

60459 - Asymmetric catalysis

Syllabus Information

Academic year: 2024/25

Subject: 60459 - Asymmetric catalysis

Faculty / School: 100 - Facultad de Ciencias

Degree: 543 - Master's in Molecular Chemistry and Homogeneous Catalysis

ECTS: 2.0

Year: 1

Semester: Second semester

Subject type: Optional

Module:

1. General information

The field of study of the subject is the application of chiral compounds as catalysts in asymmetric synthesis. It addresses the design of ligands and transition metal chiral compounds for application in asymmetric catalysis. This subject also covers in depth the reaction mechanism of the main enantioselective catalytic systems as well as their practical applications.

The overall objective of the subject is to study the general principles of asymmetric catalysis and the main catalytic systems based on chiral transition metal compounds, emphasizing the study of the reaction mechanisms.

2. Learning results

To know the general principles of stereochemistry and stereodifferentiation in catalysis.

To know the most important enantioselective catalytic processes from the industrial and technological point of view. To analyze the most relevant parameters that characterize the efficiency of a catalyst in asymmetric reactions. To assess the asymmetric catalysis potential of homogeneous catalysts depending on their nature.

To understand and interpret new knowledge in asymmetric catalysis.

3. Syllabus

Topic 1. Introduction to asymmetric catalysis

Topic 2. Asymmetric hydrogenation

Topic 3. Asymmetric hydrogen transfer

Topic 4. Asymmetric Diels-Alder

Topic 5. Friedel-Crafts asymmetric

Topic 6. Asymmetric allylic alkyl alkylation

Topic 7. Asymmetric oxidation

4. Academic activities

Expository-participative classes: 14h

Problem solving and seminars: 2h

Directed work presented in the classroom: 4h

Personal work and tutorials in small groups or individual: 28h

Assessment test: 2h

The learning process designed for the subject is essentially based on lectures of a participative nature that will be complemented with seminars and tutorials. In order to foster critical thinking and communication skills, the oral presentation of relevant results from the scientific literature and their discussion in groups has been proposed.

5. Assessment system

The continuous assessment of this subject is based on the following activities with the weighting shown below:

Participation in class, solving of exercises and questions proposed by the teacher, as well as a test on the content of the solved questions (40 %). Oral presentation of the contents of selected scientific articles and participation in group discussion (60 %).

Students who do not opt for continuous assessment or who do not pass the subject by this procedure may take a global test, which will account for 100% of the final grade, both in the first and in the second call. The global test will consist of a written test based on theoretical and practical questions on the contents covered in the subject. Students who wish to improve their

continuous assessment grade may also take the global test in the first call, keeping the best of the grades obtained.

6. Sustainable Development Goals

- 3 - Good Health & Well-Being
- 7 - Affordable and Clean Energy
- 13 - Climate Action