

**ACADEMIC YEAR 2023/2024**

<b>General information</b>	
Academic subject	<b>MICROBIAL CULTURES AND ENZYMES IN FOOD TECHNOLOGY</b> (integrated exam of INDUSTRIAL MICROBIOLOGY AND PACKAGING)
Degree course	Foods of animal origin safety and health – (LM86)
Academic Year	2023/2024 – II year
European Credit Transfer and Accumulation System (ECTS)	6 (5+1E)
Language	Italian
Academic calendar (starting and ending date)	I semester
Attendance	Free – not mandatory

<b>Professor/ Lecturer</b>	
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Virtual headquarters	Cod. TEAMS bi3e7yi
Tutoring (time and day)	Monday-Friday 8.30-13.30 e 14.30-17.30 (appointment required by email)

<b>Syllabus</b>	
<b>Learning Objectives</b>	The course aims to deepen the knowledge relating to traditional and innovative biotechnologies with particular focus on the main agri-food chains. The selection and use of microbial starters and enzymes, for the optimization of new processes and / or products, will also be studied based on what is reported in the most recent scientific literature. Students will therefore learn what the role of microorganisms is in the management of a process aimed at producing a food with well-defined structural, sensory and nutritional characteristics.
<b>Course prerequisites</b>	Biology of microorganisms and biochemistry
<b>Contents</b>	Traditional and innovative food biotechnologies Production and use of microbial starters and enzymes Cytological and metabolic characteristics of lactic bacteria: metabolism of carbohydrates, nitrogenous substances, production of antimicrobial and functional compounds, production of exopolysaccharides, environmental adaptation. The supply chains of yogurt, cheeses, leavened bakery products, other vegetable products, sausages. Biochemical characteristics of yeasts and principles of oenological microbiology. Cytological and metabolic characteristics of yeasts. The wine and beer supply chain.
<b>Books and bibliography</b>	- Microbiologia alimentare applicata, Casa Editrice Ambrosiana (2022); -Farris, Gobbetti, Neviani, Vincenzini. Microbiologia dei prodotti alimentari, Casa Editrice Ambrosiana (2012); -Jay, J.M. Modern Food Microbiology. 5.a ed. London: Chapman & Hall International Thomson Publishing (1997). -I pani tipici. Biotecnologia dei prodotti lievitati da forno. p. 263-283, MILANO: Casa Editrice Ambrosiana, ISBN/ISSN: 978-88-08-18121-3.



	- De Felip, G. Recenti Sviluppi di Igiene e Microbiologia degli Alimenti. Milano: Tecniche Nuove (2001).
<b>Additional materials</b>	Notes from lectures and scientific papers

<b>Work schedule</b>			
Total	Lectures	Hands on (Laboratory, working groups, seminars, field trips)	Out-of-class study hours/ Self-study hours
<b>Hours</b>			
<b>150</b>	<b>40</b>	<b>20</b>	<b>90</b>
<b>ECTS</b>			
<b>6</b>	<b>5</b>	<b>1</b>	
<b>Teaching strategy</b>			
Frontal lesson - blended learning			
<b>Expected learning outcomes</b>			
<b>Knowledge and understanding on:</b>	Understanding the scientific approach aimed at the use of enzymes and microorganisms for the enhancement of traditional and innovative food matrices to be used in food production.		
<b>Applying knowledge and understanding on:</b>	Students must know and be able to apply current methodologies based on the use of microorganisms and/or enzymes aimed at enhancing traditional and innovative food matrices to be used in food production		
<b>Soft skills</b>	<ul style="list-style-type: none"> <li>• Making informed judgments and choices At the end of the course, the student must be able to assess business needs/problems and optimize suitable biotechnological processes at the laboratory level and imagining a possible industrial scale-up.</li> <li>• Communicating knowledge and understanding At the end of the course, the student must be able to communicate with business and academic realities regarding the biotechnological approaches using microorganisms and/or enzymes.</li> <li>• Capacities to continue learning At the end of the course, the student must have acquired considerable autonomy of judgment in the context of the specific themes of the current biotechnological approaches used in business and academic realities for the enhancement and transformation of traditional and alternative food matrices.</li> </ul>		

<b>Assessment and feedback</b>	
Methods of assessment	<p>The single, overall, and collegial exam for the CI Industrial Microbiology and Packaging consists of an oral test on the topics developed during the theoretical and theoretical-practical lesson hours of both modules of the integrated course. The final evaluation is expressed in thirtieths. The evaluation of the student's preparation takes place based on pre-established criteria, as detailed below.</p> <p>For the exam, the oral test consists of questions regarding the topics of the programs of the two modules. The positive outcome of the oral test will give rise to the final evaluation of the exam, which will be expressed as the weighted average of the oral tests of the two modules.</p> <p>For students enrolled in the year of the course in which the teaching takes place, there is an oral exemption test relating to the topics of lessons and exercises carried out in the period preceding the test itself (approximately halfway through the program). The exemption test for the microbial cultures and enzymes in food</p>



	<p>technology module is passed if the student shows an adequate level of knowledge, i.e., mastery of the subject and technical-scientific language, ability to analyze problems and structure arguments. The positive outcome of the exemption test contributes to the evaluation of the C.I. exam and is valid for one academic year. For students who are eligible for the exemption test, the final oral exam will only cover the topics of lessons and exercises carried out in the period following the exemption test. In this case, the assessment of the exam is expressed as the average between the grade reported on the exam and the final exam.</p> <p>The exam for foreign students can be taken in English.</p>
Evaluation criteria	<ul style="list-style-type: none"> <li>• Knowledge and understanding Understand the new scientific approaches aimed at the use of enzymes and microorganisms for the enhancement of traditional and innovative food matrices to be used in food production.</li> <li>• Applying knowledge and understanding Students must know and know how to apply current methodologies to the enhancement of traditional and innovative food matrices to be used in food production.</li> <li>• Autonomy of judgment Acquisition of considerable autonomy of judgment in the context of the specific issues of current biotechnological approaches based on the use of microbial cultures and/or enzymes for the enhancement / transformation of traditional and innovative food stocks.</li> <li>• Communicating knowledge and understanding At the end of the course, the student must know how to communicate with business and academic realities regarding the biotechnological approaches using microbial cultures and enzymes.</li> <li>• Communication skills Ability to disseminate the knowledge acquired on current biotechnological approaches based on the use of microbial cultures and/or enzymes for the enhancement/transformation of traditional and innovative food stocks.</li> </ul> <p>Capacities to continue learning Knowledge of this module is tested during lectures, practical lessons and guided tours. It is also verified through the case studies proposed during the learning activities. In addition to ascertaining the acquisition of notions and correct scientific terminology.</p>
Criteria for assessment and attribution of the final mark	<p>The exam consists of an oral test on the topics developed during the theoretical and theoretical-practical lessons. The evaluation is expressed out of thirty. The exam can be done in English.</p>
<b>Additional information</b>	