

Course Unit	Chemistry	Field of study	Physic Sciences																
Bachelor in	Environmental Engineering	School	School of Agriculture																
Academic Year	2022/2023	Year of study	1																
Type	Semestral	Semester	1																
Level	1-1	ECTS credits	6.5																
Code	9099-309-1105-00-22																		
Workload (hours)	175.5	Contact hours	<table border="1"> <tr> <td>T</td> <td>30</td> <td>TP</td> <td>-</td> <td>PL</td> <td>30</td> <td>TC</td> <td>-</td> <td>S</td> <td>-</td> <td>E</td> <td>-</td> <td>OT</td> <td>25</td> <td>O</td> <td>-</td> </tr> </table>	T	30	TP	-	PL	30	TC	-	S	-	E	-	OT	25	O	-
T	30	TP	-	PL	30	TC	-	S	-	E	-	OT	25	O	-				

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 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)

- 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.
- Solubility.
 - Solubility product (Solute/Solvent Interaction).
 - solubility and Temperature of Dissolution.
 - Solubility and Precipitation
 - pH effect in solubility.
 - Solubility and complex ions.
- Chemical Kinetics.
 - Reaction velocity. The Effect of Concentration, pressure and the Temperature on Reaction.
 - Stoichiometry and reaction velocity.
 - 1st order reactions.
 - Collision theory. Catalysis.
- 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.
- 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 between conjugate acid-base ionization constants.
 - monoprotic, diprotic and polyprotic acids.
 - Common ion effect.
 - Cation and anion hydrolyze.
 - Buffer solutions. Distribution curves.
 - Acid-base titration. pH measurement.
- Redox equilibrium.
 - Electrochemistry. Redox reactions.
 - Electrochemistry. Cell Standard electrode potentials. The Nernst equation.
 - cell EMF.
 - pH meter. Types of electrodes. pH measurement.
 - Batteries. Accumulator batteries.
- Organic chemistry.
 - hydrocarbons.
 - functional groups: alcohols, ethers, aldehydes and ketones, carboxylic acids, esters, amines

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 explanation of the subject in theoretical and/or practical/theoretical lectures, and their application in laboratory 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).)
 - Intermediate Written Test - 10% (Assessment of knowledge obtained by exam.)
2. Assessment 2 - (Regular, Student Worker) (Final)
 - Final Written Exam - 100% (Assessment of knowledge obtained by exam.)
3. Assessment 3 - (Regular, Student Worker) (Final, Supplementary, Special)
 - Final Written Exam - 100% (Assessment of knowledge obtained by exam.)

Language of instruction

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

Electronic validation

Luís de Sousa Costa	Luís Avelino Guimarães Dias	Artur Jorge de Jesus Gonçalves	Maria Sameiro Ferreira Patrício
11-01-2023	12-01-2023	24-02-2023	24-02-2023