Modules offered by
Hochschule Geisenheim - University

Students of the Vinifera EuroMaster degree programme have to attend the following modules in the second academic year (M2):

- 4 Core modules 30 ECTS
- Master Thesis 30 ECTS

Core Modules

Module	**ECTS points**
Advanced Enology	6
Advanced Viticulture	6
Product- and Project Management in Wine Business (Advanced Wine Business)	6
Research Project	12
	30
Total:	**60**

Module Name	**Advanced Enology** **(Technology and Microbiology in Enology)**
Academic Year:	2nd academic year in Geisenheim
Semester:	3rd semester
Module coordinator:	Prof. Dr. Monika Christmann (Hochschule Geisenheim)
Lecturer:	Monika Christmann, Prof. Dr. (Hochschule Geisenheim); Manfred Großmann, Prof. Dr. (Hochschule Geisenheim); Doris Rauhut, Prof. Dr. (Hochschule Geisenheim); Rainer Jung, Prof. Dr. (Hochschule Geisenheim); von Wallbrunn, Christian Dr. (Hochschule Geisenheim), Ludwig Pasch, M.Sc. (Hochschule Geisenheim); Matthias Schmitt, Dr. (Hochschule Geisenheim); Andrii Tarasov Dr. (Hochschule Geisenheim),
Language:	English
Classification within the curriculum:	Module of specialisation
Teaching format:	Regular lectures and seminar during the semester
Workload:	Face to face lectures and seminar: 60 h; Student's personal study time in the module: 120
Credit points:	6 ECTS
Requirements under the examination regulations:	----------
Recommended prerequisites:	----------
Targeted learning outcomes:	Students know about the ongoing research activities in winemaking, enology and microbiology and their implementation in small, medium and large scale wine production
Content:	Current research topics in Enology; Wine making technology; Microbiology
Study / exam achievements:	Presentation and written examination
Forms of media:	Power point presentations, hand-outs
Literature:	a) General background literature as prerequisite to follow the course: REYNOLDS, A.: Managing Wine Quality., Vol. I + II, Woodhead Publishing, 2011. KÖNIG, H. ; UNDEN, G. ; FRÖHLICH, J.: Biology of Microorganisms on Grapes, in Must and in Wine. Springer-Verlag, Berlin, 2017. b) course specific references and relevant publications will be given at begin of the course
Update:	September 2017

Module name	**Advanced Viticulture**
Academic Year:	2nd academic year at Geisenheim
Semester:	3rd semester
Module coordinator:	Prof. Dr. Manfred Stoll (Hochschule Geisenheim)
Lecturer:	Randolf Kauer, Prof. Dr. (Hochschule Geisenheim); Beate Berkelmann-Löhnertz, Prof. Dr. (Hochschule Geisenheim); Elvira Bleser, Dr. (Hochschule Geisenheim); Joachim Schmid, Prof. Dr. (Hochschule Geisenheim); Johanna Frotscher, Dr. (Hochschule Geisenheim); Anette Reineke, Prof. Dr. (Hochschule Geisenheim); Jason Smith, PhD (Hochschule Geisenheim); Susanne Tittmann, Dr. (Hochschule Geisenheim)
Language:	English
Classification within the curriculum:	Module of Specialisation
Teaching format:	Regular lectures during the semester
Workload:	Face to face lectures and seminar: 60 h; Student's personal study time in the module: 120
Credit points:	6 ECTS
Requirements under the examination regulations:	----------
Recommended prerequisites:	----------
Targeted learning outcomes:	Students know about current research topics in viticulture, molecular biology, pest control and precision viticulture
Content:	Hot topics in viticulture, physiology and pest control in grape production
Study / exam achievements:	Written examination
Forms of media:	Power point, laboratory and field work
Literature:	a) General background literature as prerequisite to follow the course: GLADSTONES, J.: Wine, Terroir and Climate Change, Adelaide, Hyde Park Press, 2011.

	ILAND, P. ; DRY, P. ; PROFFITT, T. ; TYEMAN, S.: The Grapevine - from science to the practice of growing vines for wine., Patrick Iland wine Promotions Pty Ltd, 2011. KELLER, M.: The Science of grapevines: anatomy and physiology. Amsterdam, Elsevier, 2010. b) course specific references and relevant publications will be given at begin of the course.
Update:	September 2017

Module name:	**Research Project**
Academic Year:	2nd academic year at Geisenheim
Semester:	3rd semester
Module coordinator:	Prof. Dr. Manfred Stoll (Hochschule Geisenheim)
Lecturer:	Academic staff of Hochschule Geisenheim
Language:	English
Classification within the curriculum:	Module of Specialization
Teaching format:	Face to face presentations and discussion of the project *en bloc* at the beginning and end of the project. Research under continuous supervision
Workload:	Face to face: 8h; oral presentations of interim and final results of the projects within a written report: 12 h, Student's research under supervision and independent study: 300 h; preparation of interim und final reports: 40 h
Credit points:	12 ECTS
Requirements under the examination regulations:	----------
Recommended prerequisites:	----------
Targeted learning outcomes:	Students know about research strategies and methods and are able to apply them to practical research
Content:	Introduction to the library and literature research, research hypotheses and strategies; research methods; processing research data; statistics (involvement in laboratory)
Study / exam achievements:	Presentation and written report
Forms of media:	Power point and laboratory equipment (depending on the project), field visits
Literature:	Basic literature: MALMFORS, B. ; GAMSWORTHY, P. ; Gr, M.: Writing and Presenting Scientific Papers. Nottingham, Nottingham University Press., 2006. LEARDI, R.: Experimental design in chemistry: A tutorial. In: Analytica Chimica Acta, **652,** 2009, 161-172. The project specific literature research is part of the research project
Update:	September 2017

Module name:	**Master Thesis** **at Hochschule Geisenheim University**
Academic Year:	2nd academic year at Geisenheim
Semester	4th semester
Module coordinator:	General Coordination by Prof. Dr. Manfred Stoll (Hochschule Geisenheim) and Dipl.-Ing. Agr. Sonja Thielemann (Hochschule Geisenheim)
Supervisors:	Academic staff of Hochschule Geisenheim and academic staff members of the EMaVE Consortium and associated partners.
Language:	English
Classification within the curriculum:	Core module
Teaching format:	The Thesis consists of the elaboration of a written report about an independent scientific work of the student and a defense.
Workload:	24 weeks for the elaboration of the thesis; plus adequate time (at least 2 weeks) for personal preparation for the defence.
Credit points:	30 ECTS
Requirements under the examination regulations:	Admission to the thesis is granted if the student has - successfully completed the modules of the first academic year; - attended an internship of at least 8 weeks, proved by a respective certificate. Admission to the defence is granted under the condition that: - the written report was evaluated at least with the grade "E - pass"; - the student has completed all other compulsory modules of the second academic year successfully and obtained at least 120 ECTS (including the ECTS allocated to the Master Thesis)
Recommended prerequisites:	----------
Targeted learning outcomes:	The student is able to carry out scientific research independently in a given time implementing adequate scientific methods. In addition the student is able to present his/her results to a jury and answers questions related to the field of research.
Content:	Thesis document
Exam achievements:	Delivery of a written thesis report at the submission date. The written report has to be prepared under consideration of the formal requirements of the Hochschule Geisenheim University . Thesis defence in front of an examination jury of at least 3 academic members according to no 13.2 of the Study and Examination Regulations of the Vinifera EuroMaster degree programme.
Forms of media:	Research methods depending on the topic of the thesis. Written report; presentation media for the defence
Literature:	Books and scientific papers related to the topic of the thesis. The

	literature research is part of the Master Thesis
Update:	September 2017

Additional Language Module offer

The credit points are not counted for the completion of the Master degree programme.

Module	**ECTS points**
German as a Foreign Language	2

Module name:	**German as a Foreign Language**
Academic Year:	2nd academic year in Geisenheim
Semester:	3rd semester
Module coordinator:	Agi Meisl-Faust (Language Center, Hochschule Geisenheim)
Lecturer:	Free lance lecturers
Language:	German
Classification within the curriculum:	Additional Module
Teaching format:	Lectures (interactive teaching): 2 hours / per week during the semester
Workload:	30 hours interactive teaching; 30 hours independent studies
Credit points:	2
Requirements under the examination regulations:	----------
Recommended prerequisites:	----------
Targeted learning outcomes:	Depending on the entrance level: The level of the course will be defined at the beginning of the course depending on students' previous knowledge
Content:	Topics of daily live Special topics from Viticulture, Enology and Wine Business
Study / exam achievements:	Written examination and active participation
Forms of media:	Black board, Overhead; photo copies, exercise sheets
Literature:	----------
Update:	September 2017

Modules offered by the

Consorzio tra le Università di Torino, Milano, Palermo, Foggia e Sassari

Students of the Vinifera EuroMaster degree programme have to attend the following modules in the second academic year (M2), choosing among one or more of the 5 Universities of Consortium:

- Modules of an equivalent of 30 ECTS
    - Modules within a list 20 ECTS
    - Free choice modules 10 ECTS
- Vineyard and / or Winery Stage 5
- ECTS
- Master Thesis 25 ECTS

Module	Location	ECTS points
Enography	Asti	5
Fermentation microbiota and territorial characterization	Asti	5
Packaging in the wine industry: performance, safety and sustainability	Milan	5
Microbial biotechnology in oenology	Milan	5
Foods and beverages in the balanced diet	Milan	5
Oenological technologies for Mediterranean warm and arid zones	Palermo	5
Agri-food technologies	Palermo	5
Microbial biotechnology	Sassari	5
Physical and chemical analyses of foods	Sassari	5
Grapevine ecophysiology	Alba	5
Vineyard management, environment and ripening	Alba	5
Sustainable viticulture	Milan	5
Vineyard management in Mediterranean warm and arid area	Palermo	5
Studies on vineyard environments	Sassari	5
Viticultural pedology	Asti	5
Mechanic for precision viticulture	Asti	5
Advanced machinery and plant engineering in viticulture and enology	Milan	5
Soil management in warm-arid environments	Palermo	5
Insights into grapevine pathology	Sassari	5
Basic of remote sensing of agriculture	Asti	5
Secondary metabolites in grapevine	Alba	5
Enology in warm and dry climate	Foggia	5
Wine starter microbiology	Foggia	5
Viticolture and enology policy	Foggia	5
Vineyard mite control	Foggia	5
Physiology and quality of grapevine production in warm and dry climate	Foggia	5
Marketing strategies to improve Sicilian wines	Palermo	5
Tablegrape protected cultivation	Foggia	5
Tablegrape processing	Foggia	5
Tablegrape innovation	Palermo	5
Economics of food safety and nutrition	Foggia	5
Tablegrape soiless cultivation	Palermo	5

Winery/Wineyard stage		5
Master Thesis		25

Free elective Modules
Modules covering the free elective 10 ECTS have to be chosen from other programs of the Universities of Torino, Milano, Palermo, Foggia and Sassari.

Module name:	**Enography**
Academic Year:	2nd academic year at University of Turin
Semester:	Single period January-May
Module coordinator:	Prof. Vincenco Gerbi, University of Turin
Lecturers:	Prof. Vincenco Gerbi, University of Turin
Language:	English
Location	Asti
Teaching format:	Regular lectures combined with sensory analysis and visits to wineries during the semester
Workload:	Face to face lectures (including sensory analysis and visits to wineries): 40 h; student's personal study time in the module: 85 h
Credit points:	5 ECTS
Requirements under the examination regulations:	none
Recommended prerequisites:	Good knowledge of viticulture and enology
Targeted learning outcomes:	The students gain insight into their skills in sensory description of wines and their ability to find scientific information on the geographical origin, on ampelographic characteristics of the grape/ grapes used and the possible production technologies.
Content:	In the theoretical part of each lesson they are treated: Recalls of Enology, oenological chemistry and microbiology necessary for an understanding of the subject. Then are described the fundamental scientific contributions useful to the knowledge of wines described, which can be summarized as follows: Enography white wines International: France, Germany, Italy and the New World. Enography of international red wines: Italy, Spain France, California, Australia, New Zealand. The native Italian wines Some special wines national and international.
Exam achievements:	At the end of the teaching to each student is assigned the name of a wine, on which it will perform a literature search in databases. Based on the citation founded the student will prepare a presentation that will be exposed in the oral examination. The evaluation will be assigned on the basis of demonstrated capacity to find scientific papers, understand its contents, clarity and competence demonstrated during exposure.
Forms of media:	Video projection, Internet
Literature:	Petrozziello M., Guaita M., Motta S., Panero L., Bosso A. (2011). Analytical and Sensory Characterization of the Aroma of "Langhe D.O.C. Nebbiolo" Wines: Influence of the Prefermentative Cold Maceration with Dry Ice. Food Science, 76, 525-534. Torchio F., Cagnasso E., Gerbi V., Rolle L. (2010). Mechanical properties, phenolic composition and extractability indices of Barbera grapes of different soluble solids contents from several growing areas. Analitica Chimica Acta, 660,

	183-189. Genovese A., Lamorte S.A., Gambuti A., Moio L. (2013). Aroma of *Aglianico* and *Uva di Troia* grapes by aromatic series. Food Research International, 53, 15-23. Seung J.L., NobleA.C. (2003). Characterization of Odor-Active Compounds in Californian Chardonnay Wines Using GC-Olfactometry and GC-Mass Spectrometry. J. Agric. Food Chem., 51 (27), 8036-8044. http://elearning.moodle2.unito.it/disafa/mod/folder/view.php?id=4232
Update:	September 2017

Module name:	**Fermentation microbiota and territorial characterization**
Academic Year:	2nd academic year at University of Turin
Semester:	Single period January-May
Module coordinator:	Prof. Kalliopi Rantsiou, University of Turin
Lecturers:	Prof. Kalliopi Rantsiou, University of Turin
Language:	English
Location:	Asti
Teaching format:	Lectures and practical sessions in the laboratory
Workload:	40 hours of lectures and laboratory sessions
Credit points:	5 ECTS
Requirements under the examination regulations:	none
Recommended prerequisites:	Biology, Microbiology
Targeted learning outcomes:	The teaching objective of the course is to provide to the student necessary knowledge that will allow: - the study of microbial ecology during fermentations for the production of various types of wines; - the use of new methods, based on molecular biology, for the identification and characterization of strains of interest to the wine sector and for the study of their behavior during fermentation for wine production; - the development of starter of territorial origin.
Content:	The main subjects of the lectures are the following: - Introduction and main microbial groups of interest in wine production (4 hours) - Microbial dynamics and transformations during wine making (4) - Autochthonous microbiota for wine production and starter culture application in wine production:advantages and disadvantages (4 hours) - non-Saccharomyces yeasts and their application in wine (4 hours) - Molecular methods applied in wine microbiology (4 hours) - Malolactic fermentation (4 hours) The activities in the laboratory are the following: - Microbiological analysis of wine related matrices (4 hours) - Viable count and DNA extraction from isolates and must (4 hours) - Agarose gel electrophoresis (4 hours) - DGGE method (4 hours)
Exam achievements:	
Forms of media:	
Literature:	Class notes available on the webpage of the class.
Update:	September 2017

