COURSE GUIDE 2022/23

Faculty 215 - Faculty of Chemistry
Cycle Not Applicable
Degree GQUIMI20 - Bachelor's Degree in Chemistry
Year Third year

COURSE

26114 - Organic Chemistry II
Credits, ECTS: 9

COURSE DESCRIPTION

Organic Chemistry II
Type: Compulsory.
Titulación: Degree in Chemical Sciences.
Degree: Second Cycle
Departarment: Organic Chemistry I.
Credits:9

COMPETENCIES/LEARNING RESULTS FOR THE SUBJECT

- Introduction to the course:

In the first cycle of the Degree, students complete the basic course Organic Chemistry I, which is focused on the study of the basic characteristics and reactivity of the most frequent functional groups in organic compounds. In addition, the basic training is completed with the study of conjugated and aromatic systems along with the most important heterocycles.
The course Organic Chemistry II is designed to delve into two main areas: stereochemistry and organic synthesis for which the students already know the fundamental principles.
Most part of the first semester is focused on knowing in detail the structure, symmetry and stereochemistry of organic compounds. The reminder of the first and the second semester deals with modern methods in organic synthesis, through general reactions and their specific versions, and the knowledge of fundamental reaction mechanisms considering chemo- and stereoselectivity aspects. The final objective of this course is to acquire enough skills to become capable of proposing short syntheses of simple molecules.

- Previous knowledge and recommendations:

It is recommended, although not a prerequisite, to have passed the course Organic Chemistry I.

CONTENIDOS TEÓRICO-PRÁCTICOS

Objectives of the course:

1. Structure, symmetry and stereochemistry.
To provide an introduction to the shape of organic molecules and the basic principles and nomenclature of stereogenic elements in organic molecules.
- Diastereoselectivity.
- Stereoselective reactions.
- Enantiomers and chirality.
- Stereoisomers and constitutional isomers.
- Absolute and relative stereochemistry.
- Determination of stereochemistry by spectroscopic methods.

2. Organic reactions. Reactivity and mechanisms.
- Acidity, basicity, and pKa.
- C-C bond formation. Formation and reactions of enols and enolates. Alkylation of enolates and enamines. Conjugated additions of enolates and enamines (Michael reaction). Aldol reaction and its variants. Asymmetric methodology with enolates and enamines.

3. C=C bond formation:
- -elimination reactions (E1, E2 and E1cB).
- Pyrolytic syn elimination.
- Fragmentation reactions.
- Alkenes fron hydrazones, 1,2-diols or alquines.
- Controlling the geometry of double bonds (Wittig reaction and its variants, Julia and Peterson olefinations)
- Olefin Metathesis.

4. Functionalization of alkenes:
- Electrophilic addition to alkenes.
- Electrophilic alkenes.
- Nucleophilic conjugate addition to alkenes

5. Oxidations:
- Oxidizing agents.
- Catalytic hydrogenation.

6. Reductions:
- Reduction of carbonyl groups (Hydride additions).
- Catalytic hydrogenation.

TEACHING METHODS

Teaching methods:

In the development of the subject, a mixed methodology based on cooperative learning and self-learning will be followed. The face-to-face activities of the subject are structured mainly on master classes with great content in theoretical aspects and the individual resolution of specific problems.

Classroom activities:

1. Theoretical classes: Approximately 45 hours.
The main concepts and theoretical contents of the subject will be introduced in the theoretical classes. With the support of the blackboard and the Power-Point presentations, the teacher will present the objectives and contents of each topic and explain the basic and fundamental aspects of the subject. The student will have, in the days prior to its start, all the material presented necessary to monitor the classes in the Virtual Campus of the UPV / UHU.

2. Practical classes: Approximately 20 hours.
Preferably, problems proposed by the teacher will be solved that will contribute in a decisive way to apply the knowledge acquired in the theoretical classes. Students must have previously worked on the problems that will be solved. For which, the proposed exercises and any other necessary material will be delivered well in advance of the seminar class.

