

## 27133 - Wine Biochemistry and Microbiology

### Información del Plan Docente

Academic Year	2017/18
Faculty / School	100 - Facultad de Ciencias
Degree	446 - Degree in Biotechnology
ECTS	6.0
Year	4
Semester	First semester
Subject Type	Optional
Module	---

### 1.General information

#### 1.1.Introduction

#### 1.2.Recommendations to take this course

#### 1.3.Context and importance of this course in the degree

#### 1.4.Activities and key dates

For students enrolled in the subject, places, times and dates of lectures, visit and practical sessions will be public via Notice Board advertisements of the grade on the platform Moodle at the University of Zaragoza, <https://moodle2.unizar.es/add/>, and in the moodle page for the course. These routes will be also used to communicate enrolled students their distribution by groups of practical sessions, which will be organized by the coordination of degree. Provisional dates will be available on the website of the Faculty of Sciences in the corresponding section of the Degree in Biotechnology: <https://ciencias.unizar.es/grado-en-biotechnologia>.

In this web there will be also available the dates of exams.

### 2.Learning goals

#### 2.1.Learning goals

#### 2.2.Importance of learning goals

### 3.Aims of the course and competences

#### 3.1.Aims of the course

#### 3.2.Competences

### 4.Assessment (1st and 2nd call)

#### 4.1.Assessment tasks (description of tasks, marking system and assessment criteria)

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Achievements of learning objectives will be monitored through the following tasks:

**Participation in the practical course:** submission of a Laboratory Notebook

The practical course will be based on problem-based learning, hence students will learn how to investigate practical cases such as identification of yeast isolates, detection of contaminant microorganisms, determination of microbiological features of oenological interest, chemical and sensorial inspection of fermenting musts for detecting deviations, etc. Students will record all activities in a Laboratory Notebook, including protocols, results, critical discussion and rationale for next experiments.

Laboratory Notebooks will be marked from 0 to 10, and this will contribute a 35% to the final mark of the subject.

Criteria for assessment Laboratory Notebooks are the following:

- Does it describe methods precisely?
- Does it discuss results conveniently?
- When designing a new experiment, is it in agreement with previous results and with the final aim of the course?
- Are there cross-references in the Laboratory Notebook?

**Individual seminars:** written report and oral presentations

Students will work on a specific topic, suggested either by the teachers or by the students themselves (upon agreement with the teachers). The teachers will help students in looking for information, and critically reviewing its relevance. Finally, students will present a written report and present orally their work in front of the class.

Submission of this written report along with the oral presentation will be compulsory for succeeding in this subject. This will be marked from 0 to 10 and this will contribute a 15% to the final mark of the subject.

Criteria for assessment reports and presentations are the following:

About the report:

- Is it clearly structured in introduction, methods, results, discussion, conclusions and bibliography?
- Does it describe clearly and properly the topic under investigation?
- Are methods described clearly?
- Presentation of results, is this done in a sequential and logical order?
- Does the student suggest any original alternative when discussing results?
- About bibliography, it is adequate and updated?

About the oral presentation:

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- Has it been presented clearly, and ordered?

### Written exam

The exam will include a series of questions about the topics presented during the course (practical and theoretical). Study materials will be available at Moodle2, Anillo Digital Docente, Universidad de Zaragoza (<https://moodle2.unizar.es/add/>).

- Introduction and key concepts: history and microbiological foundations of wine-making.
- Prokaryotic and Eukaryotic cells. Taxonomy, structure and genetics. Microbial growth.
- Wine-making techniques: grapes and wine quality
- Components in grapes and wine: analysis and relevance.
- Using sulphur dioxide as antioxidant and antiseptic
- Fermentations: culturing and working with microorganisms in the laboratory
- Microorganisms: ecology, identification and characterisation. Yeast: *Saccharomyces cerevisiae* and other yeasts. Lactic acid bacteria. Acetic acid bacteria. Fungi.
- Wine spoilage due to microorganisms (yeast, bacteria, fungi). Microbial analysis of wine. Preservation of wines and control of microbial growth.
- Genetic improvement of microorganisms interesting for oenology. Applied microbiology of wine-making.

The written exam will be marked from 0 to 10 points and this will contribute a 50% to the final mark of the subject; a minimum mark of 5 points will be required in order to pass this subject.