Module name:	**Packaging in the wine industry: performance, safety and sustainability**
Academic Year:	2nd academic year at University of Turin
Semester:	Single period January-May
Module coordinator:	Prof. Stefano Farris, University of Milan
Lecturers:	Prof. Stefano Farris, University of Milan
Language:	English
Location:	Milan
Teaching format:	Frontal lectures with multimedial slides
Workload:	40 hours
Credit points:	5 ECTS
Requirements under the examination regulations:	none
Recommended prerequisites:	none
Targeted learning outcomes:	This module aims to provide students with fundamental concepts related to the most common packaging materials used in the food sector, with special emphasis on the wine industry. In addition, students will gather the technical skills necessary to design properly the final packaging system according with the sought performance, with particular attention toward recent hot topics such as sustainability, consumer's safety, and "active" and "intelligent" features.
Content:	Different topics will be covered within the course, such as: • Food packaging functions • Chemical properties • Physical properties • Most important materials for the packaging of wine • Packaging technologies in the wine industry • Food Contact Materials (FCM) • "Active" and "Intelligent" packaging • Packaging design – shelf life extension and sustainability Main packaging innovations in the wine world
Exam achievements:	At the end of the module, students will be asked to be acquainted with most important and representative packaging materials. They should demonstrate the ability to distinguish different materials based on the most relevant functional properties. Moreover, students should exhibit full competence about fundamental concepts linked to phenomena such as permeation, migration, compostability, biodegradability, etc. Students will be encouraged to develop an adequate criticism enabling them to perform a careful assessment of the environmental, economic, and social impact of any packaging system they will deal with, based on the topics covered within the module.
Forms of media:	Multimedial slides and scientific papers (hardcopies)
Literature:	Robertson, G. Food Packaging – Principles and Practice. CRC Press: Boca Raton, Florida, 2013. Lee, D. S.; Yam, K. L.; Piergiovanni, L. Food Packaging Science and Technology. CRC Press: Boca Raton, Florida, 2008.
Update:	September 2017

Module name:	**Microbial biotechnology in oenology**
Academic Year:	2nd academic year at University of Turin
Semester:	Single period January-May
Module coordinator:	Prof. Roberto Foschino, University of Milan
Lecturers:	Prof. Roberto Foschino, Ileana Vigentini, Univerity of Milan
Language:	English
Location:	Milan
Teaching format:	Traditional, with lab
Workload:	40 hours
Credit points:	5 ECTS
Requirements under the examination regulations:	none
Recommended prerequisites:	none
Targeted learning outcomes:	Aim of the course is to give basic knowledge for understanding the identity, the genetic traits and the role of wine microorganisms with particular attention to lactic acid bacteria and yeasts, as well as the microorganisms that can modify the final product. In addition, the course will release information onmicrobial biotechnologyand the useof genetically modified microorganismsin winemaking.
Content:	Lectures Yeast and Lactic Acid Bacteria (LABs) Systematics, Phylogenesis of the microorganisms with oenological interest, Genetics of *S. cerevisiae*, Genetics of *O. oeni*, Dynamic of Yeast and LABs Populations during must/wine fermentation, Non-Saccharomyces wine yeasts, Biomolecular Analysis of the microorganisms with oenological interest: Nucleic acids extraction from oenological substrates, DNA sequencing (Sanger, Pyrosequencing and NGS approaches), Molecular tools for the yeasts and LABs identification, Molecular tools for the typing of yeasts and LABs, Metagenomic analysis, Microbial Biotechnology, Recombinant DNA technology, Wine Biotechnology, The CRISPR/Cas9 system Laboratory classes Yeast isolation from musts, Extraction and purification of DNA, PCR of the ribosomal regions ITS and electrophoretic separation of the PCR products on agarose gel, Typing of the S. cerevisiae species, Deletion of the CAN1 gene in *S. cerevisiae* by the CRISPR/Cas9 approach: *S. cerevisiae* transformation and selection of recombinant strains on canavanine by replica plating.
Exam achievements:	Journal Club: oral presentation on the available international scientific literature.
Forms of media:	
Literature:	Lecturer papers Vincenzini M., Romano P., Farris G.A. Microbiologia del Vino. Casa editrice Ambrosiana. Helmut K., Gottfried U., Jürgen F. Biology of Microorganisms on Grape, in Must and in Wine. Springer
Update:	September 2017

Module name:	**Foods and beverages in the balanced diet**
Academic Year:	2nd academic year at University of Turin
Semester:	second
Module coordinator:	Prof. Marisa Porrini, University of Milan
Lecturers:	Prof. Marisa Porrini, University of Milan
Language:	English
Location:	Milan
Teaching format:	Taught class with slide projection
Workload:	40 hours
Credit points:	5 ECTS
Requirements under the examination regulations:	none
Recommended prerequisites:	none
Targeted learning outcomes:	Basic knowledge of: - body composition and physiologyical processes of digestion and nutrient absorption; - nutrients (proteins, lipids, carbohydrates, fiber, minerals and vitamins), ethanol, bioactive compounds and their role in the diet; - energy requirements and nutritional needs of different groups of population; - nutrient and bioactive compound composition of typical and innovative foods
Content:	Lifestyle, dietary habits and nutritional issues in industrialized countries. Body composition and energy metabolism (basal metabolic rate, diet induced thermogenesis and exercise associated thermogenesis). Fundamentals of anatomy and physiology of the digestive tract (mouth, stomach, small intestine and large intestine), pancreas and liver. Macro and micro nutrients (proteins, lipids, carbohydrates, vitamins and minerals) and the mechanisms of digestion and absorption. Physical and chemical characteristics and nutritional role of fiber. Dietary reference intakes for energy and nutrients. Nutritional quality of foods. Absorption and metabolism of ethanol. Alcoholic beverages in the diet. Dietary bioactive compounds and their health implication.
Exam achievements:	Oral examination
Forms of media:	Slides, internet
Literature:	Gerard J. Tortora, Brian Derrickson – Principi di Anatomia e Fisiologia – Casa Editrice Ambrosiana. (Milano), 2011 Giuseppe Arienti – Le basi molecolari della nutrizione, Piccin Editore, 2015 Società Italiana di Nutrizione Umana – LARN – SICS, 2014
Update:	September 2017

Module name:	**Oenological technologies for Mediterranean warm and arid zones**
Academic Year:	2nd academic year at University of Turin
Semester:	Single period January-May
Module coordinator:	To be assigned
Lecturers:	To be assigned
Language:	Italian/English
Location:	Palermo
Teaching format:	Traditional
Workload:	40 hours
Credit points:	5 ECTS
Requirements under the examination regulations:	none
Recommended prerequisites:	none
Targeted learning outcomes:	Knowledge of grapes and parameters influencing the quality of wine produced in hot and arid areas. Acquisition of new knowledge about conventional and innovative oenological technologies for the production of wines (white, red, and special) in arid and hot areas.Troubleshooting for the control of operations by mass and energy balances and kinetics.
Content:	The class focuses on subject that are configured in the learning context of Processing technologies wine Grape maturation evolution in hot and arid areas. Relationship between product specifications and raw material characteristics. Variability of chemical and physical characteristics of the grapes produced in hot climate. Factors affecting concentration of different constituents of the grapes grown in hot climate. Balance composition problems of grapes grown in warm countries. The date of grape harvest. Technological problems winemaking in hot areas. Effect of high temperatures at harvest time. Harvesting at night, the use of carbon dioxide ice. Correction of the must during winemaking in hot countries. Use of reverse osmosis technique on musts of hot countries. Sulfur dioxide in winemaking hot-arid areas. The refrigeration of the must. Plants continuous refrigeration during fermentation. Mass and energy balance. Preparation of red wines in hot countries. Prefermentantive treatments. Role of oxygen. Redox potential. Management of fermentation process and maceration in hot-arid areas. Special maceration technique. Conventional and innovative fermentation tank used in hot countries. Vinification of sweet aromatic white wine grape. Wine stabilization in hot countries by cold and electrodialysis treatment.
Exam achievements:	Oral examination
Forms of media:	
Literature:	Ribereau-Gayon et al. 2007. Trattato di Enologia. Voll. 1 e 2. Il Sole 24 Ore Edagricole (Milano). Nardin G. et al 2006. Impiantistica enologica Edizioni Edagricole (Bologna). Articles in the scientific literature provided during the lessons. Lecture notes and materials provided by the teacher.
Update:	September 2017

Module name:	**Agri-food technologies**
Academic Year:	2nd academic year at University of Turin
Semester:	Single period January-May
Module coordinator:	Prof. Aldo Todaro, University of Palermo
Lecturers:	Prof. Aldo Todaro, University of Palermo
Language:	Italian/English
Location:	Palermo
Teaching format:	Traditional
Workload:	40 hours
Credit points:	5 ECTS
Requirements under the examination regulations:	none
Recommended prerequisites:	none
Targeted learning outcomes:	The module aims to provide students the knowledge on technologies for the production of baked, tomato products, milk and cheese, winemaking, also we will address the issue of what techniques and technologies adopted to maintain the quality of fruit and vegetable products in the post-harvest. The module has two purposes: knowledge of the industrial technologies of processed food, and the knowledge of the chemical and physical characteristics and composition of food products.
Content:	**Module introduction** 2h **Food technologies, food product, process, unit operations definitions.** Food technologies classification. Food products. 4h **Classification of processes, unit operations and the food production processes.** 2h **Food safety** 3h **Unit operation:** Mass and energy balance. Principles and applications of the mechanical separation Unit Operation. Sedimentation and centrifugation. Activity water. 6h **Milk and cheesemaking**: quality evaluation; In-depth knowledge of the main chemical and biological characteristics of cow's milk and dairy products. Functional properties and rheology of appeals applied to dairy products. Dairy cheese making techniques and technologies. 6h **Olive oil**: analisys of raw materials. properties of raw food materials and their susceptibility to deterioration and damage. raw material properties. colour. texture. flavour. functional properties. Good manufacture practices. 6h **Winemaking**: analisys of raw materials. properties of raw food materials and their susceptibility to deterioration and damage. raw material properties. colour. texture. flavour. functional properties. good manufacture practices. 6h **Tomato processing:** analisys of raw materials. properties of raw food materials and their susceptibility to deterioration and damage. raw material properties. colour. texture. flavour. functional properties. good manufacture practices. 6h **Juice fruit, jam, gelatin:** definitions, law, processes, food analisys. 6h **Minimally processed food:** definitions, law, processes, food analisys. 7h **Bakery products:** definitions, law, processes, food analisys. 6h
Exam achievements:	Oral examination
Forms of media:	
Literature:	Zanoni Bruno, 2011, Tecnologia Alimentare, Libreriauniversitaria; Pompei C., 2005, La trasformazione industriale di frutta e ortaggi, Edagricole;

	Pompei C., 2009, Operazioni Unitarie della tecnologia alimentare, Casa Editrice Ambrosiana; Cappelli P. e Vannucchi V., Chimica degli Alimenti. Zanichelli. Heldman D.R. & Lund D.B.,2007. Handbook of Food Engineering. CRC Press
Update:	September 2017

Module name:	**Microbial biotechnology**
Academic Year:	2nd academic year at University of Turin
Semester:	Single period January-May
Module coordinator:	Prof. Ilaria Maria MANNAZZU, University of Sassari
Lecturers:	Prof. Ilaria Maria MANNAZZU, University of Sassari
Language:	Italian/English
Location:	Sassari
Teaching format:	Most of the topics are presented as schemes and figures organized in form of power point presentation or through the critical reading of scientific papers.
Workload:	125 hours
Credit points:	5 ECTS
Requirements under the examination regulations:	none
Recommended prerequisites:	none
Targeted learning outcomes:	The study and elucidation of recent developments in continuous and batch fermentations and the use of starters or microbial metabolites in winemaking biotechnology will provide students with specific knowledge necessary to experiment and transfer innovative procedures aimed at improving the management of the fermentative process and wine quality to local productive realities.
Content:	Introduction. Development of innovative biotechnologies. Batch and continuous processes. Starters: utilization of free or immobilized cells. Multistarter cultures in winemaking. Simultaneous inoculation of yeast and lactic bacteria. Microbial metabolites in winemaking. Enzymes. Killer toxins. Lab classes: Production of microbial starters. Production and partial purification of killer toxins. Batch and continuous winemaking. Analyses of wines.
Exam achievements:	Oral exam
Forms of media:	Slides projection, reading of original papers
Literature:	Biodiversity and Biotechnology of wine yeasts (2002) M. Ciani (Ed) , Research Signpost, Trivandrum, India Microbiologia del vino (2005) M.Vincenzini, P Romano, GA Farris (Eds) Casa editrice ambrosiana, Milano.
Update:	September 2017

Module name:	**Physical and chemical analyses of foods**
Academic Year:	2nd academic year at University of Turin
Semester:	Single period January-May
Module coordinator:	Dr. Alessandra Del Caro, University of Sassari
Lecturers:	Dr. Alessandra Del Caro, University of Sassari
Language:	Italian/English
Location:	Sassari
Teaching format:	Traditional
Workload:	30 hours of lectures and 10 hours devoted to laboratory work
Credit points:	5 ECTS
Requirements under the examination regulations:	none
Recommended prerequisites:	none
Targeted learning outcomes:	Students completing the course will have acquired knowledge about the role of the physical and sensory analyses on the food quality. Students will be able to support food industry by applying physical and sensory techniques on foods and by solving problems encountered during food processing and storage. Moreover students will acquire communication skills due to the participation to the working groups solicited by the teacher during the course.
Content:	Course Introduction (1h). Importance of the role of physical and sensory analysis in quality control and food process. Application of physical and sensory analysis to food quality. Sensory analysis (18h). Introduction to sensory analysis. Physiology of the sense organs. Psychophysiology of perception: perception thresholds, responses to stimuli, different sensitivities, physiological and psychological errors. sensory attributes of foods. The sensory analysis laboratory. The sensory analysis judges: selection and training. Use of measurement scales. Methods of sensory analysis: discriminant , descriptive and affective tests. Preference and acceptability test. Basic and advanced statistical techniques applied to sensory analysis of food. Application and solving problems of sensory analysis in companies. Color analysis of foods (5h). The perception of color. Light and interaction with food. Color spaces: C.I.E. system, Munsell, Yxy. Instrumental measurement of color and color difference, color variation causes. Colorimetric instrumentation: tristimulus colorimetry and spectrophotometry. Food and color changes during processing and storage. Correlations between physical and sensory measurements (2h). Image analysis (Image analysis) (2h): objectives, instrumentation and application on foods. Electronic nose and electronic tongue (2h): Application on food matrices. Laboratory work (10 h) Discriminant and descriptive tests on different foods, statistical analysis of the results obtained (8 h). Colorimetric analysis on foods (2h).
Exam achievements:	Oral assessment
Forms of media:	
Literature:	M.Bourne. Food texture and viscosity. Concept and measurement. 2nd Edition. 2002. Academic Press. Meilgaard, Civille and Carr. Sensory Evaluation Techniques. 4th Edition. 2006.

