

## COURSE OF STUDY **AGRICULTURAL SCIENCES AND TECHNOLOGIES**

**ACADEMIC YEAR 2023/2024**

### **ACADEMIC SUBJECT Biology of microorganisms (I. C. Agricultural biochemistry and biology of microorganisms)**

<b>General information</b>	
Academic subject	Biology of microorganisms (I. C. Agricultural biochemistry and biology of microorganisms)
Degree course	Agricultural science and technology
Academic Year	3
European Credit Transfer and Accumulation System (ECTS)	3
Language	Italian
Academic calendar (starting and ending date)	<i>Second semester</i>
Attendance	Not compulsory

<b>Professor/ Lecturer</b>	
Name and Surname	Erica PONTONIO
E-mail	erica.pontonio@uniba.it
Telephone	080-5442945
Department and address	<i>Department of Soil, Plant and Food Sciences</i>
Virtual headquarters	<i>TEAM 28x1dli</i>
Tutoring (time and day)	Lun – ven 8:30 – 17:30 (prior appointment to be agreed by e-mail.)

<b>Syllabus</b>	
<b>Learning Objectives</b>	The course aims to provide students with knowledge about microbial biology, cytology, and biochemistry, also dealing with microbial growth and the most technical aspects of culturing, isolating, and identifying microorganisms. Furthermore, the course aims to provide students with an overview about influence of environmental factors on the microbial activities, techniques for controlling over undesired microbial populations, so that students will have acquired enough expertise to drive the role of microorganisms in agriculture and food sectors.
<b>Course prerequisites</b>	Knowledge on Chemistry.
<b>Contents</b>	<ul style="list-style-type: none"> <li>• Principles of prokaryotic cell biology: morphology, cytology, genomics, chemotaxis.</li> <li>• Principles of eukaryotic cell biology.</li> <li>• Virus. Phages.</li> <li>• Microbial catabolic reactions: aerobic and anaerobic respiration, alcoholic fermentation, homo- and hetero-lactic fermentation, photosynthesis.</li> <li>• Basic techniques in microbiology: culture media; enumeration and isolation of microorganisms from food items, including examination of morphological, physiological and cultivation traits.</li> <li>• Microbial ecology. Kinetics of microbial growth in culture batch systems. Principles of continuous systems.</li> <li>• Microbial taxonomy: nomenclature, classification and identification.</li> </ul>

	<ul style="list-style-type: none"> <li>• Sterilization and other antimicrobial techniques.</li> </ul>
<b>Books and bibliography</b>	<ul style="list-style-type: none"> <li>• Lectures notes</li> <li>• Madigan, Bender, Buckley, Sattley, Stahl. Brock – Biology of Microorganisms. 15th ed. London: Pearson, 2018.</li> <li>• Cappuccino, J.G., Sherman, N. Microbiology – A laboratory manual. Ninth edition. Benjamin Cummings, an imprint of Pearson, 2011.</li> </ul>
<b>Additional materials</b>	

<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>			
75	16	14	45
<b>ECTS</b>			
3	2	1	
<b>Teaching strategy</b>			
Topics will be discussed through: <ul style="list-style-type: none"> <li>○ lessons that discuss the teaching material and data presented with the help of PowerPoint.</li> <li>○ Practical lessons</li> </ul> Guided tours at agri-food companies			
<b>Expected learning outcomes</b>			
<b>Knowledge and understanding on:</b>	Knowledge about main structures and functions of microbial cells, microbial growth and taxonomy, microbial ecology and control of agriculture- and food-related microorganisms		
<b>Applying knowledge and understanding on:</b>	<ul style="list-style-type: none"> <li>○ To know the potential of microorganisms in relation to their role in agriculture and food fields</li> </ul>		
<b>Soft skills</b>	<ul style="list-style-type: none"> <li>○ <i>Making informed judgments and choices</i> <ul style="list-style-type: none"> <li>○ To acquire information needed for evaluating the potential role of microorganisms in agriculture and food</li> </ul> </li> <li>○ <i>Communicating knowledge and understanding</i> <ul style="list-style-type: none"> <li>○ Ability to describe the main structures of microbial cells and catabolic pathways, microbial growth, classification, nomenclature and identification of microorganisms, microbial ecology and methods for controlling over undesired microorganisms</li> </ul> </li> <li>○ <i>Capacities to continue learning</i></li> <li>○ Ability to increase knowledge for evaluating the potential role of microorganisms in agriculture and food</li> </ul>		

