COURSE DATA

DATA SUBJECT

Code: 36455
Name: Organic Chemistry Laboratory I
Cycle: Undergraduate Studies
ECTS Credits: 4.5
Academic year: 2025-26

STUDY (S)

Degree	Center	Acad. year	Period
1110 - Degree in Chemistry	Facultat de Química	2	Second quarter
1929 - Double Degree Program in Physics and Chemistry	Facultat de Física	3	Second quarter
1934 - Double Degree Program in Chemistry-Chemical Engineering	Facultat de Química	2	Second quarter

SUBJECT-MATTER

Degree	Subject-matter	Character
1110 - Degree in Chemistry	Organic Chemistry	COMPULSORY
1929 - Double Degree Program in Physics and Chemistry	Tercer Curso (Obligatorio)	COMPULSORY
1934 - Double Degree Program in Chemistry-Chemical Engineering	Segundo curso	COMPULSORY

COORDINATION

PICHER URIBES MARÍA TERESA

SUMMARY

Organic chemistry deals with the study of the structure and reactivity of compounds of carbon, usually known as organic molecules. It is easy to understand the importance of organic compounds if we consider that among them are the vast majority of compounds essential to life as lipids, sugars, proteins or nucleic acids. In addition to these substances, which are involved in the primary metabolism of living beings, there are other organic compounds that possess pharmacological activity and are the basis of drugs. In addition, there are these substances, pesticides, fertilizers, herbicides, preservatives, dyes, scents, perfumes, plastics, rubbers, varnishes, paints, coatings, adhesives, textile fibers, fuels and many other types of materials essential for modern life and are also organic molecules.
The continuous advancement of discipline within a sustainable framework to the environment, is enabling the development of new compounds and organic materials that keep-improving the quality of life we enjoy today, present less risk to health or have a lower environmental impact than other previously designed compounds.

The number of new organic substances that are described every year is very high and if we want to understand the very different properties, applications, and potential problems in the use of organic compounds, the knowledge of the factors that determine its structure and its reactivity is essential. That kind of knowledge is determined in a manner in this sense, Organic Chemistry I Laboratory and experimental is a compulsory subject of 4th semester of the degree in chemistry which allows the student to acquire skills in laboratory work, in general, and in particular, seat and deepen the knowledge of the basics of working in the laboratory of organic chemistry and the manipulation of organic compounds. For the realization of this laboratory is based on the know-how acquired in the laboratories of Chemistry I and II (first course) (see section VIII: prior knowledge) and the subjects of theoretical Organic Chemistry I (3rd semester) and Organic Chemistry II (4th semester, simultaneously with the laboratory).

The objectives to be achieved in this subject can be summarized in the following points:
- that the student learn and observe the safety rules and operate with fluent material, apparatus and reagents used in a laboratory of Organic Chemistry.
- that the student learn and follow the various methods of waste treatment
- that the student learn the bibliographical sources unfolding fluently in the search for information by selecting it and collecting and properly.
- that the student learn how to prepare, develop, and properly record an experimental work in Organic Chemistry and to analyze the results obtained.
- the student learn both the basis and the possibilities of the standard techniques in Organic Chemistry.

- that the student know about and perform the characterization and identification of organic compounds.
- that the student carry out getting different organic compounds, either by a direct transformation (a stage) or by a synthetic sequence (synthesis by stages).
- that the student develop the critical spirit necessary in any scientific activity.
- that the student acquire the experience necessary to correctly interpret any experimental procedure as well as prepare and develop an experimental procedure simple face and solving the problems that may arise, analyzing the results obtained and conclusions are drawn.
- that the student know express themselves properly both orally and in writing
- enhance the skills of the student to work in a team.
- that the student will be able to relate the acquired knowledge to everyday life.