	CRC. Kemp, Hollowood, Hort. Sensory Evaluation. A practical handbook. Wiley. Blackwell. 2009. J. Houtchings. Food color and appearance. 2nd Edition. 1999. Aspen. Schanda Janos. Colorimetry. Undestanding the CIE System. 2007. Wiley. R.S. Jackson. Wine tasting: A Professional Handbook. 2002. Elsevier. Academic Press.
Update:	September 2017

Module name:	**Grapevine ecophysiology**
Academic Year:	2nd academic year at University of Turin
Semester:	Single period January-May
Module coordinator:	Prof. Claudio Lovisolo, University of Turin
Lecturers:	Prof. Claudio Lovisolo, University of Turin
Language:	English
Location:	Alba
Teaching format:	Traditional
Workload:	40 Hours
Credit points:	5 ECTS
Requirements under the examination regulations:	Written test on three points of the program and oral examination focused on a research paper.
Recommended prerequisites:	Viticulture, Plant biology.
Targeted learning outcomes:	The students will integrate the knowledge acquired both by following the course programme and by examining scientific literature. The will learn about the relationships between grapevine physiology and inputs from vineyardpractices, upon both cultivation standards and abiotic limiting conditions.
Content:	General overview of the grapevine ecophysiology Water metabolism: physiological role. Concept of water potential as an energy index. Measurement of water potential: in the leaf, in the shoot, pre-dawn, at mid-day. The analogy of the Ohm Law to study water fluxes in plant. The continuum of water flow along soil-plant-atmosphere. How to modelize hydraulic resistances in grapevine organs. Implication of cell water metabolism on grapevine water balance: osmoregulation; symplasm/apoplasm water exchange; aquaporin role. Time scaling relationships between water potential and transpiration: occurrence of water stress; occurrence of rain; diel fluctuations; seasonal fluctuations; in different water-holding soils. Plant water balance: isohydric response to water stress, connection with pre-dawn water potential; anisohydric response, connection with stem water potential. Measurement of hydraulic conductance (in the root, in the shoot, in the leaf, in the whole plant). The evaporative flux method to estimate hydraulic resistances in grapevine organs. The high-pressure-flow-meter: principles; measurements of embolism extent; estimation of aquaporin role in controlling plant hydraulics. Root water absorption and transport: symplasm, apoplasm and cell-to-cell water pathways; hormonal control at budbreak; soil temperature and seasonal control. Abscisic acid biosynthesis in root: activation by pH; influence of water stress; influence of root respiration; split-root experiments and partial root drying. Abscisic acid root-to-shoot control: implications in rootstocks; auxin/ABA interaction for root deepening and later root emergence; soil properties (clay) modulate ABA response.

	Water transport in rootstocks: induction of tolerance to water stress (mechanisms and genotypes related); Induction of stress avoidance (mechanisms and genotypes related); hormonal control of aquaporin activation; vigor induction and water metabolism. Auxin control of vascular development. Model of auxin translocation: auxin control on apex dominance in grapevine; auxin control on tropisms in grapevine. Xylem conductivity in relation to upward and downward shoot growth orientation. Water (sap) transport in the shoot: embolism formation; embolism refilling; role of aquaporins; hormonal control of aquaporin activation. Transpiration: the vapor pressure deficit (VPD) as energy determinant. Atmospheric demand of transpiration. Kinetics of temperature and relative humidity. Stomatal opening and closure (physiology of guard cells). Environmental control of transpiration (microclimatic influences and viticultural issues). Stomatal control (regulation during water stress and CO2 feedbacks). VPD influence on ABA catabolism. ABA-mediated stomatal opening response at lower VPD. Optimization of gas exchange to current environmental conditions (Speirs et al 2013 JXB, Soar et al 2006 AJGWR) VPD/ABA Involvement in controlling embolism repair (Perrone et 2012 Planta) Photosynthesis; Photorespiration; Photoinhibition: measurement of chlorophyll fluorescence. Limitations to photosynthesis in grapevine: water stress; stomatal regulation; light deficiency; light excess;
Exam achievements:	During classes, anonimous in itinere written tests. The exam will be a written evaluation by answering to open questions based on program points and an oral discussion on a scientific paper.
Forms of media:	
Literature:	Scientific articles get during the study of the sector's scientific databases.
Update:	September 2017

Module name:	**Vineyard management, environment and ripening**
Academic Year:	2nd academic year at University of Turin
Semester:	Single period January-May
Module coordinator:	Prof. Silvia Guidoni, University of Turin
Lecturers:	Prof. Silvia Guidoni, University of Turin
Language:	English
Location:	Alba
Teaching format:	The teaching involves 40 hours of activities in the presence of the teacher and a set of activities to be carried out individually or in groups. Activities include plenary meetings (case study proposals, planning and organization of activities, result presentations and collective discussions) and guided study (by groups or individually). Case studies or problems related to the course's topics are proposed. Students explore scientific literature to collect data and information useful to find effective solutions. and to evaluate the effects of the identified solutions on the entire vineyard agro-system. An independent approach to source selection, information gathering and solution identification is require. The results are presented and discussed collectively during plenary meetings in order to encourage peer learning.
Workload:	125 hours
Credit points:	5 ECTS
Requirements under the examination regulations:	none
Recommended prerequisites:	base knowledge of Viticulture and Vineyard management
Targeted learning outcomes:	The teaching aim is to provide knowledge concerning influence of climatic and environmental variables and of cultivation choices on the grapevine development and grape ripening with attention to the environmental aspects. Teaching also provides tools for the interpretation and management of information extracted from scientific literature and their multimedia presentation.
Content:	1. Sources of variability in the vineyard: soil, site, climate, cultural choices. 2. Radiation, temperature, water availability: variability in the vineyard and influence on fruit and vine development, fruiting zone microclimate, grape ripening and metabolite accumulation; 3. Vineyard management practices and canopy manipulations: influence on vine microclimate, grape ripening and metabolite accumulation. 4. Consulting scientific databases: identifying keywords, extracting useful sources, studying the selected material (teacher-led group activities). Organizing material in multimedia presentations to be presented and discussed with colleagues.
Exam achievements:	Each student presents and debates with teacher and colleagues the scientific material studied during the course. The evaluation takes into consideration the quality of individual and team job; the quality of the oral presentations (both in term of form and content), the participation in the plenary meetings and in the peer evaluation, the acquired skills and knowledge. The students contribute to the final judgment by filling up an evaluation card proposed by the teacher
Forms of media:	Multimedia - International scientific data base
Literature:	A.VV 2004. Viticoltura ed enologia biologica. Edagricole, Bologna. pp363. Keller M., 2010 - The Science of Grapevines: Anatomy and Physiology. Academic Press. pp.400

	AA.VV 2015. La nuova viticoltura. Edagricole - Edizioni Agricole di New Business Media s.r.l., Milano. pp.532. AA.VV. 2016. Progressi in viticoltura. EdiSES, Napoli. pp. 269.
Update:	September 2017

Module name:	**Sustainable viticulture**
Academic Year:	2nd academic year at University of Turin
Semester:	Single period January-May
Module coordinator:	Prof. Osvaldo Failla, University of Milan
Lecturers:	Prof. Osvaldo Failla, University of Milan
Language:	English
Location:	Milan
Teaching format:	Lessons and seminars
Workload:	40 hours
Credit points:	5 ECTS
Requirements under the examination regulations:	none
Recommended prerequisites:	none
Targeted learning outcomes:	The module aims to provide students with some knowledge of both technical and scientific applications allow to the winemaker to better use the variability present in the soil and climatic conditions and in the germplasm of Italian viticulture
Content:	The class focuses on subject that are configured in the learning context of Production and quality of the grapes The module aims to provide students with some scientific knowledge, both technical and application to better use in his profession as a winemaker, the soil and climate variability. In particular, the course will focus some aspects of the origin of Italian viticultural soils, climate and on the characteristics of grape varieties cultivated and on how to address the selection and cultivation of the latter depending on the climatic conditions. 1st ECTS - Introduction: the wine-growing region and grape variety, origin of the mainline denominations, the ecosystem wine 2nd ECTS - Work on 'geological origin of Italian soils, the soil formation, the climatic characteristics and their influence on the annual cycle of the vine and the compositional characteristics of the must 3rd ECTS The interaction genotype x environment. The bases of the interaction, phenotypic stability and assessment of the interaction through zoning 4th ECTS - Answers to quality and production of the main Italian grape varieties to some climatic conditions evaluated through the analysis of some studies case 5th ECTS - Some applications of the precision farming for the improvement varietal of adaptation and the development of a sustainable viticulture
Exam achievements:	Oral examination
Forms of media:	
Literature:	Teaching and bibliographic materials delivered by the teacher to the tutor of the module
Update:	September 2017

Module name:	**Vineyard management in Mediterranean warm and arid area**
Academic Year:	2nd academic year at University of Turin
Semester:	Single period January-May
Module coordinator:	Dr. Antonino Pisciotta, University of Palermo
Lecturers:	Dr. Antonino Pisciotta, University of Palermo
Language:	Italian/English
Location:	Palermo
Teaching format:	Lectures in classroom and in the experimental field. For lectures the teacher makes use of presentations and slides that are available to students. Visit to commercial vineyards and experimental field will be done.
Workload:	40 hours of lectures and 85 of student work
Credit points:	5 ECTS
Requirements under the examination regulations:	none
Recommended prerequisites:	None/Basic knowledge of plant physiology and general viticulture
Targeted learning outcomes:	Ability to find sources of information on cropping systems in viticulture in hot arid environments. Knowledge of sources of information on plant material. Find information and analysis on the environmental variables using geographical information systems and service to viticulture. Ability to critical comparison between the physiological principles learned and applications in the field of management choices in viticulture. Ability to transfer the knowledge to the farmers.
Content:	New vineyard plantation, Plant material selection, soil preparation, fertilization, Trellis system, vineyard management during the vegetative growth, plant density, Development of vineyard mechanization, Plant water status and irrigation, Soil management, cover crops, Vineyard fertilization and their effects on quality grapes, Canopy management, Optimal ripeness and different harvest techniques.
Exam achievements:	Oral
Forms of media:	digitalized
Literature:	Slides and articles available in the library. Different books suggested below can be consulted: - AAVV, Manuale di Viticoltura - (a cura di Matteo Marenghi), Edagricole, Bologna, 2005. - M. Fregoni, Viticoltura di Qualità, Techiche Nuove, III Edizione - 2013 - AAVV, La vite ed il vino, Coltura e cultura- (Bayer CropScience) - 2007. - AAVV Progressi in Viticoltura, (a cura di Maurizio Boselli), Edises, Napoli, 2016. - La nuova viticoltura. Innovazioni tecniche per modelli produttivi efficienti e sostenibili. Alberto Palliotti, Stefano Poni, Oriana Silvestroni. Edagricole - New Business Media, 2015 - General Viticulture. A. J. Winkler (Author), James A. Cook (Author), William Mark Kliewer (Author), Lloyd A. Lider (Author), Laura Cerruti (Editor) - Methodologies and Results in Grapevine Research. Editors: Delrot, S., Medrano, H., Or, E., Bavaresco, L., Grando, S. (Eds.)
Update:	September 2017

Module name:	**Studies on vineyard environments**
Academic Year:	2nd academic year at University of Turin
Semester:	Single period January-May
Module coordinator:	Prof. Giovanni Nieddu, University of Sassari
Lecturers:	Prof. Giovanni Nieddu, University of Sassari
Language:	Italian/English
Location:	Sassari
Teaching format:	Lessons and seminars are the main teaching format used
Workload:	125 hours
Credit points:	5 ECTS
Requirements under the examination regulations:	none
Recommended prerequisites:	none
Targeted learning outcomes:	The course aims to provide basic and technical knowledge on the ecology of the vine and tools useful for the analysis of the environments. Others aims are related to enhance the study methods in order to facilitate a continuous update and to enhance the student's understanding of the interactions between variety and pedo-climatic environment. The educational goal is to develop the student's ability to work alone or in team, to absorb and transfer innovative processes, also evaluating the scientific literature and to use the acquired skills and knowledge.
Content:	The responses of vine to climate, microclimate: the temperature, radiation, light interception, rain, UR and wind. The meteorological trend and its influence on annual growth. The climate during time : the carbon balance and the climate change.The responses of vine to soils: the influence of the physical and chemical characteristics and the water regime. The genesis of soils and their influence on the quality of the wines. The bioclimatic indexes. The zoning of vines in Italy and in the world. The new tools and models for the studies of the viticulture environments. The interactions between genotype /environment and cultural practices. Viticulture and landscape: current studies methodologies. The terroir and the productive and oenological objectives.
Exam achievements:	oral
Forms of media:	Topics are presented as schemes and figures organized in form of power point presentation. Video. Critical visit of websites.
Literature:	Scientific articles and educational material presented during the lectures. Will be referred to the following texts for parties from which to study: Scientific papers and Proceedings of International of congress. M. Fregoni, D. Schuster, A. Paoletti: 2003. Terroir zonazione viticoltura. Ed. Phytoline,
Update:	September 2017

