

Course Unit	Oenological Microbiology	Field of study	Food Industries
Bachelor in	Oenology	School	School of Agriculture
Academic Year	2023/2024	Year of study	2
Type	Semestral	Semester	1
Level	1-2	ECTS credits	6.0
Code	9998-705-2102-00-23		
Workload (hours)	162	Contact hours	T 30 TP - PL 30 TC - S - E - OT 4 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 Letícia Miranda Fernandes Estevinho

### Learning outcomes and competences

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

1. - To study the microorganisms used in the wine industry, from the field to the final product, and the factors influencing their diversity and evolution throughout the fermentation process;
2. - To understand the most relevant aspects of the physiology, growth and metabolism of microorganisms and their role in the final quality of wine;
3. To acquire skills in the identification and control of microorganisms, allowing students to understand and solve real problems in winery setting;
4. to apply the laboratory methodologies for microorganisms' study and control.
5. To understand the concepts of microbiological stabilization of wines.
6. - To Implement HACCP systems in oenology.

### Prerequisites

Before the course unit the learner is expected to be able to:  
Not applicable.

### Course contents

Wine microorganisms and their natural habitat: Wort transformation in wine: Wine fermentation, the specificity of grape must: Selection criteria for yeast for winemaking; Causes and treatments of problematic wine fermentations. Bioconversion of malic acid: LAB selection for winemaking; Wine contamination and spoilage microorganisms; Microbiological stabilization; HACCP in oenology.

### Course contents (extended version)

1. Wine microorganisms and their natural habitat: vine / grape ecosystems, winery and bottling line;
2. Wort pathways, metabolism transformation in wine: alcoholic fermentation,
  - fermentation biochemistry and metabolic
  - metabolic of sugars and nitrogen compounds.
3. Wine fermentation, the specificity of grape must
  - mixed populations, growth kinetics and conditioning factors;
  - application of yeasts; natural vs inoculated fermentations.
4. Selection criteria for yeast for winemaking; .
  - Causes and treatments of problematic wine fermentations.
5. Bioconversion of malic acid: by the vine; by bacteria;
6. Lactic acid bacteria (LAB) and physiology of malolactic fermentation,
  - utilization of yeast and conditioning factors;
  - criteria of LAB selection for winemaking;
7. Wine contamination and spoilage microorganisms;
8. Microbiological stabilization;
9. Microbiological stabilization;
10. Practices: Evaluation of microbiological quality of yeasts
11. Accompanying a wine fermentation
12. Rapid screening of wine microorganisms
13. Microbiological analysis of wines by membrane filtration
14. Detection and identification of *Dekkera bruxellensis*
15. Microbiological analysis of surfaces
16. Recuperação de vinhos com defeito de prova.

### Recommended reading

1. Tógores, J. H. (2003). Tratado de enología. Ediciones Mundi-Prensa, V. 1,
2. Fugelsang, K. and Edwards, C. (2006). Wine Microbiology. Chapman and Hall, Nova Iorque, EUA.
3. Ribéreau-Gayon, P., Dub (2000). Handbook of Enology: The Microbiology of Wine and Vinifications. John Wiley and Sons, Ltd, Chichester, England
4. Jacson, R. S. (2008). Wine Science: principles and applications. 3ª Edição, Academic Press, Elsevier.
5. Delfini C., JV Formica (2001). Wine Microbiology – Science and Technology

### Teaching and learning methods

Lectures - Oral presentation methodologies using TIC (Technologies of Information and Communication). Study-cases and problem-based approaches with invited speakers. Practices - Practical work with short-reports; presentation and discussion of monographs. Performances assessed by both coursework and examinations.

### Assessment methods

1. Regular student - (Regular) (Final, Supplementary, Special)
  - Final Written Exam - 60% (Minimum 9. 5 marks.)
  - Development Topics - 20%
  - Intermediate Written Test - 20% (Average of subjects and intermediate exam, minimum score 9, 5)
2. Student worker - (Student Worker) (Final, Supplementary, Special)
  - Final Written Exam - 60% (Theoretical contents, minimum 9. 5)
  - Final Written Exam - 40% (Practical contents, minimum 9. 5)

## Language of instruction

Portuguese

## Electronic validation

Maria Letícia Miranda Fernandes Estevinho	Ermelinda Lopes Pereira	António Castro Ribeiro	Paula Cristina Azevedo Rodrigues
17-01-2024	17-01-2024	27-01-2024	01-02-2024