COURSE DATA

DATA SUBJECT

Code: 36594
Name: Chemistry Laboratory
Cycle: Undergraduate Studies
ECTS Credits: 7.5
Academic year: 2025-26

STUDY (S)

Degree	Center	Acad. year	Period
1929 - Double Degree Program in Physics and Chemistry	Facultat de Física	1	First quarter

SUBJECT-MATTER

Degree	Subject-matter	Character
1929 - Double Degree Program in Physics and Chemistry	Primer Curso (Obligatorio)	COMPULSORY

COORDINATION

MURCIA MASCAROS M SONIA

SUMMARY

This course is a compulsory basic course taught in the first semester of the first year of the Double Degree in Physics and Chemistry, with a volume of 7.5 credits. In it, it is essentially intended that the student learn the operation and basic work techniques that they will develop in a chemical laboratory, and the preparation, recording, analysis and presentation of results of an experimental work. In this way, the essential foundations will be established so that you can subsequently successfully tackle the experiences of the different branches that are part of Chemistry.

In this specific subject the security, analysis and interpretation of data necessary for the development of any chemical experience will be addressed, as well as the management and treatment of data obtained in any chemical laboratory. For this, experiments will be carried out in which different basic techniques must be used, so that they can then be applied to more complex tests.

It is assumed that students know and use, in a basic but clear way, the concepts taught in the last year of High School Chemistry. However, all the scripts include a theoretical introduction and whenever necessary additional teaching material will be provided to cover those deficiencies that are detected.

PREVIOUS KNOWLEDGE

RELATIONSHIP TO OTHER SUBJECTS OF THE SAME DEGREE

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

COMPETENCES / LEARNING OUTCOMES

1929 - Double Degree Program in Physics and Chemistry

Acquire a permanent sensitivity to quality, the environment, sustainable development and the prevention of occupational hazards.

Carry out standard experimental procedures involved in synthetic and analytical work, in relation to organic and inorganic systems.

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 knowledge and understanding of essential facts, concepts, principles and theories related to the areas of chemistry.

Demonstrate knowledge of the characteristics and behaviour of the different states of matter and the theories used to describe them.

Demonstrate knowledge of the main aspects of chemical terminology, nomenclature, conventions and units.

Demonstrate knowledge of the main types of chemical reaction and their main characteristics.

Demonstrate knowledge of the principles of thermodynamics and kinetics and their applications in chemistry.

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.

Handle chemicals safely.

Have basic skills in the use of information and communication technology and properly manage the information obtained.

Recognise and evaluate chemical processes in daily life.

Show inductive and deductive reasoning ability.

Solve qualitative and quantitative problems following previously developed models.

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 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.

Understand the qualitative and quantitative aspects of chemical problems.

DESCRIPTION OF CONTENTS

1. 1. Prevention Session

Fire prevention and action in teaching-university buildings.

2. 2. Seminar 1: Presentation

Management and organization of laboratory work. Preparation of the experimental work. Elaboration of a laboratory report. Objectives, index and theoretical introduction. Treatment and discussion of results. Formal aspects. Presentation of tables and figures. Bibliography.

3. 3. Practice 1: Safety and Laboratory Material.

Safety rules. Simplified compound worksheets. Pictograms. Phrases H and P. Laboratory equipment (glassware, electrical equipment, assemblies, lighter, vacuum pump, etc.). Types of filtration. Use of the scale. Direct weighing and tare. Waste. Waste minimization program.

4. 4. Practice 2: Dissolution, precipitation and crystallization.

Dissolution and Solubility. Precipitation and Crystallization. Solid-liquid separations: decantation and filtration.

5. 5. Practice 3: Characterization of liquids and solids.

Distillation. Determination of the boiling point. Melting point determination.

6. 6. Practice 4: liquid-liquid extraction

Separation and isolation of unknown organic compounds. Solvents extraction. Aqueous phase and organic phase.

7. 7. Practice 5: Crystallization and identification of samples.

Session A: Purification (crystallization) and identification of an organic acid. Session B: Purification (crystallization) and identification of a neutral compound. Characterization and identification by melting point.
Thin layer chromatography.

8. 8. Seminar 2: Presentation of results.

Presentation of results.
Physical magnitudes. System of units. Measurement and experimental error. Accuracy and precision. Significant figures.

9. 9. Practice 6: Preparation of solutions and measurement of pH.

Acidity, basicity, balance and pH. Preparation of solutions of different concentrations. Solutions from solid salts. Use of the pH-meter and pH measurements.

10. 10. Practice 7: Acid-base assessment and potentiometric assessment.

Stoichiometry and neutralization of acid-base reactions Indicators in acid-base assessments. Use of primary patterns. Valuation curves. Determination of the autoprotolysis constant of water (Kw). Determination of the acidity constant of acetic acid.

11. 11. Seminar 3

Analysis and discussion of the results of practices P2 to P5

12. 12. Practice 8: Absorbance spectrum of solutions.

Aqueous solutions of CuSO4 by dilution. Preparation and utility of a white solution. Using the visible spectrophotometer and recording the spectrum. Absorbance measurements of copper sulfate solutions. Data processing.

13. 13. Practice 9: Distillation of mixtures of miscible liquids.

Acetone-acetic acid distillation. Simple distillation and fractionation column. Efficiency of both processes. Density of a mixture by weighing.

14. 14. Practice 10: Stoichiometric calculations.

Reaction between calcium carbonate and hydrochloric acid. Determination of the molar mass of CaCO3. Richness in weight of a sample problem. Gravimetric method and volumetric method.

