

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 personal 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)

1. 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.
2. Átomos, Moléculas e Iões
 - Atomic number, mass number and isotopes.
 - The periodic table.
 - Molecules and ions.
 - Nomenclature of compounds.
3. Chemical Kinetics.
 - Reaction velocity. The Effect of Concentration, pressure and the Temperature on Reaction.
 - Stoichiometry and reaction velocity.
 - 1st order reactions.
 - Collision theory. Catalysis.
4. 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.
5. Chemical Equilibrium.
 - The concept of equilibrium and the equilibrium constante
 - Equilibrium constant expressions
 - Factors that affect the chemical equilibrium. Le Châtelier Principle.
6. 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.
7. Solubility.
 - Solubility and dissolution temperature.
 - solubility product
 - Precipitation.
 - Effect of pH on solubility.
 - The common ion effect.
8. Redox Equilibrium.
 - Electrochemistry. Redox reactions.
 - Electrochemical cells. Normal electrode potential. The Nernst equation.
 - Batteries.

Recommended reading

1. Chang, R, Goldsby, K, Química - 11ª Edição, Ed. McGraw Hill, 2002;
2. Goldberg, D, Fundamentals of Chemistry, Ed. McGraw-Hill, 2006;
3. Murray, J, Fay, R, Chemistry, Ed. Prentice Hall, 2003;
4. Zumdahl, S. S, Zumdahl, SA, Chemistry, Ed. Houghton Mifflin Company, 2007;
5. 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

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30-01-2024	01-02-2024	01-02-2024	01-02-2024