

Course Unit	Chemistry	Field of study	Physical Sciences
Bachelor in	Biology and Biotechnology	School	School of Agriculture
Academic Year	2023/2024	Year of study	1
Type	Semestral	Semester	1
Workload (hours)	175,5	Contact hours	T - TP - PL - TC - S - E - OT - O -
		Level	1-1
		ECTS credits	6.5
		Code	9029-782-1105-00-23

T - Lectures; TP - Lectures and problem-solving; PL - Problem-solving, project or laboratory; TC - Fieldwork; S - Seminar; E - Placement; OT - Tutorial; O - Other

Name(s) of lecturer(s) Maria João de Almeida Pinto Santos Afonso

### Learning outcomes and competences

At the end of the course unit the learner is expected to be able to:  
To describe matter properties. To understand and solve Chemistry problems. To know how to handle laboratory materials and apply techniques correctly. To know the laboratory personnel safety procedures

### Prerequisites

Before the course unit the learner is expected to be able to:  
To have sufficient basic knowledge of chemistry to follow the program.

### Course contents

General Chemistry

### Course contents (extended version)

- The Matter
  - Classification of matter. Pure substances and mixtures. Suspensions and colloidal solutions.
  - States of matter.
  - International system of units.
  - Intermolecular forces.
  - Boyle's Law.
  - Charles's Law.
  - Gay Lussac's Law.
- Átomos, Moléculas e Iões
  - Atomic number, mass number and isotopes.
  - The periodic table.
  - Molecules and ions.
  - Nomenclature of compounds.
- Chemical Kinetics.
  - Reaction velocity. The Effect of Concentration, pressure and the Temperature on Reaction.
  - Stoichiometry and reaction velocity.
  - 1st order reactions.
  - Collision theory. Catalysis.
- Chemical Reactions.
  - Concept of mole. Avogadro's number.
  - Molar Mass.
  - Stoichiometry. Lavoisier's Law.
  - Balancing of chemical equations.
  - Limiting reagent.
  - Reaction Yied.
  - Concentrations of solutions. Dilutions.
- Chemical Equilibrium.
  - The concept of equilibrium and the equilibrium constante
  - Equilibrium constant expressions
  - Factors that affect the chemical equilibrium. Le Châtelier Principle.
- Acid-Base Equilibrium
  - Acids and bases according to Arrhenius, Bronsted-Lowry and Lewis.
  - pH. Sorensen scale.
  - Acid-base properties of water. The ion product of water.
  - Weak acids, weak bases and their ionization constants. Conjugated acids and bases.
  - Diprotic and polyprotic acids.
  - Ionization. Percentage Ionization.
  - Buffer solutions.
  - Acid-base titrations. Acid-base titrations curves.
  - Acid-base indicators.
- Solubility.
  - Solubility and dissolution temperature.
  - solubility product
  - Precipitation.
  - Effect of pH on solubility.
  - The common ion effect.
- Redox Equilibrium.
  - Electrochemistry. Redox reactions.
  - Electrochemical cells. Normal electrode potential. The Nernst equation.
  - Batteries.

### Recommended reading

- Chang, R, Goldsby, K, Química - 11ª Edição, Ed. McGraw Hill, 2002;
- Goldberg, D, Fundamentals of Chemistry, Ed. McGraw-Hill, 2006;
- Murray, J, Fay, R, Chemistry, Ed. Prentice Hall, 2003;
- Zumdahl, S. S, Zumdahl, SA, Chemistry, Ed. Houghton Mifflin Company, 2007;
- Solomons, T. W. G, Química Orgânica, Ed. LTC - Livros Técnicos e Científicos Editora Lda, 2012;

### Teaching and learning methods

Theoretical lessons: Presentation of theoretical concepts. Presentation, analysis and discussion of application examples.  
Practical lessons: Resolution of exercises and explanation of doubts related with exercises proposed. Laboratory work.

### Assessment methods

1. Alternative 1 - (Regular, Student Worker) (Final)
  - Intermediate Written Test - 25% (Assessment of theoretical (75%) and practical (25%) knowledge acquired.)
  - Intermediate Written Test - 25% (Assessment of theoretical (75%) and practical (25%) knowledge acquired.)
  - Intermediate Written Test - 25% (Assessment of theoretical (75%) and practical (25%) knowledge acquired.)
  - Laboratory Work - 25% (Quizzes about laboratory work.)
2. Alternative 2 - (Regular, Student Worker) (Final)
  - Final Written Exam - 75% (Assessment of theoretical (75%) and practical (25%) knowledge acquired.)
  - Laboratory Work - 25% (Quizzes about laboratory work.)
3. Alternative 4 - (Regular, Student Worker) (Supplementary, Special)
  - Final Written Exam - 100%

### Language of instruction

1. Portuguese
2. Spanish
3. Portuguese, with additional English support for foreign students.

### Electronic validation

Maria João de Almeida Pinto Santos Afonso	Luís Avelino Guimarães Dias	Altino Branco Choupina	Maria Sameiro Ferreira Patrício
30-01-2024	01-02-2024	01-02-2024	01-02-2024