INSTITUTO POLITÉCNICO DE BRAGANÇA

Course Unit	Analytical Control and Monitoring			Field of study	Chemistry		
Bachelor in	Oenology			School	School of Agriculture		
Academic Year	2023/2024	Year of study	2	Level	1-2	ECTS credits	6.0
Type	Semestral	Semester	1	Code	9998-705-2101-00-23		

Workload (hours)	162	Contact hours	T	TP	PL	TC	S	E	OT	O
			15	-	45	-	-	-	4	-

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): António Manuel Coelho Lino Peres, Luís Avelino Guimarães Dias

Learning outcomes and competences

At the end of the course unit the learner is expected to be able to:
1. To interpret the results of analytical chemistry by using the statistic.
2. To understand, apply the theoretical concepts of analytical chemistry and use the quality control in analytical measurement results.
3. To know the instrumentation of various analytical methods and understand the physical principle that serves as basis for the analytical technique.
4. To understand the advantages and disadvantages of each technique and identify the qualitative and quantitative capabilities of each technique.
5. Plan, prepare laboratory experiments and calibrate analytical equipment for the analysis of grapes, must and wine.
6. Acquire critical capacity of analytical results in laboratory work.

Prerequisites

Before the course unit the learner is expected to be able to:
1. Descriptive statistics and linear regression.
2. Acid-base, precipitation, oxidation-reduction and complexation reactions.
3. Intermolecular interactions and molecules polarity.
4. Nomenclature and typical organic reactions.
5. Electricity concepts.

Course contents

Laboratory safety. Concepts of analytical chemistry. Sampling. Methods of analysis. Analysis of physisco-chemical parameters. Fraud and contaminations.

Course contents (extended version)

1. Concepts of analytical chemistry:
   - Characterization of the experimental error rand propagation of uncertainty.
   - Precision and Accuracy.
   - Significant figures.
   - Methods of Calibration and validation of analytical methods.
   - Quality control of analytical results.
   - Selection of analytical method and interpretation of analytical data.
2. Sampling to assess fruit, must, wine and wine quality.
3. Analysis methods: classic; conductometry; spectrophotometry; potentiometry.
   - Fundamentals of each technique.
   - Quantitative and qualitative applications.
   - Advantages and disadvantages.
4. Analysis methods: classic; refractometry; chromatography.
   - Fundamentals of each technique.
   - Quantitative and qualitative applications.
   - Advantages and disadvantages.
5. Laboratory safety
6. Control and monitoring of physical-chemical parameters in must and wine.
7. Fraud and contaminations.

Recommended reading

1. DC Harris, Quantitative Chemical Analysis, W. H. Freeman and Company, 2010.
2. BM Ham, A Maham, Analytical Chemistry: A chemist and Laboratory Technician's Toolkit, Wiley, 2016.
3. AS Curvelo-Garcia, P Barros, Química Enológica – métodos analíticos, Agrobook, 2015.
4. Compendium of international methods of wine and must analysis, International Organisation of Vine and Wine, volume 1, 2019.
5. Compendium of international methods of wine and must analysis, International Organisation of Vine and Wine, volume 2, 2019.

Teaching and learning methods

Lectures for the acquisition of concepts of analytical chemistry and instrumental methods of analysis. Practical/theoretical-practical lessons of: problem-solving and analytical application of theoretical concepts, practical implementation of laboratory work. Preparation of reports of practical work.

Assessment methods

1. Assessment 1 - (Regular, Student Worker) (Final, Supplementary)
   - Final Written Exam - 70% (Assessment of knowledge acquired.)
   - Laboratory Work - 30% (The practical component will be measured taking into account the evaluation of written reports.)
2. Assessment 2 - (Student Worker) (Final, Supplementary, Special)
   - Final Written Exam - 100% (Assessment of knowledge acquired.)
3. Assessment 3 - (Regular) (Special)
   - Final Written Exam - 100% (Assessment of knowledge acquired.)

Language of instruction

Portuguese

Electronic validation

António Manuel Coelho Lino Peres, Luís Avelino Guimarães Dias	Clementina Maria Moreira dos Santos	António Castro Ribeiro	Maria Sameiro Ferreira Patrício
16-01-2024	18-01-2024	27-01-2024	29-01-2024