

General information	
Academic subject	<b><i>Biotechnologies for valorization of wastes and by-products for food use</i></b>
Degree course	<i>Master degree: Food Science and Technology (LM70)</i>
Academic Year	<i>Third</i>
European Credit Transfer and Accumulation System (ECTS)	3 ECTS
Language	<i>Italian</i>
Academic calendar (starting and ending date)	<i>First semester (September 26<sup>th</sup>, 2022 – January 20<sup>th</sup>, 2023)</i>
Attendance	<i>No Compulsory</i>

Professor/ Lecturer	
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Virtual headquarters	<i>Microsoft teams</i>
Tutoring (time and day)	<i>Monday to Friday 9.00 a.m. – 17.30 p.m. by appointment only.</i>

Syllabus	
<b>Learning Objectives</b>	<i>The student will acquire knowledge and skills on microbiology applied to food waste valorization strategies and bio-processes for food waste/by-products reduction.</i>
<b>Course prerequisites</b>	<i>Knowledge of Biochemistry, Enzymology, Biology, General Microbiology, Food Technology, Food Chemistry. Knowledge of the main food technologies and food supply chains.</i>
<b>Contents</b>	<ul style="list-style-type: none"> <li>• <i>Microbial biotechnologies for the extraction or transformation of molecules and compounds of technological and / or functional interest from food wastes and by-products;</i></li> <li>• <i>Microbial biotechnologies for the reuse of food wastes and by-products in food formulations;</i></li> <li>• <i>Bioprocesses for the reduction of wastes in the food supply chains.</i></li> </ul>
<b>Books and bibliography</b>	<ul style="list-style-type: none"> <li>• <i>Food Waste to Valuable Resources: Applications and Management. Rajesh Banu, Gopalakrishnan Kumar, Gunasekaran M., Kavitha S. 2020</i></li> <li>• <i>Food Industry Wastes: Assessment and Recuperation of Commodities. Maria R. Kosseva, Colin Webb. 2013.</i></li> </ul>
<b>Additional materials</b>	<i>The recommended books are intended to supplement the lecture notes and lecture materials provided during the course.</i>

Work schedule			
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>	<i>Lectures will be presented through digital tools (PowerPoint presentation, video). Laboratory classes will be performed. Lecture notes and educational supplies will</i>		

	<i>be provided by means of online platforms Lecture notes and educational supplies will be provided by means of online platforms</i>
<b>Expected learning outcomes</b>	The expected learning outcomes, in terms of both knowledge and skills, are provided in Annex A of the Academic Regulations of the Degree in Food Science and Technology (expressed through the European Descriptors of the qualification)
<b>Knowledge and understanding on:</b>	<ul style="list-style-type: none"> <li>• Knowledge of the main advanced microbiological methods for selection and use of microbial starter;</li> <li>• Knowledge of the main biotechnological strategies to valorise food wastes and by-products.</li> </ul>
<b>Applying knowledge and understanding on:</b>	<ul style="list-style-type: none"> <li>• Mastership of advanced microbiological techniques to valorise food wastes and by-products;</li> <li>• Mastership of biotechnologies applied to the valorisation of food wastes and by-products.</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>○ Ability to manage the selection process of microbial starter to valorise wastes and by-products through the application of biotechnologies;</li> <li>○ Acquisition of considerable autonomy of judgment in the context of the specific themes of biotechnologies applied to the wastes and by-products valorisation, and to the sustainability of food processes;</li> <li>○ Ability to provide a critical interpretation of the results of biotechnological processes.</li> </ul> </li> <li>• <i>Communicating knowledge and understanding</i> <ul style="list-style-type: none"> <li>○ Ability to communicate the acquired theoretical concepts in oral and written form, using appropriately the scientific language and the specific lexicon of predictive microbiology applied to biotechnologies;</li> <li>○ Ability to describe, also through applicative cases, the practical aspects and potential effects of this discipline on the research and development activities in food industry and food industry.</li> </ul> </li> <li>• <i>Capacities to continue learning</i> <ul style="list-style-type: none"> <li>○ Ability to deepen and update knowledge regarding the application of biotechnologies for the valorisation of wastes and by-products in food industries;</li> <li>○ Ability to deepen and update knowledge concerning the application of biotechnologies to innovative raw materials for the production of novel foods and food supplements.</li> </ul> </li> </ul>
The expected learning outcomes, in terms of both knowledge and skills, are provided in Annex A of the Academic Regulations of the Degree in Food Science and Technology (expressed through the European Descriptors of the qualification).	

<b>Assessment and feedback</b>	
Methods of assessment	<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's degree in food science and Technology.</p>

	The foreign student's profit test can be done in English in the way described above.
Evaluation criteria	<ul style="list-style-type: none"> <li>• <i>Knowledge and understanding</i> <ul style="list-style-type: none"> <li>○ Describing the main advanced microbiological methods for selection and use of microbial starter;</li> <li>○ Describing the main biotechnological strategies to valorise food wastes and by-products.</li> </ul> </li> <li>• <i>Applying knowledge and understanding</i> <ul style="list-style-type: none"> <li>○ Applying advanced microbiological techniques to valorise food wastes and by-products;</li> <li>○ Applying microbial biotechnologies to the valorisation of food wastes and by-products.</li> </ul> </li> <li>• <i>Autonomy of judgment</i> <ul style="list-style-type: none"> <li>○ Managing the selection process of microbial starter to valorise wastes and by-products through the application of biotechnologies;</li> <li>○ Autonomy of judgment in the context of the specific themes of biotechnologies applied to the wastes and by-products valorisation, and to the sustainability of food processes;</li> <li>○ Providing a critical interpretation of the results of biotechnological processes.</li> </ul> </li> <li>• <i>Communicating knowledge and understanding</i> <ul style="list-style-type: none"> <li>○ Describing, also through applicative cases, the practical aspects and potential effects of this discipline on the research and development activities in food industry and food industry.</li> </ul> </li> <li>• <i>Communication skills</i> <ul style="list-style-type: none"> <li>○ Communicating the acquired theoretical concepts in oral and written form, using appropriately the scientific language and the specific lexicon of microbiology applied to biotechnologies;</li> </ul> </li> <li>• <i>Capacities to continue learning</i> <ul style="list-style-type: none"> <li>○ Deepening and updating knowledge regarding the application of microbial biotechnologies for the valorisation of wastes and by-products in food industries.</li> <li>○ Deepening and updating knowledge concerning the application of microbial biotechnologies to innovative raw materials for the production of novel foods and food supplements.</li> </ul> </li> </ul>
Criteria for assessment and attribution of the final mark	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>Additional information</b>	