

## 27113 - Macromolecules Structure

### Syllabus Information

**Academic year:** 2024/25

**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

The objective of the subject is to get to know the structure of the main biological polymers: proteins, nucleic acids and polysaccharides - relating it to the properties of the constituent monomers and to the interactions they establish with each other and with the solvent molecules - in order to understand their biological functions and their biotechnological importance.

It is a core subject of the degree, essential for a proper understanding of the subjects: 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, Environmental Biotechnology, Animal Biotechnology, and Microbial Biotechnology.

The subject Structure of Macromolecules contributes to all SDGs, from 1 to 17.

### 2. Learning results

In order to pass this subject, the student must know the structure and properties of the main biological polymers and understand their relationship with their biological function and biotechnological importance.

### 3. Syllabus

Theory classes:

I. Biological solvents

II. Protein structure and stability

III. Polysaccharides

IV. Structure and stability of nucleic acids

V. Interactions between macromolecules. Macromolecular assemblies

VI. Determination of structures

VII. Synthesis and sequencing tools

Practical classes:

Obtaining coordinates of PDB macromolecules and visualization of their three-dimensional structure.

Structural resolution of a protein by X-ray crystallography: crystallization and refinement.

Measurement of the conformational stability of a protein by chemical denaturation.

A gene has just been sequenced: now what?

### 4. Academic activities

The learning process designed for this subject is based on lectures (4 ECTS) and practices (2 ECTS). The class period will coincide with the officially established class period. The calendar and the groups of practices will be established in coordination with the rest of the subjects at the beginning of the term. Theoretical classes will be 3 hours per week. The Moodle of the subject will be used as well as a Computer Portal that can also be accessed from Moodle.

### 5. Assessment system

Theory. Examination at the end of the term on the date determined by the Faculty: 70% of the final grade. The exam will include open questions, multiple choice questions and numerical exercises. In the theory exam students must obtain at least a 4.5 in order to pass the subject.

Practices. Examination after completion. 30% of the final grade. The exam will evaluate the acquisition of knowledge and skills directly related to the practices. Passed practices are kept for the following year.

At the teacher's discretion, a program of seminars may be prepared and given by volunteer students and moderated by the teacher, who will evaluate the rigor, clarity and amenity of the presentation and may, on that basis, increase the final grade of the participating students by up to 10% of their previous grade obtained by combining the grades for theory and practice as indicated above. The content presented in such seminars may, at the teacher's discretion, be considered part of the ordinary content of the subject for its evaluation in the theory exam common to all students.

In addition to what has been previously described, students will have the possibility of being evaluated in a **global test** that will judge the achievement of the learning results previously mentioned.

## **6. Sustainable Development Goals**

- 1 - End of Poverty
- 2 - Zero Hunger
- 3 - Good Health & Well-Being