<b>Assessment and feedback</b>	
<b>Methods of assessment</b>	The final exam, unique, total, and collegial, for the Biology of microorganisms (I. C. Agricultural biochemistry and biology of microorganisms), consists of an oral test on the topics of both modules. Marks are out of 30, as defined in the Didactic regulations of the bachelor in Agricultural Science and Technology (article 9) and in the syllabus (Annex A). The evaluation of the student's preparation is based on established criteria, as detailed in Annex A of the Didactic regulations of the bachelor program.

	<p>For the final exam, the oral test aims at evaluating the knowledge and skills obtained on the course of both modules. The positive outcome of the oral test will result in the final evaluation of the examination, which will be expressed as the weighted average of the oral tests of the two modules.</p> <p>For students enrolled in the academic year of the course, there is an written exemption test related to the topics of lessons and exercises conducted in the period preceding the test (about half the program). Examination for Biology of Microorganisms module is overcome if the student shows at least sufficient preparation, a level of knowledge appropriate to the minimum level of requirements, sufficient mastery of acceptable subject matter and language, and ability to analyse problems and structure of the arguments. The positive outcomes of the exemption tests of both modules contribute to the evaluation of Technologies of Agri-food Manufacturing I.C. and have the validity of an academic year.</p> <p>For students eligible for exoneration, the final oral exam will only cover the topics of lessons and exercises carried out during the period following the exemption test. In this case, the assessment of the final exam is expressed as the mean between the mark of the exemption and the final tests.</p> <p>For foreign students the exam can be done in English.</p>
<p>Evaluation criteria</p>	<ul style="list-style-type: none"> <li>• <b>Knowledge and understanding</b> <ul style="list-style-type: none"> <li>○ To describe the main structures and functions of microbial cells, microbial growth and taxonomy, basic techniques in microbiology, principles of microbial ecology, and the main methods for controlling over agriculture- and food-related microorganisms</li> </ul> </li> <li>• <b>Applying knowledge and understanding</b> <ul style="list-style-type: none"> <li>○ To describe the potential roles of microorganisms in agriculture and food fields</li> </ul> </li> <li>• <b>Autonomy of judgment</b> <ul style="list-style-type: none"> <li>○ To describe the main roles of microorganisms in agriculture and food</li> </ul> </li> <li>• <b>Communicating knowledge and understanding</b> <ul style="list-style-type: none"> <li>○ To describe the main structures of microbial cells and catabolic pathways, microbial growth, classification, nomenclature and identification of microorganisms, basic techniques in microbiology, principles and application of microbial ecology, methods for controlling over undesired microorganisms</li> </ul> </li> <li>• <b>Communication skills</b> <ul style="list-style-type: none"> <li>○ The student will be evaluated in terms of use of appropriate technical language.</li> </ul> </li> <li>• <b>Capacities to continue learning</b> <ul style="list-style-type: none"> <li>○ To describe how to increase knowledge for evaluating the potential role of microorganisms in agriculture and food. Ability to update and deepen self-knowledge of food biotechnological processes through the study of scientific publications in the microbiological field, with particular focus to applications in oenology, dairy and leavened baked goods.</li> </ul> </li> </ul>
<p>Criteria for assessment and attribution of the final mark</p>	<p>Marks are out of 30, as defined in the Didactic regulations of the bachelor in Agricultural Science and Technology (article 9) and in the syllabus (Annex A). The evaluation of the student's preparation is based on established criteria, as detailed in Annex A of the Didactic regulations of the bachelor program.</p>
<p><b>Additional information</b></p>	
	<p>Office hours: Monday - Friday, after appointment, at the Department of Soil, Plant and Food Sciences, to be agreed by e-mail.</p>



UNIVERSITÀ  
DEGLI STUDI DI BARI  
ALDO MORO

DISSPA – DIPARTIMENTO DI  
SCIENZE DEL SUOLO, DELLA  
PIANTA E DEGLI ALIMENTI

