

| Degree | Type | Year |
|-----------|------|------|
| Chemistry | FB | 1 |

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Teachers

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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.

Learning Outcomes

1. CM04 (Competence) Propose the optimal mathematical tools for solving problems in the field of Chemistry.
2. CM05 (Competence) Solve real, basic mathematical problems applied to chemistry and, to a lesser extent, to other scientific fields.
3. KM04 (Knowledge) Identify the presence of underlying mathematics in science, with special emphasis on chemistry, taking into account analytical thinking, abstraction, and logical and rigorous reasoning.
4. KM05 (Knowledge) Identify elementary mathematical models and tools for calculus, linear algebra, and differential equations.
5. KM06 (Knowledge) Describe the concepts of numerical methods: precision, discretisation, numerical error, conditioning and normalisation for use in solving physical problems.
6. SM05 (Skill) Analyse the mathematical nature of certain chemical phenomena by abstracting essential variables and formulating mathematical models to describe them.
7. SM06 (Skill) Use mathematical calculations to solve simple problems in the field of Chemistry and, to a lesser extent, in other scientific fields.
8. SM07 (Skill) In the field of Chemistry, use graphic and numerical methods in the exploration, description and interpretation of mathematical data.

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 methode.
- 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 | |
| Seminars | 3 | 0.12 | |
| Theory | 25 | 1 | |
| Type: Supervised | | | |
| Tutorial | 6 | 0.24 | |
| Type: Autonomous | | | |
| Problem solving | 40 | 1.6 | |
| Study | 42 | 1.68 | |

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

Continuous Assessment Activities

| Title | Weighting | Hours | ECTS | Learning Outcomes |
|-----------------------|-----------|-------|------|--|
| final exam | 40% | 4 | 0.16 | CM04, CM05, KM04, KM05, KM06, SM05, SM06, SM07 |
| midterm exam | 40% | 4 | 0.16 | CM04, CM05, KM04, KM05, KM06, SM05, SM06, SM07 |
| Seminar qualification | 20% | 4 | 0.16 | |

During the course, we will evaluate 3 items.

1) During the problem classes and/or seminars, their content will be evaluated in certain sessions that will be announced well in advance. From this, an S grade is derived.

2) A partial exam that will be held approximately halfway through the semester, from which a P1 grade is derived.

3) A partial exam with the contents of the subject not evaluated in the first partial and that will be held at the end of the semester, from which a P2 grade is derived.

In case $\min(P1, P2) < 3$ the person must take the retake exam. Otherwise, the final grade is calculated with the formula $N1 = 0.2*S + 0.4*(P1+P2)$.

In case $N1 < 5$ the person must take the retake exam. If $N1 \geq 5$, the person has passed the subject with a final grade of N1.

The retake exam provides an R grade. For those who take the retake exam, a final grade $N2 = \min(7, 0.2*S + 0.8*R)$ is calculated, which replaces N1.

Students who have taken advantage of the single assessment modality must take a final test which will consist of an exam of the entire subject syllabus to be taken on the day that students in the continuous assessment take the second midterm exam. The student's grade will be the grade of this test.

Students who have been assessed on less than 25% of the course material will be considered non-evaluatable.

Bibliography

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

S. I. Grossman, Álgebra 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

Groups and Languages

Please note that this information is provisional until 30 November 2025. You can check it through this [link](#). To consult the language you will need to enter the CODE of the subject.

| Name | Group | Language | Semester | Turn |
|------|-------|----------|----------|------|
|------|-------|----------|----------|------|

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|----------------------------|---|---------|----------------|---------------|
| (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 |