

**COURSE OF STUDY** *Food Science and Technology (L26)*
**ACADEMIC YEAR** 2023-2024

**ACADEMIC SUBJECT** *Biology of microorganisms (I.C. Biology and Ecophysiology of Food-related microorganisms)*

General information	
Year of the course	<i>Second</i>
Academic calendar (starting and ending date)	<i>Second semester (February 26<sup>th</sup> – June 21<sup>st</sup>, 2024)</i>
Credits (CFU/ETCS):	3
SSD	<i>Agricultural microbiology (AGR/16)</i>
Language	<i>Italian</i>
Mode of attendance	<i>No Compulsory</i>

Professor/ Lecturer	
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Department and address	<i>DIP. DISSPA – Università degli Studi di Bari</i>
Virtual room	<i>Microsoft Teams: code bk9dxd</i>
Office Hours (and modalities: e.g., by appointment, on line, etc.)	<i>Monday-Friday 8.00-18.00, only by appointment</i>

Work schedule			
Hours			
Total	Lectures	Hands-on (laboratory, workshops, working groups, seminars, field trips)	Out-of-class study hours/ Self-study hours
75	16	14	45
CFU/ETCS			
3	2	1	

<b>Learning Objectives</b>	The student will acquire knowledge about microbial biology, cytology, and biochemistry, as well as about the most technical aspects of cultivation, growth, isolation, and taxonomic allotment, in order to control over the potentialities of food-related microorganisms and their pro-technological, spoiling, and pathogenic role.
<b>Course prerequisites</b>	Prerequisites: basic knowledge in biochemistry and maths

<b>Teaching strategie</b>	Lectures will be presented through PC assisted tools (Powerpoint) and slide projector. Projection of educational videos is also included as supplementary teaching method. Powerpoint presentations, in pdf format, will be shared with students through the Microsoft TEAMS platform.
<b>Expected learning outcomes in terms of</b>	
<b>Knowledge and understanding on:</b>	<ul style="list-style-type: none"> <li>Knowledge about main structures and functions of microbial cells, microbial growth and taxonomy, as well as about basic techniques in microbiology</li> </ul>
<b>Applying knowledge and</b>	<ul style="list-style-type: none"> <li>To know the potential of microorganisms in relation to pro-technological,</li> </ul>

<b>understanding on:</b>	spoilage or pathogenic role
<b>Soft skills</b>	<ul style="list-style-type: none"> <li>• Making informed judgments and choices: <ul style="list-style-type: none"> <li>○ To acquire information needed for evaluating the potential role of microorganisms in food</li> </ul> </li> <li>• Communicating knowledge and understanding: <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, as well as basic techniques in microbiology</li> </ul> </li> <li>• Capacities to continue learning: <ul style="list-style-type: none"> <li>○ Ability to increase knowledge for evaluating the potential role of microorganisms in food</li> </ul> </li> </ul>
<b>Syllabus</b>	
<b>Content knowledge</b>	<ul style="list-style-type: none"> <li>• Principles of prokaryotic cell biology: morphology, cytology, genomics, chemotaxis.</li> <li>• Virus. Phages.</li> <li>• Microbial catabolic reactions: fermentations, anaerobic and aerobic respiration.</li> <li>• Basic techniques in microbiology: culture media; isolation of microorganisms from food items, including examination of morphological, physiological and cultivation traits.</li> <li>• Kinetics of microbial growth in batch culture systems and notions about continuous culture systems.</li> <li>• Microbial taxonomy: nomenclature, classification and identification.</li> </ul>
<b>Texts and readings</b>	<ul style="list-style-type: none"> <li>• Notes from lectures and laboratory classes. Presentations (in pdf) provided by the lecturer.</li> <li>• Madigan, Bender, Buckley, Sattley, Stahl. Brock – Biology of Microorganisms. 15th ed. London: Pearson, 2018.</li> <li>• Jay, J.M., M.J. Loessner, D.A. Golden. Modern Food Microbiology. 7th ed. Springer Verlag, 2006.</li> <li>• Cappuccino, J.G., Sherman, N. Microbiology – A laboratory manual. Ninth edition. Benjamin Cummings, an imprint of Pearson, 2011.</li> </ul>
<b>Notes, additional materials</b>	
<b>Repository</b>	All teaching material will be available to students on web platforms (class Teams code 23x1id5).

<b>Assessment</b>	
<b>Assessment methods</b>	<p>The exam consists of an oral dissertation on the topics developed during the theoretical and theoretical-practical lectures in the classroom and in the laboratory/production plants, as reported in the Academic Regulations for the Bachelor Degree in Food Science and Technology (article 9) and in the study plan (Annex A).</p> <p>Students attending at the lectures may have a middle-term preliminary exam, consisting of a written test, relative to the first part of the program, which will concur to the final evaluation and will be considered valid for a year.</p> <p>The evaluation of the preparation of the student occurs on the basis of established criteria, as detailed in Annex B of the Academic Regulations for the Bachelor Degree in Food Science and Technology.</p> <p>Non-Italian students may be examined in English language, according to the aforesaid procedures.</p>
<b>Assessment criteria</b>	<ul style="list-style-type: none"> <li>• Knowledge and understanding: <ul style="list-style-type: none"> <li>○ To describe the main structures and functions of microbial cells,</li> </ul> </li> </ul>

	<p>microbial growth and taxonomy, as well as about basic techniques in microbiology</p> <ul style="list-style-type: none"> <li>• Applying knowledge and understanding: <ul style="list-style-type: none"> <li>○ To describe the potential of microorganisms in relation to pro-technological, spoiling or pathogenic role Applying mathematical modelling aimed to describe microbial evolution in food products, depending on known and measurable environmental conditions.</li> </ul> </li> <li>• Autonomy of judgment: <ul style="list-style-type: none"> <li>○ To describe how to evaluate the potential role of microorganisms in food</li> </ul> </li> <li>• Communicating knowledge and understanding: <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, as well as basic techniques in microbiology</li> </ul> </li> <li>• Communication skills: <ul style="list-style-type: none"> <li>○ The student will be evaluated in terms of use of appropriate technical language.</li> </ul> </li> <li>• Capacities to continue learning: <ul style="list-style-type: none"> <li>○ To describe how to increase knowledge for evaluating the potential role of microorganisms in food</li> </ul> </li> </ul>
Final exam and grading criteria	The evaluation criteria that contribute to the attribution of the final mark will be: knowledge and understanding, the ability to apply knowledge, autonomy of judgment, i.e. the ability to criticize and formulate judgments, communication skills
<b>Further information</b>	