

Academic Year/course: 2022/23

27113 - Macromolecules Structure

Syllabus Information

Academic Year: 2022/23

Subject: 27113 - Macromolecules Structure

Faculty / School: 100 - Facultad de Ciencias

Degree: 446 - Degree in Biotechnology

ECTS: 6.0

Year: 2

Semester: First semester

Subject Type: Compulsory

Module:

1. General information

1.1. Aims of the course

To know the structure of the main biological polymers and to relate it to the properties of their monomers and to the interactions they establish with each other and with solvent molecules.

To understand the relationship between the structure of macromolecules and their biological functions.

To understand the biotechnological importance of proteins, nucleic acids and polysaccharides.

1.2. Context and importance of this course in the degree

The subject has Mandatory character

It will be necessary to deepen adequately in the comprehension of the following subjects that describe or teach to manipulate and / or modify biological macromolecules or to obtain, modify or use entities that contain them:

Instrumental techniques in biotechnology,

Microbiology,

Chemistry-Physics,

Immunology,

Plant Physiology,

Chemical Engineering,

Clinical Biotechnology,

Molecular Biology,

Cell cultures,

Genetic Engineering,

Introduction to Systems Biology,

Bioinformatics,

Bioreactors,

Plant Biotechnology,

Biotechnology of the environment,

Animal biotechnology, and

Microbial biotechnology.

1.3. Recommendations to take this course

Knowledge of Biology and Biochemistry is recommended. Class attendance and active participation is recommended. Personal work with bibliographical material is also recommended.

2. Learning goals

2.1. Competences

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

Know the types of structures acquired by the main biological polymers

Relate the structures of the biological macromolecules with the properties of the constituent monomers

Relate the structures of the biological macromolecules with the different types of interactions that they establish with each other and with solvent molecules

Visualize and analyze macromolecule structures

Apply the basic principles of structural resolution

Relate the structure of macromolecules with their biological functions

Develop and defend reports

2.2. Learning goals

The student, to overcome this subject, must know the structure and properties of the main biological polymers and understand the relationship of these with their biological function

2.3. Importance of learning goals

The learning results obtained in the subject are important because they allow us to understand the structure and stability of the main macromolecules of living beings, which provides the basis for their modification and improvement in the face of their biotechnological use in industry and medicine.

3. Assessment (1st and 2nd call)

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

The student must demonstrate that he has achieved the anticipated learning outcomes through the following assessment activities:

Theory. Exam at the end of the semester on the date determined by the Faculty for this purpose: 70% of the final grade.

A mark higher than 4.5 in Theory is needed in order to pass.

Practices. Exam after its completion. 30% of the final grade.

There is no need to redo Practices once approved.

At the teacher's discretion, a program of seminars prepared and taught by volunteer students and moderated by the teacher will be conducted. The teacher will evaluate the rigor, clarity and amenity of the exhibition and may, based on this, increase the final grade of the participating students in up to 10% of their previous grade obtained by combining the theory and practical marks, as indicated. The content exhibited in such seminars may be considered, at the teacher's discretion, as a part of the ordinary content of the subject for its evaluation in the examination of theory common to all students.

In addition to the ordinary modality of evaluation indicated, those students who do not pass the practice exam must take a global test consisting of taking the Theory Exam on the same date and time as the rest of their classmates plus an additional test of practices.

The syllabus that students must use to prepare the different tests can be found in the section "Activities and resources" of this same teaching guide and in the portal of the subject: <http://bifi.es/~jsancho/estructuramacromoleculas/EMvirtual.htm>

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, Practice sessions, seminars, tutorial and autonomous work.

The program offered to the student to help him achieve the expected results includes face-to-face and practical classes.

All students will be informed about the risks that can be incurred in the practice of this subject, as well as if they handle dangerous products and what to do in case of accident, and should sign the commitment to comply with work and safety standards to be able to carry them out. For more information, consult the information for students of the Occupational Risk Prevention Unit: <http://uprl.unizar.es/estudiantes.html>.

4.2. Learning tasks

The course includes the following learning tasks:

- Lectures in big group. (4 ECTS).
- Possibility of seminars.
- Tutorials
- Practice sessions. (2 ECTS).
- Autonomous work.

The teaching and evaluation activities will be carried out in face-to-face mode, unless, due to the health situation, the provisions issued by the competent authorities and by the University of Zaragoza require them to be carried out telematically

4.3. Syllabus

The course will address the following topics:

Theoretical classes

- I. Biological solvents
- II. Protein structure and stability
- III. Polysacarides
- IV. Nucleic acid structure and stability
- V. Macromolecules interactions and assemblies
- VI. Structure determination
- VII. Synthetic and sequencing tools

Practical classes

- PDB files visualization
- Protein crystalization and model refinement
- Protein stability determination
- Basics of bioinformatics

4.4. Course planning and calendar

Schedules of lectures and problems will coincide with the officially established and will be available at: <https://ciencias.unizar.es/grado-en-biotecnologia>.

The places, calendar and groups for training and practical sessions will be established in coordination with the rest of the subjects at the beginning of course. The Coordinator will propose the groups of students for these activities at the beginning of course to avoid overlaps with other subjects.

Theoretical classes: 3 hours per week.

For students enrolled in the course, places, times and dates of lectures and practical sessions will be public via Bulletin Board advertisements of the grade on the platform Moodle at the University of Zaragoza, <https://moodle2.unizar.es/add/>, and in the moodle page for the course. These routes will be also used to communicate enrolled students their distribution by groups of practical sessions, which will be organized by the coordination of degree. Provisional dates will be available on the website of the Faculty of Sciences in the corresponding section of the Degree in Biotechnology: <https://ciencias.unizar.es/grado-en-biotecnologia>.

In this web there will be also available the dates of exams.

4.5. Bibliography and recommended resources

<http://psfunizar10.unizar.es/br13/egAsignaturas.php?codigo=27113>