

Academic Year/course: 2022/23

27133 - Wine Biochemistry and Microbiology

Syllabus Information

Academic Year: 2022/23

Subject: 27133 - Wine Biochemistry and Microbiology

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

2. Learning goals

3. Assessment (1st and 2nd call)

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

All learning and assessment activities will be done on site, at the Faculty of Sciences, unless the University of Zaragoza or other local, regional or national authorities, due to sanitary reasons, could decide to do such activities on line.

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

1) Participation in the practical course, introduction of initial open questions, written exam at the end of the practical course, and submission of a report on the winery visit.

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.

The initial open questions and the written exam on the practical course will be marked from 0 to 10, and this will contribute a 30% to the final mark of the subject.

The practical course will include as well a visit to a winery. Students will submit a report after the visit to the winery, which will be marked from 0 to 10, and this will contribute a 5% to the final mark of the subject.

2) 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 same as those used for assessment of Degree Final Project.

3) Written exam

The exam will include a series of questions about the topics presented during the course (practical and theoretical), and it may include questions about the seminars. 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.

Total or partial fraud or plagiarism in any of the evaluation tests will result in the immediate termination of the course for the student, who will get the lowest mark. Disciplinary actions will be undertaken, according to the University regulations on the field.

4. Methodology, learning tasks, syllabus and resources

4.1. 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.

Students are expected to participate actively in class throughout the semester. Further information regarding the course will be provided on the first day of class.

4.2. Learning tasks

All learning and assessment activities will be done on site, at the Faculty of Sciences, unless the University of Zaragoza or other local, regional or national authorities, due to sanitary reasons, could decide to do such activities on line.

The course will address the following task:

- Lectures. On-site. 30 hours. Basic theoretical knowledge of the subject will be presented to students
- Laboratory practical course. On-site. 20 hours.
- Special practical classes. On-site. 5 hours.
- Dissertation and presentation. On-site, 5 hours. Student's work, 22 hours. In this activity students will collect information on a particular topic, assisted by the teachers. The analysis of information should result in a written dissertation structured in Introduction, Methods, Results, Discussion, Conclusions, and Bibliography. Professors will monitor all time the work of students by scheduling tutoring sessions.

4.3. Syllabus

The course will address the following topics:

- Topic 1. Introduction to wine making.
- Topic 2. Chemical composition of wine. Analysis and significance.
- Topic 3. Sulphur dioxide in oenology.
- Topic 4. Yeast and alcoholic fermentation. Historical overview.
- Topic 5. Basic biology of yeast.
- Topic 6. Starter cultures. Natural and inoculated fermentations
- Topic 7. Biochemistry of alcoholic fermentation.
- Topic 8. Wine spoilage by yeast
- Topic 9. Lactic acid bacteria. Starter cultures.
- Topic 10. Biochemistry of malolactic fermentation
- Topic 11. Wine spoilage by lactic acid bacteria
- Topic 12. Biochemistry of phenolic compounds in wine.
- Topic 13. Biochemistry of aromatic compounds in wine.
- Topic 14. Sensory analysis of wine, and aroma.
- Topic 15. Using enzymes in oenology.

- Topic 16: Fermentations for sparkling and sherry wines
- Topic 17. Wine spoilage by acetic acid bacteria. Vinegar.
- Topic 18. Wine spoilage by filamentous fungi
- Topic 19. Yeast genomics. Oenological biotechnology.
- Topic 20. Cases of applied oenological microbiology.

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

4.4. Course planning and calendar

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-biotecnologia>.

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

4.5. Bibliography and recommended resources

<http://psfunizar10.unizar.es/br13/egAsignaturas.php?codigo=27133>