

## 32106 - Chemistry

### Syllabus Information

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**Academic year:** 2024/25

**Subject:** 32106 - Chemistry

**Faculty / School:** 110 - Escuela de Ingeniería y Arquitectura

**Degree:** 653 -

**ECTS:** 6.0

**Year:** 1

**Semester:** First semester

**Subject type:** Basic Education

**Module:**

### 1. General information

The Chemistry course aims to introduce students to the following approaches and goals:

- To acquire a general vision of chemistry and its importance in society, in order to be able to apply the knowledge acquired in different technological and biomedical fields.
- To provide the basis of knowledge about the structure and composition of matter and its transformations in environments of biological interest.
- To teach the basic rules to be followed in a chemistry laboratory and to carry out experiments involving chemical and physical transformations.
- To be able to apply the theoretical and practical knowledge of chemistry in future subjects and in the development of their profession in the field of Biomedical Engineering.

### 2. Learning results

**General Learning results:**

CO\_01. Master the fundamentals of mathematics, physics, chemistry, biology, statistics, computer science, materials engineering, mechanics, fluids, manufacturing technologies, computer-aided design, biomechanics and biomaterials, and business management and administration, tissue engineering, biomechanics and biomaterials, and business management and administration.

CO\_05. Master laboratory work, instrumentation and experimental methods, as well as numerical methods in order to be able to perform experiments and/or design applications independently and to be able to describe, quantify, analyze and critically evaluate the results obtained.

HA\_03. Apply the basic principles of general chemistry, organic and inorganic chemistry and their applications in biomedical engineering.

CP\_07. Critical thinking. Reflective reasoning on a subject being able to deliberate on its validity, submitting own and external convictions to debate.

**Specific Learning results:**

- Master the basic laws of chemistry that regulate reactions: thermodynamics, kinetics and equilibrium.
- Master the theoretical concepts in the laboratory through the correct and safe use of the basic equipment.
- Apply the basic principles of general chemistry, organic and inorganic chemistry and their applications in biomedical engineering.
- Present and interpret data and results.
- Use rigorous language in chemistry.
- Solve exercises and problems in a complete and reasoned way.

### 3. Syllabus

Unit 1. Introduction to Chemistry in Biomedical Engineering and its relevance (1 h).

Unit 2. Formulation review (inorganic and organic) (2 h).

Unit 3. Chemistry of polymers and biomolecules (2 h).

Unit 4. Chemical reactions. Types and stoichiometry (2 h).

Unit 5. Chemical thermodynamics (3 h).

Unit 6. Entropy, free energy and chemical equilibrium (4 h).

Unit 7. Phase change equilibria (3 h).

Unit 8. Physical properties of solutions and biological media (3 h).

Unit 9. Acid-base equilibria (3 hrs).  
Unit 10. Solubility and complex formation equilibria (2 h).  
Unit 11. Electrochemistry (4 h).  
Unit 12. Chemical kinetics (3 h).  
Unit 13. Catalysis in biological media (3h).

#### 4. Academic activities

The 6 ECTS subject requires a dedication of 150 hours of work on the part of the student. The approximate time distribution corresponds to the following planning of teaching-learning activities:

- Master class (35 h).
- Problem solving (15 h).
- Laboratory practices (8 h).
- Supervised work (2 h).
- Personal study (85 h). This includes the study of the subject taught in the master class, problem solving and the preparation of the laboratory practices. In addition, it can be complemented with support classes that will be programmed at the beginning of the term.

-Assessment tests (5 h). 2 h corresponding to the first partial and 3 h corresponding to the test scheduled in the test band of January-February.

#### 5. Assessment system

1. Completion of all laboratory practices. The fulfillment of the assignments and the completion of a written test will be assessment. 10% of the grade.

2. Group work (2-3 students) and oral presentation (10%).

3. Midterm eliminatory exam, theory and problems,(40%). If the grade obtained in this test is less than 5, the student should take the final test to be assessment himself/herself for the whole subject.

4. Second midterm exam (40%), coinciding with the final test (80%). This test will be adapted to assessment 100% of the subject (including internships).

Tests 1 to 3 will be during the class period, test 4 during the test period. In order to pass the second midterm exam or the final test, a grade higher than 4 must be obtained, both in theory and in problems, as long as the other components of the assessment (practicals, group work and first partial exam) have more than 5. Students who are registered as no-shows for the internship must take the final test at , as well as those who want to improve their internship grade. There will be no possibility to re-assessment the group work in the final test. The student will be entitled to the highest weighted grade resulting from including or not including the group work grade. Finally, the grades of the first and second partial exams for the second call will not be savedat.

#### 6. Sustainable Development Goals

9 - Industry, Innovation and Infrastructure  
12 - Responsible Production and Consumption  
13 - Climate Action