

**1. General information****Course:** ENOLOGICAL BIOTECHNOLOGY**Type:** CORE COURSE**Degree:** 400 - UNDERGRADUATE DEGREE PROGRAMME IN OENOLOGY**Center:** 107 - E.T.S. OF AGRICULTURAL ENGINEERS OF C. REAL**Year:** 3**Main language:****Use of additional languages:****Web site:****Code:** 58522**ECTS credits:** 6**Academic year:** 2023-24**Group(s):** 20**Duration:** First semester**Second language:****English Friendly:** Y**Bilingual:** N**Lecturer:** MONICA FERNANDEZ GONZALEZ - Group(s): 20

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2. Pre-Requisites

It is recommended to have taken the subjects of Microbiology and Biochemistry.

3. Justification in the curriculum, relation to other subjects and to the profession

Currently, Biotechnology, that is, the use of living organisms or their parts in industrial processes, has a great importance and a growing social impact due to its large number of applications in different areas of life, among which the field of food and by extension, the Oenological Industry, in addition to other areas of Medicine and the Environment. Wine is a biotechnological product since its production is nothing more than the fermentation of a must obtained from the grapes by living microorganisms (yeasts and bacteria), therefore, this subject addresses the study of the applications of biotechnology in oenology, for which it is necessary the knowledge and comprehensive understanding of the bases and biological and molecular foundations of living microorganisms.

4. Degree competences achieved in this course**Course competences**

Code	Description
CB01	Prove that they have acquired and understood knowledge in a subject area that derives from general secondary education and is appropriate to a level based on advanced course books, and includes updated and cutting-edge aspects of their field of knowledge.
CB02	Apply their knowledge to their job or vocation in a professional manner and show that they have the competences to construct and justify arguments and solve problems within their subject area.
CB03	Be able to gather and process relevant information (usually within their subject area) to give opinions, including reflections on relevant social, scientific or ethical issues.
CB04	Transmit information, ideas, problems and solutions for both specialist and non-specialist audiences.
CE02	Apply in an integrated way basic knowledge at the molecular, cellular and metabolic level in the control and selection of microorganisms as well as in plants.
CE05	Acquire knowledge about the chemical composition of grapes and wine as well as the chemical and biological processes that occur during the production and conservation of wines for its application in the development and progress of the enological industry.
CE06	Ability to manage the obtaining of musts for winemaking and conservation, the control of the fermentation of all types of wines, their aging, and the packaging, bottling and storage of wine and derived products according to legal, hygienic and environmental provisions.
CE08	Ability to carry out or supervise routine or specific analytical, microbiological and sensory control in the vineyard and winery and apply it to the control of raw materials, enological products, intermediate products and final products throughout the entire production process.
CE12	Ability to control and organize the production, management and marketing processes of different types of special wines, grape juices, mistelas, wine aperitifs, vinegars and other derivatives of musts, wine and related products.
CG01	Develop motivation for quality, the ability to adapt to new situations and creativity.
CG02	Manage complex technical or professional projects. Solve complex problems effectively in the field of Enology.
CT01	Know a second foreign language.
CT03	Use correct oral and written communication.
CT04	Know the ethical commitment and professional deontology.

5. Objectives or Learning Outcomes**Course learning outcomes****Description**

Arouse the ability to criticize and discuss new issues related to the subject.

Correctly use of starter cultures in the wineries, as well as knowing the selection and production process on an industrial scale.

To know the morphological, physiological and molecular characteristics of the microorganisms involved in oenological processes, as well as the methods used to identify them.

Define, explain and correctly relate the basic concepts of biotechnology.

To demonstrate knowledge of the biochemical principles of alcoholic and malolactic fermentation processes, as fundamentals of oenological technology.

To apply the basic concepts of biotechnology to practical cases of the production of wine and its derivatives, and solve problems related to applications of biotechnology in the field of oenology.