Regarding the Sustainable Development Goals (SDGs), it is expected that students will be able to know in this subject how to apply the knowledge learned to guarantee an inclusive, equitable, and quality education and promote learning opportunities for everyone (SDG 4). To acquire a special sensitivity for sustainable management of water (SDG 6), raw materials and energy sources (SDG 7), as well as for an environmentally friendly and sustainable development (SDGs 11 , 12, 13, 14 and 15), in addition to being able to design, select and/or develop efficient chemical products, processes and/or analytical methodologies (SDG 7) that minimize their impact on the environment (SDGs 14 and 15), using alternative raw materials and reducing wastes (SDG 11).

PREVIOUS KNOWLEDGE

RELATIONSHIP TO OTHER SUBJECTS OF THE SAME DEGREE

1110 - Degree in Chemistry
Obligation to take the subject(s) simultaneously 36453 - Organic Chemistry I

1929 - Double Degree Program in Physics and Chemistry

Obligation to take the subject(s) simultaneously 36453 - Organic Chemistry I

1934 - Double Degree Program in Chemistry-Chemical Engineering
Obligation to take the subject(s) simultaneously 36453 - Organic Chemistry I

OTHER REQUIREMENTS

The work to be performed at the Laboratory of Organic Chemistry I is based on the knowledge acquired in the courses General Chemistry I and II, Organic Chemistry I and Organic Chemistry II (the latter given simultaneously with the laboratory).
From a practical point relies on the knowledge must be acquired in the laboratories of Chemistry I and II.
For more details see Guide Department.

COMPETENCES / LEARNING OUTCOMES

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Act autonomously in learning, making well-founded decisions in various contexts, forming judgements based on experimentation and analysis, and applying knowledge to new situations.

Address new problems and propose strategies to solve them.

Collaborate effectively in work teams, assume responsibilities and leadership roles, and contribute to collective improvement and development.

Communicate effectively both orally and in writing, adapting to the context and audience.

Contribute to the design, development and implementation of solutions that respond to social demands, using the Sustainable Development Goals as a reference.

Demonstrate both inductive and deductive reasoning skills.

Demonstrate critical and self-critical thinking, considering professional ethics, moral values and social implications of the different activities carried out throughout the degree.

Demonstrate the ability to analyse, synthesise and reason critically.

Distinguish between the qualitative and quantitative aspects of chemical problems.

Distinguish the principles, procedures and techniques used in the determination, separation, identification and characterisation of chemical compounds.

Evaluate the risks involved in the use of chemical substances and laboratory procedures.

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

Identify chemical elements and their compounds, including their extraction, structure, reactivity, properties and applications.

Identify chemical processes in everyday life.

Identify the main types of chemical reactions and their associated key characteristics.

Implement sustainable and environmentally friendly methodologies.

Interpret the relationship between the variation in the characteristic properties of chemical elements and the Periodic Table.

Propose creative and innovative solutions to complex situations or problems in the field, addressing diverse professional and social needs.

Relate chemistry to other disciplines.

Relate theory to experimentation.

Solve problems effectively.

State the principles of thermodynamics and kinetics and their application in chemistry.

Understand and analyse, from the perspective of the degree programme, social inequalities based on sex and gender; integrate gender-sensitive approaches into problem-solving and solution design.

Use chemical terminology, nomenclature, conventions and units correctly.

DESCRIPTION OF CONTENTS

1. Seminar

INTRODUCTION. Objectives. The space. Safety. Material. Compounds. Basic language. Residues. Preparation of experimental work: Search, interpretation and organization of information. Review of the basic techniques seen in Chemistry Lab I and II: Acid-base extraction, gravity and vacuum filtration, crystallization, distillation, chromatography. Organic functional groups with acid-base properties.

2. Separation of the components of a pharmaceutical product, purification, characterization and identification.

Separation, purification, characterization and identification of the components of a commercial product: Application of basic laboratory techniques: Liquid-liquid extraction, Filtration, Crystallization, Melting point, Solvent evaporation in Rotavapor, CCF. Isolation of caffeine from a natural source and comparison of the results with those of the pharmaceutical product.

