Universidad Zaragoza

Year : 2019/20

27215 - Organic Chemistry II

Syllabus Information

Academic Year: 2019/20
Subject: 27215 - Organic Chemistry II
Faculty / School: 100 - Facultad de Ciencias
Degree: 452 - Degree in Chemistry
ECTS: 12.0
Year: 3
Semester: Annual
Subject Type: Compulsory
Module: ---

1.General information

1.1.Aims of the course

1.2.Context and importance of this course in the degree

1.3.Recommendations to take this course

2.Learning goals

2.1.Competences

2.2.Learning goals

2.3.Importance of learning goals

3.Assessment (1st and 2nd call)

3.1.Assessment tasks (description of tasks, marking system and assessment criteria)

4.Methodology, learning tasks, syllabus and resources

4.1.Methodological overview

The methodology followed in this course is oriented towards achievement of the learning objectives. It favors the understanding of the different chemical processes that occur in the environment. A wide range of teaching and learning tasks are implemented, such as theory sessions, laboratory sessions, assignments, and tutorials.

Students are expected to participate actively in the class throughout the semester.

Classroom materials will be available via Moodle. These include a repository of the lecture notes used in class, the course syllabus, as well as other course-specific learning materials.

Further information regarding the course will be provided on the first day of class.

4.2.Learning tasks

The 12 ECTS course includes the following learning tasks:

- Lectures (6 ECTS): 60 hours. lecture notes and a series of problems (and its solutions) will be available for the students. At the end of each topic, some of the problems will be solved in class by the professor and the rest will be done individually.
- Laboratory sessions (3 ECTS): 30 hours. these 4-hour sessions take place approximately 2 times every week. Students are provided with the practical exercises' instructions to be done as well as a theoretical introduction to the session's contents.

- Problem-solving sessions (3 ECTS): 30 hours.

4.3.Syllabus

The course will address the following topics:

Lectures

- **Enols and enolates**: Ceto-enol tautomerism. Formation of enolates. Reactivity of enols and enolates. Nitrogen analogous of enols and enolates.
- **Alkylation of enolates**: Enolates of compounds with active methylenes. Enolates derived from other carbonyl compounds: regio- and stereoselectivity. Enamines and aza-enolates.
- **Reaction of enolates with aldehydes and ketones**: The aldol reaction. The Mannich reaction. The Knoevenagel reaction. The enolates of esters.
- **Acylation of enolates**: Reactions of Claisen and Dieckmann. Acylation of enolates of ketones. Other acylations.
- **Conjugate addition of enolates**: The Michael reaction. The Robinson anulation. Other reactions of addition conjugate to a,b unsaturated carbonyls
- **Compounds of phosphorus**: Utility in transformation of functional groups. Ylides and carbanions stabilized by phosphorus: reactions of Wittig, Wadswoth-Emmons and Horner.
- **Compounds of sulfur**: Carbanions and ylides of sulfur in the creation of C-C bonds. Elimination giving to C=C bonds.
- **Compounds of silicon**: Compounds with a Si-O bond. Carbanions established by silicon: Peterson reaction. Compounds of organosilicon: b-effect and synthetic utility.
- **Reductions**: Catalytic hydrogenation. Hydrides of B and Al. Reduction by dissolving metals. Reductive coupling of carbonyls.
- **Oxydations**: Oxidation of alcohols. Epoxidation and dihydroxylation of alkenes. Oxidative cleavage of 1,2-diols and alkenes. Baeyer-Villiger oxidation.
- **Heterocyclic compounds**: Aromatic heterocycles. p-deficient systems: pyridine. p-excedents systems : pyrrole, furan and thiophene
- **Carbohydrates**: Structure and reactivity of monosaccharides. Glycosides and anomeric effect. Disaccharides and polisaccharides.
- **Amino acids, peptides and proteins**: Structure and synthesis of amino acids. Peptides and proteins. Synthesis of peptides.
- **Polymers**: Polymers of addition. Radical , anion and cation polymerization. Polymers of condensation. Properties of polymers

Laboratory sessions

- **Session 1.** NaBH4 reduction
- **Session 2.** Addition of an enolate to a carbonyl compound
- **Session 3.** Claisen condensation
- **Session 4.** Wittig reaction
- **Session 5.** Synthesis of a heterocycle
- **Session 6.** Penta-O-acetyl-D-glucose
- **Session 7.** Preparation of nylon 6,10

4.4.Course planning and calendar

Further information concerning the timetable, classroom, office hours, assessment dates and other details regarding this course, will be provided on the first day of class or please refer to the Facultad de Ciencias web (https://ciencias.unizar.es/grado-en-quimica-0).

4.5.Bibliography and recommended resources

http://biblos.unizar.es/br/br_citas.php?codigo=27215&year=2019