Search, obtain, and use information sources in the area of wine biotechnology.
Get the student to know the techniques for the genetic improvement of oenological microorganisms, as well as the judicious use of enzymes during the winemaking process.

6. Units / Contents

Unit 1: Biotechnology: basic concepts and historical development

Unit 2: Description of microorganisms of oenological interest and their use in winery

Unit 3: Fundamentals of alcoholic and malolactic fermentation

Unit 4: Starter cultures: isolation, characterization and selection for use in the wine industry

Unit 5: Methods used for the identification of oenological microorganisms

Unit 6: Enzymes used in the oenological industry

Unit 7: Techniques for the genetic improvement of oenological microorganisms

7. Activities, Units/Modules and Methodology

Training Activity	Methodology	Related Competences (only degrees before RD 822/2021)	ECTS	Hours	As	Com	Description
Class Attendance (theory) [ON-SITE]	Lectures	CB01 CE05 CG01 CT01 CT04	1.4	35	Y	N	The teacher will explain the theoretical concepts and several examples will be used in order to understand the new concepts explained. The student will be provided with didactic material to follow the subject.
Class Attendance (practical) [ON-SITE]	Practical or hands-on activities	CB01 CB02 CB03 CB04 CE02 CE05 CE06 CE08 CE12 CG01 CG02 CT03 CT04	0.6	15	Y	Y	Realization of practices of laboratory. Counting, isolation and Identification of microorganisms Oenological. Selection and control of Implementation of starter cultures
Problem solving and/or case studies [ON-SITE]	Guided or supervised work	CB02 CB03 CE02 CE08 CG02 CT01 CT03	0.24	6	Y	N	Different activities will be planned that involve discussion, analysis, and resolution, with the guidance of the teacher
Writing of reports or projects [OFF-SITE]	Self-study	CB02 CB03 CB04 CE02 CE08 CE12 CG02 CT03	0.64	16	Y	N	The student must solve and deliver the exercises, problems or cases raised. A Memory of practices that will be evaluable within the item Preparation of a report of internship
Study and Exam Preparation [OFF-SITE]	Self-study	CB01 CB02 CB03 CB04 CE02 CE05 CE06 CE08 CE12 CG01 CG02 CT01 CT03 CT04	2.96	74	N	N	Autonomous work of the student to study and assimilate the theoretical and practical concepts taught
Mid-term test [ON-SITE]	Assessment tests	CB01 CB02 CB03 CB04 CG02 CT03	0.16	4	Y	Y	Two partial tests will be carried out on the contents of the subject with multiple choice questions, short answers and / or case resolution. A student who does not take the partial tests will be evaluated in non continuous mode.
Total:			6	150			
Total credits of in-class work: 2.4					Total class time hours: 60		
Total credits of out of class work: 3.6					Total hours of out of class work: 90		

As: Assessable training activity

Com: Training activity of compulsory overcoming (It will be essential to overcome both continuous and non-continuous assessment).

8. Evaluation criteria and Grading System

Evaluation System	Continuous assessment	Non-continuous evaluation*	Description
Practicum and practical activities reports assessment	20.00%	20.00%	Attendance to laboratory practices and preparation of a report of the practices carried out
Mid-term tests	70.00%	0.00%	A partial test will be carried out at the end of the contents of topic 3 and another once the agenda is finished, which may coincide with the date of the ordinary call
Assessment of problem solving and/or case studies	10.00%	0.00%	Referring to problem solving or questionnaires of the different topics and / or class exposure of a work done
Final test	0.00%	80.00%	Final test of the subject
Total:	100.00%	100.00%	

According to art. 4 of the UCLM Student Evaluation Regulations, it must be provided to students who cannot regularly attend face-to-face training activities the passing of the subject, having the right (art. 12.2) to be globally graded, in 2 annual calls per subject, an ordinary and an extraordinary one (evaluating 100% of the competences).