3. Manufacture of a soap.

Saponification of a natural triglyceride and soap making. Soap testing (water hardness, fat dissolving capacity...).

4. Fischer esterification. Obtaining synthetic flavors.

Esterification reaction between an acid and an alcohol to obtain a synthetic aroma. Equilibria in organic synthesis.

5. Isolation of limonene from orange.

Distillation of immiscible liquids. Measurement of the optical rotation of natural products.

6. Nucleophilic substitution reaction and / or elimination.

Synthesis using nucleophilic substitution reactions and / or elimination.

7. Obtaining an oxirane and opening by solvolysis.

Synthesis of an azo dye and dyeing of different fibers.

8. Obtaining a dye.

Synthesis of a dye azoic and dyed different fibers.

WORKLOAD

PRESENCIAL ACTIVITIES

Activity	Hours
Tutorials	7,00
Laboratory	38,00
Total hours	**45,00**

NON PRESENCIAL ACTIVITIES

Activity	Hours
Attendance at other activities	0,00
Individual or group project	0,00
Independent study and work	67,50
Preparation of lessons	0,00
Preparation for assessment activities	0,00
Resolution of case studies	0,00
Total hours	**67,50**

TEACHING METHODOLOGY

Before the first experimental session will be held an introductory seminar. ASSISTANCE REQUIRED

FOR THIS SEMINAR WILL BE ABLE TO MAKE THE PRACTICE.

This seminar will cover the following topics:

- The Laboratory of Organic Chemistry and Applied Organic Chemistry: Objectives and limitations of the experimental work in organic chemistry.
- Laboratory Safety: Safety and compliance; Use blankets, fire extinguishers and so on. Use of
- Showcases, Exits and emergency protocol.
- Organization of laboratory work: Standards and timing.
- Material and equipment: material per job, common, in addition, use of catalogs, English names, handling and safety (broken material, use a vacuum and so on.) Cleaning and drying, scale of work.
- Reagents and products: Labelling commercial physical, chemical, origin, uses and safety Proper
- handling of solids and liquids. Specimen labelling, storage and destruction of waste.
- Lab notebook and / or Laboratory notebook.
- To deliver the products and results
- The experimental work in progress: How to take efficient advantage of the time. When can you stop?
- Where is the product?. Safety: What to do if....?

The different parts in which the subject is organized are:

a) Teaching material: trough the \"Aula Virtual\" it will be delivered to the students the convenient pedagogic material.

b) Preparation of experience to perform: PREPARATION PREVIOUS EXPERIMENTAL WORK IS

REQUIRED TO ACCESS THE LABORATORY. After defining the objectives the student must carry out the preparation of each of the experiences compiling relevant information from the sources indicated by the teacher and ordering them appropriately. The teacher can review the material prepared and limit access to the laboratory if it is not appropriate.

Of special note in this section:

1. Knowledge of the characteristics and safety of compounds and techniques involved.

2. Preparation and analysis of the separation scheme that allows greater understanding of the experience and the factors that contribute to a good result. This analysis allows the student to understand what it does and why and correct or adjust the procedure in case of error or if the expected results do not coincide with expectations.

Optionally you may want to prepare a scheme of work to be done in order to have a clear idea of the different operations carried out, order them and details to take special care to obtain good results.

c) Seminars: In addition to the Introductory Seminar before each session will be held a short seminar.

These seminars will take place either by the teacher presentations or by students working in small groups. Devoted to:

1. Presentation and discussion of the experience to make and resolve doubts about the work carried out.

2. Analysis of the results obtained in previous sessions, identifying problems and how they were resolved or could be solved in order to develop the student's analytical skills, enhance information sharing and teamwork.

d) Work in the laboratory. Depending on the number of students per group experiences are carried out individually or in pairs. In the latter case it is advisable to introduce some practical ways to accomplish individually.