Module name:	**Viticultural pedology**
Academic Year:	2nd academic year at University of Turin
Semester:	Single period January-May
Module coordinator:	Prof. Eleonora Bonifacio, University of Turin
Lecturers:	Prof. Eleonora Bonifacio, University of Turin
Language:	English
Location:	Asti
Teaching format:	The module consists of 30 h lectures and 10 h practicals in the classroom
Workload:	40 hours
Credit points:	5 ECTS
Requirements under the examination regulations:	none
Recommended prerequisites:	none
Targeted learning outcomes:	Understand soil classification according to USDA-Soil Taxonomy. Recognising master and diagnostic soil horizons. Field description of soil profiles.
Content:	1. Pedology and the study of the soil as a natural body: definitions of soil, soil profile, solum and pedon; 2. Soil morphology a. The soil profile. how to describe and recognize soil horizons: morphological properties b. The soil profile. how to describe and recognize soil horizons: physical and chemical properties 3. Soil genesis a. Pedogenesis and factors of soil formation: Jenny's model, soil sequences and soil functions b. the soil parent material: general effect of rock type on soil, physical disgregation and chemical weathering; igneous and metamorphic rocks and their stability towards weathering, bonding energy in minerals c. climate and soil formation: temperature and rainfall, element leaching, translocation, effects of climate on weathering, dynamics of Ca and iron and horizon formation, lessivage, examples of climosequences d. organisms as a factor of soil formation: effects of soil biomass, effects of animals, microrganisms and plants on soil properties e. relief as a factor of soil formation: elevation, slope and aspect, qualitative features of soil toposequences (summit, shoulder, backslope, footslope and toeslope) and relative stability f. effect of time on soil formation: evaluation problems, pedologic and geologic time scales, age of a soil g. relating soil type to main forming processes at the global scale 4. Soil classification a. The main soil classification systems b. The USDA Soil Taxonomy c. The WRB 5. Soil Erosion a. how to estimate soil erosion in viticultural areas b. The USLE model
Exam achievements:	At the end of each topic a test will be given and the results checked and discussed in the classroom. The final examination consists of a written part (an exercise on soil classification, 30 minutes time) and an oral part immediately after. The oral part consists in teh discussion of the results of the written

	exercise, in questions about the topics learned in the course and in the critical comments of a scientific paper on viticultural soils. The paper can be selected among those proposed and available on Moodle, or proposed by the student on the basis of specific interests. The title of the selected paper must be communicated at least one week before the exam.
Forms of media:	
Literature:	Certini G., Ugolni F.C. 2010. Basi di Pedologia. Il Sole 24 ore Ed agricole Sequi P., Ciavatta C., Miano T. (Eds) 2017. Fondamenti di chimica del suolo. Patron Editore, Bologna. (useful to recall previous knowledge and to study the chapter on soil genesis) Driessen et al (Eds.) 2001. Lecture notes on the major soils of the world. World Soil Resources Reports, n. 94, FAO. Roma. (http://www.fao.org/DOCREP/003/Y1899E/y1899e00.htm) Slides shown in the classroom, exercises and additional study material are available on the Moodle platform
Update:	September 2017

Module name:	**Mechanic for precision viticulture**
Academic Year:	2nd academic year at University of Turin
Semester:	Single period January-May
Module coordinator:	Prof. Paolo Balsari, University of Turin
Lecturers:	Prof. Paolo Balsari, University of Turin
Language:	English
Location:	Asti
Teaching format:	The module consists of lectures for which the teacher use Power Point presentations that will be available for students at the beginning of the course.
Workload:	40 hours (8 lecture of 4 hours, 2 practice)
Credit points:	5 ECTS
Requirements under the examination regulations:	none
Recommended prerequisites:	A basic knowledge of mathematic and physic
Targeted learning outcomes:	The student will be able to made an appropriate choice of the main machines used in a winery farm with regards especially to the tractor and to the crop protection equipments and to their environmental sustainability
Content:	Essential of mechanics: labour, power, passive forces, transmission Winery mechanization: history, development and necessity of improvement The concept of precision viticulture Tractor: main component, technical characteristics, and parameters for a correct choice and use in a winery farm Crop protection machines: type and functioning principles Spray and droplet transport system: hydraulic, pneumatic, centrifugal Main elements and parameters responsible of spray production How to choice the correct droplet size Machines for crop protection in a winery farm: classification components, functioning , adjusting and maintenance parameters, choice criteria Machines for weed control: classification components, functioning , adjusting and maintenance parameters, choice criteria Main sprayers environmental requirements to follow EU Directives on Machinery and regarding sustainable use of pesticide The correct disposal of remnant materials from pesticide application Sprayers certification and inspection in Italy and in EU Leaf stripping machines: classification components, functioning , adjusting and maintenance parameters, choice criteria Example of machinery for precision viticulture and evaluation of their possible future development Winery waste management: characterisation of solid and liquid waste and possible management solution
Exam achievements:	The final exam consist in an oral colloquium during witch the student will be evaluated in terms of his capacity to reason and connection between the knowledge acquired During the exam could be ask to the student also to solve some problems related to the lectures topics
Literature:	S Balsari P. et al (2007) "TOPPS: a European project aimed at reducing PPP point sources". Proceedings XIII Symposium on Pesticide Chememistry - Piacenza, 595-600 - Balsari P. et al (2000)" Distribuzione dei fitofarmaci in vigneti con elevata pendenza trasversale: valutazione della possibilità di migliorare la distribuzione

	regolando la posizione degli ugelli" Atti Giornate Fitopatologiche, 1, 277-282 - Balsari P. et al (2016) " Trattamenti fitosanitari in agricoltura di precisione" In Agricoltura di Precisione, Edagricole, pp.301-328 - Douruchowski G., Balsari P., Van De Zande J. (2009) "Development of a crop adapted spray application system for susstainable plant protection in fruit growing" Acta Horticulturae, 824,251-260 - Mahlein A et al (2012) "Recent advances in sensing plant diseases for precision crop protection" European Journal of Plant Pathology, 133, 197-209 - Thiessen at al. (2013) " Site specific sensing for fungicide spraying" In H.Heege (Ed) ,Precision in Crop Farming . Springer, pp.295-311 Web site :http://www.topps-life.org/topps-water-protection-project.html
Update:	September 2017

Module name:	**Advanced machinery and plant engineering in viticulture and enology**
Academic Year:	2nd academic year at University of Turin
Semester:	Single period January-May
Module coordinator:	Prof. Domenico Pessina, University of Milan
Lecturers:	Prof. Domenico Pessina, University of Milan
Language:	English
Location:	Milan
Teaching format:	Theoretical Lesson with numerical applications
Workload:	40 hours
Credit points:	5 ECTS
Requirements under the examination regulations:	none
Recommended prerequisites:	none
Targeted learning outcomes:	- Increase of the knowledge of the operator's safety and ergonomics principles relevant to the mechanization in viticulture; - assessment of the "winery system" in terms of inputs and wastes energy; - acquisition of the theoretical and operational methods for the analysis of simple and complex systems of machinery and plants.
Content:	The module is divided into two areas. **1."Mechanics and mechanization in viticulture" (2.5 ECTS, 20 hours):** - Analysis of the problems relevant to the traveling and the safety of agricultural machinery used in vineyards located on slopes and of most suitable solutions for minimizing the risk in the event of an overturning, with reference to different types of tractor architecture and the relevant influence on the tractor-implement stability (narrow-track, isodiametric and crawler tractors). Aftermarket fitting and correct use of ROPS (Roll Over Protective Structures), auto-ROPS, automatic and manual self-leveling devices, etc.). - presentation of advanced techniques to increase the efficiency of chemicals distribution, in order to minimize environmental (air and soil) pollution and protecting the operators' and consumers' health. Examination of electrostatic devices, chemical recovery systems, innovative nozzle types. Relationship between the micronization degree of the liquid mixture and extent of coverage, choice of the most correct spraying volume and air speed; - analysis of the contamination risk of the operators devoted to the chemical distribution and proper use of the most suitable PPEs; - increase of the efficiency of the grape harvesters quality: optical sensors for automatic sorting, refrigeration and self-calibration systems. **2. "Advanced Plant for enology" (2.5 ECTS, 20 hours):** - The Winery System: Analysis of production factors, the quantification of inputs and outputs. Identification of critical issues. - Renewable energies in the wine industry: heat pumps, photovoltaic systems, the use of vine pruning, geothermal probes. Description of individual technologies and design criteria. The sustainable winery. - The absorption refrigeration systems: principles thermodynamic description of the cycle, types, performance. - The waste from wine making process: rules, characterization, management,

	plant. - The automation in the winery: the ring of regulation, the concept of sensor and actuator. Control strategies (proportional, proportional time, etc..). Application examples in the wine-making machinery.
Exam achievements:	Two oral discussions with the various Professors
Forms of media:	
Literature:	- Handouts provided by the teacher - Lecture notes
Update:	September 2017

Module name:	**Soil management in warm-arid environments**
Academic Year:	2nd academic year at University of Turin
Semester:	Single period January-May
Module coordinator:	Prof. Agata Novara, University of Palermo
Lecturers:	Prof. Agata Novara, University of Palermo
Language:	Italian/English
Location:	Palermo
Teaching format:	Lectures in classroom and in the experimental field.
Workload:	40 hours of lectures and 80 hours of student work
Credit points:	5 ECTS
Requirements under the examination regulations:	None
Recommended prerequisites:	none
Targeted learning outcomes:	The student will be able to evaluate different soil managments with regard to environmental issue and viticulture farm managment
Content:	Overview on different soil management in vineyard over the time and in various bio-climates. Tillage: Conventional tillage, soil management in the intra-row and inter-row. Tillage machines. Minimum tillage and no tillage. Weed control. Cover crop. Effect of cover crop management on soil physical , chemical and biological characteristic, soil erosion, biodiversity, nutrient availability. Description of cover crops suitable for Mediterranean environment. Cover crop management (seeding time, green manure and relating machines Soil management and environmental issues. Soil management and GHGs emission, Nitrate control, vegetative buffer strip.
Exam achievements:	Oral exam
Forms of media:	
Literature:	Lecture notes, Slide and research paper.
Update:	September 2017

Module name:	**Insights into grapevine pathology**
Academic Year:	2nd academic year at University of Turin
Semester:	Single period January-May
Module coordinator:	Dr. Vanda Assunta Prota, University of Sassari
Lecturers:	Dr. Vanda Assunta Prota, University of Sassari
Language:	Italian/English
Location:	Sassari
Teaching format:	Lectures by projections
Workload:	40 hours
Credit points:	5 ECTS
Requirements under the examination regulations:	none
Recommended prerequisites:	Have supported the examination of Pathology of the vine
Targeted learning outcomes:	The student will have to gain a solid scientific knowledge and be able to use scientific methods, and to understand the problems connected to the grapevine diseases and the integrated plant protection.
Content:	General information about the grapevine sanitary status, specific information on systemic diseases (viruses and phytoplasmas diseases) and deepening in symptomatology, etiology, epidemiology and crop protection. Monitoring in the field will provide a practical idea of field diagnosy, latency and recovery phenomenons. Futher, students will exercise in laboratory diagnostic techniques in order to detect the most dangerous grapevine pathogens (plant viruses and phytoplasmas) and their vectors. Meristem tip culture aimed to recover grapevine and eradicate virus agents will be acquired. Development of a disease control plan depending on weather and fenology.
Exam achievements:	Oral examination
Forms of media:	
Literature:	Scientific articles and educational material presented during the lectures
Update:	September 2017

Module name:	**Basic of remote sensing of agriculture**
Academic Year:	2nd academic year at University of Turin
Semester:	Single period January-May
Module coordinator:	Prof. Enrico Corrado Borgogno Mondino, University of Turin
Lecturers:	Prof. Enrico Corrado Borgogno Mondino, University of Turin
Language:	English
Location:	Asti
Teaching format:	The module is composed of theoretical and practical lessons. The former concern basic topics of optical remote sensing and digital photogrammetry. The latter is specifically addressed to traditional image processing workflow (spectral and geometric operations) and statistical computations aimed at translating spectral information into agronomic information. Moreover free WEB resources of remotely sensed satellite data will be presented.
Workload:	40 hours
Credit points:	5 ECTS
Requirements under the examination regulations:	none
Recommended prerequisites:	none
Targeted learning outcomes:	The module will supply fundamentals of multispectral optical remote and digital photogrammetry sensing from satellite/airplane/UAV. In addition, student will be trained in image interpretation and quantitative information extraction from spectral properties of imaged crops. The course introduces students to the most common imaging technics, both ordinary and multispectral, applied in the Precision Farming context. Remote sensing is intended to map crops properties in time and space to derive information useful to support ordinary crop management practices.
Content:	• Introduction to Remote Sensing: definitions and main physical laws • Surface and radiation: reflectance, transmittance, absorbance, emittance, roughness. • Spectral signature of objects; • Radiation and atmosphere: transmission and scattering. Radiative transfer models. • The scheme of a generic multispectral sensor: multispectral imagery characteristics • Satellites for Earth Observation • Basics of image processing • Basics of colorimetry • Imagery radiometric pre-processing • Image georeferencing • Image classification: supervised and unsupervised classifiers; classification validation. • Spectral Indices: NDVI, EVI, SAVI, NDWI. • Relating spectral indices to crop features: vigour, productivity, water potential, etc. • Interpreting maps. Clustering (prescription maps) and estimation (estimate of quantitative agronomic parameters from indices). • Remote sensing from airplane and UAV • Basics of digital photogrammetry • Basics of GNSS • The UAV data processing workflow: flight plan, Ground Control Points

	survey by GNSS, image bundle adjustment, ortho-mosaic generation
Exam achievements:	At the beginning of a new lesson students are required to discuss with professor (10 minutes) about the content of the previous lesson. In this context students are invited to answer some technical questions and proposing their own ones. Exam will be WRITTEN. It includes: a) 4 open questions scoring 5 points each; b) 5 closed questions with the following scores: 1 for correct answer, -0.5 for wrong, 0 for NOT answered; c) on numerical exercise (score = 5) concerning one of the following topics: leveling network adjustment, error propagation, simple and multiple resection, traverse survey, photogrammetric measurements. Total maximum score is 30/30.
Forms of media:	
Literature:	[1] Computer Processing of Remotely Sensed Images. An introduction (3rd edition), P. Mather, 2006. [2] Telerilevamento: Informazione Territoriale mediante immagini da satellite, A. Dermanis, L.Biagi, Casa Editrice Ambrosiana [3] Basics of Geomatics, M.A. Gomarasca, Springer, 2009.
Update:	September 2017

