

General information		
Academic subject	<i>Upcycling of waste and by-products for use in foods (I.C. Sustainability of supply chains)</i>	
Degree course	<i>Food Science and Technology (LM70)</i>	
Academic Year	<i>Second</i>	
European Credit Transfer and Accumulation System (ECTS)	3 ECTS	
Language	<i>Italian</i>	
Academic calendar (starting and ending date)	<i>September 26th, 2022 – January 20th, 2023</i>	
Attendance	<i>No Compulsory</i>	

Professor/ Lecturer	
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Department and address	DiSSPA
Virtual headquarters	Microsoft Teams
Tutoring (time and day)	Tuesday-Friday 9.00-16.00

Syllabus	
Learning Objectives	<i>Knowledge about the techniques of extraction of functional molecules and bioactive compounds from waste and by-products of the food industry and the possibility of use in food also with a view to improving nutritional properties and shelf-life.</i>
Course prerequisites	<i>Knowledge of chemistry, biochemistry and plant production. Knowledge of the main constituents of food.</i>
Contents	<i>Environmental impact of food production and basic principles of the circular economy: main strategies to manage and exploit plant waste and by-products. Technological processes for the management of waste and by-products from different agro-food chains: pre-treatment of waste and vegetable by-products; extraction of functional and bioactive molecules. Applications in the food sector: use of waste and by-products and/or extracted molecules as functional ingredients for the production of high added value foods and for the formulation of innovative packaging.</i>
Books and bibliography	<p><i>Notes from lectures and laboratory classes. Presentations (in pdf) provided by the teacher.</i></p> <ul style="list-style-type: none"> • <i>“Food Waste Recovery. Processing Technologies and Industrial Techniques”. Ed. Charis M. Galanakis, Academic press Elsevier, (2015)</i> • <i>Reviews scientifiche da letteratura di settore Per approfondimenti:</i> • <i>Belitz, H.-D., Grosch, W., & Schieberle, P. (2009). Food chemistry. Springer.</i> • <i>Wong D. W. S., Mechanism and Theory in Food Chemistry. Springer, 1989.</i>
Additional materials	<i>Notes, slides and other bibliographic materials will be furnished during the course</i>

Work schedule			
Total	Lectures	Hands on (Laboratory, working groups, seminars, field trips)	Out-of-class study hours/Self-study hours

Hours			
75	16	14	45
ECTS			
3	2	1	
Teaching strategy	<p><i>Lectures will be presented through PC assisted tools (PowerPoint, video). Field and laboratory classes, reading of regulations will be experienced.</i></p> <p><i>Lecture notes and educational supplies will be provided by means of online platforms</i></p>		
Expected learning outcomes	<p>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)</p>		
Knowledge and understanding on:	<ul style="list-style-type: none"> ○ knowledge about the techniques of extraction of functional molecules and bioactive compounds from waste and by-products of the food industry and the possibility of use in food also with a view to improving nutritional properties and shelf-life. 		
Applying knowledge and understanding on:	<ul style="list-style-type: none"> ○ knowledge of the qualitative characteristics of the by-products deriving from the productive processes object of the teaching ○ <i>Ability to describe the methods used to exploit waste/by-product</i> ○ <i>Knowledge the functional and extractable molecules from waste/by-product</i> ○ <i>Knowledge of the functional molecules applications in food</i> ○ 		
Soft skills	<p><i>Making informed judgements and choices</i></p> <ul style="list-style-type: none"> ○ Ability to critically analyze methodologies and processes developed to solve practical problems related to the exploitation of by-products ○ Ability to correctly orient the search for suitable means to treat waste and by-products in order to obtain functional molecules to be used in food sector <p><i>Communicating knowledge and understanding</i></p> <ul style="list-style-type: none"> ○ Ability to describe possible technologies to exploit waste and by-products <p><i>Capacities to continue learning</i></p> <ul style="list-style-type: none"> ○ Ability to deepen and update the knowledge on the reuse of waste and by-products and its use for formulating high added value food ○ 		
<p>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).</p>			

Assessment and feedback	
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 Master'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	<p><i>Knowledge and understanding</i></p> <ul style="list-style-type: none">○ <i>Describe the main methods of treatment and/or extraction of functional molecules from waste and by-products of the agro-food supply chains</i> <p><i>Applying knowledge and understanding</i></p> <ul style="list-style-type: none">○ <i>Describe how functional molecules from food waste and by-products are recovered and applied</i> <p><i>Making informed judgements and choices</i></p> <ul style="list-style-type: none">○ <i>Express reasonable assumptions to improve the characteristics of food with added ingredients from waste and by-products presented as case studies</i> <p><i>Communicating knowledge and understanding</i></p> <ul style="list-style-type: none">○ <i>Describe methods of recovery of functional molecules of waste and by-products and phenomena affecting foods presented as case studies</i> <p><i>Capacities to continue learning</i></p> <ul style="list-style-type: none">○ <i>Envisaging a possible approach for the exploitation of a waste/by-product</i>
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
Additional information	