COURSE DATA

DATA SUBJECT

Code: 36457
Name: Advanced Experimentation
Cycle: Undergraduate Studies
ECTS Credits: 6
Academic year: 2026-27

STUDY (S)

Degree	Center	Acad. year	Period
1110 - Degree in Chemistry	Facultat de Química	4	Second quarter

SUBJECT-MATTER

Degree	Subject-matter	Character
1110 - Degree in Chemistry	Experimentation Advanced	ELECTIVES

COORDINATION

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SUMMARY

Advanced Experimentation is an optional subject of 8th semester of the degree in chemistry, which aims to the student strengthens skills in laboratory work in general, and in particular, to know to integrate the knowledge acquired in each of the different areas of Chemistry (analytical, inorganic, physics and organic). Moving one step further, intends that the student will be able to adapt a synthetic strategy aimed at the preparation of an organic compound to be used in other studies from other fields of chemistry, as well as to carry out proper analytical studies that allow to check its purity. For the realization of this course we rely on the knowledge acquired in all the subjects of chemistry course in the first three courses of the degree in chemistry.

The objectives to be achieved in this subject can be summarized in the following points:

¿ Strengthen the trainee's knowledge of the rules of safety, material handling and reagents and treatment of waste in a Chemistry lab, on the literature search and analysis of data.

¿ reinforce the skills of the student in the preparation, development and registration of experimental work in Chemistry (laboratory notebook, memory of the practice, reports etc.).

¿ increase the critical spirit necessary in any scientific activity.

¿ perform different synthesis of organic products.

¿ carry out the determination of compounds with the most appropriate analytical technique

¿ select the most appropriate experimental methodology depending on the level of concentration (majority compounds against those to trace level)

¿ develop the student's ability to resolve the problems that can occur in a Chemistry lab.

¿ develop the student's ability to analyze the results and draw conclusions.

¿ enhance the skills of the student to work in a team.

¿ encourage the expression both oral and written.

In relation to the Sustainable Development Goals (SDGs), this course expects students to be able to apply the knowledge acquired to contribute to ensuring inclusive, equitable, and quality education and to promote lifelong learning opportunities for all (SDG 4); to develop a particular sensitivity toward the sustainable management of water (SDG 6), raw materials, and energy sources (SDG 7); and to support sustainable development that is compatible with environmental protection (SDGs 11, 12, 13, 14, and 15). Additionally, students should be capable of designing, selecting, and/or developing efficient products, chemical processes, and/or analytical methodologies (SDG 7) that minimize environmental impact (SDGs 14 and 15), make use of alternative raw materials, and generate less waste (SDG 11).

PREVIOUS KNOWLEDGE

RELATIONSHIP TO OTHER SUBJECTS OF THE SAME DEGREE

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

OTHER REQUIREMENTS

The study and use of the subject Advanced Experimentation is based on the knowledge acquired in the different subjects of laboratory subjects taught in the first years of the degree in Chemistry. It is also convenient to get overcome the basic theoretical subjects from each of the areas of the degree in chemistry.

COMPETENCES / LEARNING OUTCOMES

1110 - Degree in Chemistry

Act autonomously in learning, making informed decisions in different contexts, forming judgements based on experimentation and analysis, and transferring knowledge to new situations.

At the end of the course, the student will be able to solve problems effectively.

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.

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.

Contribute to the design, development and implementation of solutions that address social needs, taking the Sustainable Development Goals as a reference.

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.

Propose creative and innovative solutions to complex situations or problems within the field of study, in order to respond to diverse professional and social needs.

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. Seminar

Presentation of the subject, rules of operation of an integrated laboratory, explanation of the objectives, content and techniques.

2. Literature review

In computer classroom, students are intended to analyze the literature regarding the development of processes and determine both the experimental processes to be performed and the subsequent analyzes.

3. Organic Synthesis

The preparation of diverse organic compounds will be carried out departing from commercial reagents.

4. Inorganic Synthesis

Making use of the compounds prepared in the previous activity a series of synthesis will be carried out with different inorganic compounds.

5. Analytical determination

Determination of products of organic and inorganic synthesis, both majority compound as impurities, using analytical techniques most appropriate, according to the nature and level of concentration of such products.

