Universidad Zaragoza

Academic Year/course: 2022/23

27240 - Biological Activity of Chemical Compounds

Syllabus Information

Academic Year: 2022/23
Subject: 27240 - Biological Activity of Chemical Compounds
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

1.1. Aims of the course

The course and its expected results respond to the following approaches and objectives:

Provide students with general knowledge about the biochemical basis of the biological effect of chemical compounds.

These approaches and objectives are aligned with the following Sustainable Development Goals (SDGs) of the United Nations 2030 Agenda (https://www.un.org/sustainabledevelopment/es/), in such a way that the acquisition of the results of Learning the subject provides training and competence to contribute, to some extent, to its achievement.

- Objective 3: Health and wellness
- Objective 6: Clean water and sanitation
- Objective 7: Affordable and clean energy
- Objective 11: Sustainable cities and communities
- Objective 12: Responsible production and consumption
- Objective 13: Climate Action
- Objective 14: Underwater Life
- Objective 15: Life of terrestrial ecosystems

1.2. Context and importance of this course in the degree

Knowledge of the action of chemical compounds on living beings is essential for the development of new drugs and also for managing the impact of chemical contaminants on the environment.

1.3. Recommendations to take this course

It is recommended to have passed the subjects Biology and Biochemistry and review the essential concepts of both.

2. Learning goals

2.1. Competences

Upon passing the subject, the student will be more competent to...

? Describe and explain the groups of xenobiotic chemical compounds with biological activity.

? Discuss the processes of absorption, accumulation and degradation of xenobiotics.

? Know the biochemical transformations that xenobiotics undergo in living organisms and be able to relate the biochemical alterations that xenobiotics produce in living beings with their biological effect.

? Interpret experimental data on the biochemical and cellular effect of xenobiotics.

? Analyze in vitro cell toxicity and the biochemical effect of various xenobiotics.

? Evaluate and design experimental procedures to analyze the biochemical and cellular toxicity of chemical compounds.

2.2. Learning goals

The student, to pass this course, must demonstrate the following results...

? Knows the transport mechanisms through biological membranes and the biotransformation phenomena of chemical compounds.

? Describes and argues from the point of view of Biochemistry, the mechanisms of toxicity of various chemical compounds and the mechanism of action of the main groups of drugs.

? Experimentally evaluates the toxicity of chemical compounds.

2.3. Importance of learning goals

Knowledge of the biochemical mechanisms of action of chemical compounds on living beings is essential for the development of new bioactive compounds and for controlling the environmental effect of chemical pollutants.

3. Assessment (1st and 2nd call)

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

The evaluation of this subject will be continuous, according to the following evaluation activities:

1) The laboratory activities will be evaluated according to the preparation and quality of the work carried out in it, the resolution of problems and questions related to the practices and the completion of a practice report. All this will lead to an L grade (0-10 points).

2) The theory activities will be evaluated by carrying out 2 qualifying partial tests (P). The tests will consist of a series of multiple choice questions and each partial test will be graded between 0 and 10 points. To pass the subject by continuous assessment, it will be necessary to have taken the 2 tests and to have obtained a score higher than 3.5 in all of them. The average of the 2 tests will give rise to a theory mark (T).

The global mark (F) of the subject by continuous assessment will be calculated according to the following formula:

$$F = 0.8*T + 0.2*L$$

The subject will be passed when the grade F is greater than or equal to 5.

4. Methodology, learning tasks, syllabus and resources

4.1. Methodological overview

The methodology followed in this course is oriented towards the achievement of the learning objectives. A wide range of teaching and learning tasks are implemented, such as:

- Lectures (4 ECTS)
- Laboratory sessions (1 ECTS)

4.2. Learning tasks

The course will address the following learning tasks:

- Classroom lectures according to the program described in point 4.3
- Laboratory sessions that include some of the techniques previously explained in classroom lectures.

4.3. Syllabus

The course will address the following topics:

1. Transport and biotransformations. Transport of xenobiotics across biological membranes: types and biochemical mechanisms. Enzymes as drug targets. DNA as drug target. Other targets. Biotransformation of xenobiotics. Activation and inactivation. Phase I and Phase II transformations. Response and adaptation of xenobiotics.
2. Toxicity of chemical contaminants. Molecular mechanisms of toxicity. Cell effects of xenobiotics. Cell damage.Carcinogenesis.
3. Drug development. Pharmacological targets. Preclinical phase. Clinical essays.
4. Mechanism of action of drugs. General aspects of pharmacological drugs. Antimicrobials. Antitumoral drugs. Drugs acting on the nervous system. Other drugs.

Practical courses:

- Evaluation of toxicity through a cell proliferation assay and analysis of nuclear morphology.
- Mutagenicity activity (Ames test).

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=27240&year=2021