Module name:	**Secondary metabolites in grapevine**
Academic Year:	2nd academic year at University of Turin
Semester:	Single period January-May
Module coordinator:	Dr. Alessandra Ferrandino, University of Turin
Lecturers:	Dr. Alessandra Ferrandino University of Turin
Language:	English
Location:	Alba
Teaching format:	Traditional (+ visit to an organic viticulturist, if possible)
Workload:	40 hours in class
Credit points:	5 ECTS
Requirements under the examination regulations:	none
Recommended prerequisites:	none
Targeted learning outcomes:	Students will learn main phenylpropanoids and volatiles accumulated in grapevine berries and vegetative organs. They will learn the main steps of their biosynthesis and the effects exerted by biotic and abiotic stressors on their accumulation. Students will learn some innovative methods to assess grapevine main secondary metabolite (fluorescence-based spectroscopy for phenylpropanoids and SBSE/GC-MS for grapevine volatile identification and quantification).
Content:	Description of the main secondary metabolites produced by grapevine berries and vegetative organs, focusing on the biological role they cover (hints to their technological role in grape-to-wine transformation will be limited). Main phenylpropanoid and volatile biosynthetic pathways, timing of biosynthesis, and intensity of gene expression. Effects exerted by biotic and abiotic stressors on secondary metabolite accumulation and profiles. Abscisic acid mediation role between stressful events and secondary metabolites. Complex interplay between phenylpropanoid and volatile accumulation.
Exam achievements:	Achievements coming from this course are the knowledge of main grapevine secondary metabolite accumulation steps and timing, with the aim to offer to future vine-agronomists tools to be able to affect their accumulation in the vineyard, directly on the vine. This aspect is undoubtly interesting also in a future perspective, representing a field of investigation for driving secondary metabolite accumulation in berries (influencing wine quality) and secondary metabolite in vegetative organs (influencing vine resistance to pest diseases).
Forms of media:	Power Point presentations
Literature:	Lectures will be organized in seminars where the teacher will describe and comment some literature papers. Students will have access to all of them (normally sharing a Dropbox folder).
Update:	September 2017

Module name:	**Enology in warm and dry climate**
Academic Year:	2nd academic year at University of Turin
Semester:	Single period January-June
Module coordinator:	Dr. Sandra Pati, Univerity of Foggia
Lecturers:	Dr. Sandra Pati, Univerity o f Foggia
Language:	Italian/English
Location:	Foggia
Teaching format:	Ex cathedra lessons and visits to visits to wine establishments.
Workload:	30 hours of lectures and 10 hours of visits to wine establishments. For lectures the teacher makes use of slides that are available to students.
Credit points:	5 ECTS
Requirements under the examination regulations:	none
Recommended prerequisites:	Knowledge of oenology
Targeted learning outcomes:	Students will show knowledge and skills in enology in warm and dry climate, with particular attention to the innovative winemaking technologies which can be effective for the relative problem solving.
Content:	Review on technological, phenolic and aromatic maturities of grape.Acidity and tartaric precipitations. Acidity corrections. Technologies on membrane. Management of fermentations for the enology in warm and dry climate. Cold technology. Technological strategies for the extraction of phenolic compounds. Thermovinification.
Exam achievements:	The final exam is an oral exam of about 30 min. The evaluation will take into account the achieved level of results expected from the course, the ability to connection between the knowledge acquired, the reporting clarity and the correct use of scientific language.
Forms of media:	Video projection, Internet.
Literature:	Ribéreau Gayon P., Dubourdieu D., Donéche P., Lavaud A. -2007- Trattato di Enologia Vol. I e II., Edagricole- Il sole24ore, Bologna. Scientific papers suggested by the teacher
Update:	September 2017

Module name:	**Wine starter microbiology**
Academic Year:	2nd academic year at University of Turin
Semester:	Single period January-June
Module coordinator:	Dr. Vittorio Capozzi, University of Foggia
Lecturers:	Dr. Vittorio Capozzi, University of Foggia
Language:	Italian/English
Location:	Foggia
Teaching format:	Ex cathedra lessons and laboratory practice.
Workload:	5 teaching lessons unit, one seminar and, 1 practical exercitation in microbiology laboratory
Credit points:	5 ETS
Requirements under the examination regulations:	none
Recommended prerequisites:	Knowledge of microbiology.
Targeted learning outcomes:	To get advanced knowledge on wine microorganisms and wine ecology. To learn how to isolate, identify and characterize starter cultures for modern oenology. To manage application of wine starter in winemaking and to face all critic aspects in management of wine starters
Content:	Microbial communities of the vineyard, grape, must and winery. Isolation and count of wine microorganisms.The yeasts: taxonomy and characterization. Reproductive cycle. Isolation and identification methods. Wine yeast. Yeast growth during fermentation processes. Sugar and nitrose methabolism in Yeasts. Genetic breeding. Quality and echnological characters. Yeast autolysis. Set up and scale up of starter yeast cultures. The Use of starter yeasts in wine fermentations. Lactic acid bacteria: general, physiological and metabolic characteristics of wine LAB. The principal wine LAB genera. Isolation, identification and characterization of wine LABs. Growth of LABs in wine. Effect of temperature and ethanol content on LAB growth during fermentation. Bacteriophages. Malolactic fermentation. Wine Starter microorganisms. Isolation, characterization and selection of alcoli and malolactic starters. methods for preparation and storage of wine starters. The use and management of wine starters in oenology. The control and management of stuck fermentation, spoilage, alterations, by the use of wine starter microorganisms. Molecular biology applied to wine starters.
Exam achievements:	Oral; about 20 min. The student will answer to 2 question concerning the program.
Forms of media:	Video projection, Internet
Literature:	Vincenzini M., Romano P., Farris G. A. Microbiologia del vino. Ed. Ambrosiana (2005). Zambonelli, C. Microbiologia e Biotecnologia dei vini. Bologna, Edagricole (2004). Ribereau-Gayon, Dubourdieu, Doneche, Lonvaud: Trattato di enologia. Vo. 1, Edagricole, (2003)
Update:	September 2017

Module name:	**Viticolture and enology policy**
Academic Year:	2nd academic year at University of Turin
Semester:	Second
Module coordinator:	Prof. Antonio Seccia, University of Foggia
Lecturers:	Prof. Antonio Seccia, University of Foggia
Language:	Italian/English
Location:	Foggia
Teaching format:	Ex cathedra lessons; classroom discussions
Workload:	Ex cathedra lessons: 32 hrs; practical activities: 12 hrs.
Credit points:	5 ECTS
Requirements under the examination regulations:	none
Recommended prerequisites:	Knowledge of agriculture economics
Targeted learning outcomes:	The student will learn about the economic and regulatory aspects related to the wine industry, will acquire skills in the interpretation and application of legal rules in specific economic contexts, will be able to understand and solve problems associated with the economic and legal aspects as well as will have decision-making autonomy in relation to the economic and regulatory aspects in terms of both production and marketing.
Content:	1. Introduction to wine economics: production, strategies and markets 2. Institutions and international regulations on the production and marketing of vitivinicultural products 3. Wine law for vitivinicultural products, Protected Designation of Origin (PDO), Protected Geographical Indication (PGI), varietal wines and traditional terms 4. Rules on traceability, HACCP, safety and labelling; Private standards and certifications schemes 5. Case studies
Exam achievements:	Oral
Forms of media:	Video projection; web-sites
Literature:	Notes taken during classroom. Papers given by the lecturer Gregori M., Galletto L., Malorgio G., Pomarici E., Rossetto L. (2017) " Il Marketing del Vino capire decidere agire" , EDISES, Napoli Caldano G., Rossi A. "Codice della Vite e del Vino", Considerare l'ultima edizione disponibile Mariani A., Pomarici E. (2010) "Strategie per il vino italiano", ESI, Napoli. MBRES (2015) "Indagine sulle imprese vinicole" Mediobanca – Ufficio Studi, Milano. Pomarici E., Sardone R. (2009) "L'OCM vino – La difficile transizione verso una strategia di comparto", INEA, Roma. Sabellico A., Martelli G. (2011) "Note pratiche di legislazione vinicola", Milano, Assoenologi.
Update:	September 2017

Module name:	**Vineyard mite control**
Academic Year:	2nd academic year at University of Turin
Semester:	Second
Module coordinator:	Prof. Antonella Marta Di Palma, University of Foggia
Lecturers:	Prof. Antonella Marta Di Palma, University of Foggia
Language:	Italian/English
Location:	Foggia
Teaching format:	Ex cathedra lessons and laboratory practice.
Workload:	The course consists of 36 hours of lectures and 6 hours devoted to laboratory work. For lectures the teacher will use slide presentations that will be available for the students.
Credit points:	5 ECTS
Requirements under the examination regulations:	none
Recommended prerequisites:	Knowledge of zoology.
Targeted learning outcomes:	The student must be able to recognize in the field the presence of different mite species, symptoms and damage and hence be able to organize an integrated pest management program.
Content:	General part. Phylum Artropoda: general morphology and biology. Phylogeny and Classification. Arachnida and Acarina: general morphology, internal anatomy, biology, ethology, ecology, reproduction, embryonic e post-embryonic development. Vineyard Mites: damage, ecology, population dynamic, monitoring, IPM. Predatory mites and Suppliers of Natural Enemies. Systematic. Vineyard Mites: Tetranychidae: Panonychus ulmi, Tetranychus urticae, Eotetranychus carpini, Tenupalpidae: Brevipalpus lewisis, Eriophyidae: Calepitrimerus vitis, Colomerus vitis, Eriophyes oculivitis. Predators: Phytoseiidae.
Exam achievements:	The final exam is an oral exam of about 20 minutes with questions on at least four topics of the program.
Forms of media:	Video projection; Internet.
Literature:	Ragusa S. Tsolakis H. La difesa della vite dagli artropodi dannosi. Università degli studi di Palermo. Zangheri L. Pellizzari Scaltriti G. – Parassitologia animale dei vegetali. C.L.E.U.P. Padova. AA.VV. - Manuale di Zoologia Agraria. Antonio Delfino Editore AA.VV. World crop pests. Spider mites: Their biology, natural enemies and control. Vols 1A and 1B. Helle and Sabelis (eds), Elsevier Science Publishers. Lecture notes.
Update:	September 2017

Module name:	**Physiology and quality of grapevine production in warm and dry climate**
Academic Year:	2nd academic year at University of Turin
Semester:	Single period January-June
Module coordinator:	Prof. Laura de Palma, University of Foggia
Lecturers:	Prof. Laura de Palma, University of Foggia
Language:	Italian/English
Location:	Foggia
Teaching format:	Ex cathedra lessons and practical activities
Workload:	Ex cathedra lessons: 32 hrs; practical activities in vineyard and in laboratory: 16 hrs
Credit points:	5 ECTS
Requirements under the examination regulations:	none
Recommended prerequisites:	Good knowledge of grapvine biology and growing techniques, grape quality and evaluating methods; basic knowledge of plant ecophysiology.
Targeted learning outcomes:	The student, by recalling previous knowledge of plant physiology as related to the agro-environmental conditions, must: - learn how to use indicators of bio-physiological status and related stress conditions; - understand the influence of the vineyard management on the vine bio-physiological status; - be able to elaborate growing strategies to improve grape quality and productivity under semi-arid environmental conditions.
Content:	After recalling knowledge on the main climate types, grapevine climatic requirements, the following topics will be treated: rootstock and grapevine cultivar response to draught and thermal excess; influence of the main climatic factors and of the vine water status on grape composition; dynamics of phenol compound production and influence of environmental factors; diurnal and seasonal patterns of main parameters of ecophysiological leaf functionality as related to vine water status. The gained knowledge will be applied to understand: influence of climate changing on viticulture and methods to face their effects; response of grapevine genotypes to multiple environmental stresses (water-temperature-light).
Exam achievements:	Oral. The student will answer to 2 main questions focused on the teaching program, plus minor questions in order to provide details.
Forms of media:	Projections, Internet
Literature:	Fregoni M., Viticoltura di Qualità. Ed. Phytoline, 2005. Carbonneau A., Deloire A., Jaillard B., 2007. La vigne. Dunod, Paris. Technical and scientific paper provided by the teacher.
Update:	September 2017

Module name:	**Marketing strategies to improve Sicilian wines**
Academic Year:	2nd academic year at University of Turin
Semester:	Single period January-May
Module coordinator:	Prof. Stefania Chironi, University of Palermo
Lecturers:	Prof. Stefania Chironi, University of Palermo
Language:	Italian/English
Location:	Palermo
Teaching format:	The module consists of 40 hours frontal lessons; for frontal lessons the teacher makes use of presentations and slide and a book of lecture notes of the course specially prepared and available to students that they will be able to rely in order to deepen the study
Workload:	40 hours
Credit points:	5 ECTS
Requirements under the examination regulations:	none
Recommended prerequisites:	none
Targeted learning outcomes:	The module fits in the learning economy, marketing and wine culture, it aims to provide students with the basic elements for the study of marketing and especially the agri-food marketing, with an in-depth study about the wines of the region Sicily
Content:	The module is part of the areas of the knowledge ECONOMY, MARKETING, CULTURE WINE Introduction: wine marketing and communication The role of marketing in business and society and its evolution over time Basic concepts of marketing: marketing tools, the 4 P's of marketing (marketing mix). The guidelines of the company to the market: the production concept, product, selling, marketing, social marketing, local marketing, wine marketing The process of marketing and planning: analysis of opportunities, research target markets, developing marketing strategies, planning marketing activities, implementation and control. Market segmentation and definition of target markets Consumer behavior The brand: importance for the consumer The model of the life cycle of the product and price policies The communication strategies and communication techniques Communicating the wine: the language, the image, the perfect slogan The label as a marketing tool of the wine
Exam achievements:	The final exam consists of an oral exam that provides ability to reason and the connection between the knowledge acquired during the module
Forms of media:	
Literature:	P. Kotler; V. Scott*:* *Marketing management* - ISEDI Editore W.J. Stanton; R. Varaldo : *Marketing* – Il Mulino Editore E. Rouzet; G.Seguin: Il marketing del vino – Ed agricole Cinelli Colobini D.: Il marketing del turismo del vino. I segreti del business e del turismo in cantina. Edizioni AGRA S. Chironi: Appunti delle lezioni del corso di "Marketing per la valorizzazione dei vini siciliani" dispense preparate dal docente.
Update:	September 2017