6. Characterization of chemical-physical properties

There will be studied chemical-physical different properties of the prepared compounds.

7. Seminar

They will analyze and discuss the results obtained during the practical sessions

WORKLOAD

PRESENCIAL ACTIVITIES

Activity	Hours
Tutorials	12,00
Laboratory	48,00
Total hours	**60,00**

NON PRESENCIAL ACTIVITIES

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

TEACHING METHODOLOGY

Work in the laboratory. The experiments are designed in such a way that basically should be performed in

more than one lab session, by which the student must learn to distribute your time and organize.

For the purpose of enhancing the responsibility of the student in the proper functioning of the laboratory and team work will be assigned weekly small tasks for which the student will contribute to the smooth functioning of the same.

An important part in the lab work is the laboratory notebook and the drafting of memoranda and reports.

The student must analyze the results obtained in both the laboratory and in the calculations. We will analyze the results obtained by identifying the problems and how they have been resolved or could be used to solve. Therefore this stage aims to develop the capability for analysis of pupil, enhance the exchange of information and the team work.

Seminars. All laboratory sessions require a prior exchange of views Where the teacher and the students can solve the specific questions of that day's work. Work of the teacher in this stage is foster in students a positive attitude in scientific work, this has been a seminar at the beginning of each session. A seminar, at the beginning of the course, designed to make the presentation of the subject, operation of an integrated laboratory, explanation of the objectives, content and techniques to be used throughout the course.

It has designed a seminar, at the end of the practice sessions, where they will discuss the results obtained, the problems that have arisen and make reasoned proposals for solution.

EVALUATION

The student's academic performance and the final grade for the course will be made, in a weighted manner, according to the percentages shown in each of the evaluated sections. All grades will be based on the absolute score out of 10 points. The different sections that will be evaluated are the following: a) LABORATORY WORK (30%): it will be evaluated the material released where there are experimental proposals, synthetic schemes and calculations to carry out the experimental and/or analytical parts, as well as the realization of these experimental and/or analytical parts. b) PRESENTATION OF RESULTS - WRITTEN REPORT (30%): the students will present a written report with a maximum number to be indicated by the professors of the course, which will include all the scientific work carried out as well as the analysis, discussion of the results obtained and conclusions drawn. c) PRESENTATION OF RESULTS- ORAL EXHIBITION (40%): A summary of the written report will be presented in an oral presentation of 15 min. at the end of which, the professors will ask questions about it.

It is necessary to obtain a minimum of 4 points out of 10 in each of the sections in order to obtain the final average grade.

The second call will include the presentation of the corresponding report as well as the oral presentation of the results obtained and presented in this report.

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*".

REFERENCES

- Características de los compuestos (datos físicos, químicos, seguridad etc.): a) Inst. Nacional de Seguridad e Higiene en el Trabajo (Ministerio de Trabajo e Inmigración) b) Catálogo SIGMA-ALDRICH (Casa Comercial) c) CHEMnetBASE reúne una serie de Bases de datos como: 1. Combined Chemical Dictionary (CCD) 2. The Handbook of Chemistry & Physics d) Index Merck (libro que se puede encontrar en la biblioteca)

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- CHEMBIOOFFICE ULTRA, perkinelmer (cambridgesoft) amplia selección de aplicaciones y funcionalidades que permite estudiar dibujar, formular, modelar y editar estructuras moleculares químicas y biológicas.

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- SKOOG, DA. WEST, DM. HOLLER, FJ. CROUCH SR. Fundamentos de química analítica. 8ª edición. Madrid: Paraninfo, 2005. 1196 p. ISBN: 9788497323338.

- SPIRIDONOV, VP. LOPATKIN, AA. Tratamiento matemático de datos fisicoquímicos. Moscú: Mir, 1973. 207 p. ISBN: mkt0004416619

- GIAMBERARDINO, V. Teoría de los errores. Caracas: Reverté Venezolana, 1980. 168 p. ISBN: 978-84-291-4009-5

- LEVINE, IN. Físico química. 4ª edición. Madrid: McGraw-Hill, 1996. 594 p. ISBN: 84-481-0617-2.