In order to enhance the student's responsibility in the functioning of the laboratory and teamwork small weekly tasks were allocated for students to contribute to a smooth operation.

The experiences are designed so that in general can be performed during a laboratory, although the drying of solid compounds to calculate yield and characterization should be performed in a later session.

The core of the laboratory work is the immediate registration of the same in the notebook. The teacher can check the newspaper to check this point.

EVALUATION

The assessment of the apprenticeship will be conducted continuously, taking into account the following sections:

a) LABORATORY WORK AND RESULTS (50%):

Your performance will be evaluated based on the observation of the following criteria: adherence to general rules and safety regulations, attitude, preparation of experiments, work and handling in the laboratory, and the analysis of obtained results.

General Rules:

Attendance at the introductory seminar is **mandatory** for participation in subsequent practices.

Students are expected to be familiar with and adhere to the general and safety regulations of the laboratory. Failure to comply with safety rules may result in expulsion from the laboratory.

Students must come to the laboratory prepared with a lab coat, safety goggles, rubber gloves, spatula or spoon, pencil, and calculator.

Students must have a well-prepared lab notebook, which includes written answers to any questions assigned for the laboratory work. The teacher may review the notebooks before the start of the practice session.

At the beginning and end of each practice session, students are responsible for completing assigned general tasks and cleaning their work area.

Each experimental session will last for 4.5 hours, including seminars. Missed sessions will not be made up, so attendance and punctuality are crucial. **Failure to attend more than two practical sessions will result in a loss of qualification for the Laboratory Work and Results department**.

The answers to questions before or after the practice, either in the lab notebook or those raised by the teacher, will be considered in the evaluation.

Practical exam: The professor may conduct a practical exam to further assess your performance. This exam will involve carrying out an unplanned experimental task of similar difficulty to the ones conducted during regular practices.

b) SEMINARS (10%): Your preparation, writing, and presentation of the assigned work will be assessed, along with your understanding of the subject matter and your ability to answer questions posed by the professor or other students.

c) WRITTEN EXAM (40%): This exam will consist of practical-type questions related to the experiments conducted throughout the course. It will test your overall knowledge and your ability to express yourself in writing. Additionally, it aims to evaluate your research efforts, information compilation, and organization skills, as well as your ability to establish connections with the knowledge acquired in Organic Chemistry I and Organic Chemistry II. The written exam will be common to all groups and will be held on the official date established in the Degree exam calendar. To be eligible for the remaining percentage, a minimum score of 4 out of 10 is required in this section.

In the second call evaluation, the grade obtained in the continuous evaluation of the first call (Point a)-"Laboratory work and results" and (Point b)-"Seminars" will be maintained. Point c – "Written exam" will be re-evaluated.

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

BASIC

- MARTINEZ GRAU, M. A.; CSAKY, A. Técnicas experimentales en síntesis orgánica. Madrid: Ed. Síntesis, 1998.
- DURST, H.D.; GOKEL, G. W. Química Orgánica experimental. Madrid: Reverté, 1985.
- FURNISS, B.S.; HANNAFORD, A. J.; SMITH, P.W.G.; TATCHELL, A.R. Vogel's textbook of practical organic chemistry. Ed. Longman, 1989.
- HARWOOD, L.M.; MOODY, C. J. Experimental Organic Chemistry. Blackwell Sci. Publ., 1989.
- PALLEROS, D. R. Experimental Organic Chemistry. John Wiley and Sons, 2000.
- "ChemBioOffice Ultra, PerkinElmer (CambridgeSoft) Àmplia selección de aplicaciones y funcionalidades que permite estudiar, dibujar, formular, modelar y editar estrcutras moleculares químicas y biológicas.
- Manuales del Laboratorio de Química I y Laboratorio de Química II (Grado en Química, primer curso)

ADDITIONAL

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)