INSTITUTO POLITÉCNICO DE BRAGANÇA

Course Unit	Chemistry			Field of study	Physic Sciences		
Bachelor in	Agronomic Engineering			School	School of Agriculture		
Academic Year	2022/2023	Year of study	1	Level	1-1	ECTS credits	6.5
Type	Semestral	Semester	1	Code	9086-307-1105-00-22		

Workload (hours)	175,5	Contact hours	T	TP	PL	TC	S	E	OT	O
			30	-	30	-	-	-	25	-

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): Luís de Sousa Costa

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 personnal 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. Mixture.
   - States of matter. Intermolecular forces. Suspensions and colloids.
   - Pressure-Volume Relationship of gases. Boyle's Law.
   - Homogeneous and heterogeneous mixtures. Relationships of Gases: Gay-Lussac's Law and Raoult's Law.
   - Solubility of gases. Point of depression.
   - Point Osmotic Pressure.
   - Colligative properties of solutions.
2. Solubility.
   - Solubility product (Solute/Solvent Interaction).
   - solubility and Temperature of Dissolution.
   - Solubility and Precipitation
   - pH effect in solubility.
   - Solubility and complex ions.
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. Thermochemistry.
   - Internal energy. Energy changes in chemical reactions.
   - Standard enthalpy and enthalpy of reactions.
   - The conservation of energy. Hess law.
   - Gibbs energy.
   - Spontaneous chemical reactions.
   - Entropy.
5. Acids-base equilibrium
   - Bronsted, Arrhenius e Lewis acid-base.
   - Ionization. Degree of ionization.
   - Weak acids and acid ionization constants.
   - Weak bases and base ionization constants.
   - Relationship bettwen conjugate acid-base ionization constants.
   - monoprotic, diprotic and polyprotic acids.
   - Common ion effect.
   - Cation and anion hydrolyze.
   - Buffer solutions. Distribuition curves.
   - Acid-base titration. pH measurement.
6. Redox equilibrium.
   - Electrochemistry. Redox reactions.
   - Electrochemistry. Cell Standard electrode potentials. The Nernst equation.
   - cell EMF.
   - pH meter. Types of electrodes. pH meaurement.
   - Batteries. Accumulator batteries.
7. Organic chemistry.
   - hydrocarbons.
   - funcional groups: alcohols, ethers, aldehydes and ketones, carboxylic acids, esters, amines

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 explanation of the subject in theoretical and/or practical/theoretical lectures, and their application in aboratory work carried out by students.

Assessment methods

1. Assessment 1 - (Regular, Student Worker) (Final)
   - Final Written Exam - 90% (Intermediate Written Test - 90% (2 -3 tests).)
   - Final Written Exam - 10% (Final Written Exam - 10% (Assessment of knowledge obtained by exam))
2. Assessment 2 - (Regular, Student Worker) (Final)
   - Final Written Exam - 100% (Final Written Exam - 100% (Assessment of theoretical knowledge by exam.)
3. Assessment 3 - (Regular, Student Worker) (Final, Supplementary, Special)
   - Final Written Exam - 100% (Final Written Exam - 100% (Assessment of theoretical knowledge by exam.)

Language of instruction

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

Electronic validation

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11-01-2023	12-01-2023	12-01-2023	12-01-2023