Organic Chemistry

Code: 106809
ECTS Credits: 6

2025/2026

Degree	Type	Year
Nanoscience and Nanotechnology	OB	2

Contact

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Teachers

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Teaching groups languages

You can view this information at the end of this document.

Prerequisites

It is appropriate to have approved the subjects "Reactivitat Química" and "Enllaç Químic i Estructura de la Matèria".

Objectives and Contextualisation

Organic Chemistry studies the reactivity of carbon and systematizes the properties of the compounds that contain it. Basic ideas about the characteristics and reactivity of the different functional groups are given, as well as the conformational analysis and the stereochemistry of organic compounds.
The objectives are:

1. Study of the conformational and stereochemical analysis of organic molecules.
2. Study of the structure and reactivity of the main functional groups.
3. Study of synthetic methodologies for the formation of carbon-carbon bonds and interconversion of functional groups.
4. Learning of basic experimental techniques and procedures of an Organic Chemistry laboratory.

Learning Outcomes

1. CM13 (Competence) Apply chemical knowledge to solve quantitative and qualitative problems, using bibliographic sources when necessary.

2. CM14 (Competence) Work collaboratively to plan and organise the basic tasks carried out in a physicochemical analysis laboratory.
3. CM15 (Competence) Handle chemical products and wastes while taking their impact on safety and the environment into account.
4. KM21 (Knowledge) Recognise the most common functional groups within organic molecules, the nomenclature and formulation, stereochemical aspects and three-dimensional representation.
5. KM22 (Knowledge) Describe the structure and reactivity of organic compounds.
6. KM26 (Knowledge) Identify the main methods for the preparing and characterising polymeric materials and biomaterials.
7. SM23 (Skill) Identify the properties and applications of the main organic and inorganic compounds.

Content

1. Introduction to Organic Compounds (Lewis structures, resonance, coordinates and reaction profile, acid/base, functional groups).

2. Conformational Analysis (Concept of conformation. Representation of conformations: Newman projection and sawhorse perspective. Acyclic systems. Conformational equilibrium. Cyclic systems. Geometric isomerism in carbon-carbon double bonds: cis-trans or Z-E isomers. Symmetry in organic molecules: Chiral molecules. Optical activity. Stereogenic centers. R / S configuration. Optical isomerism: enantiomers and diastereoisomers. Fisher projections).

3. Nucleophilic Substitution on Saturated Carbon (Mechanism and stereochemistry. Effects of substituents. Relative reactivity of nucleophiles).

4. Elimination Reactions (Mechanisms and stereochemistry. Regiochemistry of E2 elimination. Alkene formation. Alcohol elimination).

5. Electrophilic Addition to Multiple Bonds (Mechanism, orientation, and stereochemistry. Markovnikov's rule. Hydration of double bonds: alcohol formation. *Syn* and *anti* additions).

6. Nucleophilic Addition to the Carbonyl Group (Reactivity of the carbonyl group. Additions of nitrogen compounds: formation of imines and enamines. The hydride ion as a nucleophile. Addition-elimination reactions. Reactions with alcohols: acetal formation. Carbohydrates. Aldol addition).

7. Substitution on Carbonyl and Related Groups (Carboxylic acids and derivatives. Peptides and proteins. Claisen condensation).

8. Benzene Derivatives (Aromaticity criteria, electrophilic and nucleophilic aromatic substitution reactions, effect of substituents).

Activities and Methodology

Title	Hours	ECTS	Learning Outcomes
Type: Directed			
Homework	12	0.48	CM13, KM21, KM22, CM13
Laboratory practices	16	0.64	CM14, CM15, KM22, CM14
Theory	26	1.04	KM21, KM22, KM26, SM23, KM21

Type: Supervised			
Tutorials	4	0.16	KM21, KM22, KM21
Type: Autonomous			
Homework	7.5	0.3	CM13, KM21, KM22, KM26, SM23, CM13
Laboratory practices	3.5	0.14	CM14, CM15, KM22, CM14
Problems	13.5	0.54	CM13, KM21, KM22, CM13
Theory	56.5	2.26	KM21, KM22, KM26, SM23, KM21

Theory classes

The student acquires the own knowledge of the subject attending the classes of theory that will complement with the individualized study.

Problems classes

The student consolidates the knowledge acquired in theory classes by solving problems. A dossier of exercises will be delivered that will have to be resolved throughout the course. A selected part of these exercises will be solved by problem teachers so that students learn the appropriate methodology to find the solutions. During this process, students' participation will be important. Teachers will help to develop the critical sense and logical reasoning, in order to increase the ability of students to solve problems.

Classes of Practices

The laboratory classes focus on the learning of the basic techniques and to familiarize the student with the conditions of security that manipulation of chemical products requires. In order to be able to attend the sessions of laboratory practices, the student must justify having passed the security tests that will be found in the Virtual Campus and be aware of, and accept, the rules of operation of the laboratories of the Faculty.

Annotation: Within the schedule set by the centre or degree programme, 15 minutes of one class will be reserved for students to evaluate their lecturers and their courses or modules through questionnaires.