## 5. Methodology, learning tasks, syllabus and resources

### 5.1. Methodological overview

This course is scheduled starting from an intensification of theoretical knowledge acquired an eminently practical and applied orientation. It is intended that students are able to apply in practice those theoretical and practical knowledge they have acquired in the course.

To achieve this, the theoretical, visit and practical classes are interleaved to optimize the learning process, reducing the time from students acquire theoretical knowledge until applied in the laboratory. This strategy progressively adapts to solve practical problems involved ultimately more applied part of the course, and a way of bringing students to situations that would confront in a job in the field of biochemistry and microbiology oenology.

### 5.2. Learning tasks

Theoretical classes. Presencial. 30 hours. They are presented to students basic theoretical knowledge of the subject

Laboratory practical classes. Presencial. 20 hours.

Special practical classes. Presencial. 5 hours.

Redaction and exposition. Presencial, 5 hours. No presencial, 22 hours. This activity is that students collect information on a particular topic, aided by the teacher. The analysis of information should lead to the development of a structured in Introduction, Methods, Results, Discussion, Conclusions, and Bibliography work. Professor monitor at all times the individual work of students by scheduling tutoring sessions.

### 5.3. Syllabus

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### **Part 1. Grape and wine composition. Vinifications.**

Lesson 1. The vinification. The berries, base of wine quality

Lesson 2. Chemical composition of wine and berries. Analysis and meaning

Lesson 3. Sulphur dioxide in oenology

### **Part 2. Alcoholic and malolactic fermentations**

Lesson 4. Yeast and alcoholic fermentation

Lesson 5. Natural fermentation of must

Lesson 6. Starter cultures and inoculated fermentations

Lesson 7. Lactic acid bacteria and malolactic fermentation

Lesson 8. Malolactic fermentation in wines

Lesson 9. Control of malolactic fermentation

Lesson 10. Special fermentations: sparkling wine and others

Lesson 11. Applied biotechnology in wine-making

### **Part 3. Microbial wine spoilage**

Lesson 12. Introduction to microbial wine spoilage

Lesson 13. Wine spoilage by yeast

Lesson 14. Wine spoilage by filamentous fungi

Lesson 15. Wine spoilage by lactic acid bacteria

Lesson 16. Wine spoilage by acetic acid bacteria

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Lesson 17. Microbial wine spoilage affecting safety of wine

**Special practical course** . Visit to a winery.

### Practical course

Wine and must physic-chemical analysis

Monitoring microbes during wine fermentation

Isolation and identification of fermenting yeast

Starter cultures for wine fermentation

Detection of spoilage microorganisms

### 5.4.Course planning and calendar

Schedules of lectures and problems will coincide with the officially established and will be available at:  
<https://ciencias.unizar.es/grado-en-biotecnologia>.

The places, calendar and groups for training, visit and practical sessions will be established in coordination with the rest of matters at beginning of course. The Coordinator will produce the groups of students for these activities at beginning of course to avoid overlaps with other subjects.

### 5.5.Bibliography and recommended resources

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|-----------|--|
| <b>BB</b> | Blouin, Jacques. Enología práctica :<br>Conocimiento y elaboración del vino /<br>Emile Peynaud, Jacques Blouin ; versión<br>española Eduardo Cotillas Provencio ;<br>revisión Alfredo González Salgueiro . - 4 <sup>a</sup><br>ed. rev. y ampl. Madrid : Mundi-Prensa,<br>2004 |
| <b>BB</b> | Microbiología del vino / coordinadores<br>Alfonso V. Carrascosa, Rosario Muñoz,<br>Ramón González . - 1 <sup>a</sup> ed Madrid : AMV<br>Ediciones, 2005  |
| <b>BB</b> | Peynaud, E.. Enología Practica:<br>conocimiento y elaboración del vino.<br>Mundi-Prensa Libros, 2006   |
| <b>BB</b> | Microbiología enológica : fundamentos de<br>vinificación / José Antonio Suárez Lepe,<br>Baldomero Iñigo Leal . 3 <sup>a</sup> ed. Madrid :<br>Mundi-Prensa, 2004   |

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- BC** Bird, D.. Understanding Wine Technology. Board and Bench Publishing: Warwickshire UK, 2010.
- BC** Fugelsang, K. C.. Wine Microbiology: Practical applications and Procedures. 2nd Springer. 2007
- BC** Goode, J.. The Science of Wine. From wine to glass. 2nd ed. University of California Press-Mittechell Beazley: Berkeley and Los Angeles, CA, 2014.