Module name:	**Tablegrape protected cultivation**
Academic Year:	2nd academic year at University of Turin
Semester:	Single period January-June
Module coordinator:	Prof. Laura de Palma, University of Foggia
Lecturers:	Prof. Laura de Palma, University of Foggia
Language:	English
Location:	Foggia
Teaching format:	Ex carhedra lessons and practical activities.
Workload:	Main lectures. Ex cathedra lessons: 16 hrs; practical activities: 12 hrs. Supplementary lectures: ex cathedra lessons: 12 hrs, practical act.: 6 hrs.
Credit points:	5 ECTS
Requirements under the examination regulations:	none
Recommended prerequisites:	Good preliminary knowledge of grapvine biology and growing techniques, parameters of grape quality and related evaluating methods, entomology and methods to contrast grapevine phytophagous.
Targeted learning outcomes:	Growing grapevines under protected structures, practical/physiological implications, influences on grape quality/yield. Planning integrated and organic pest management applying the most recent techniques for sustainable protection and preserving functional biodiversity.
Content:	Main lectures. Origin of protected cultivation in Italy. Types of structures. Netting tablegrape vineyards; main types and implications. Plastic sheet covering; main types and purposes. Early covering and late covering techniques. Photoselective plastic sheet covering. Practical activities: assessing plastic film radiometric properties. Visit to protected vineyards. Supplementary lectures. Principles of arthropod pest management under coverings. Arthropod biodiversity. The foundation of IPM. Alternatives to chemical control. IPM in organic viticulture. Examples of pest thresholds. Geographic models used in grape IPM. Biological control. Pratical activities: visit to vineyards with innovative management approaches.
Exam achievements:	Oral. Two main questions per each part of the course. The student must demonstrate knowledge and understanding of the theoretical topics and of their practical applications. The exposition wil be evaluated as well.
Forms of media:	Projections, Internet
Literature:	Main lectures. Technical and Scientific papers provided by the lecturer. Slides from the lessons. Supplementary lectures. Arthropod Management in Vineyards: Pests, Approaches and Future Directions. Bostanian, NoubarJ., Vincent, Charles, Isaacs, Rufus (Eds.). Ragusa S. Tsolakis H. La difesa della vite dagli artropodi dannosi. Università degli studi di Palermo.
Update:	September 2017

Module name:	**Tablegrape processing**
Academic Year:	2nd academic year at University of Turin
Semester:	Single period January-June
Module coordinator:	Dr. Sandra Pati, University of Foggia
Lecturers:	Dr. Sandra Pati, University of Foggia
Language:	English
Location:	Foggia
Teaching format:	Ex cathedra lessons; practical activities and classroom discussions
Workload:	24 hrs lectures; 24 hrs case studies and practical activities
Credit points:	5 ECTS
Requirements under the examination regulations:	none
Recommended prerequisites:	Knowledge of food technologies and of microbiology.
Targeted learning outcomes:	Basing on the knowledge of the biological variability of the raw material, the student will learn how to use the information about tablegrape characteristics in order to steer the process towards the most suitable type of final product; understand the influence of the process variables on the characteristics of the final product; be able to manage and control processes; know the tablegrape microbiology to manage the microbiological problems derived by processes.
Content:	Hints concerning table grape composition and indicators of grape quality. Production of not fermented, partially fermented, fermented and probiotic table grape juices. Production of purees with high concentrations of nutraceutical. Stabilization of juice and purees. Composition of the final products made with table grape varieties. Practical activities: projection of video concerning grape processing Use of innovative methods for the microbiological stability of tablegrape and final products.
Exam achievements:	Oral examination. The student will answer to 5 questions, including one on a topic chosen by the student. The student will have to demonstrate knowledge and understanding of the theoretical topics and capacity to apply the knowledge to the management of the table grape processing.
Forms of media:	Video projection, Internet
Literature:	Electronic and printed materials supplied by the lecturer.
Update:	September 2017

Module name:	**Tablegrape innovation**
Academic Year:	2nd academic year at University of Turin
Semester:	Second
Module coordinator:	Dr. Antonino Pisciotta, University of Palermo
Lecturers:	Dr. Antonino Pisciotta, University of Palermo
Language:	English
Location:	Palermo
Teaching format:	Lectures in classroom and in the experimental field. For lectures the teacher makes use of presentations and slides that are available to students. Visit to commercial vineyards and experimental field will be done.
Workload:	40 hours of lectures and 85 of student work
Credit points:	5 ECTS
Requirements under the examination regulations:	
Recommended prerequisites:	Basic knowledge of plant physiology and general viticulture
Targeted learning outcomes:	Transfer the scientific and technical knowledge necessary to know the specifics of the table grape compartment. Acquire the knowledge necessary to understand the possible answers of table grapes to variations in environmental factors and cultivation. Understand the physiological processes that allow table grape varieties to tolerate/overcome/recover abiotic stress conditions and the criteria for deciding whether and how to intervene to favor/Interfere with certain essential biological processes for fructification purposes. Disseminates the knowledge and skills necessary to establish and manage vineyards of table grapes, in relation to the different production objectives and the different types of plant. It also allows the holistic approach to understand climate relations, biotic stresses, crop. Ability to relate the various factors that contribute to determining the productive result in the table grape sector by adjusting the choices to change the socio-economic conditions of the market and the product's destination taking into account the most recent technical innovations that can contribute to achieving the production goals.
Content:	The table grape sector in the World, Italy and Sicily. The productive objectives in the table grape sector. The specifics of genetic improvement. Ecology. The "vineyard system" in modern table grape viticulture. Architecture of table grape vineyards, description of the breeding methods and vine pruning types and criteria of choice. Physiological pruning bases Source-sink relationship, Soil management, Irrigation, fertigation, Vineyard establishment for early and late production. Innovations of production process..
Exam achievements:	
Forms of media:	Slides presentation
Literature:	Slides and articles available in the library. Different books suggested below can be consulted: AAVV, Manuale di Viticoltura - (a cura di Matteo Marenghi), Edagricole, Bologna, 2005. M. Fregoni, Viticoltura di Qualità, Techiche Nuove, III Edizione - 2013 AAVV, La vite ed il vino, Coltura e cultura- (Bayer CropScience) - 2007. AAVV Progressi in Viticoltura, (a cura di Maurizio Boselli), Edises, Napoli, 2016. La nuova viticoltura. Innovazioni tecniche per modelli produttivi efficienti e

	sostenibili. Alberto Palliotti, Stefano Poni, Oriana Silvestroni. Edagricole - New Business Media, 2015 General Viticulture. A. J. Winkler (Author), James A. Cook (Author), William Mark Kliewer (Author), Lloyd A. Lider (Author), Laura Cerruti (Editor) Methodologies and Results in Grapevine Research. Editors: Delrot, S., Medrano, H., Or, E., Bavaresco, L., Grando, S. (Eds.)
Update:	September 2017

Module name:	**Economics of food safety and nutrition**
Academic Year:	2nd academic year at University of Turin
Semester:	Single period January-May
Module coordinator:	Prof. Antonio Stasi, University of Foggia
Lecturers:	Prof. Antonio Stasi, University of Foggia
Language:	English
Location:	Foggia
Teaching format:	Ex cathedra lessons; practical activities and classroom discussions
Workload:	Ex cathedra lessons 32 hrs; classroom discussions 12 hrs.
Credit points:	5 ETCS
Requirements under the examination regulations:	none
Recommended prerequisites:	Knowledge of economy and of food safety
Targeted learning outcomes:	Knowledge and skills on economy of nutrition and of food safety. Ability in presenting scientific report in English. Ability in using data properly, adopting excel for statistical programming. Learning how to participate in work groups and assuming own responsabilities
Content:	Recalls on economic theory, welfare economy and demand analysis. Introduction of econometric models to evaluate the effects of gro-alimentary policies on community wellfare markets evolution. Case studies
Exam achievements:	Oral
Forms of media:	Video projections, web-sites
Literature:	Economics of food safety. Ed by J. Caswell, Elsevier Press, 1991 Valuing food safety and nutrition. Ed. by J. Caswell, Westview Press, 1995 The economics of reducing health risk from food. Conference proceedings, Ed by J. Caswell, Food Marketing Policy Center, 1996 Environmental regulation and food safety. Ed by V. & Jha, E. Elgar, 2005 Strategy and policy in the food system. Conference proceedings, Ed. by J. Caswell & R.W.Cotterill, Food Marketing Policy Center, 1996
Update:	September 2017

Module name:	**Tablegrape soiless cultivation**
Academic Year:	2nd academic year at University of Turin
Semester:	Second
Module coordinator:	Prof. Rosario Di Lorenzo, University of Palermo
Lecturers:	Prof. Rosario Di Lorenzo, University of Palermo
Language:	English
Location:	Palermo
Teaching format:	Lectures in classroom and in the experimental field. For lectures the teacher makes use of presentations and slides that are available to students. Visit to commercial vineyards and experimental field will be done.
Workload:	40 hours of lectures and 85 of student work
Credit points:	5 ECTS
Requirements under the examination regulations:	none
Recommended prerequisites:	Basic knowledge of plant physiology and general viticulture
Targeted learning outcomes:	Provide the knowledge necessary to make the right choices in the plant and in the management of out-of-table grape plants. Tackle the main issues related to the cultivation of table grapes in the ground. Highlight the strengths and weaknesses of the "table grapes".Know to understand and handle the issues related to the typology of table grapes on the ground. Know how to evaluate for different environments and productive goals the opportunity to take out the ground
Content:	Panoramic view of table grapes in the world, Italy and Sicily, Process and product innovations in table grapes, Out of ground: strengths and weaknesses, Choice of containers and substrates, Choice of variety for off-the-ground, The vineyard system in the ground: training and production cycle, Climate management in the off-shore greenhouse, Management of the plant grown on the ground, Water and mineral nutrition in the groundness.
Exam achievements:	Oral
Forms of media:	Slides presentation
Literature:	Slides and articles
Update:	September 2017

Module name:	**Vineyard and / or Winery Stage**
Academic Year:	2nd academic year
Semester:	3rd or 4th semester of the Vinifera EuroMaster degree programme
Module coordinator:	Master thesis tutor
Lecturers:	----------
Language:	Italian/English
Classification within the curriculum:	All specializations
Teaching format:	Internship
Workload:	275 h
Credit points:	5
Requirements under the examination regulations:	----------
Recommended prerequisites:	----------
Targeted learning outcomes:	Stage linked to the Master thesis
Content:	Master thesis research argument
Exam achievements:	----------
Forms of media:	----------
Literature:	----------
Update:	September 2017

Module name:	**Master Thesis** **at the Consortium among the Universities of Turin, Milan, Palermo, Foggia and Sassari**
Academic Year:	2nd academic year at Consortium among the Universities of Turin, Milan, Palermo, Foggia and Sassari
Semester	3rd or 4th semester
Module coordinator:	General coordination by Prof. Vittorino Novello, University of Turin
Supervisors:	Academic staff of the Consortium among the Universities of Turin, Milan, Palermo, Foggia and Sassari, and academic staff members of the EMaVE Consortium and associated partners.
Language:	English
Classification within the curriculum:	Core module
Teaching format	The Thesis consists of the elaboration of a written report about an independent scientific work of the student and a defense.
Workload:	20 weeks for the elaboration of the thesis; plus adequate time for personal preparation for the defence
Credit points:	25 ECTS
Requirements under the examination regulations:	Admission to the thesis is granted if the student has - successfully completed the modules of the first academic year. Admission to the defence is granted under the condition that: - the written report was evaluated at least with the grade "E - pass"; - the student has completed all other compulsory modules of the second academic year successfully and obtained at least 120 ECTS (including the ECTS allocated to the Master Thesis)
Recommended prerequisites:	----------
Targeted learning outcomes:	The student is able to carry out scientific research independently in a given time implementing adequate scientific methods. In addition the student is able to present his/her results to a jury and answers questions related to the field of research.
Content:	Thesis document
Exam achievements:	Delivery of a written thesis report at the submission date, prepared under formal requirements of the University of Turin . Thesis defence in front of an examination jury of at least 3 academic members according to no 13.2 of the Study and Examination Regulations of the Vinifera EuroMaster degree programme.
Forms of media:	Research methods depending on the topic of the thesis. Written report; presentation media for the defence.
Literature:	Books and scientific papers related to the topic of the thesis. The literature research is part of the Master Thesis.
Update:	September 2017

MODULES offered by
Universidad Politécnica de Madrid

Students of the Vinifera EuroMaster degree programme have to attend the following modules in the second academic year (M2):

- 7 Core modules 30 ECTS
- Master Thesis 30 ECTS

Core Modules

Module	ECTS points
Microbiological and Physicochemical Stabilization of Wines from Dry Regions	6
Training Design and Practices for Viticulture in Dry Regions	5
Wine Technology in Wines from Dry Mediterranean Regions	4
Viticulture in Dry Mediterranean Regions/Spanish Grape cultivars	4
Marketing and Diffusion in Spanish Wine Sector	6
Vine pests and diseases in dry regions	3
Study Trip – Spanish Wines	2
Total	**30**

Module name:	**Microbiological and Physicochemical Stabilization of Wines from Dry Regions**
Academic Year:	2nd academic year at Universidad Politécnica de Madrid
Semester:	3rd semester
Module coordinator:	José Antonio Suárez Lepe, Prof. Ph.D (Universidad Politécnica de Madrid)
Lecturer:	José Antonio Suárez Lepe, Prof. Ph.D; Carmen González Chamorro, Prof. Ph.D; Pedro Tienda Priego, Prof. Ph.D; Jose Barcenilla Moraleda, Dr.; Antonio Morata Barrado Prof. Ph.D (Universidad Politécnica de Madrid)
Language:	Spanish
Classification within the curriculum:	Module of Specialisation at Universidad Politécnica de Madrid
Teaching format:	Regular lectures, laboratory exercises during the semester
Workload:	Face to face lectures: 30 h; laboratory exercises: 45 h; Student's personal study time in the module: 105 h
Credit points:	6 ECTS
Requirements under the examination regulations:	----------
Recommended prerequisites:	Wine microbiology, grape and wine composition, wine chemical analysis.
Targeted learning outcomes:	Students are familiar with microbiological strategies and biotechnologies to improve wine fermentation in dry regions. They possess an advanced knowledge to manage typical disequilibria in musts and wines of dry Mediterranean regions concerning acidity, alcohol content, colour, metabolic profile etc. They know the microbiological and analytical techniques to check the quality and evolution of fermentation and aging processes. The students are skilled to manage alcoholic and malolactic fermentations in dry regions. They are able to apply special maceration and extraction processes to increase quality and they possess the skills for the management of the alterations during stabilization and aging. Students are competent to evaluate biotechnological process in wineries. They have the capacity to take technical decisions according to analytical -results in dry regions. They are able to evaluate and to control microbiological and physicochemical alterations in Mediterranean regions
Content:	<u>Microbiology</u>: Yeast selection and fermentation biotechnologies to improve technical and sensorial parameters in dry regions. Colour stabilization, pyranoanthocyanin formation, malic acid

	production, increase of glycerine and polysaccharides. Microbiological alterations in Mediterranean regions and strategies to manage these problems. LAB alterations, TCAs, Dekkera/Brettanomyces and ethylphenols. Advanced management of biological ageing. Over lees ageing in red and white wines, film aging. New perspectives in fermentation. New biotechnologies, use of no Saccharomyces. Microbiological analysis: Analytical management of malolactic fermentation. Techniques for yeast characterization (molecular and conventional). Analytical determination of spoilage molecules from microbial activity. Physicochemistry: Advanced physicochemical techniques to improve/control acidity/ph. Techniques to reduce alcoholic degree. Techniques to reduce sulphites addition in dry regions. Management of wines to increase self life with good aromatic profile. Instrumental analysis: Spectrophotometric determinations of phenols PDA-Spectrophotometry Enzymatic analysis Atomic Absorption Spectrophotometry GC-FID (liquid injection and purge and trap injection) GC-MS (liquid injection and SPME) LC-DAD-RI LC-ESI/MS NIRS-FT
Study / exam achievements:	Written examination and laboratory reports
Forms of media:	Multimedia presentations and demonstrations, conventional media, videos, laboratory presentations.
Literature:	Morata, A., Loira, I. Eds. (2016). Grape and wine biotechnology. Intech pp: 458 ISBN 978-953-51-2693-5; Print ISBN 978-953-51-2692-8 Open Access http://dx.doi.org/10.5772/61694 Suárez Lepe, J. A., Morata, A. 2015. Levaduras para vinificación en tinto. pp 350 Ed. Antonio Madrid Vicente Ediciones, Madrid, España ISBN: 978-84-943451-9-7 RIBEREAU-GAYON, P. ; GLORIES, Y. ; MAUJEAN, A. ; DUBORDIEU, D.: Handbook of Enology. Vol. 2. The Chemistry of Wine Stabilization and Treatments. Wiley, New York, 2001. RIBEREAU-GAYON, P. ; GLORIES, Y. ; MAUJEAN, A. ; DUBORDIEU, D.: Handbook of Enology. Vol. 2. The Chemistry of Wine Stabilization and Treatments. Wiley, New York, 2001.

