

General information	
Academic subject	Oenology and Oenological Chemistry (I.C. Oenological Technology and Packaging)
Degree course	<i>Food Science and Technology (L26)</i>
Academic Year	<i>Third</i>
European Credit Transfer and Accumulation System (ECTS)	6 ECTS
Language	<i>Italian</i>
Academic calendar (starting and ending date)	<i>First semester (September 26th, 2022 – January 20th, 2023)</i>
Attendance	<i>No Compulsory</i>

Professor/ Lecturer	
Name and Surname	Giuseppe Gambacorta
E-mail	giuseppe.gambacorta@uniba.it
Telephone	0805442942
Department and address	DISSPA
Virtual headquarters	Microsoft Teams
Tutoring (time and day)	Monday-Friday 9.00-16.00

Syllabus	
Learning Objectives	<i>The course aims to provide knowledge of the components of grapes and their evolution during vinification and ageing of wine, traditional and innovative vinification technologies, wine stabilisation and ageing treatments, the main wine diseases and their prevention and treatment and the main chemical-physical and sensory analyses of wine in order to acquire skills useful to independently manage vinifications according to the raw material and to control the quality of the final product.</i>
Course prerequisites	<i>Prerequisites: Chemistry; Unit operations of food technology</i>
Contents	<p>The raw material <i>Grape composition: distribution of the various classes of substances in the different parts of the berry. Sugars: types, origin, evolution. Organic acids: types, origin, evolution. Salts: salt balances, precipitation. Phenolic compounds: types and classes of substances (phenolic acids and derivatives, flavonoids, anthocyanins, tannins), properties, evolution during vinification and ageing. Organoleptic effects of phenolic compounds. Aromatic substances: classes and types of aromatic substances, origin and evolution of aromas. Correction of musts.</i></p> <p>Winemaking aids <i>Endogenous and exogenous enzymes, role, use in oenology. Role and use of sulphur dioxide in oenology. Alcoholic fermentation, yeast requirements, by-products of yeast fermentation, production of higher alcohols, maloalcoholic fermentation. Lactic bacteria: malolactic fermentation, effects on biological stability and organoleptic characteristics.</i></p> <p>Vinifications <i>Red vinification: managing maceration using technological variables. White vinification: pre-fermentation treatments, hyperoxygenation, vinification by reduction, must clarification techniques, fermentation management. Rosé vinification. Vinification with carbonic maceration. Grape drying techniques and production of “passito” wines.</i></p> <p>Stabilisation and ageing <i>Tartaric and protein stabilisation of wines. Oenological adjuvants and their use. Fining and ageing of wines.</i></p>

	<p>Wine defects <i>Wine defects and alterations, strategies for prevention and treatment.</i></p> <p>Special wines <i>Production of classic method (Champenoise) and autoclave (Charmat) sparkling wines. Marsala, Port, Jerez, and Madeira wines.</i></p> <p>Practical lessons <i>Guided instruction visits to a winery. In-depth chemical-physical and sensory analysis of wines. Analysis of case studies.</i></p>
Books and bibliography	<p><i>Ribéreau-Gayon P., Dubourdieu D., Donèche B., Lonvaud, A. (2018). Trattato di Enologia – Microbiologia del vino e Vinificazioni. Vol. 1. Quarta Edizione, Edagricole, Milano.</i></p> <p><i>Ribéreau-Gayon P., Glorie Y., Maujean A., Dubourdieu D. (2017). Trattato di Enologia – Chimica del vino - Stabilizzazioni e trattamenti. Vol. 2. Quarta Edizione, Edagricole, Milano.</i></p> <p><i>Romano P., Ciani M., Cocolin L. Microbiologia della vite e del vino. CEA – Casa Editrice Ambrosiana, Rozzano, (MI).</i></p> <p><i>Lanati D. (2007). De Vino “Lezioni di enotecnologia”. Edizioni AEB, Brescia.</i></p> <p><i>De Rosa T. (1987). Tecnologia dei vini liquorosi e da dessert. Edizioni AEB, Brescia.</i></p>
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			
150	32	28	96
ECTS			
6	4	2	
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 and understanding of biochemical phenomena occurring during ripening of grapes and during winemaking, and ripening, stabilization, and preservation of wines. 		
Applying knowledge and understanding on:	<ul style="list-style-type: none"> ○ Ability to identify and apply with autonomy the appropriate winemaking technologies depending on the compositional characteristics of the grape. ○ Ability to identify and carry out technological interventions during the wine aging process in order to obtain a healthy and stable product over time. 		
Soft skills	<ul style="list-style-type: none"> ● <i>Making informed judgments and choices</i> ○ Ability to interpret the results of analytical controls of wines and to establish the most appropriate technological interventions for qualitative improvement. ● <i>Communicating knowledge and understanding</i> 		

	<ul style="list-style-type: none"> ○ Ability to communicate the importance of raw material quality and of the rational application of winemaking technologies in order to obtain product of quality. ○ Ability to describe the impact of technological variables on the quality characteristics of wines, even to an inexpert public. ● <i>Capacities to continue learning</i> <ul style="list-style-type: none"> ○ Ability to update and deepen the knowledge of winemaking techniques through the study of scientific publications in the field of oenological sector.
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Assessment and feedback	
Methods of assessment	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). 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. 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. The foreign student's profit test can be done in English in the way described above.
Evaluation criteria	<ul style="list-style-type: none"> ● <i>Knowledge and understanding</i> <ul style="list-style-type: none"> ○ Describe the components of grape and their evolution during ripening on the vine and during vinification. ● <i>Applying knowledge and understanding</i> <ul style="list-style-type: none"> ○ Ability to identify and apply with autonomy the appropriate winemaking technologies depending on the compositional characteristics of the grape. ○ Ability to identify and carry out technological interventions during the wine aging process in order to obtain a healthy and stable product over time. ● <i>Autonomy of judgment</i> <ul style="list-style-type: none"> ○ Ability to interpret the results of analytical controls of wines and to establish the most appropriate technological interventions for qualitative improvement. ● <i>Communicating knowledge and understanding</i> <ul style="list-style-type: none"> ○ Ability to communicate the importance of raw material quality and of the rational application of winemaking technologies in order to obtain product of quality. ○ Ability to describe the impact of technological variables on the quality characteristics of wines, even to an inexpert public. ● <i>Communication skills</i> <ul style="list-style-type: none"> ○ The student will be evaluated considering the use of appropriate technical language. ● <i>Capacities to continue learning</i> <ul style="list-style-type: none"> ○ The Ability to update and deepen the knowledge of winemaking techniques through the study of scientific publications in the field of oenological sector.
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	