

Course Unit	General and Organic Chemistry		Field of study	Chemistry	
Bachelor in	Dietetics and Nutrition		School	School of Health	
Academic Year	2023/2024	Year of study	1	Level	1-1
Type	Semestral	Semester	1	Code	8149-807-1106-00-23
Workload (hours)	108	Contact hours	T -	TP 22,5	PL 30
			TC -	S -	E -
			OT 7,5	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) Miguel José Rodrigues Vilas Boas

### Learning outcomes and competences

At the end of the course unit the learner is expected to be able to:

1. - Plan and execute experiments in a chemistry lab. - Interpret, recognize and evaluate the effect of disturbance in the chemical balance.
2. Controlling the equilibrium by changing the characteristics of solubility, complexation or pH.
3. Conduct and provide acid-base titrations, and redox.
4. To understand the chemistry of carbon compounds; Recognize the families of hydrocarbons and the functional groups; - Acquire and apply the concepts of structure and nomenclature of organic compounds.
5. Recognize the aspects that determine the reactions characteristics in organic chemistry; - Know the chemical and physical properties for the various families of organic compounds;
6. Acquire the concepts to identify the spatial relationships between atoms and molecules.
7. Apply the concepts of chemistry in health sciences.
8. Implement and manage work independently and in groups.

### Prerequisites

Not applicable

### Course contents

Mixtures and solutions. - Chemical kinetics. - Chemical equilibrium - Acids and bases - oxidation/reduction- Organic Nomenclature - Structure properties of organic compounds - Stereochemistry. - Properties and reactivity of hydrocarbons - Properties and reactivity of functionalized organic compounds.

### Course contents (extended version)

1. Mixtures and solutions
  - States of matter and intermolecular forces. .
  - Heterogeneous and homogeneous mixtures: Solutions, colloidal dispersions and suspensions
  - Aqueous solutions. How to express concentration.
2. Chemical kinetics
  - Average speed reaction. kinetic Law and its rate constant. Reaction order.
  - Determination of the kinetic law.
  - Factors influencing the speed of a chemical reaction. Theory of collisions. Mechanisms reactions.
3. Chemical equilibrium
  - Equilibrium heterogeneous. Solubility curves.
  - Product of solubility. Effect of common ion. Precipitation reactions. Reaction coefficient.
  - Ion complex structure: metal centre and ligand.
  - Formation constant. Effect of complexation in solubility.
4. Acids and bases
  - The amphoteric behavior of water and the pH scale. Ionization constants for acids and bases.
  - Buffer solutions. Polyprotic acids. Acid-base titration.
5. Electrochemistry
  - Oxidation-reduction reactions. Redox equations balance using ion electron method. Redox titrations.
6. Organic nomenclature
  - Classification and nomenclature of organic compounds.
  - General aspects in the mechanisms of organic reactions.
7. Structure and properties of organic compounds
  - Hybridization and geometry.
  - The connections and interconnections in organic compounds: variability in physical properties.
  - Isomery. Electronic effects: inductive and resonance effect.
8. Stereochemistry
  - The chirality in biological world. Enantiomers. Asymmetric carbon. Symmetry in achiral structures
  - Notation R and S. Physical properties of enantiomers.
  - Molecules with two or more chiral centres. Resolution of enantiomers
9. Properties and reactivity of hydrocarbons
  - Structure, conformations and physical properties of alkanes, alkenes and alkynes.
  - Synthesis reactions and their reactivity: oxidation, pyrolysis, halogenation.
  - b-elimination reactions (mechanisms E1 and E2) and hydration.

### Recommended reading

1. Overby, J.; Chang, R. (2018) Chemistry, Editorial McGraw Hill
2. McMurry, J. (2012). Organic Chemistry (8ª Ed. ). Thomson.
3. Brown, W. , Foote, C. (2013) Organic Chemistry, (7ª ed). Cengage Learning.
4. Madivata, C.; Manhique, A.; Júnior, P. M.; Muiambo, H.; Siteo, A. (2013) Química geral e Inorgânica. Teoria, Escolar Editora
5. Atkins, P, & Jones, L. (2012). Chemical principles (5ª Ed. ). W. H. Freeman and Company.

### Teaching and learning methods

- Theory - Interactive approach, using audiovisual materials. Study materials available via e-learning. - Practical classes - Integration of knowledge with the resolution of nomenclature exercises, and numeric calculus. Execution of practical work, with educational and scientific laboratory equipment.

**Assessment methods**

1. Continuous evaluation - (Regular, Student Worker) (Final)
  - Intermediate Written Test - 6% (Small quizzes about the experimental protocol)
  - Laboratory Work - 6% (This component reflects the student performance during the execution of the practical experiments.)
  - Intermediate Written Test - 18% (Written assay about the results of the practical experiments, performed in two stages)
  - Intermediate Written Test - 70% (Written exam in two stages: general chemistry and organic chemistry (or full exam, normal season))
2. Special evaluation - (Regular) (Supplementary, Special)
  - Final Written Exam - 100% (This exam includes questions on the practical experiments (30%) and resolutions of exercises (70%).)
3. Working students - (Student Worker) (Final, Supplementary, Special)
  - Final Written Exam - 100% (This exam includes questions about the practical experiments (30%) and exercises (70%).)

**Language of instruction**

Portuguese, with additional English support for foreign students.

**Electronic validation**

Miguel José Rodrigues Vilas Boas	Juliana Almeida de Souza	Ana Maria Nunes Português Galvão	Adília Maria Pires da Silva Fernandes
05-12-2023	08-02-2024	14-02-2024	14-02-2024