	BOULTON, R. B. ; SINGLETON, V. L. ; BISSON, L. F. ; KUNKEE, R. E.: Principles and Practices of Winemaking. Chapman and Hall, New York, 1996. SUAREZ LEPE, J. A. ; ÍNIGO LEAL, B.: Microbiología Enológica. Fundamentos de vinificación. Ed. Mundiprensa, Madrid, 2004. SUAREZ LEPE, J. A. ; LEVADURAS, V.:Funcionalidad y Uso en Bodega. Ed. Mundiprensa, Madrid, 1997. FLANZY, C.: Fundamentos Científicos y Tecnológicos. Ed AMV y Mundiprensa, Madrid, 2000. SCI Journals American Journal of Enology and Viticulture. Australian J. of Grape and Wine Research. South African Journal of Enology and Viticulture. Journal International des Sciences de la Vigne et du Vin. Journal of Agricultural and Food Chemistry. Food Chemistry. International Journal of Food Microbiology. Journal of Applied Microbiology.
Update	September 2017

Module name	**Training Design and Practices for Viticulture in Dry Regions**
Academic Year	2nd academic year at the Universidad Politécnica de Madrid
Semester	3rd semester
Module coordinator	Vicente Sotés Ruiz, Prof. Ph.D (Universidad Politécnica de Madrid)
Lecturer	Vicente Sotés Ruiz, Prof. Ph.D; José Ramón Lissarrague García-Gutiérrez, Prof. Ph.D; Pilar Baeza Trujillo, Prof. Ph.D; (Universidad Politécnica de Madrid)
Language	Spanish
Classification within the curriculum	Module of Specialisation at Universidad Politécnica de Madrid
Teaching format:	Regular lectures and practical exercises during the semester
Work load	Face to face lectures: 45 h; practical exercises: 15 h; Student's personal study time in the module: 90 h
Credits points	5 ECTS
Requirements under the examination regulations	----------
Recommended prerequisites	Vine anatomy, morphology and biology; Vine ecology; Basis on soil science knowledge and fundamentals on Terroir; Fundamentals on vine pests and control media
Targeted learning outcomes	Students possess the knowledge to evaluate the environmental potential for vine growing in a given area. They know how to establish an irrigation program based on objectives and resources. They are familiar with the irrigation management based on plant observations, soil water control, atmosphere demand and weather forecast. The students are familiar with the different canopy management systems suitable for different environments, cultivars and objectives. They know how to adapt and optimize the resources – radiation, water, soil fertility, etc.- to the objectives fixed by the winemaker or the company and they know how to establish a soil management program adapted to vineyard conditions: soil, climate, variety, rootstock and the winemaker's requirements. The students are able to find out new solutions concerning training design and viticulture adapted to upcoming challenges: new laws, machinery , or current demanded products. They are skilled to improve the efficiency of the viticulture practices. They are capable for conducting education programmes and research within the industry
Content	Effects of dry, warm climate on must composition parameters:

	Berry size Sugar download to berry under hot environments Uncouple saccharimetric and phenolic maturity Factors affecting acidity synthesis and breakdown in the berry Hazards during berry maturity as due to hot climate: sugar blockage, shriveling, raisin, small berry size Viticultural Practices: Basis on Irrigation applied to warm and Mediterranean regions Irrigation strategies. How to couple saccharimetric and skin maturation. Water management when water is a scarce well. Irrigation management to affect particular yield components. Evaluation of the vineyard potential productivity. Irrigation control: atmosphere, soil and plant. Pruning and trellising Canopy management Soil management for Mediterranean vineyards
Study/exam achievements	Written examination and reports on practical exercises
Forms of media	Multimedia presentations, field practices
Literature	COOMBE B. G. ; DRY, P. R.: Viticulture Vol 1.Resources. Winetitles, Adelaide, 2004. COOMBE, B: G. ; DRY, P. R.:Viticulture Vol 2. Practices. Winetitles, Adelaide, 2006. INGELS, C. A. ; BUGG, R. L. ; MCGOURTY, G. T. ; CHRISTENSEN, L. P.: Cover Cropping in Vineyards: A Grower's Handbook. Winetitles, Adelaide, 1998. GLADSTONES, J.: Viticulture and Environment. Winetitles, Adelaide, 2002. JACKSON, D.: Monographs in Cool Climate Viticulture - 2. Climate. Adelaide, 2001. MULLINS, M. G. ; BOUQUET, A. ; WILLIAMS, L. E.: Biology of the grapevine. Cambridge University Press, 1992. WHITE, R. E.: Soils for Fine Wines. Oxford University Press, New York, 2003. SMART, R. ; ROBINSON, M.: Sunlight into Wine: A Handbook for Winegrape Canopy Management. Winetitles, Adelaide, 2006. BAEZA, P. ; LISSARRAGUE, P. ; SANCHEZ, P.: Fundamento y aplicación del riego en la vid. Ed. Agrícola Española, Madrid. 2007. HUGLIN, P. ; SCHNEIDER, C.: Biology and écologie de la Vigne. Payot-Lausanne, Rustica, 1998. MARTINEZ DE TODA, F.: Biologia de la vid. Mundi-Prensa, Madrid, 1991. Acta Horticulture. GESCO and GiESCO. American Journal of Enology and Viticulture. Australian Journal of Grape and Wine Research. HortTechnology. Journal International des Sciences de la Vigne et du Vin. Irrigation Science.

	Le Progrès Agricole et Viticole. Rev. Suisse de Vitic. Arboric. Hortic. Spanish Journal of Agricultural Research. Scientia Horticulturae. South African Journal of Enology and Viticulture. Viticultura y Enología Profesional. Vitis.
Update	September 2017

Module name:	**Wine Technology in Wines from Dry Mediterranean Regions**
Academic Year:	2nd academic year at Universidad Politécnica de Madrid
Semester:	3rd semester
Module coordinator:	Fernando Calderón Fernández, Prof. Ph.D (Universidad Politécnica de Madrid)
Lecturer:	Fernando Calderón Fernández, Prof. Ph.D; Pedro Tienda Priego, Prof. Ph.D; Antonio Morata Barrado, Prof. Ph.D; José Antonio Suárez Lepe, Prof. Ph.D (Universidad Politécnica de Madrid)
Language:	Spanish
Classification within the curriculum:	Module of Specialisation at Universidad Politécnica de Madrid
Teaching format:	Regular lectures during the semester
Workload:	Face to face lectures: 45 h Student's personal study time in the module: 75 h
Credit points:	4 ECTS
Requirements under the examination regulations:	----------
Recommended prerequisites:	Conventional red and white wine making
Targeted learning outcomes:	Students understand the processes of wine stabilization in dry regions. They know the technology for making wines with a high alcoholic degree and low acidity and are familiar with special wines like Sherry wines, Porto and Madeira wines, Noble rot wines. The students have advanced skills in winemaking in dry regions. They are able to manage wine stabilization in dry regions. They can apply and develop strategies for quality management. The students have the capacity to improve wine quality with unbalanced grapes from dry regions. They are able to develop strategies to increase shelf life of products in warm regions.
Content:	Refrigeration engineer in warm regions: Refrigeration necessities during elaboration, stabilization and conservation; Climatization of wineries and aging cellars Special strategies for winemaking in warm regions Wine conservation: Inert gases in wine making Wine stabilization Bottling and other package systems Special wines: Sherry wines: wine technology and microbiology and biochemistry of aging; Porto wines: wine technology and aging.; Madeira wines: wine technology and ageing; Liquor wines; Spirits.
Study / exam achievements:	Written examination

Forms of media:	Multimedia presentations and demonstrations, conventional media, videos
Literature:	Morata, A., Loira, I. Eds. (2016). Grape and wine biotechnology. Intech pp: 458 ISBN 978-953-51-2693-5; Print ISBN 978-953-51-2692-8 Open Access http://dx.doi.org/10.5772/61694 BOULTOB, R. B. ; SINGLETON, V. L. ; BISON, L. ; KUNKEE, R. E.: Teoría y práctica de la elaboración del vino. Editorial Acribia, Zaragoza, 2002. FLANZY, G. M.: Enología. Fundamentos científicos y tecnológicos. Ed. AMV- Mundi-Prensa, Madrid, 2000. HIDALGO, J.: Tratado de Enología. Tomo I y II. Ed. Mundi-Prensa, Madrid, 2003. RIBEREAU-GAYON, P. ; GLORIES, Y. ; MAUJEAN, A. ; DUBOURDIEU, D.: Tratado de Enología. 1. Microbiología del vino. Vinificaciones. Editorial Hemisferio Sur- Mundi-Prensa, Buenos Aires, Madrid, 2002. RIBEREAU-GAYON, P. ; GLORIES, Y. ; MAUJEAN, A. ; DUBOURDIEU, D.: Tratado de Enología. 2. Química del vino. Estabilización y Tratamientos. Editorial Hemisferio Sur- Mundi-Prensa, Buenos Aires, Madrid, 2002. SUAREZ, J. A. ; IÑIGO, B.: Microbiología enológica. Fundamentos de vinificación. Ed. Mundi-Prensa, Madrid, 2004. TROOST, G.: Tecnología del vino. Ed. Omega,. Madrid, 1980. ZAMORA, F.: Elaboración y crianza del vino tinto. Aspectos científicos y prácticos. AMV Ediciones, Madrid, 2003.
Update	September 2017

Module name	**Viticulture in Dry Mediterranean Regions / Spanish Grape cultivars**
Academic Year	2nd academic year at the Universidad Politécnica de Madrid
Semester	3rd semester
Module coordinator	Vicente Sotés Ruiz, Prof. Ph.D. (Universidad Politécnica de Madrid)
Lecturer	Vicente Sotés Ruiz, Prof. Ph.D; José Ramón Lissarrague García-Gutiérrez, Prof. Ph.D; Pilar Baeza Trujillo, Prof. Ph.D; Vicente Gómez-Miguel, Ph.D; Pedro Junquera González, (Universidad Politécnica de Madrid)
Language	Spanish
Classification within the curriculum	Module of Specialisation at Universidad Politécnica de Madrid
Teaching format:	Regular lectures and field exercises during the semester; study trips to Spanish vine-growing regions
Work load	Face to face lectures and field exercises: 60 h; Student's personal study time in the module: 60 h
Credits points	4 ECTS
Requirements under the examination regulations	----------
Recommended prerequisites	Vine anatomy, morphology and biology,vine ecology, basis on soil science knowledge and fundamentals on Terroir, fundamentals on vine pests and control media
Targeted learning outcomes	Students know the methodology for the evaluation of the environmental potential of a given area for vine growing. They are able to decide on the best rootstock and cultivar performance for any potential vine growing area. They are able to evaluate the potential of new varieties in an area. Students know how to determine the soil factors affecting vine performance and how to identify possible problems and how to find out the techniques to solve them. They know the factors affecting planting and new plants care in a dry, hot area.
Content	Environmental characteristics of the Spanish vineyards: Vine-growing regions; cultivars and rootstocks Table grapes growing in Spain: General scope; cultivars and rootstocks; particular field practices for table grapes growing. Zoning and Terroir: Basis and methodology applied to Spanish and South-America vine growing regions Vineyard establishment: Objectives of the vineyard; vineyard design; plant material; care and training of young vines
Study/exam achievements	Written examination, reports on practical exercises

Forms of media	Multimedia presentations, practical demonstrations in the field
Literature	BETTIGA, L.: Wine grapes varieties in California. ANR publications, 2003. COOMBE, B. G. ; DRY, P. R.: Viticulture Vol 1.Resources. Winetitles, Adelaide, Australia, 2004. COOMBE, B. G. ; DRY, P. R.: Viticulture Vol 2. Practices. Winetitles, Adelaide, Australia, 2006. GLADSTONES. J.: Viticulture and Environment. Winetitles, Adelaide, Australia, 2002. JACKSON, D.: Monographs in Cool Climate Viticulture - 2. Climate. Adelaide, 2001. WHITE, R. E.: Soils for Fine Wines. Oxford University Press, New York, 2003. ROBINSON, J.: The Oxford Companion to wine. Oxford University Press, 2006. ROBINSON, J.: Vines, grapes and wines. Mitchell Beazley, 1986 JOHNSON, H. ; ROBINSON, J.: The world atlas of wine. Mitchell Beazley, 2007. ALBURQUERQUE, M. V. ; YUSTE, R. ; RUBIO, J. A. ; YUSTE, J.: Despcripción y caracterización agronómica de 28 variedades tintas de vid en Castilla y León. ITACyL, 2006. CENTRO DE INVESTIGACIÓN Y DESARROLLO AGRARIO DE LA RIOJA: Aspectos vitícolas y enológicos de la variedad Graciano. La Rioja. Consejerí ad Agricultura y Alimentación de La Rioja, 1994. HUGLIN, P. ; SCHNEIDER, C.: Biology and écologie de la Vigne. Payot-Lausanne, Rustica, 1998. RUBIO, J. A. ; YUSTE, J. ; ALBURQUERQUE, M. V. ; ARRANZ, C. ; BARAJAS, E.: Clones certificados de las principales variedades tradicionales de vid en Castilla y León, ITACyL, 2008. JOHNSON, H. ; ROBINSON, J.: The world atlas of wine. Mitchell Beazley, 2007. <u>Journals</u> American Journal of Enology and Viticulture. Australian Journal of Grape and Wine Research. Journal International des Sciences de la Vigne et du Vin. Le Progrès Agricole et Viticole. Rev. Suisse de Vitic. Arboric. Hortic. Spanish Journal of Agricultural Research. Scientia Horticulturae. South African Journal of Enology and Viticulture. Viticultura y Enología Profesional. Vitis.
Update	September 2017

