VNIVERSITAT DE VALÈNCIA

Course Guide
36471 Organic Compounds and Materials of Industrial Interest

COURSE DATA

DATA SUBJECT

Code: 36471
Name: Organic Compounds and Materials of Industrial Interest
Cycle: Undergraduate Studies
ECTS Credits: 4.5
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	Organic Chemistry Applied	ELECTIVES

COORDINATION

GALIAN BACA RAQUEL EUGENIA

SUMMARY

The subject Organic compounds and materials of industrial interest belongs to the section Applied Organic Chemistry with 15 ECTS credits. This is an optative subject with 4.5 ECTS credits, which is imparted in the 8th semester (fourth course).

This is a subject with a clear informative character. Is important that the student, as a future candidate for an industrial professional career, recognize the main sectors of the organic chemical industry, such as petrochemical, polymers, colorants, surfactants, agrochemical and pharmaceutical industry.. It involves basic knowledge of the main sources of raw materials, either renewable (petroleum, natural gas or coal) or not renewable (biomass). Additionally, and due to the growing interest of the environmental aspects in the chemical industry, is adequate a basic knowledge of the reactions of organic compounds in the environment, together with the contribution of chemistry to a sustainable development, and the principles that governs the so called green chemistry. 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

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

OTHER REQUIREMENTS

The student should get acquainted with the previously gained concepts of Chemistry and Biology, basic pillars that support an important part of the contents of this subject. Specifically, the study of the general organic chemistry imparted during the second and third year of the grade will help to a better understanding of the contents.

COMPETENCES / LEARNING OUTCOMES

1110 - Degree in Chemistry

At the end of the course, the student will be able to address new problems and develop strategies to solve them.

At the end of the course, the student will be able to identify chemical elements and compounds, including their production, structure, reactivity, properties and applications.

At the end of the course, the student will be able to identify chemical processes in everyday life.

At the end of the course, the student will be able to identify the structure and reactivity of the main classes of biomolecules and the chemistry of key biological processes.

At the end of the course, the student will be able to implement sustainable and environmentally friendly methodologies.

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 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.

At the end of the subject, the student will evaluate, interpret and synthesize the chemical data and information correctly.

Capacidad de análisis, síntesis y razonamiento crítico en la aplicación del método científico.

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.

Ser capaces de analizar la influencia que sobre el diseño del sistema de información de costes, ejercen, tanto la actividad concreta desarrollada por la entidad como la tecnología utilizada, la estructura organizativa y el estilo de dirección. Calcular costes preestablecidos y relacionarlos con la planificación y el control de la actividad interna. Seleccionar aquellos indicadores de gestión que faciliten el desempeño personal, estableciendo la frecuencia y el formato en función del usuario de destino.

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. Introduction

The chemical industry, history and economic impact. Chemical production: its major sectors. Evolution of the organic compounds in the environment.

2. No renewable sources of raw materials: oil, natural gas, coal

Oil as a source of basic chemicals. Oil refining. Cracking and reforming. Natural gas as a source of chemicals. Coal as a source of chemicals. Syngas. Basic organic chemicals.

3. Renewable sources of raw materials: biomass

The cycle of organic matter. Biomass. Bio-refineries. Energy and chemicals from biomass. Ingredients for the modern perfumery industry.

4. Organic products in Industry: polimers

Polymers: classification. Types of polymerization. Representative polymers. Composition of commercial plastics. Biodegradable polymers. Polymers and environment.

5. Organic products in Industry: colorants

Color and electromagnetic spectrum. Dyes vs pigments. Pigment types. Main types of dyes: classification. Textile dying. Organic pigments. Food colorant as additives. More food additives.

6. Organic products in Industry: surfactants

Introduction. Properties of surfactants. Classification of surfactants. Commercial detergents: composition, types of additives. Environmental behavior of surfactants. Fatty food systems.

7. Organic products in Industry: plaguicides

Introduction. Classification of pesticides. Mode of action: representative examples. Discovery and development of pesticides. Pesticides and environment.

8. Green chemistry introduction

Green chemistry definition. Green chemistry principles and practical examples.

9. Organic products in Industry: drugs

Main groups of drugs: representative examples. Discovery and drug design. Drugs as emerging

contaminants.

WORKLOAD

PRESENCIAL ACTIVITIES

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

NON PRESENCIAL ACTIVITIES

Activity	Hours
Attendance at other activities	0,00
Individual or group project	7,00
Independent study and work	30,50
Preparation of lessons	20,00
Preparation for assessment activities	10,00
Resolution of case studies	0,00
Total hours	**67,50**

TEACHING METHODOLOGY

This subject was conceived to give to the student the role of principal actor of its own learning and is organized in the following manner:

- In-person theoretical classes.

These classes will be dedicated to the exposition to the students of the fundamental aspects of the subject. Thus, the different topics found in the program will be discussed in detail in an orally form. In this manner, the student will obtain a global and comprehensive view of the subject. Both, the blackboard and power point presentations will be used during this time. Previously to the classes, the educational material needed for an easy follow-up of the subject will be introduced in the Aula Virtual.

Those classes will be complemented with the personal work of the student.

- **Practical classes.** In those classes, the application of the concepts introduced in the theoretical classes will be performed for the students. Previously to the attendance of those practical

classes, the students will be revised the problems proposed by the professor. The resolution of those problems will be carried out either by the professor or by the students, in an individual form or in a team-work.

- **Tutorial classes.** There will be 7 sessions distributed uniformly along the course. Each session will last for one hour. During those sessions, the professor will evaluate the learning process of the students, which previously and optionally organized in small groups. The difficulties that could arise to the students along the course will be solved, and the students will have guidance in the selection of the most appropriate methods for the resolution of possible future problems.
- **Seminars**. There will be three one-hour seminar sessions. In those seminars, some aspects related to the pharmaceutical industry sector will be discussed in more detail, as an important industrial area with its owns features.

EVALUATION

The student's academic performance and the final grade for the course will be weighted according to the percentages shown in each of the sections evaluated. All grades will be based on the absolute score of 10 points, and according to the scale established in RD 1125/2003. This criterion will be maintained in all calls

The different sections to be evaluated are the following:

1- Direct evaluation of the teacher (0.5 points): In this evaluation different aspects will be taken into account, among which it is worth highlighting:

• Attendance and clear and reasoned participation in the discussions.

• Progress in the use of the characteristic language of organic chemistry.

• Solving problems and raising questions.

• Critical spirit.

2.- Tutorials and seminars (3 points). The note of each student in this section will take into consideration:

• Content and oral and written presentation of the exercises and assignments commissioned by the teacher in each subgroup of work.

3.- Exams (6.5 points): will be held on the date indicated by the Faculty and will be common to all groups in the subject. This test will consist of questions, problems and exercises to assess the student's acquisition of the skills included in the teaching guide. The global pass in the subject will necessarily imply having obtained a minimum score of 3.25 points out of the 6.5 total in the exam

In the evaluation of the second call, the grade obtained in the continuous evaluation (point 1- "Direct evaluation of the teacher" and Point 2 "Seminars") of the first call will be maintained and the part corresponding to the Point will be re-evaluated 3- "Exams".

The student will be eligible to be evaluated only with a written exam on the contents of the subject treated to theory classes, tutorials and seminars, so that the teacher can thus assess whether the student has acquired the skills and knowledge related to the subject. This exam will be 100% of the overall grade. In this case, the student must renounce the continuous evaluation and take advantage of this communicating evaluation modality before the first written summons presented with a registration record to the department secretary.

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

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