

26901 - Chemistry

Syllabus Information

Academic year: 2024/25

Subject: 26901 - Chemistry

Faculty / School: 100 - Facultad de Ciencias

Degree: 447 - Degree in Physics

ECTS: 6.0

Year: 1

Semester: First semester

Subject type: Basic Education

Module:

1. General information

This subject is part of the basic module of the Physics degree and aims to unify the students' knowledge on the basic contents of Chemistry. Its objective is to provide a global vision of chemistry, establishing relationships between atomic structure, chemical bonding, the structure of matter, its physical properties and the chemical transformations it may undergo, with special emphasis on acid-base, precipitation and redox processes.

It is recommended to have studied Mathematics, Physics and Chemistry in the Baccalaureate, as well as the attendance and active participation in the activities, with a continuous and simultaneous work to the presentations in the classes.

2. Learning results

The competences that this subject contributes to acquire are relevant because they allow to explain in an understandable way basic phenomena and processes of chemical systems. Their learning involve the development in the student of skills such as reasoning, problem solving and critical thinking. Chemistry shares with Physics many principles, concepts and methods and as a basic training subject, it serves as a support for other subjects of the Degree.

Upon completion of the subject, the student will be able to:

- Develop working habits in a laboratory and to handle chemical products appropriately.
- Master the basic terminology of chemistry.
- Identify chemical compounds under the basic rules of chemical formulation.
- Properly handle the chemical properties of the elements as a function of their atomic number.
- Understand the fundamentals and basic rules governing chemical equilibrium.
- Identify the properties of different types of solutions.
- Know the chemical characteristics of acids and bases.
- Understand the most important electrochemical reactions, such as those that take place in a battery, electrolysis or corrosion.
- Know the most important organic groups and their reactivity.
- Know some current lines of research in which Chemistry and Physics converge.
- Be able to use some basic experimental methods in Chemistry.

The student, in order to pass this subject, must demonstrate the following results...

- Accurately handle chemical representation, the mole concept and stoichiometry of basic chemical reactions
- Identify the properties of compounds associated with the type of chemical bond.
- Relate the pH of a solution to the characteristics of the acid-base equilibrium present.
- Deduce the chemical reactions that occur as a function of the redox potentials of the components.
- Evaluate the dynamic behaviour of a chemical reaction as a function of kinetic constants.
- Solve basic chemistry problems.

3. Syllabus

Topic 1. Atoms, compounds and chemical equations
Topic 2. Electronic structure of the atom and periodic properties
Topic 3. Chemical Bonding I: basic aspects
Topic 4. Chemical Bonding II: Bonding Theories
Topic 5. Intermolecular forces
Topic 6. Chemical reaction kinetics
Topic 7. Principles of chemical equilibrium
Topic 8. Acid-base balance
Topic 9. Solubility and complex formation equilibria.
Topic 10. Redox equilibrium and electrochemistry
Topic 11. Physical and chemical properties of metals and non-metals
Topic 12. Introduction to Organic Chemistry
Practice 1. Concentration of solutions. Strong and weak electrolytes
Practice 2. Determination of an equilibrium constant
Practice 3. Redox reaction. Calculation of reduction potentials

4. Academic activities

- Theory classes (3.5 ECTS), presentations aimed at the acquisition of knowledge.
- Problem classes (1.5 ECTS), in which exercises and standard questions, previously provided, are solved, explaining the relevant steps.
- Laboratory practices (1.0 ECTS), carried out in pairs to promote teamwork learning. The student will previously have the scripts of the practices to be performed and, once performed, will submit a report with the results of each practice and with the questions that have been asked.
- Tutorials, for the resolution of doubts and expansion of concepts, at the specified place and time.

5. Assessment system

1.a Continuous evaluation.

Two written tests, the first one with the contents of topics 1-6 and the second one with the contents of topics 7-12.

Each test will consist of four questions and will be considered passed if a minimum grade of 5 out of 10 is achieved in each of these two tests. The final grade will be obtained as the arithmetic mean of both grades.

1.b Global test.

Students who have not passed the continuous evaluation will have to take a global test in the first and/or second official call

Students who have achieved the minimum grade in only one of the midterm exams, may choose, in the first official call, to take the overall exam only of the contents of the midterm exam they have not passed.

2. Laboratory practices.

Three laboratory practices will be carried out, with individual evaluation of the preparation of the practices by means of a previous written test (50 %) consisting of 7 multiple-choice questions and a problem, and the completion of the practices and elaboration of the final report (50 %)

The minimum grade to pass this activity will be 5 out of 10.

In case of not passing this activity, it will be necessary to take a practical evaluation test in the laboratory during the period of the official calls.

Subject grade = $0.8 \times \text{overall test grade} + 0.2 \times \text{practices grade}$.

6. Sustainable Development Goals

4 - Quality Education
7 - Affordable and Clean Energy
9 - Industry, Innovation and Infrastructure