# COURSE DATA

## DATA SUBJECT

**Code:** 34188
**Name:** Mathematics II
**Cycle:** Undergraduate Studies
**ECTS Credits:** 6
**Academic year:** 2026-27

## STUDY (S)

| Degree | Center | Acad. year | Period |
|---|---|---|---|
| 1110 - Degree in Chemistry | Facultat de Química | 1 | Second quarter |

## SUBJECT-MATTER

| Degree | Subject-matter | Character |
|---|---|---|
| 1110 - Degree in Chemistry | Matemáticas | BASIC |

## COORDINATION

HIDALGO GARCIA MARTA ROSA

# SUMMARY

Mathematics II, taught in year 1 of the Degree in Chemistry, is designed as an instrumental subject to provide theoretical knowledge and practical techniques on data processing, both numerical and statistical, and statistical and numerical methods to be used in a multitude of contexts in scientific activities in general and in chemistry in particular.

The focus is on solving chemical problems using laboratory data, which will allow students to obtain valid conclusions from the data obtained in laboratory experiments.

# PREVIOUS KNOWLEDGE

## RELATIONSHIP TO OTHER SUBJECTS OF THE SAME DEGREE

There are no specified enrollment restrictions with other subjects of the curriculum.

## OTHER REQUIREMENTS

There are no prerequisites.

## COMPETENCES / LEARNING OUTCOMES

### 1108 -

Demonstrate ability to communicate information, ideas, problems and solutions to both specialist and non-specialist audiences and using information technology, as appropriate.

Demonstrate ability to work in teams both in interdisciplinary teams and in an international context.

Demonstrate a commitment to ethics, equality values and social responsibility as a citizen and as a professional.

Demonstrate leadership and management skills, entrepreneurship, initiative, creativity, organization, planning, control, leadership, decision making and negotiation.

Develop capacity for analysis, synthesis and critical thinking.

Evaluate, interpret and synthesise chemical data and information.

Express oneself correctly, both orally and in writing, in any of the official languages of the Valencian Community.

Interpret data from observations and measurements in the laboratory in terms of their significance and the theories that underpin them.

Prepare reports, surveys and industrial and environmental projects in the field of chemistry.

Relate chemistry with other disciplines.

Relate theory and experimentation.

Show inductive and deductive reasoning ability.

Solve qualitative and quantitative problems following previously developed models.

Students must be able to apply their knowledge to their work or vocation in a professional manner and have acquired the competences required for the preparation and defence of arguments and for problem solving in their field of study.

Students must be able to communicate information, ideas, problems and solutions to both expert and lay audiences.

Students must have acquired knowledge and understanding in a specific field of study, on the basis of general secondary education and at a level that includes mainly knowledge drawn from advanced textbooks, but also some cutting-edge knowledge in their field of study.

Students must have developed the learning skills needed to undertake further study with a high degree of autonomy.

Students must have the ability to gather and interpret relevant data (usually in their field of study) to make judgements that take relevant social, scientific or ethical issues into consideration.

**1110 - Degree in Chemistry**

At the end of the course, the student will be able to prepare reports, expert assessments and industrial and environmental projects in the field of chemistry.

At the end of the course, the student will be able to relate theory and experimentation.

At the end of the course, the student will demonstrate inductive and deductive reasoning skills.

At the end of the course, the student will demonstrate the ability to analyse, synthesise and apply critical reasoning.

At the end of the course, the student will relate chemistry to other disciplines.

Collaborate effectively in teams, assuming responsibilities and leadership roles and contributing to collective improvement and development.

Communicate effectively, both orally and in writing, adapting to the characteristics of the situation and the audience.

Demonstrate critical and self-critical reasoning within the field of study, considering aspects such as professional ethics, moral values and the social implications of the different activities undertaken.

Express oneself correctly, both orally and in writing, in any of the official languages of the Valencian Community.

