

## 27235 - Organic Chemistry Insights

### Syllabus Information

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**Academic year:** 2023/24

**Subject:** 27235 - Organic Chemistry Insights

**Faculty / School:** 100 - Facultad de Ciencias

**Degree:** 452 - Degree in Chemistry

**ECTS:** 5.0

**Year:** 4

**Semester:** Second semester

**Subject type:** Optional

**Module:**

### 1. General information

The subject will delve into the most advanced concepts of organic chemistry, such as the interrelationship between structure, properties and reactivity of organic compounds. Students will learn synthetic strategies for the design and preparation of organic compounds as well as the study of reaction mechanisms.

The approach is aligned with the following Sustainable Development Goals (SDGs), such that the acquisition of the learning results of the subject provides training and competence to contribute to some extent to their achievement: Goal 3: Health and wellness Goal 4: Quality Education. Goal 7: Affordable and Clean Energy Goal 9: Industry, innovation and infrastructure.

To take this subject it is recommended to have passed Organic Chemistry I and Organic Chemistry II.

### 2. Learning results

Upon completion of the subject, the student will be able to:

- Have a precise knowledge of the concepts and fundamentals of organic chemistry.
- Know and handle concepts such as: synthetic equivalent, protecting groups, polarity inversion and in general the selectivity problem in an organic chemistry reaction.
- Propose reasonable synthetic procedures for the preparation of organic compounds
- Solve problems and proposed questions, as well as critically defend the results obtained. Generate possible ideas and options for action before problems related to Organic Chemistry.
- Adequate handling of the usual bibliography in chemistry
- Express themselves orally and in writing in a precise and clear manner. Use specific vocabulary and terminology accurately and appropriately.
- Connect Organic Chemistry with other areas and disciplines.

Upon completion of the subject, the student will:

- Manage the general concepts, previously studied, on stereochemistry and reactivity of the main organic functions, using with precision and appropriateness the specific vocabulary and terminologies.
- Determine isomerism relationships between organic molecules, establishing topicity relationships between atoms and functional groups.
- Differentiate between different types of organic reactions in view of reactants and products.
- Learn about new reactions of synthetic interest.
- Propose reaction mechanisms based on the proposed intermediates
- Design moderately complex organic syntheses by retrosynthetic analysis.
- Establishes the most suitable protecting groups for the most important functional groups.
- Understands and establishes methods to predict selectivity in stereoselective reactions.
- Understands the principle of catalysis and its application to both metal catalysis and organocatalysis.

### 3. Syllabus

Organic synthesis. Obtaining and interconversion of functional groups. Chemoselectivity and protective groups.

Regioselectivity. Stereoselectivity. Introduction to retrosynthetic analysis.

Ring formation and ring-opening reactions. Concerted and pericyclic reactions.

Transition metal-mediated organic reactions. Hydroformylation. Nucleophilic allylation. Cross-coupling.

Obtaining enantiomerically pure compounds. Resolution by crystallization. Resolution by chromatography.

Kinetic normal (KR) and parallel kinetic resolutions (PKR). Dynamic Kinetic Resolution (DKR). Dynamic kinetic asymmetric transformations (DYKAT).

Stereoselective and stereospecific syntheses. Asymmetric Synthesis. Catalysis in Organic Chemistry. Metal complexes. Asymmetric Organocatalysis.

#### 4. Academic activities

Type 1 training activity: Theoretical master classes. This activity comprises 30 classroom hours.

Type 2 training activity: Types of problems. This activity comprises 20 classroom hours of active resolution by the students. The presentation of individual works is included.

Type 6 training activity: Carrying out supervised work. This activity includes 15 hours of individual work by the student, supervised by the teacher.

Attendance to lectures at the Faculty of Science (complementary activity as a study, Type 7 activity).

#### 5. Assessment system

The student must demonstrate achievement of the intended learning results through the following assessment activities:

In accordance with the evaluation regulations of the University of Zaragoza, the student may sit for the continuous evaluation or for the single global test.

##### CONTINUOUS ASSESSMENT

The evaluation of knowledge will be carried out by continuously assessing each of the parts of the subject:

- Follow-up and active participation in classes, resolution of theoretical-practical questions and presentation of summaries of lectures that may be scheduled (15 %)
- Work and bibliographic searches (20 %)
- Written test (65 %)

In order to be evaluated by the continuous evaluation modality, students must have completed all the proposed activities and have delivered in due time and form those that have been requested. The grade of this exam will be modulated with the grade of the activities carried out throughout the term according to the indicated percentage.

##### SINGLE COMPREHENSIVE TEST

In this type of global test, only the results of the test will be taken into account, which will consist of an exam on the contents of the subject.