TYPES OF TEACHING

Types of teaching	M	S	GA	GL	GO	GCL	TA	TI	GCA
Hours of face-to-face teaching	40	10	15	25					
Horas de Actividad No Presencial del Alumno/a	60	22,5	15	37,5					

Legend:
M: Lecture-based | S: Seminar | GA: Applied classroom-based groups
GL: Applied laboratory-based groups | GO: Applied computer-based groups | GCL: Applied clinical-based groups
TA: Workshop | TI: Industrial workshop | GCA: Applied fieldwork groups

Evaluation methods

- Continuous evaluation
- End-of-course evaluation

Evaluation tools and percentages of final mark

- Written test, open questions 70%
- Exercises, cases or problem sets 30%

ORDINARY EXAMINATION PERIOD: GUIDELINES AND OPTING OUT

Evaluation methods and percentage in the final mark:

Mixed evaluation:

20% Partial written exam (does not eliminate subject).
50% Final written exam.
10% Seminars.
20% Laboratory practices.

1- To pass the course it is necessary to obtain a minimum mark of 4.0 in the final exam and to pass the laboratory practices.

2- The non-completion of the partial exam and seminars (or their presentation after the deadline) will imply a zero for said test). Failure to submit to the final written exam will suffice to be qualified NOT PRESENTED (no call is required),

regardless of whether the partial exam or seminars have been taken.

3- The mark obtained in the partial exam and the seminars is only valid for the first call. In case of failing the first call, the second call will only be evaluated as a single exam with 80% of the grade.

EXTRAORDINARY EXAMINATION PERIOD: GUIDELINES AND OPTING OUT

80% Final written exam.
20% Laboratory practices.

1- To pass the subject it is necessary to obtain a minimum grade of 5.0 in the final exam and to pass the laboratory practices.
2- Failure to submit to the final written exam will suffice to be qualified NOT PRESENTED (no call is required).

MANDATORY MATERIALS

El indicado por el profesor y al menos un texto de la bibliografía básica. Material personal de laboratorio, en especial bata, gafas de seguridad, espátula y guantes de látex.

BIBLIOGRAFÍA

Basic bibliography

Structure, symmetry and stereochemistry:

1. E. Juaristi, Introduction to Stereochemistry and Conformational Analisis, John Wiley, New York.
2. A. Bassindale, The Third Dimension in Organic Chemistry, Ed. John Wiley & Sons, New York, 1991.
3. E. Eliel, S. H. Wilen, Stereochemistry of Organic Compounds, Ed. John Wiley & Sons, New York, 1994.
4. D. Nasipuru, Stereochemistry of Organic Compounds: Principles and Applications, John Wiley & Sons, New York, 1991.

Organic reactions. Reactivity and mechanisms:

5. F. A. Carey, Advanced Organic Chemistry, Kluver Academic, New York, 2001.
6. J. Clayden, N. Greeves, S. Warren, Organic Chemistry, Oxford University Press, 2012.
7. D. Klein, Química Orgánica, Ed. Panamericana, 2014

Detailed bibliography

1. ORGANIC SYNTHESIS: THE DISCONNECTION APPROACH. S. Warren, P. Hyatt, Wiley, 2008.
2. ORGANIC CHEMISTRY. J. Clayden, N. Greeves, S. Warren, P. Wothers, Oxford, 2005.
3. SÍNTESIS ORGÁNICA. RESOLUCIÓN DE PROBLEMAS POR EL MÉTODO DE DESCONEXIÓN. M. Carda, S. Rodríguez, F. González, J. Murga, E. Falomir, E. CASTILLO, Publicaciones de la Universitat Jaume I, Castellón, 1996.
4. SAFETY IN ACADEMIC CHEMISTRY LABORATORIES: VOLUME 1 y 2. ACCIDENT PREVENTION FOR FACULTY AND ADMINISTRATORS, 7ª Ed. American Chemical Society, Washington, DC, 2003

Journals

Organic Syntheses: http://www.orgsyn.org/
The Journal of Organic Chemistry: http://pubs.acs.org/journal/joceah
Organic Letters: http://pubs.acs.org/journal/orlef7
European Journal of Organic Chemistry: http://www3.interscience.wiley.com/journal/27380/home
Tetrahedron: http://www.sciencedirect.com/science/journal/00404020
Organic and Biomolecular Chemistry: http://www.rsc.org/Publishing/Journals/Ob/Index.asp
The Journal of Chemical Education: http://jchemed.chem.wisc.edu/

Web sites of interest

Organic Chemistry Portal: http://www.organic-chemistry.org/
Organic Resources Wordwide: http://www.organicworldwide.net/
Bases de datos de compuestos orgánicos: http://pubchem.ncbi.nlm.nih.gov/ , http://www.chemspider.com/

OBSERVATIONS