Oenology I (Chemistry and Microbiology of Wine)

Prof. Mario Gabrielli

***Text under revision. Not yet approved by academic staff.***

COURSE AIMS AND INTENDED LEARNING OUTCOMES

Course aims

The aim of the course is to provide students with useful skills for understanding the composition of must and wine, the microorganisms of oenological interest and those causing defects to the finished product, and the biochemical actions involved in the transformation of grapes into wine.

Intended learning outcomes

At the end of the course, students will be able to know and define the compositional elements of must and wine, namely: sugars, organic acids, nitrogen compounds, mineral compounds, phenolic and aromatic matrix. They will know their relevance in all the transformation stages of grapes into wine (mashing, alcoholic and malo-lactic fermentation, and ageing), being able to identify the phenomena underlying each of them. Students will be able to define technical-economic assessments on the most efficient and sustainable wine choices. Students will be able to solve practical problems inherent in the oenological practices of acidification, deacidification and enrichment.

***COURSE CONTENT***

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|  | ECTS |
| Chemical composition of must and wine |  |
| Grape components and their distribution in the grape. Indices of technological and phenolic maturity. Components of must and wine: sugars, organic acids, mineral compounds, nitrogen compounds, phenolic compounds comprising the varietal aroma, fermentation and post-fermentation. | 1.25 |
| Chemical properties of phenolic compounds, oxidation, polymerisation and co-pigmentation reactions and their influence on the colour of wine | 0.75 |
| Colloidal phenomena in wine: natural wine macromolecules and their interaction, flocculation mechanisms, protective colloids. | 0.50 |
| Outline of wine-making regulations concerning oenological products | 0.25 |
| Microbiology of must and wine |  |
| Yeasts of oenological interest and selected yeasts.  Selection of customised starter strains. Chemistry of alcoholic fermentation. | 1.00 |
| Selected lactic bacteria. Chemistry of malolactic fermentation.  Biochemistry of biogenic amine production. | 0.75 |
| Microorganisms that cause wine defects, the appearance of defects and their identification. | 0.50 |
| Tutorials |  |
| Calculations and balances in operations for correcting musts and wines.  The application of basic methods to microbiological analyses of oenological interest. | 1.00 |

READING LIST

P. Ribéreau-Gayon, D. Dubourdieu, B. Donèche, A. Lonvaud, *Trattato di Enologia I and II,* Edagricole, Bologna 2007.

TEACHING METHOD

* Frontal and dialogue-based theoretical lectures, where the key concepts of the composition of grapes, musts and wines and the relative phenomena of oenological transformation will be presented with a number of application examples.
* Frontal tutorials aimed at studying in-depth some of the key aspects through case studies.
* Numerical tutorials concerning oenological practices, such as enrichment, acidification, deacidification.

ASSESSMENT METHOD AND CRITERIA

The expected methods for ascertaining the knowledge and skills acquired are: a) for the institutional content of the course, a written exam with multiple choice and open-ended questions. The maximum achievable mark is 24/30, which will be supplemented by the marks achieved in the numerical tutorials; b) for the numerical tutorial activity, the student's ability to use the theoretical tools to solve problems in oenological practices, such as enrichment, acidification and deacidification, will be assessed. The expected mark varies from 1 to 7 marks.

NOTES AND PREREQUISITES

A basic knowledge of oenology-related chemistry and microbiology will help students to both benefit more fully from the course and pass the final exam. The student must possess a basic knowledge of the concepts of organic chemistry and biochemistry.

Should the health situation relating to the Covid-19 pandemic not allow face-to-face teaching, remote teaching in synchronous or asynchronous mode will be guaranteed; this will be communicated in good time to students.

Information on office hours available on the teacher's personal page at http://docenti.unicatt.it/.