15. 15. Practice 11: Chemical balance.

Chemical reactions in the test tube. Factors that influence a chemical balance. Reversible and irreversible reactions.

16. 16. Practice 12: Determination of water hardness.

Determination of the hardness of a water sample by complexometric titration with EDTA. Ion exchange. Softening and deionization. Ionic conductivity and pH measurements. Chloride test.

17. 17. Practice 13: Electrochemistry.

Behavior of some metals before a solution of HCl. Influence of pH and complex formation on redox reactions. Construction of galvanic cells. Electrolysis.

18. 18. Practice 14: Photovoltaic Energy, chemical and physical aspects related to the design of efficient solar cells.

Basic knowledge of a photovoltaic cell. Construction of an organic photovoltaic cell and determination of its efficiency.

19. 19. Practice 15: Kinetics.

Decoloration kinetics of violet crystal. Instant speed. Experimental determination of rate constant and the reaction order. Photocolorimetric technique. Apparent rate constants and absolute constant.

20. 20. Seminar 4

Oral presentation of the practice assigned to each student.

21. 21. Evaluation

Final evaluation session

WORKLOAD

PRESENCIAL ACTIVITIES

Activity	Hours
Tutorials	15,00
Laboratory	60,00
Total hours	**75,00**

NON PRESENCIAL ACTIVITIES

Activity	Hours
Attendance at other activities	0,00
Individual or group project	25,00
Independent study and work	62,50
Preparation of lessons	12,50
Preparation for assessment activities	12,50
Resolution of case studies	0,00
Total hours	**112,50**

TEACHING METHODOLOGY

In this subject, you will take part in your training activities: the practical classes of laboratories and seminars.

In the laboratory practical sessions, there will be a global vision of the basic treball of a chemistry laboratory. It is intended that the students acquire a stress in the execution of the technical techniques of the treball d'un laboratori. They must familiarize themselves with the mechanisms of security and management, handling of material and equipment, handling and presentation of data, prey for decisions and choice of the most appropriate procedure, if applicable. A standard session will consist of the initial

discussion of the questions that each practice has (which the student must carry out resolutions), and which will serve as the basis for introducing the theoretical concepts on which the practice is based and discussing the possible doubts or special precautions that is required. The important part of the session will be treball and handling of materials and products, depending on the object of the practice (the main part of the experimental procedure is to be registered for the student in the seu quadern de laboratori). And at the end of the session it is convenient to find an inn in common with the results advices, an interpretation of the results and a reflection regarding whether they have advised the object proposals.

S'han programat quatre seminaris adionaless and independents de les sessions de laboratori, which will serve to reinforce the aprenentatge d'aquestes, bé tractant temes monogràfics (per exemple, tractament de magnitudes, unitats i càlcul d'errors), bé per a Resoldre or analyze dubtes that make sorgit in the tractament and interpretation of the results of the practices.

As this is the first laboratory to which the first-year students accessed, there are plans for additional activities related to prevention and management of residus:

- Workshop on Prevention and extinction of fire, taught by the official prevention chapter of the Provincial Consortium of bombers of Valencia.

- Lecture on tractament of residus in the laboratories of the Faculty of Chemistry, taught by a technician of the Laboratory of General Chemistry, and the objective of which is to make students aware of the minimization process and correct management of the residus d'un laboratori d'aquestes caracteristiques.

EVALUATION

Attendance at practical laboratory classes is mandatory. A maximum of two sessions will be allowed excused absence (preferably, their recovery should be suggested in some other subgroup).

The evaluation of student learning will be formative in nature and will be carried out addressing different aspects that are part of two blocks with well-differentiated characteristics:

a) Continuous evaluation

Those aspects that require a continuous evaluation of the progress and of the work developed throughout the course are part of this section. For this, the following will be taken into account: the active participation in the seminars, the resolution of all those questions and problems that are proposed to them so that they work independently, and of course, the handling in the laboratory, the monitoring of the rules of security and lab notebook.

Given that the work in the laboratory, the work of preparing the experience and the preparation of the notebook implies a continuous evaluation process throughout the course, the grade obtained for these three sections, in the first call, will be maintained in the second . The sections listed below, together with the percentage of the grade, cannot be recovered, if necessary, on the second call. Only in the case of the laboratory notebook will a partial recovery of those sections that correspond to the treatment and

interpretation of the results be allowed.

1. Preparation of the experience (pre-questions 10%, phase diagram 10%): 20%

2. Laboratory work: 20%

3. Laboratory notebook (post-laboratory questions 10%, results 10%): 20%

b) Evaluation of specific activities

The knowledge and skills acquired will be evaluated through tests throughout the course and / or an exam common to all subgroups of the subject that will be carried out at the end of the laboratory work, on an official call date. The oral and written presentation of a laboratory report is also part of this section.

4. Memory of a laboratory practice: 20%.

5. Assessment exercises (report 10%, oral presentation 10%): 20%

In order to pass the course, a grade equal to or greater than 4 points is required in each of the five sections that make up the evaluation, and the weighted sum of all of them reaches 5 points.

Final warning

Copying or plagiarism of any assignment that is part of the evaluation will make it impossible to pass the course, and the student will be subject to the appropriate disciplinary procedures.

Please note that, according to Article 13 d) of the University Student Statute (RD 1791/2010, December 30), "*it is the duty of a student to refrain from using or cooperating in fraudulent procedures in evaluation tests, in the work performed or in official University documents*".

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