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Assessment

Continous Assessment Activities

Title	Weighting	Hours	ECTS	Learning Outcomes
Evidences	10%	1	0.04	CM13, KM21, KM22, KM26, SM23
Laboratory Module	20	4	0.16	CM14, CM15, KM21, KM22
Module of partial written tests and examination of recovery	30% (first writen test) + 40% (second writen test)	6	0.24	CM13, KM21, KM22, KM26,

Continuous Assessment

The continuous assessment of competencies is organized into three modules, each with a specific weight in the final grade:

- Evidence Module: Throughout the course, exercises, quizzes, or other small assignments may be proposed, to be completed individually or in groups. Any evidence not submitted will be graded as 0.0 out of 10 when calculating the average.
- Laboratory Module: The student's performance in the lab will be assessed, and an exam will be held with an overall weight of 20%.
- Written Partial Exams Module: This will consist of two partial exams, with the first carrying a weight of 30% and the second 40%.

To pass the course, students must score at least 4 out of 10 in each of the two written partial exams and in the laboratory practices. The course will be considered passed when the average of the modules is equal to or greater than 5 out of 10.

Students who do not pass the first and/or second partial exam may take a make-up exam after the second partial exam. To be eligible for this make-up, students must have taken both partial exams.

Students who do not achieve the minimum required grade in any of the written partial exams, or the minimum grade to pass the written assignments module or the laboratory module, will not pass the course. In such cases, the maximum final grade will be 4.

From the second enrollment onwards, students will not be required to complete the laboratory module if they already achieved the competencies for this part of the course in the previous academic year.

A student will receive a grade of Not Assessable if the number of assessment activities completed is less than 50% of those scheduled for the course (evidence, both exams, and the four lab sessions).

Single Assessment

Students who opt for the single assessment modality must complete a "Final Exam", an "Evidence", and a "Lab Exam".

The Final Exam will consist of a theory and problem-solving test, where students must solve exercises similar to those practiced in classroom sessions.

After completing the exam, students must submit an evidence assignment that was posted online at some point during the course.

The Lab Exam will take place on the last day of the lab period, together with the students in the continuous assessment track.

To pass the course, students must score at least 4 out of 10 in each of the three activities.

The final grade will be the weighted average of the three components:

- 70%: theory and problem-solving exam
- 20%: laboratory exam
- 10%: evidence assignment

If the final grade is below 5, students will have another opportunity to pass the course through a make-up exam, which will be held on the date set by the Degree Coordination.

Bibliography

1.- i) Bruice, P.Y. *Organic Chemistry*, 8th Ed. Ed. Pearson Education, 2017 (ISBN 9781292160344, ISBN1292160349).

ii) Bruice, P.Y. *Essential Organic Chemistry*, 3rd Ed. Ed. Pearson Education, 2016 (ISBN 9781292089034).

iii) Bruice, P. Y. *Química Orgánica*, 5ª Edición, Ed. Pearson Educación, México, 2008 (ISBN 9789702607915).

2.- Solomons T.W.G. *Química Orgánica*, 3ª Ed. Ed. Limusa S.A. 2014 (Vol. 1: ISBN 10 9786070506963, Vol 2: 9786070506970).

3.- Carey F.A., Giuliano R.M. *Química Orgánica*, 9a Ed. Ed. McGraw-Hill, 2014 (ISBN 9786071512109).

4- IUPAC Nomenclatureof Organic Chemistry:

i) https://iupac.qmul.ac.uk/BlueBook/

ii) https://publicacions.iec.cat/repository/pdf/00000195/00000013.pdf

iii) https://www.upo.es/depa/webdex/quimfis/docencia/quimbiotec/Nomenclatura_organica.pdf

5.- ACD/ChemSketch for Academic and Personal Use. A Free Comprehensive Chemical Drawing Package: http://www.freechemsketch.com

6.- Pulido F. Nomenclatura de Química Orgánica: http://es.slideshare.net/manoa21/nomenclatura-quimicaorganica-29646851?next_slideshow=1

7.- Rosso V. Química Orgánica Nomenclatura: http://es.slideshare.net/verorosso/qumica-orgnica-nomenclatura?qid=09239331-ba5c-4096-9104-dd4cb26fe630&

The course material will be found in the space of the subject of the Virtual Campus of the UAB. Among this material you will find: general information, marks of the final exam and any other information that is considered of interest to the students.

Software

ACD/ChemSketch for Academic and Personal Use. A Free Comprehensive Chemical Drawing Package: http://www.freechemsketch.com

Groups and Languages

Please note that this information is provisional until 30 November 2025. You can check it through this link. To consult the language you will need to enter the CODE of the subject.

Name	Group	Language	Semester	Turn
(PAUL) Classroom practices	1	Catalan/Spanish	first semester	afternoon
(PLAB) Practical laboratories	1	Catalan/Spanish	first semester	morning-mixed

(PLAB) Practical laboratories	2	Catalan/Spanish	first semester	morning-mixed
(TE) Theory	1	Catalan/Spanish	first semester	afternoon