

29909 - Chemistry extension I

Syllabus Information

Academic year: 2023/24

Subject: 29909 - Chemistry extension I

Faculty / School: 110 - Escuela de Ingeniería y Arquitectura

Degree: 435 - Bachelor's Degree in Chemical Engineering

ECTS: 6.0

Year: 1

Semester: Second semester

Subject type: Compulsory

Module:

1. General information

This subject aims to provide the student with basic notions about the behavior of chemical equilibrium in thermodynamic and electrochemical aspects, as well as its application to chemical processes and analysis

It is recommended to have taken the subject "Chemistry".

These approaches and goals are aligned with the following Sustainable Development Goals (SDGs) of the United Nations Agenda 2030 (<https://www.un.org/sustainabledevelopment/es/>), such that the acquisition of the learning outcomes of the subject provides training and competence to contribute, to some extent, to the achievement of objective 2.4 of Goal 2, objective 3.9 of Goal 3, objective 6.3 of Goal 6, objective 9.4 of Goal 9 and objective 12.4 and 12.5 of Goal 12.

2. Learning results

- To distinguish the most relevant chemical-physical parameters and to handle the laws that govern them in the different chemical systems.
- To master the basic laws governing equilibria (acid-base, complex formation, precipitation and redox) and apply them to chemical analysis .
- To know the stages of the analytical procedure and the basis of the main instrumental methods of analysis.
- To solve exercises and problems in a complete and reasoned way.
- To use rigorous language in chemistry.
- To present and interpret data and results.

3. Syllabus

Part 1. Physical Chemistry

Block I. Electrochemistry (13 h)

Unit 1.E. Electrolytes in solution

Unit 2.E. Electrolysis

Unit 3.E. Debye-Hückel theory

Unit 4.E. Electrochemical equilibrium

Unit 5.E. Galvanic cells. Applications of e.m.f. measurements.

Unit 6.E. Chemical sources of electrical energy

Unit 7.E. Corrosion

Block II. Phase diagrams (12 h)

Unit 1. F. Heterogeneous equilibria. Single-component systems

Unit 2.a.F. Two-component systems. Vapor-liquid and liquid-liquid equilibria

Unit 2.b.F. Two-component systems. Solid-liquid equilibrium

Unit 3.F. Three-component systems

Block III. Surface chemistry (5 h)

Unit 1.S. Surface tension

Unit 2.S. Adsorption

Part 2. Analytical Chemistry

Block I. Introduction to chemical analysis (7 h)

Unit 1. Introduction to Analytical Chemistry

Unit 2. The analytical process

Block II. Gravimetric analysis (2 h)

Unit 3. Gravimetric analysis

Block III. Volumetric analysis (13 h)

Unit 4. Fundamentals of volumetric analysis

Unit 5. Neutralization volumetries

Unit 6. Precipitation volumetries

Unit 7. Complex formation volumetries

Unit 8. Oxidation-reduction volumetries

Block IV. Instrumental analysis (8 h)

Unit 9. Introduction to instrumental analysis

4. Academic activities

- Participative **lectures** (57 hours), in which the theoretical aspects of the subject will be presented and related problems will be posed and problems related to them will be presented and solved.
- **Individual tutored work** (3 hours), in which a specific topic is studied in depth (analytical calibration).
- **Personal study and work** (84 hours). It is recommended that the student carry out individual study in a continuous manner throughout the term. For this purpose, subject material will be included in the Moodle platform. Includes virtual networking.
- **Evaluation tests** (6 hours). Different tests will be carried out to evaluate the knowledge achieved by the student.

5. Assessment system

Continuous assessment:

- For the Physical Chemistry part (50% of the grade, minimum of 4.0 out of 10.0) a written test that will include problem questions on the most relevant chemical-physical parameters of the different chemical systems, phase diagrams and electrochemistry and will account for 80% of the grade for this part. In addition, the completion of various tests through the Moodle platform that will account for 20% of the grade of this part.
- For the Analytical Chemistry part (50% of the grade, minimum of 4.0 out of 10.0) a written test (multiple choice) that will include multiple choice questions and problems on the stages of the analytical process, classical analysis and instrumental analysis and will account for 80% of the grade for this part. In addition, there will be an individual work that will account for 20% of the grade.

All the students who follow the continuous assessment system will be able to opt for the global assessment, either of the whole subject (100%) or of each one of the written tests, test (Physical Chemistry) and (100%) or of each of the written tests, test (Physical Chemistry) and calibration work (Analytical Chemistry) that make up the continuous assessment.

Global assessment:

During the examination period established by the Center, a global test will be scheduled, consisting of an Analytical Chemistry (50% of the grade, minimum of 4.0 out of 10.0) and another of Physical Chemistry (50% of the grade, minimum of 4.0 out of 10.0) out of 10.0) and that will represent 100% of the student's grade; it will include theoretical-practical questions of the subject .

The grade obtained in the continuous assessment of the different parts (Physical Chemistry and Analytical Chemistry) is kept for the first and second call of the term if it is equal or higher than 4.0 points. The grade obtained in the first call for the different parts (Physical Chemistry and Analytical Chemistry) is kept for the second call of the term if it is equal or higher than 4.0 points.