

## 27110 - Physical Chemistry

### Syllabus Information

**Academic year:** 2024/25

**Subject:** 27110 - Physical Chemistry

**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 main objective of this subject is that the student learns the essential concepts and principles of physical chemistry and its application to systems of interest in biotechnology. To this end, students will acquire a solid knowledge base and the skills that will enable them to continue their studies in more specific subjects of the degree and in the exercise of their profession.

These approaches and objectives are aligned with the Sustainable Development Goals (SDGs) of the United Nations Agenda 2030 (<https://www.un.org/sustainabledevelopment/es/>), so that the acquisition of the learning results of the subject provides training and competence to contribute to some extent to the achievement of goals 3, 4, 5, 7 and 13.

### 2. Learning results

- Ability to use tables and graphs of chemical-physical data, as well as the laws or equations of chemistry. Physics with a critical sense, considering its applicability and adequacy to concrete problems.
- Knowledge of the factors on which the rate of a chemical reaction depends, its experimental determination and its expression in terms of a kinetic equation.
- Knowledge of the fundamental concepts of Thermodynamics and its application within the field of Chemistry and, by extension, Biochemistry and Biotechnology,
- Ability to determine the equilibrium position of chemical reactions for given experimental conditions and the manipulation of these experimental conditions to reach pre-set equilibrium positions
- Knowledge and rigorous handling of the fundamental concepts of electrolytic solutions and electrochemical systems, the different types of electrodes and galvanic cells as well as their main applications.
- Ability to handle instruments and perform chemical-physical measurements within the syllabus of the subject
- Knowledge of the theoretical basis and importance of Surface Phenomena

### 3. Syllabus

Theory:

Topic 1. Chemical kinetics Fundamental concepts. Integrated velocity equations. Reaction mechanisms.

Topic 2. Thermodynamics Fundamental concepts. Chemical potential. Dissolutions. Phase equilibrium. Colligative properties. Chemical equilibrium.

Topic 3. Electrochemistry. Electrodes. Batteries. Electromotive force.

Topic 4. Transport phenomena Diffusion. Viscosity. Electrical conductivity.

Topic 5. Surface phenomena. Interphase. Surface tension. Adsorption.

Practical classes:

- Study of the acid-catalysed sucrose inversion reaction by polarimetric measurements
- Study of enzyme inhibition and poisoning of enzymes
- Absorption spectrum and calculation of dissociation constant for p-methoxyphenol
- Measurement of the electromotive force of batteries

### 4. Academic activities

Master classes: 30 hours

Theoretical-practical sessions in which the contents of the subject will be explained

Problems: 15 hours

Laboratory practices: 15 hours

Preparation of reports: 12 hours

Preparation of reports linked to the Learning Portfolio and final project.

Personal study. 75 hours

Assessment tests. 3 hours

## 5. Assessment system

Throughout the term:

- E: A written test including theory questions, numerical questions and exercises (85% of the grade, minimum 4 out of 10).
- S: Continuous activity in class problems and/or assignments in Moodle (5% of the grade).
- P: Assessment of laboratory work and practical reports(10% of the grade, minimum 5 out of 10).

If the subject has not been passed, the final grade in the transcript (C) will be: C= E (if  $E < 4$ ) or C=P (if  $P < 5$ )

For those students who have not passed the subject by means of the evaluation described above:

- E: A written test including theory questions, numerical questions and exercises (85% of the grade, minimum 4 out of 10).
- P: Completion of a laboratory practice and the corresponding report (15% of the grade, minimum 5 out of 10).

If the subject has not been passed, the final grade in the transcript (C) will be: C= E (if  $E < 4$ ) or C=P (if  $P < 5$ )

## 6. Sustainable Development Goals

1 - End of Poverty

3 - Good Health & Well-Being

9 - Industry, Innovation and Infrastructure