

# General Chemistry

**Calendar:** 2nd semester

**Contact Hours:** T:30,0; TP:30,0; O:7,5

## **Intended learning outcomes of the curricular unit:**

After this course it is expected that the student will know and understand the fundamentals of general chemistry. The student should be able to recognize the atomic structure and chemical bonds, basic foundations of chemistry, with the aim of understanding the structure of matter and its transformations, as well as understand and to know how to implement qualitative and quantitative chemical analysis, distinguishing between the different chemical equilibrium. Understand the acid-base equilibrium, knowing how to use buffer solutions, titrations and acid-base volumetry. Although the essentially introductory character of this UC, it is intended that students acquire skills allowing them a better adaptation and understanding of problems involved in chemical processes in the subsequent UC, essential to access profession as professionals in Biotechnology in general and particularly in the pharmaceutical, agrochemical, food and biochemistry, or related fields, and in public services.

## **Syllabus:**

1. Atomic structure. Evolution of the atomic models. The quantum theory and electronic configuration. The periodic table and the periodic properties. 2. Chemical bond. Ionic bond, electron-pair bond, (covalent bond and metallic bond), the macro-molecules. Bond energy structure and bond theories. Orbital hybridization theory, charge and formal charge. 3. Intermolecular forces. Physical properties of the solutions, types of solutions, molecular dissolution process. 4. Chemical reactions and equations. Concentration of solutions. Electrolytes. 5. Chemical equilibrium. Homogeneous and heterogeneous equilibrium. Equilibrium disorders. 6. Acid-base equilibrium. The concept of acid and base. Constants of acidity and alkalinity. Strength of acids and bases. The pH scale. The pH of salt and aqueous solutions. Buffer solutions. Acid-base titrations. 7. Complexometric equilibrium. Equilibrium in complexation reactions. Chelation. Effect of pH and other ligands. Complexometric titrations. Indicators on complexometry. 8. Equilibrium solubility, saturated and supersaturated solution. Solubility product. Effect of temperature, the common ion, pH, acid-base complex formation on the solubility. Gravimetry and volumetry. 9. Redox equilibrium. Oxidation-reduction reactions. Nernst equation. Redox titrations. Redox indicators in titrations. 10. Chemical kinetics.

## **Teaching methodologies (including evaluation):**

The lectures will be addressed with an essentially qualitative study of the fundamentals of general chemistry, suitable for students of first year of university level. Whenever possible, resort to the method of rediscovery and the use of models which make the concepts more real. In theoretical-practical classes, practical examples should be solved by students through application of the concepts used in lectures and with the teacher's aid. The evaluation is based on the realization of a final exam weighing 100% and the approval is obtained for a final score equal or higher to 9.5 values.