

General Information	
Academic subject	Enology and Enological Chemistry (I.C. Enology and Packaging)
Degree course	Food Science and Technology
ECTS credits	6 CFU (5 ECTS of Lectures + 1 ECTS of laboratory or guided visits to wineries)
Compulsory attendance	No
Teaching language	Italian

Subject teacher	Name Surname	Mail address	SSD
	<b>Giuseppe Gambacorta</b>	<a href="mailto:giuseppe.gambacorta@uniba.it">giuseppe.gambacorta@uniba.it</a>	AGR/15

ECTS credits details	
Basic teaching activities	5 ECTS Lectures   1 ECTS Laboratory or field classes

Class schedule	
Period	I Semester
Course year	Third
Type of class	Lecture- workshops

Time management	
Hours	150
In-class study hours	54
Out-of-class study hours	96

Academic calendar	
Class begins	September 27 <sup>th</sup> , 2021
Class ends	January 21 <sup>th</sup> , 2022

Syllabus	
Prerequisites/requirements	Prerequisites: "Chemistry" and "Unit operations of food technology" Requirements: knowledge of general, inorganic and organic chemistry; knowledge of the activity and needs of microorganisms; knowledge of the main unit operations of food technology.
Expected learning outcomes	<p><i>Knowledge and understanding</i></p> <ul style="list-style-type: none"> <li>○ Knowledge and understanding of biochemical phenomena occurring during ripening of grapes and during winemaking, and ripening, stabilization and preservation of wines.</li> </ul> <p><i>Applying knowledge and understanding</i></p> <ul style="list-style-type: none"> <li>○ Ability to identify and apply with autonomy the appropriate winemaking technologies depending on the compositional characteristics of the grape.</li> <li>○ Ability to identify and carry out technological interventions during the wine aging process in order to obtain a healthy and stable product over time.</li> </ul> <p><i>Making informed judgements and choices</i></p> <ul style="list-style-type: none"> <li>○ Ability to interpret the results of analytical controls of wines and to establish the most appropriate technological interventions for qualitative improvement.</li> </ul> <p><i>Communicating knowledge and understanding</i></p> <ul style="list-style-type: none"> <li>○ Ability to communicate the importance of raw material quality and of the rational application of winemaking technologies in order to obtain product of quality.</li> <li>○ Ability to describe the impact of technological variables on the quality characteristics of wines, even to an inexpert public.</li> </ul> <p><i>Capacities to continue learning</i></p>

	<ul style="list-style-type: none"> <li>○ Ability to update and deepen the knowledge of winemaking techniques through the study of scientific publications in the field of enological sector.</li> </ul>
Contents	<ul style="list-style-type: none"> <li>• Grape composition: distribution of the various classes of substances in the various parts of the grape.</li> <li>• Sugars: types, origin, and evolution.</li> <li>• Organic acids: types, origin, and evolution.</li> <li>• Salts: saline equilibrium, precipitations.</li> <li>• Phenolic compounds: types and classes of substances (phenolic acids and derivatives, flavonoids, anthocyanins, tannins), properties, and evolution during winemaking and ageing. Organoleptic effects of phenolic compounds.</li> <li>• Aromatic substances: classes and types of aromatic substances, origin and aroma evolution.</li> <li>• Correction of musts.</li> <li>• Endogenous and exogenous enzymes, role, use in enology.</li> <li>• The role and use of sulfur dioxide in enology.</li> <li>• Alcoholic fermentation, yeast needs to grow, secondary products of yeasts fermentation, production of higher alcohols, malo-alcoholic fermentation.</li> <li>• Lactic bacteria: malo-lactic fermentation, effects on the biological stability and on organoleptic characteristics.</li> <li>• Red winemaking: maceration management using technological variables.</li> <li>• White winemaking: pre-fermentative treatments, iperoxidation, reductive winemaking, musts clarification techniques, fermentation management.</li> <li>• Rosé winemaking.</li> <li>• Carbonic maceration.</li> <li>• Grape drying techniques and straw wine production.</li> <li>• Tartaric and proteic wines stabilization.</li> <li>• Enological additives use.</li> <li>• Fining and ageing of wines.</li> <li>• Wine defects, strategies for prevention and care.</li> <li>• Sparkling winemaking (Champenoise and Charmat methods).</li> <li>• Fortified wines: Marsala, Porto, Jerez.</li> <li>• Didactic tour in vinery.</li> <li>• Chemical, physical analysis of wines.</li> <li>• Cases study.</li> </ul>
Course program	
Reference books	<ul style="list-style-type: none"> <li>• Note of the lecture distributed during the course.</li> <li>• Teaching material available and downloaded from social e-learning platform Edmodo during the course.</li> <li>• Ribéreau-Gayon P., Dubourdieu D., Donèche B., Lonvaud, A. (2006). The Microbiology of Wine and Vinifications. <i>Handbook of Enology</i>. In: <i>Handbook of enology</i>. Vol. 1. 2<sup>nd</sup> edn. John Wiley &amp; Sons, Chichester, England.</li> <li>• Ribéreau-Gayon P., Dubourdieu D., Donèche B., Lonvaud, A. (2006). The Chemistry of Wine - Stabilization and Treatments. <i>Handbook of Enology</i>. In: <i>Handbook of enology</i>. Vol. 2. 2<sup>nd</sup> edn. John Wiley &amp; Sons, Chichester, England.</li> <li>• Lanati D. (2007). De Vino "Lezioni di enotecnologia". Edizioni AEB.</li> <li>• De Rosa T. (1987). Tecnologia dei vini liquorosi e da dessert, Edizione AEB, Brescia.M. Marconi, D. Fajner, G. Benevelli, G. Vicoli – Dentro al gusto: arte, scienza e piacere nella degustazione. Edagricole, Bologna, 2007.</li> </ul>

Notes	
Teaching methods	<p>The course topics will be treated with the help of Power Point presentations, case studies discussion, exercises in the classroom and laboratory, educational visits to sensory and instrumental analysis laboratories.</p> <p>Lecture notes and educational supplies will be provided by means of a mailing list or online platforms (i.e.: Edmodo, Google Drive...)</p>
Evaluation methods	<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>
Evaluation criteria	<p><i>Knowledge and understanding</i></p> <ul style="list-style-type: none"> <li>○ Describe the components of grape and their evolution during ripening on the vine and during vinification.</li> </ul> <p><i>Applying knowledge and understanding</i></p> <ul style="list-style-type: none"> <li>○ Describe the wine production processes according to the raw material and product required by the consumer.</li> <li>○ Describe the impact of technological variables and stabilisation treatments on the quality and health characteristics of wines.</li> </ul> <p><i>Making informed judgements and choices</i></p> <ul style="list-style-type: none"> <li>○ Interpret the results of wine analysis and propose technological solutions for quality improvement.</li> </ul> <p><i>Communicating knowledge and understanding</i></p> <ul style="list-style-type: none"> <li>○ Illustrate the layout of the wine production process by reporting any critical points and quality control strategies.</li> <li>○ Illustrate hypothetical winemaking technologies according to the compositional characteristics of the raw material.</li> </ul> <p><i>Capacities to continue learning</i></p> <ul style="list-style-type: none"> <li>○ Ability to deepen and update independently the oenological knowledge acquired.</li> </ul>
Receiving times	Tuesday-Friday by previous agreement