

Course Unit	Chemistry	Field of study	Chemistry
Bachelor in	Food Engineering	School	School of Agriculture
Academic Year	2025/2026	Year of study	1
Type	Semestral	Semester	1
Level	1-1	ECTS credits	6.0
Code	9087-641-1105-00-25		
Workload (hours)	162	Contact hours	T - TP - PL - TC - S - E - OT - 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, Filipa Alexandra Pires Fernandes

Learning outcomes and competences

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

1. To describe the properties of matter in terms of its internal structure, its arrangement and the interrelationship between the parties.
2. To apply the general concepts of chemistry in the field of agricultural, environmental and food sciences.
3. To perform calculations required for the experimental preparations.
4. To know the rules of safety in the laboratory.
5. To acquire techniques for handling the laboratory material.
6. To assemble simple laboratory experiments.
7. Recognize the structure and nomenclature of organic compounds

Prerequisites

Before the course unit the learner is expected to be able to:
There are no mandatory requirements.

Course contents

Basic concepts in chemistry. Stoichiometry. Mixtures. Chemical kinetics. Chemical equilibrium. Heterogeneous equilibrium. Acid-base equilibrium. Complexion equilibrium. Oxidation-reduction reactions. Electrochemistry. Classification of organic compounds.

Course contents (extended version)

1. Basic concepts in chemistry:
 - Electronic structure of atoms.
 - Periodicity in the periodic table.
 - Structure of molecules.
 - Nomenclature of inorganic compounds
2. Stoichiometry:
 - Stoichiometric calculations.
 - Limitant and in excess reagents.
 - Chemical reaction yield.
3. Mixtures:
 - States of matter and intermolecular forces.
 - Heterogeneous mixtures.
 - Homogeneous mixtures: Solutions, colloidal dispersions and suspensions.
 - Aqueous solutions and colligative properties of solutions.
4. Chemical kinetics:
 - Average, instantaneous and initial velocity of a reaction.
 - Kinetic law and rate constant.
 - Reaction orders.
 - Determination of rate reaction.
 - Factors influencing the rate of a reaction.
 - Theory of collisions.
 - Mechanisms of reactions.
 - Catalysis.
5. Chemical equilibrium:
 - Reversible reactions.
 - Equilibrium law for a reaction.
 - Constants of equilibrium.
 - Le Chatelier's principle and chemical equilibrium.
 - Equilibrium calculations.
6. Heterogeneous equilibrium:
 - Solubility and chemical equilibrium.
 - Solubility curves.
 - Solubility product.
 - Effect of ion common.
 - Precipitation reactions.
 - Coefficient of reaction.
7. Acid-base equilibrium:
 - Concept of Bronsted acid-base.
 - Ionic product of water.
 - Concept of pH.
 - Constants of ionization of acids and bases.
 - Buffer solutions.
 - Polyprotic acids.
 - Acid-base titration.
8. Equilibrium of complexation:
 - Complexes and ligands.
 - Equilibrium of complexation.
 - Effect of complexation in solubility.
9. Reactions oxidation-reduction:
 - Half-reactions of oxidation and reduction.
 - Oxidation numbers.
 - Balance redox equations in acid and basic medium.
10. Electrochemical:

Course contents (extended version)

- Spontaneous reactions.
- Galvanic batteries.
- Schematic diagram-representation.
- Reduction potentials.
- Electromotive force.
- 11. Organic chemistry
 - Classification and representation of organic compounds
 - Systematic nomenclature for hydrocarbons and functional groups
 - Classification of organic reactions

Recommended reading

1. Overby, J. ; Chang, R. (2018) Chemistry, Editorial McGraw Hill
2. Madivate, C. ; Manhique, A. ; Júnior, P. M. ; MUiambo, H. ; Siteo, A. (2013) Química geral e Inorgânica. Teoria, Escolar Editora.
3. T. W. G. Solomons, C. B. Fryhle, S. A. Snyder; (2018). Química Orgânica (12ª edição). Rio de Janeiro: LTC Livros Técnicos e Científicos Editora Lda
4. A. Tomé; (2023). Fundamentos de Nomenclatura de Química Orgânica. Ist Press.
5. Chang, R. , Overby, J. S (2011) General Chemistry: The Essential Concepts, McGraw-Hill

Teaching and learning methods

Lectures for acquisition of general concepts of chemistry. Practical and practical-theoretical classes for practice of: solving chemical problems and for application of theoretical concepts. Application of queries on organic nomenclature; Implementation of practical laboratory experimental and training with measurement laboratory materials.

Assessment methods

1. General assessment. - (Regular, Student Worker) (Final)
 - Final Written Exam - 70% (The theoretical component will be held by exam (partial exam or full exam).)
 - Practical Work - 30% (The practical component will be: -Performance (6%); -Quiz (6%) -Practical assays (18%))
2. Global Assessment - (Student Worker) (Final, Supplementary, Special)
 - Final Written Exam - 100% (Theoretical and practical components evaluated in simultaneous.)
3. Global Assessment - (Regular) (Supplementary, Special)
 - Final Written Exam - 100% (Theoretical and practical components evaluated in simultaneous.)

Language of instruction

Portuguese, with additional English support for foreign students.

Electronic validation

Miguel José Rodrigues Vilas Boas	Luís Avelino Guimarães Dias	Elsa Cristina Dantas Ramalhosa	José Paulo Mendes Guerra Marques Cortez
14-01-2026	20-01-2026	22-01-2026	04-02-2026