

Mathematics I

Code: 105037
ECTS Credits: 6

Degree	Type	Year	Semester
2502444 Chemistry	FB	1	1

Contact

Name: Silvia Cuadrado Gavilan
Email: silvia.cuadrado@uab.cat

Use of Languages

Principal working language: catalan (cat)
Some groups entirely in English: No
Some groups entirely in Catalan: Yes
Some groups entirely in Spanish: No

Teachers

Bogdan Vasile Crintea
David Marín Pérez

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.
- Factoritization 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) Diferential equations of first order

- Diferential 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.

Methodology

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.

Activities

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

Assessment

The qualification of this subject consists of

- 1) A work consisting of delivering some problems proposed by the teachers that will have to be explained orally in case the teacher requires it. 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 pass the subject from the three previous points may be presented to a recovery exam if they have been evaluated at least in two of the three previous activities (delivery of problems, partial and final exams). The final mark is then the 10% corresponding to the presentation of problems (this note can not be recovered) plus 90% corresponding to the recovery exam.

In this case, you can not obtain the maximum qualification of "Matricula de Honor"

Assessment Activities

Title	Weighting	Hours	ECTS	Learning Outcomes
Delivery problems	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

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