section of Description of Contents.

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 use geometric intuition to enrich mathematical knowledge, and vice versa, to take advantage of the vocabulary of mathematics to raise geometric vision.
- To acquire a basic understanding of the concepts and terminology of functions of one real variable (relating properties of a function and the shape of its graph, understanding what is the derivative and how it is used and similar questions regarding the integration) and the corresponding calculation skills.
- To understand the basic statistical definitions and apply them in simple situations
- To perform some simple applications of interest in engineering, building on the basic content of the course.

Observations: The classes will be taught in the language as stated in the course sheet available on the website of the degree.

## 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 recommended that the student has taken the subject of Mathematics of the High-school secondary education. Similarly, it is recommended that those students who come from Higher Training Cycles have taken this subject.

## COMPETENCES / LEARNING OUTCOMES

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Acquire knowledge of basic and technological subjects to facilitate the learning of new methods and theories, and develop the versatility to adapt to new situations.

Act autonomously in learning, make informed decisions in different contexts, issue judgements based on experimentation and analysis and transfer knowledge to new situations.

Solve mathematical problems that may arise in engineering and apply knowledge of linear algebra, geometry, differential geometry, differential and integral calculus, differential equations and partial differential equations, numerical methods, numerical algorithms, statistics and optimisation.

Solve problems with initiative, make decisions, think creatively and critically, and communicate and convey knowledge, skills and competences in the field of industrial engineering.

## DESCRIPTION OF CONTENTS



## 1. Linear equations and Matrices

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

## 2. Basic Geometry

Vectors. Linear dependence and independence. Bases, linear applications. Straight lines and planes. Diagonalization. Affine geometry. Scalar product. Angle between vectors. Orthogonal projection. Complex numbers.

## 3. Differential Calculus

Elementary functions, continuity. Derivatives of the elementary functions. The Chain Rule. Successive derivatives. Taylor formula. Study of the graph of a function.

## 4. Integral Calculus

Primitives. Integration by parts. Change of variable. Definite integral. Computation of areas and averages.

## 5. Basic Statistics

Basic vocabulary in Statistics. Centrality (mean, means) and dispersion (variance, standard deviation). Introduction to probability distributions. Binomial distribution. Normal distribution.

### WORKLOAD

#### PRESENCIAL ACTIVITIES

Activity	Hours
Theory	30,00
Classroom practices	30,00
<b>Total hours</b>	<b>60,00</b>

#### NON PRESENCIAL ACTIVITIES

Activity	Hours
Attendance at other activities	0,00
Individual or group project	0,00
Independent study and work	20,00
Preparation of lessons	55,00
Preparation for assessment activities	15,00



Resolution of case studies	0,00
<b>Total hours</b>	<b>90,00</b>

## TEACHING METHODOLOGY

The teacher will gradually introduce the mathematical concepts and their use, mainly through examples. Likewise, the teacher will explain the standard procedures for solving problems related to the topic.

The aim of the Exercises Sessions will be that the students, through their work, internalize what has been explained in the Lessons. The way to achieve the active participation of students can vary according to the size of the practice groups, but will emphasize the balance between (a) individual work and (b) discussion and reasoned analysis of the exercises proposed by the teacher.

## EVALUATION

The evaluation will be carried out according to the following model in the first and second call:

50% of the final grade will be obtained by continuous assessment in which the work of the student will be valued through a series of activities throughout the course, and other assignments indicated by the teacher. Continuous assessment activities are non-recoverable.

The remaining 50% of the grade will be obtained from a final exam. It will be necessary to pass a minimum grade of 3.5 in the final exam.

If the exam grade is higher than 5,0 and the calculation of the final grade taking into account the continuous assessment is lower, the final grade will be that of the exam.

Anyway, the evaluation system will be based on the guides stated in the Reglament d'Avaluació i Qualificació de la Universitat de València per a Graus i Màsters ([ACGUV 108/2017](#)).

Copying or plagiarism of any activity that is part of the evaluation will result in the impossibility of passing the course, and the student will then be subject to the appropriate disciplinary procedures indicated in the ACTION PROTOCOL FOR FRAUDULENT PRACTICES AT THE UNIVERSITY OF VALENCIA ([ACGUV 123/2020](#)).

## REFERENCES

- Anthony Croft, Robert Davison, Mathematics for engineers: a modern interactive approach, Addison-Wesley, 1999



- C. Neuhauser, Matemáticas para ciencias, Prentice-Hall, Madrid, 2004
- 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.
- Rafael Sivera, Francisca Mascaró, Apuntes de Matemáticas I, 2012 (disponibles online en el aula virtual)