

Mathematics I

Code: 105037
ECTS Credits: 6

2024/2025

Degree	Type	Year
2502444 Chemistry	FB	1

Contact

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Teaching groups languages

You can view this information at the [end](#) of this document.

Prerequisites

It is convenient to know the contents of mathematics that allow you to pass the exam of Mathematics in the Selectivity [exam to enter at the University] without problems.

Objectives and Contextualisation

This course consists of a brief introduction to complex numbers, linear algebra and differential equations.

The objectives of the course are:

- (i) Understand the basics in each of these parts. These concepts include both the definitions of the mathematical objects that are introduced and their interrelation.
- (ii) To be able to apply the concepts studied coherently to the approach and resolution of problems.
- (iii) Acquire skills in mathematical writing and in calculus.

Competences

- Adapt to new situations.
- Communicate orally and in writing in one's own language.
- Learn autonomously.
- Manage, analyse and synthesise information.
- Obtain information, including by digital means.
- Propose creative ideas and solutions.
- Reason in a critical manner
- Recognise and analyse chemical problems and propose suitable answers or studies to resolve them.
- Resolve problems and make decisions.
- Show an understanding of the basic concepts, principles, theories and facts of the different areas of chemistry.

Learning Outcomes

1. Adapt to new situations.
2. Apply the suitable mathematical tools to deal with and resolve chemistry problems.
3. Communicate orally and in writing in one's own language.
4. Interpret mathematical language to deal with chemistry problems.
5. Learn autonomously.
6. Manage, analyse and synthesise information.
7. Obtain information, including by digital means.
8. Propose creative ideas and solutions.
9. Reason in a critical manner
10. Resolve problems and make decisions.

Content

(1) Complex numbers

- Definition and elementary operations.
- Polar form.
- n-th root of complex numbers.
- Factorization of polynomials.

(2) Linear algebra

- Systems of linear equations. The Gauss method.
- Matrices and determinants.
- Vectorial spaces: linear dependence, basis and dimension.
- Eigenvalues and eigenvectors. Diagonalisation.

(3) Differential and Integral calculus

- Functions. Derivative. Graphical representation.
- Primitives. Fundamental calculus theorem.
- Change of variable. Integration by parts.
- Primitives of rational functions.

(4) Differential equations of first order

- Differential equations: Definition and geometrical interpretation. Examples.
- Equations of separated variables.
- Linear equations of first order.
- Linear equations of greatest order.

- Linear equations of second order with constants coefficients.

- Systems of differential equations.

Activities and Methodology

Title	Hours	ECTS	Learning Outcomes
Type: Directed			
Problems	22	0.88	1, 2, 5, 3, 6, 4, 7, 8, 9, 10
Seminars	3	0.12	1, 2, 5, 3, 6, 4, 7, 8, 9, 10
Theory	25	1	1, 2, 5, 3, 6, 4, 7, 8, 9, 10
Type: Supervised			
Tutorial	6	0.24	1, 2, 5, 3, 6, 4, 8, 9, 10
Type: Autonomous			
Problem solving	40	1.6	1, 2, 5, 3, 6, 4, 7, 8, 9, 10
Study	42	1.68	1, 2, 5, 3, 6, 4, 7, 8, 9, 10

The standard methodology in this type of subject: theory classes where the definitions, the first results and examples are given, accompanied by problems classes where these examples are dealt with and where the students should try to solve these problems by themselves before coming to class.

Annotation: Within the schedule set by the centre or degree programme, 15 minutes of one class will be reserved for students to evaluate their lecturers and their courses or modules through questionnaires.

Assessment

Continous Assessment Activities

Title	Weighting	Hours	ECTS	Learning Outcomes
Seminar qualification	20%	4	0.16	1, 2, 5, 3, 6, 4, 7, 8, 9, 10
final exam	50%	4	0.16	1, 2, 5, 3, 6, 4, 7, 8, 9, 10
midterm exam	30%	4	0.16	1, 2, 5, 3, 6, 4, 7, 8, 9, 10

The qualification of this subject consists of

- 1) The day of the seminar there will be an exam for the students. It represents 20% of the mark.
- 2) A partial exam that will be carried out approximately in the middle of the semester. It represents 30% of the

grade.

3) The final exam of all the material that will take place at the end of the semester. It represents 50% of the grade.

4) Students who do not obtain a grade bigger or equal to 5 from the three previous points will get the chance of a recovery exam. In this case, one can not obtain the maximum qualification of "Matricula de Honor"

The students who have joined the single assessment modality will have to carry out a final test which will consist of an exam of all the contents of the subject to be carried out on the day of the second test of the students of the continuous assessment. The qualification of the student will be the grade of this test.

If the final grade does not reach 5, the student will have another opportunity to pass the subject with the recovery exam. The qualification of the student will be the grade of this test. In this case, the student will not be eligible for the "Matricula d'Honor" qualification.

If the students have been assessed for less than 25% of the subject their final grade will be non-assessable.

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Bibliography

M. Moreno, Una introduccion al algebra lineal elemental, UAB, 1990. Codi biblioteca de Ciencies: 15-M-9; 512.64 Mor.

S. I. Grossman, Algebra lineal, McGraw Hill, 1996. Codi biblioteca de Ciencies: 15- G.19; 512.64 Gro.

F. Carreras, M. Dalmau, F. Albeniz, M. Moreno, Ecuaciones diferenciales, UAB, 1987. Codi biblioteca de Ciencies: 34-E-16; 34-E-17; 517.9 Ecu.

Dennis G. Zill, Ecuaciones diferenciales con aplicaciones de modelado, Thomson Editors, 1997. Codi biblioteca de Ciencies: 34-Z-5; 517.9 Zil.

C. Neuhauser, Matemáticas para Ciencias, Prentice Hall, 2004, Codi biblioteca de Ciencies: 00-N-04

Software

Not applicable

Language list

Name	Group	Language	Semester	Turn
(PAUL) Classroom practices	1	Catalan	first semester	morning-mixed
(PAUL) Classroom practices	2	Catalan	first semester	morning-mixed
(PAUL) Classroom practices	3	Catalan	first semester	afternoon
(SEM) Seminars	1	Catalan	first semester	morning-mixed

(SEM) Seminars	2	Catalan	first semester	morning-mixed
(SEM) Seminars	3	Catalan	first semester	afternoon
(SEM) Seminars	4	Catalan	first semester	afternoon
(TE) Theory	1	Catalan	first semester	morning-mixed
(TE) Theory	2	Catalan	first semester	afternoon