Understand and recognise, from within the discipline, inequalities based on sex and gender in society; integrate different needs and preferences related to sex and gender into problem-solving and solution design.

## DESCRIPTION OF CONTENTS

### 1. Statistical Sampling Theory

Random sampling. Binomial, Poisson, normal and deducted distributions. Statistical distributions. Statistical treatment of errors. Confidence intervals. Contrast of hypothesis.

### 2. Polynomial interpolation

Existence and uniqueness of the interpolating polynomial. Resolution of linear systems. Lagrange interpolation. Newtons interpolation: divided differences. Other interpolating techniques.

## 3. Numerical integration

Review of integration. Newton-Cotes formulas for numerical integration. Trapezoidal and Simpson rules. Error formulas.

## 4. Numerical methods for EDOs

Resolution of EDOs (separable variables, linears in general, homogeneous, exacts, non linear of type Bernoulli). Eulers method, improved Eulers method and Runge-Kuttas methods.

## 5. Practice 1

Use of general software for mathematical calculation and introduction to descriptive statistics. Statistical inference: confidence intervals.

## 6. Practice 2

Hypothesis testing: test for the mean, comparison of means of different populations.

## 7. Practice 3

Polynomial interpolation. Programming of methods of interpolation. Obtaining results. Estimation of errors.

## 8. Practice 4

Numerical integration (integrals and EDOs). Programming of numerical methods of integration. Obtaining results. Example of analytic solving of EDOs.

# WORKLOAD

### PRESENCIAL ACTIVITIES

| Activity | Hours |
|---|---|
| Tutorials | 7,00 |
| Theory | 41,00 |
| Computer classroom practice | 12,00 |
| **Total hours** | **60,00** |

### NON PRESENCIAL ACTIVITIES

| Activity | Hours |
|---|---|
| Attendance at other activities | 0,00 |
| Individual or group project | 15,00 |
| Independent study and work | 30,00 |
| Preparation of lessons | 25,00 |
| Preparation for assessment activities | 20,00 |
| Resolution of case studies | 0,00 |
| **Total hours** | **90,00** |

## TEACHING METHODOLOGY

Contents will be delivered in theory and practical classes, and also in tutorials and seminars as specified in the workload section. The theory classes will introduce statistical and numerical methods, with special emphasis on their application to practical cases.

The theory lectures must be participatory, with the presentation of examples by the lecturer and the proposal of others to be developed by students.

Practical classes will take place in a lab so that students learn how to use the computer tools that are appropriate to implement the theoretical concepts into practical cases. In the practical classes the lecturer will propose some exercises to assess the knowledge acquired by students.

Tutorials will be devoted to solving doubts and to clarify the concepts that students require for their effective acquisition of knowledge. Examples and problems may also be used to complete the theoretical and practical training offered and to discuss and debate on the various possible ways to solve a given problem.

In seminars the lecturer will present supplementary aspects, either theoretical or applied, related to the contents and skills introduced in the course.

## EVALUATION

A written exam will be conducted to assess the knowledge acquired in the theoretical classes, and its grade will account for 70% of the final mark. The practical grade will be the average of the grades obtained in each practical session. These will be assessed either through a test at the end of each session or an equivalent deliverable assignment. The practical component will represent 30% of the final grade. A minimum score of 5 out of 10 in the theoretical exam is required in order to apply these percentages. Otherwise, the subject will be considered failed. The second examination period will consist of a retake of the written theoretical exam. The practical grade cannot be recovered.

**Final warning:** Clear evidence of copying or plagiarism in any task that is part of the assessment will result in the impossibility of passing the subject, and the student will be subject to the appropriate disciplinary procedures. It should be noted that, according to Article 13 d) of the Statute of the University Student (Royal Decree 1791/2010, of December 30), "it is the duty of students to refrain from using or cooperating in fraudulent procedures in assessment tests, in submitted assignments or in official University documents."

## REFERENCES


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