INSTITUTO POLITÉCNICO DE BRAGANÇA

Course Unit	Food Chemistry Laboratories			Field of study	Chemistry		
Bachelor in	Food Engineering			School	School of Agriculture		
Academic Year	2022/2023	Year of study	1	Level	1-1	ECTS credits	6.0
Type	Semestral	Semester	2	Code	9087-641-1204-00-22		

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): Maria Fátima Alves Pinto Lopes da Silva, Vitor Manuel Ramalheira Martins

Learning outcomes and competences

At the end of the course unit the learner is expected to be able to:
1. To know hydrolysis reactions in organic compounds (biomolecules: carbohydrates, proteins, and lipids);
2. To understand the importance of sampling and food sample preparation in the quality of analytical results;
3. To know some chemical analysis techniques (volumetry, gravimetry, potenciometry, chromatography, and spectrophotometry) applied to food samples;
4. To understand the basic principle and instrumentation of the analytical chemistry techniques;
5. Research, select, and establish adequate analytical procedures.

Prerequisites

Before the course unit the learner is expected to be able to:
possess basic knowledge of Chemistry and Biochemistry.

Course contents

Hydrolysis reactions of organic compounds. Introduction to analytical techniques. Methods for chemical analysis of food: volumetric methods, gravimetric methods, potentiometric methods, optical methods, and chromatographic methods.

Course contents (extended version)

1. Hydrolysis reactions of organic compounds:
   - Hydrolysis id lipids, proteins, and carbohydrates;
   - Impact in food characteristics and stability.
2. Introduction to the analytical methods:
   - Classification of analytical methods;
   - Characteristics and selection of analytical methods;
   - Calibration of analytical methods (external and internal standard, and standard addition methods).
3. Volumetric methods:
   - Definitions;
   - Acid-base titrations, complexometric titrations, and precipitation titrations.
4. Gravimetric methods:
   - Steps of a gravimetric analysis;
   - Gravimetric calculations;
   - Examples of gravimetric analysis.
5. Potentiometric methods:
   - General principles;
   - Reference and indicator electrodes;
   - Direct potentiometry;
   - Potentiometric titrations.
6. Spectrophotometric methods:
   - General principles and instrumentation;
   - Atomic spectroscopy (absorption and emission);
   - Molecular absorption spectrometry (UV-VIS and IR).
7. Chromatographic methods:
   - General principles;
   - Thin layer chromatography;
   - Gas chromatography;
   - Liquid chromatography.
8. Preparation of food samples and practical application of the previous techniques to their analysis.

Recommended reading

1. G. D. Christian, Analytical Chemistry, 5 Edition, John Wiley & Sons, New York, 1994;
2. D. A. Skoog, D. West, F. J. Holler Fundamentals of Analytical Chemistry, 7th Edition, Brooks Cole, New York, 1995;
3. D. Harvey, Modern Analytical Chemistry, McGrawHill, 2000;
4. Normas portuguesas e Internacionais relativas à análise química de géneros alimentícios.
5. Belitz, H. -D. ; Grosch, W. (1992). Quimica de los Alimentos. Editorial Acribia.

Teaching and learning methods

Theoretic-practical lessons involve presentation, solving and discussion of theoretical/practical exercises. Laboratory lessons will consist in the use of experimental protocols, based in the various techniques approached in the theoretical lessons, for the determination of analytical parameters in foodstuffs.

Assessment methods

1. Alternative 1 - (Regular, Student Worker) (Final)
   - Final Written Exam - 75% (minimal grade of 8,0 values (in a total of 20 values))
   - Reports and Guides - 25% (without minimal grade)
2. Alternative 2 - (Regular, Student Worker) (Supplementary, Special)
   - Final Written Exam - 100% (This exam will evaluate the totality of the theoretical and practical topics.)

Language of instruction

Portuguese, with additional English support for foreign students.

Electronic validation

Maria Fátima Alves Pinto Lopes da Silva, Vitor Manuel Ramalheira Martins	Maria da Conceição Constantino Fernandes	Elsa Cristina Dantas Ramalhosa	José Carlos Batista Couto Barbosa
19-12-2022	19-12-2022	19-12-2022	19-12-2022