Wine-making Facilities and Technology

Prof. Milena Lambri

COURSE AIMS AND INTENDED LEARNING OUTCOMES

The aim of the course is to provide students with the knowledge and means for using the tools needed to study the phenomena characterising the unit operations of oenological processes; they will also learn the fundamentals of these unit operations and the main aspects of the environmental impact of wine-making.

At the end of the course, students will be able to outline the design of an oenological technology plant for the production of white and red wines. They will know the general principles of the phenomena governing winery operations and will be able to independently select and manage the individual machines along the production lines.

COURSE CONTENT

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|  | ECTS |
| Material and energy balances and transport phenomena |  |
| Mass and energy balances, heat exchange and heat exchangers. | 1.0 |
| Use of thermal energy. The refrigeration cycle and cold distribution in the cellar. | 0.5 |
| General principles of fluid dynamics, sizing of pipes. | 0.5 |
| Machines for transferring grapes, musts and wine.  Use of conveyor belts and augers for handling solids. | 0.5 |
| Unit operations |  |
| Sizing of the main unit operations within the wine industry: winemakers and capacitive units, solvent extraction (maceration), concentration of musts. | 1.0 |
| Solid-liquid separation in the cellar (filtration, static sedimentation, flotation, centrifugation). Bottling lines. | 1.0 |
| Design criteria for a cellar. | 0.5 |
| Tutorials | 1.0 |

READING LIST

During the course, the presentations and supplementary materials (videos, catalogues, etc.) illustrated and discussed in class will be made available. For more in-depth study, the following texts are recommended:

P. De Vita, *Corso di Meccanica Enologica*, Hoepli, Milan, 2001.

C. Jacquet-C. Capdeville, *Installazioni vinicole, Volumes 1 and 2*, Eno One, Reggio Emilia, 2007.

C. Nardin-A. Gaudio-G. Antonel-P. Simeoni*, Impiantistica Enologica*,Il Sole 24 Ore, Edagricole, Bologna, 2006.

TEACHING METHOD

Theoretical frontal and dialogue-based lectures carried out with the aid of PowerPoint, during which the basic concepts, calculation rules, and understanding of problems with related solution setting will be presented. The theoretical discussion will always be supported by application examples and specific case studies. Frontal tutorials will be held during which exercises and problems will be solved using the methods explained in class.

Teaching will be supplemented with seminars by invited sector experts on specific topics relevant to the development of the wine production chain, and at least one study visit to an important wine-making facility.

ASSESSMENT METHOD AND CRITERIA

The exam includes two non-excluding written tests, taken halfway through and at the end of the course, and covering the programme studied. Each test, lasting 2 hours, involves carrying out design calculation exercises for wine-making implants and answering a questionnaire with closed-ended theoretical questions. The exercises and theoretical questions will each contribute 50% towards the assessment of each written test, marked out of thirty, and will contribute towards the overall mark of the final result. Passing the test exempts the student from preparing the corresponding part of the programme for the final exam.

Students who do not take or fail to pass the test, or who choose not to use the mark obtained in the test with its associated partial exemption, will have to take the oral exam on the entire programme indicated in the degree course guide, following the reading list indicated therein. The oral exam requires the solution of calculation exercises, as well as theoretical questions.

NOTES AND PREREQUISITES

The student must possess a knowledge of mathematical analysis and physics. A knowledge of inorganic and organic chemistry, physical chemistry and the general aspects of oenology will prove useful.

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