Evaluation criteria for the final exam:

Continuous assessment:

To pass the subject it is necessary:

- 1.- Have carried out the laboratory practices and delivered the report on the dates convened for it. It is necessary to obtain a minimum grade of 4 out of 10 to perform average with the rest of the activities. In the case of not reaching this grade, students will be evaluated with questions related to the practices in the extraordinary call and must obtain a minimum grade of 4 out of 10 in each of the partial tests.
- 2.- Obtain a minimum score of 4 out of 10 in each of the partial tests. If this is not the case in the corresponding call, the failed tests may be recovered.
- 3.- To pass the subject it is necessary to obtain a minimum grade of 5 points out of 10 in the sum of all the evaluation activities carried out throughout the course.

Non-continuous evaluation:

To pass the subject in Non-continuous evaluation it will be necessary:

- 1.- Have carried out and passed the laboratory practices (20%) on the dates convened for it with a minimum grade of 4 out of 10. In the case of not reaching this grade or not having carried out the laboratory practices, students will be evaluated with questions related to the practices in the extraordinary call and must obtain a minimum grade of 4 out of 10.
- 2.- Obtain a minimum grade of 4 out of 10 in the final test of the entire subject (80%), which will be held on the date scheduled in the corresponding call.
- 3.- To pass the subject it is necessary to obtain a minimum grade of 5 points out of 10 in the sum of all the evaluation activities carried out throughout the course.

Specifications for the resit/retake exam:

The same criteria will be followed as in the ordinary call.

Specifications for the second resit / retake exam:

The student will take a final test with a value of 100% in which questions on theoretical concepts, laboratory practices and problem solving will be included. In the case of having carried out and approved the laboratory practices and in the event that the student requests it, the grade obtained may be kept and will have a value of 20% and therefore, the final test will have a value of 80%. To pass the subject it is necessary to obtain a minimum grade of 5 points out of 10

9. Assignments, course calendar and important dates	
Not related to the syllabus/contents	
Hours	hours
Class Attendance (theory) [PRESENCIAL][Lectures]	35
Class Attendance (practical) [PRESENCIAL][Practical or hands-on activities]	15
Problem solving and/or case studies [PRESENCIAL][Guided or supervised work]	6
Writing of reports or projects [AUTÓNOMA][Self-study]	16
Study and Exam Preparation [AUTÓNOMA][Self-study]	74
Mid-term test [PRESENCIAL][Assessment tests]	4
Global activity	
Activities	hours
Class Attendance (practical) [PRESENCIAL][Practical or hands-on activities]	15
Writing of reports or projects [AUTÓNOMA][Self-study]	16
Class Attendance (theory) [PRESENCIAL][Lectures]	35
Problem solving and/or case studies [PRESENCIAL][Guided or supervised work]	6
Study and Exam Preparation [AUTÓNOMA][Self-study]	74
Mid-term test [PRESENCIAL][Assessment tests]	4
Total horas: 150	

10. Bibliography and Sources						
Author(s)	Title/Link	Publishing house	City	ISBN	Year	Description
Brock, Thomas D.	Biología de los microorganismos /	Pearson,		978-84-9035-279-3	2015	
König, H	Biology of Microorganisms on Grapes, in Must and in Wine	Springer		978-3-319-60020-8	2017	
SUAREZ LEPE, José Antonio	Microbiología enológica: fundamentos de vinificación	Mundi-Prensa		84-8476-184-3	2004	
Morata, A	Advances in Grape and Wine Biotechnology	IntechOpen		978-1-78984-613-3	2019	
Morata, A	Grape and Wine Biotechnology	IntechOpen		978-953-51-2693-5	2016	
Ribereau-Gayon, D. Dubourdieu, B. Doneche and A. Lonvaud	Handbook of Enology Volume 1 The Microbiology of Wine and Vinifications	John Wiley & Sons		978-0-470-01034-1	2006	
Carrascosa, A.V; Muñoz R; González, R	Microbiología del vino	AMV Ediciones	Madrid	84-87440-06-1	2005	