

**Chemistry I**

Code: 103264  
ECTS Credits: 6

Degree	Type	Year	Semester
2501925 Food Science and Technology	FB	1	1

**Contact**

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**Use of Languages**

Principal working language: spanish (spa)  
Some groups entirely in English: No  
Some groups entirely in Catalan: No  
Some groups entirely in Spanish: No

**Teachers**

Kevin Reyes Mateo  
Carolina Gascó Catalán

**Prerequisites**

Although there are no official pre-requisites, it is very convenient for the student to review:

- The concepts of stoichiometry and high school balance.
- The Lewis model for the representation of chemical structures.
- The basic knowledge of nomenclature of organic chemistry, as well as the representation of chemical bonds seen in the baccalaureate.

**Objectives and Contextualisation**

It is a first-year subject, of basic training in the foundations of organic chemistry, both from the structural point of view and chemical reactivity. The acquired knowledge should allow students who pass the subject to understand the concepts of isomerism related to organic compounds, as well as to interpret chemically most of the biochemical processes that will later be seen in other subjects of the degree.

More specifically, the objectives of the subject are:

- 1) Achieve knowledge and understanding of the basic concepts of the various binding theories applicable to organic compounds.
- 2) Be able to describe and understand the different types of isomerism of organic compounds.
- 3) To identify and describe the reactivity and reaction mechanisms of the main organic reactions, as well as the various factors that affect them.

**Competences**

- Analyse, summarise, resolve problems and make professional decisions.
- Apply knowledge of the basic sciences to food science and technology.
- Apply the scientific method to resolving problems.
- Display knowledge of the physical, chemical, biochemical and biological properties of raw materials and foods.

## Learning Outcomes

1. Analyse, summarise, resolve problems and make professional decisions.
2. Apply the scientific method to resolving problems.
3. Describe the different types of isomerism in organic compounds.
4. Describe the mechanisms of the principal organic reactions and the various factors that affect them.
5. Describe the structure of the atom.
6. Describe the technofunctionality of organic compounds in accordance with the characteristics of the environment.
7. Distinguish between the different types of chemical bonds and intermolecular interactions.
8. Identify the basic reactivity associated with the various functional organic groups.
9. Identify the functional groups of the principal natural organic products and their most important reactions.
10. Name and formulate the organic and inorganic chemical compounds.

## Content

Chemical bonds (1 ECTS). Electronic structure of the atom. Lewis structures and resonant forms. Introduction to the different types of links. Simple and multiple carbon bonds. States of aggregation of matter.

- Introduction to organic compounds (1 ECTS) Structures and formulas of organic molecules. Nomenclature. Structural or constitutional isomería. Nucleophiles and electrophiles. Oxidation state and degree of oxidation. Classification of organic compounds according to their degree of oxidation and their functional groups. Kinetic and thermodynamic stability of organic molecules. Acidity and basicity of organic compounds. Nucleophile and electrophile concept.

- Conformational and stereochemical analysis (1 ECTS). Dynamic stereochemistry: Conformational isomerism in linear alkanes. Newman projections.

Conformational isomerism of cycloalkanes. Static stereochemistry: Chirality. Chiral carbon atoms: stereogenic centers. Configurational isomerism: enantiomers and diastereomers. The R / S nomenclature to describe stereogénicos centers. Cis-trans or Z-E isomerism. Optical activity Fisher's projections.

- Hydrocarbons: alkanes, alkenes and aromatic compounds (0.5 ECTS). Halogenation reactions of alkanes. Reactions of addition to alkenes. Aromaticity criteria and examples.

- Organic compounds of oxidation grade 1: Achilles halides, alcohols, ethers, thiols and amines (0.5 ECTS). Nucleophilic substitution reactions: SN1 and SN2. Elimination reactions: E1 and E2. Reactivity of alcohols: dehydration and oxidation reactions. Phenoles Amines: reactivity and synthesis, examples with bioactivity.

- Organic compounds of oxidation grade 2: aldehydes and ketones (1 ECTS). Structure and general reactivity. Nucleophilic addition reactions. Acetals and hemiacetals. Cyclical forms of carbohydrates. Aldol condensation.

- Organic compounds of oxidation grade 3 and 4: carboxylic acids and derivatives, urea and derivatives (1 ECTS). Examples of acids and esters. Interconversion reactions between acids and esters. Amides Amino acids and peptides. Urea and derivatives: carbamates.

## Methodology

The development of the course, in terms of teaching methodology and training activities, is based on the following activities:

- Lectures, where the student acquires the theoretical knowledge of the subject on the one hand and on the other hand, attends and participates in the resolution of related problems.
- Seminars, which are sessions with a small number of students that should serve both to answer questions and to delve into certain key concepts and their application in practical cases.
- Evidences, which are evaluable exercises of individual realization on the part of the students. These can be commissioned as work outside the classroom or as a substitute for a master class at the decision of the responsible teacher.

## Activities

Title	Hours	ECTS	Learning Outcomes
Type: Directed			
Master classes	34	1.36	1, 10, 2, 3, 4, 5, 6, 7, 9, 8
Seminars	18	0.72	1, 10, 2, 3, 4, 5, 6, 7, 9, 8
Type: Supervised			
Tutoring	2	0.08	1, 10, 2, 3, 4, 5, 7, 9, 8
Type: Autonomous			
Study and solve problems	90	3.6	10, 2, 3, 4, 5, 6, 7, 9, 8

## Assessment

The evaluation of the scientific-technical knowledge of the subject reached by the student, is done individually, continuously and through written tests consisting of:

- 2 partial exams with an incidence in the final grade of 40% the first and 50% in the second. Minimum note required to make average: 5.0. Minimum grade necessary to pass the subject: 5.0.
- For students who have not passed the whole of the subject: recovery of one or both partial.
- The student who has passed the partial may decide to submit to the recovery to raise the grade, as long as he renounces the grade reached so far.
- Resolution of evidences (without determining) with an incidence of 10%.

\* A student receives the qualification of "not evaluable" if he has participated in evaluation activities that represent  $\leq 15\%$  of the final grade, which translates into no participation in any of the two partial exams.

## Assessment Activities

Title	Weighting	Hours	ECTS	Learning Outcomes
Evidences	10%	2	0.08	1, 2, 3, 4, 5, 6, 7, 9, 8
First exam	40%	2	0.08	1, 10, 2, 3, 4, 5, 6, 7, 9, 8

## Bibliography

- T. W. Graham Solomons, Craig B. Fryhle, Scott A. Snyder, Organic Chemistry, 11th Edition, John Wiley and Sons, New York, 2013.
- Y. Bruice. Organic Chemistry (3<sup>a</sup> Ed) Prentice-Hall International, 2001.
- K. Peter. C. Vollhardt; Neil E. Schore, Organic Chemistry (7th Ed), Ed. Freeman, WH & Co., 2015
- H. Schmid. Química Biológica. Las bases químicas de la vida. Ed. Interamericana. 1986.
- W. R. Peterson. Formulación y nomenclatura en Química Orgánica, EUNIBAR, 1987.

<https://www.organic-chemistry.org/>