

Course Unit	Chemistry	Field of study	Physical sciences
Bachelor in	Biology and Biotechnology	School	School of Agriculture
Academic Year	2022/2023	Year of study	1
Type	Semestral	Semester	1
Level	1-1	ECTS credits	6.5
Code	9029-510-1105-00-22		
Workload (hours)	175.5	Contact hours	T 30   TP -   PL 30   TC -   S -   E -   OT 15   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) Carla Susana Correia Pereira, 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 - 100% (Assessment of theoretical knowledge (first examination).)
  - Intermediate Written Test - 90% (2 or 3 tests.)
  - Intermediate Written Test - 10% (Assessment of knowledge obtained carried out by 2 or 3 tests. .)
2. Assessment 2 - (Regular, Student Worker) (Supplementary, Special)
  - Final Written Exam - 100% (Assessment of theoretical knowledge (first examination).)

**Language of instruction**

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

**Electronic validation**

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07-12-2022	19-12-2022	19-12-2022	19-12-2022