Module name:	**Marketing and Diffusion in Spanish Wine Sector**
Academic Year:	2nd academic year at Universidad Politécnica de Madrid
Semester:	3rd semester
Module coordinator:	Gabriel Yravedra Llopis, Prof. Ph.D (Universidad Politécnica de Madrid)
Lecturer:	Prof. Ph.D; Alarcón Lorenzo, Silverio; Prof. Ph.D; Pedro Arias Martín; Prof. Ph.D; Santiago Escribano Pastor; Prof. Ph.D; Cristina Lopez-Cozar Navarro, Pedro Reinares, Prof. Ph.D; Rafael del Rey, Prof. Ph.D (Universidad Politécnica de Madrid)
Language:	Spanish
Classification within the curriculum:	Module of Specialisation at Universidad Politécnica de Madrid
Teaching format:	Regular lectures during the semester
Workload:	Face to face lectures: 60 h Student's personal study time in the module: 120 h
Credit points:	6 ECTS
Requirements under the examination regulations:	----------
Recommended prerequisites:	European legislation in Wine Sector Basic Wine Economy
Targeted learning outcomes:	Students possess an advanced knowledge in wine business management. They understand the marketing strategies in wine sector. They are familiar with the markets for Spanish wines and the Wine export. Students have skills in marketing strategies of the wine sector. They are able to develop strategies for quality management. Students have the capacity to improve wine sales using suitable strategies for Spanish wines. They have the competences to participate in the management of Spanish wine business.
Content:	Wine business management: economical and financial analysis of wine business; evaluation of wine investments Wine marketing: commercial strategies of marketing applied to wine sector; price and promotion strategies on wine sector; Spanish wine market regulation in the frame of EU; government management of wine sector; quality management in wine sector International commercialization of Spanish wine: introduction; markets of France, Italy and Benelux; Markets of Germany, Great Britain and Nordic countries; other European markets, USA, Oceania, Asia and Africa; marketing programme to increase Spanish wines sales.
Study / exam achievements:	Written examination

Forms of media:	Multimedia presentations and demonstrations; conventional media; videos
Literature:	ALONSO, R. ; IRURETAGOYENA, T.: Economía de la empresa agroalimentaria. MAPA,. Madrid, 2004. CALDENTEY, A.: El marketing agroalimentario. Mundi-Prensa, Madrid,. 1999.
Update	September 2017

Module name:	**Vine pests and diseases in dry regions**
Academic Year:	2nd Academic year at Universidad Politécnica de Madrid
Semester:	3rd semester
Module coordinator:	Pedro del Estal Padillo, Prof. Ph.D (Universidad Politécnica de Madrid)
Lecturer:	María Ángeles Ayllón Talavera, Prof. Dr María Soledad Sacristán Benayas, Prof. Dr . (Universidad Politécnica de Madrid); Pedro del Estal Padillo, Prof. Dr (Universidad Politécnica de Madrid); Pilar Medina Vélez, Prof Dr (Universidad Politécnica de Madrid)
Language:	Spanish
Classification within the curriculum:	Module of Specialisation at Universidad Politécnica de Madrid
Teaching format:	Regular lectures and laboratory exercises during the semester
Workload:	Face to face lectures: 15 h; laboratory exercises 15 h Student's personal study time in the module: 60 h
Credit points:	3 ECTS
Requirements under the examination regulations:	----------
Recommended prerequisites:	----------
Targeted learning outcomes:	The students know the vineyard pests in dry regions. They are familiar with the methods for diagnosis and identification of the most important grapevine diseases and pests and are skilled in identifying these pests and diseases. Students understand the life cycles of pathogens and the biology of the major diseases. They know the specific management practices for the major diseases and pests. They possess the theoretical background of integrated management strategies for the major grapevine diseases and pests and they are able to design such strategies. They are competent to apply integrated pest and disease management program in dry regions.
Content:	Control: pest management; insects as pest; thresholds; factors regulating populations; sampling and monitoring; mechanical, physical and cultural control, chemical control, biological control, genetic manipulation of insect pests, pheromones and other insect attractants; disease management; cultural practices, disease resistant varieties, fungicides; guidelines for an integrated and organic management of major grape diseases in Spain. Pests: Orthoptera: Acrididae. Isoptera: Calotermes flavicollis and Reticulitermes spp.; Homoptera: aphids; phyloxera grape; Cicadelloidea: Empoasca spp., Scaphoideus titanus; Flatidae: Metcalfa pruinosa; Coccoidea; Thysanoptera: Frankiniella occidentalis, Drepanothris reuteri ; Coleoptera: Altica ampelophaga, Vesperus

	xatartii, Xylotrechus arvicola, Anobium punctatum, Sinoxylon sexdentatum, Byctiscus betulae, Otiorrhynchus sp.; Scarabeoidea; Elateroidea ; Lepidoptera: Sparganothis pilleriana, Lobesia botrana, Eupoecilia ambiguella Chryptoblades gnidiella; Noctuidae; Tineidae ; Diptera: Cecidomyiidae; Tephritidae; Drosophilidae; Hymenoptera: Vespidae; Acarina. Diseases**:** Major grape diseases in Spain: Powdery mildew**;** Downy mildew**;** Grey mould**;** Trunk diseases**;** Phomopsis cane and leaf spot**;** Fanleaf degeneration**;** Leafroll**;** Corky bark
Study / exam achievements:	Two written examinations and reports on laboratory exercises
Forms of media:	Multimedia presentations and demonstrations; conventional media; videos
Literature:	FLAHERTY, D. L.: Grape pest management. University of California, Oakland, 1992. PEARSON, M. C.: Compendium of grape diseases. APS Press, St. Paul, Minnesota. 2009. GALET, P.: Les maladies et les parasites de la vigne. Tome II: Les parasites animaux. Paysan du Midi, Montpellier, 1982. MUNDI-PRENSA: Los parásitos de la vid. Estrategias de protección razonada. Mundi-Prensa, Madrid. 2004. DUBOS, B.: Maladies cryptogamiques de la vigne. Éditions Féret, Bordeaux, 2002. WALTER, B. ; BOUDON-PADIEU, E. ; RIDÉ, M.: Maladies à virus, bactéries et phytoplasmes de la vigne. Éditions Féret, Bordeaux, 2000.
Update	September 2017

Module name:	**Study Trip – Spanish Wines**
Academic Year:	2nd academic year at Universidad Politécnica de Madrid
Semester:	3rd semester
Module coordinator:	José Antonio Suárez Lepe, Prof. Fernando Calderón Fernández; Prof.
Lecturer:	José Antonio Suárez Lepe, Prof.; Fernando Calderón Fernández, Prof.; José Ramón Lissarrague, Prof.; Antonio Morata Barrado, Prof.
Language:	Spanish
Classification within the curriculum:	Module of Specialisation at Universidad Politécnica de Madrid
Teaching format:	2 Study trips 1st Sherry Region (Normally 4 days) 2nd Foreign country (5days)
Workload: (Peer week)	1st Sherry Region: Normally 4 days (8 hours per day) 2nd Foreign country: 5 days (8 hours per day)
Credit points:	2 ECTS
Requirements under the examination regulations:	----------
Recommended prerequisites:	----------
Targeted learning outcomes:	Students know the main wines of the Sherry regions and are familiar with the special characteristics of the regional oenology and viticulture. They also know the main wines of the visited regions and are familiar with the special characteristics of the oenology and viticulture of these regions.
Content:	1st Sherry Region: Visit of Vineries and Vineyards of Montilla Moriles (Córdoba). Sherry region and Puerto de Santa María (Cádiz) y SanLucar de Barrameda. The trip finishes with the visit of wineries at la Mancha. Topics are the enology, viticulture, technology, architecture and traditions of these regions. 2nd To a foreign country: Typical options are Italy (Veneto, Toscana), Portugal (Porto and Alentejo) or France (Cognac-Bordeaux). Topics are the enology, viticulture, technology, architecture and traditions of these regions. At least wineries will be visited. The vineyards, the the technology and the peculiarities of the winemaking in the regions will be explained to the students
Study / exam achievements:	The knowledge acquired during the study trip is evaluated in the exams of the modules of related subjects.
Forms of media:	Visit of Wineries
Literature:	----------
Update	February 2013

Module name:	**Master Thesis at the Universidad Politécnica de Madrid**
Academic Year:	2nd academic year at Universidad Politécnica de Madrid
Semester	4th semester
Module coordinator:	General Coordination by Prof. Dr. José Antonio Suárez Lepe, Prof. Dr. Pilar Baeza and Prof. Dr. Antonio Morata
Supervisors:	Academic staff of the Universidad Politécnica de Madrid, the academic staff members of the EMaVE Consortium and associated partners.
Language:	English
Classification within the curriculum:	Core module
Teaching format:	The Thesis consists of the elaboration of a written report about an independent scientific work of the student and a defense.
Workload:	24 weeks for the elaboration of the thesis; plus adequate time (at least 2 weeks) for personal preparation for the defence.
Credit points:	30 ECTS
Requirements under the examination regulations:	Admission to the thesis is granted if the student has - successfully completed the modules of the first academic year Admission to the defence is granted under the condition that: - the written report was evaluated at least with the grade "E - pass"; - the student has completed all other compulsory modules of the second academic year successfully and obtained at least 120 ECTS (including the ECTS allocated to the Master Thesis)
Recommended prerequisites:	----------
Targeted learning outcomes:	The student is able to carry out scientific research independently in a given time implementing adequate scientific methods. In addition the student is able to present his/her results to a jury and answers questions related to the field of research.
Content:	Thesis document
Exam achievements:	Delivery of a written thesis report at the submission date. The written report has to be prepared under consideration of the formal requirements of the Universidad Politécnica de Madrid. Thesis defence in front of an examination jury of at least 3 academic members according to no 13.2 of the Study and Examination Regulations of the Vinifera EuroMaster degree programme.
Forms of media:	Research methods depending on the topic of the thesis. Written report; presentation media for the defence
Literature:	Books and scientific papers related to the topic of the thesis. The literature research is part of the Master Thesis
Update:	September 2017

Module Handbook
Second Academic Year (M2) at the Consortium Udine

Modules offered by
Consorzio tra le Università di Udine, Padova, Verona e Bolzano

Students of the Vinifera EuroMaster degree programme have to attend the following modules in the second academic year (M2):

- One specialization (to be chosen one out of three) 20 ECTS
- Elective modules* of an equivalent of 10 ECTS
- Language training (Italian for foreigners) 3 ECTS
- Master Thesis 27 ECTS
- Internship (included in the thesis) (7 ECTS)

Elective Modules*:

Modules covering 10 ECTS have to be chosen from other programmes of the University of Udine (in case of the specialisations "Research and development in Enology" or "Research and development in Viticulture") or of the University of Verona (in case of the specialisation Research and Development in "Wine Economics") or of the University of Bolzano (in case of the specialization in "Sustainable management of mountain viticulture within the alpine landscape valorization").

Specialisation: Research and development in Enology (UDINE) (20 ECTS)

	ECTS points
Module group: Biotechnology for enological techniques	**10**
Biomolecular techniques for microorganism identification	3
Management of microbial fermentations	3
Post-harvest physiology of grapes and non-conventional operations in enology	4
Module group: Techniques of separation, stabilization and packaging in enology	**10**
Stabilization techniques in enology	4
Conditioning and packaging in enology	3
Separation processes in enology	3

Module group: Biotechnology for enological techniques

Module name	**Biomolecular techniques for microorganism identification**
Academic Year:	2nd academic year at University of Udine
Semester:	3rd Semester
Module group coordinator:	Manzano, Marisa (University of Udine)
Lecturers:	Manzano, Marisa (University of Udine)
Language:	Italian/English
Classification within the curriculum:	Module of specialisation Research and Development in Enology Module group: Biotechnology for enological techniques (University of Udine)
Teaching format:	Regular lectures and laboratory courses
Workload:	Face to face lectures: 15 h; laboratory courses: 15 h; Student's personal study time in the module: 45 h
Credit points:	3 ECTS
Requirements under the examination regulations:	----------
Recommended prerequisites:	Good knowledge of biology and general microbiology
Targeted learning outcomes:	The students have advanced knowledge in microbiology techniques based on molecular analysis applied to must and wine.
Content:	Non-conventional analytical methods used in microbiology in winery and in research. Reduction of analysis timing as compared to conventional ones. Laboratory practical work.
Exam achievements:	Oral examination
Forms of media:	Power point and blackboard
Literature:	REDDY, C. A.: Methods for General and Molecular Microbiology. ASM, Washington, 2007. WESTERMEIER, R.: Electrophoresis in Practice. Wiley-VCH, Weinheim, 2005. MARKS, R. et al.: Handbook of Biosensors and Biochips. Wiley, Chichester, 2007. GLICK, B. J. ; PASTERNAK, J.: Molecular Biotechnology. ASM, Washington, 2003. POLI, G.: Biotecnologie conoscere per scegliere. UTET, 2001. RATLEDGE, C. ; KRISTIANSEN, B.: Biotecnologie di base. Zanichelli,

	2004.
Update:	September 2017

Module name:	**Management of microbial fermentations**
Academic Year:	2nd academic year at University of Udine
Semester:	3rd Semester
Module group coordinator:	Manzano, Marisa (University of Udine)
Lecturers:	Corich, Viviana (University of Padova)
Language:	Italian/English
Classification within the curriculum:	Module of specialisation Research and Development in Enology Module group: Biotechnology for enological techniques (University of Udine)
Teaching format:	Regular lectures and paper discussion
Workload:	Face to face lectures: 25 h; paper discussions: 5h; Student's personal study time in the module: 45 h
Credit points:	3 ECTS
Requirements under the examination regulations:	----------
Recommended prerequisites:	----------
Targeted learning outcomes:	Students have profound knowledge about the main parameters influencing alcoholic fermentation.
Content:	Effect of nitrogen nutrition, oxygen and temperature on fermentation kinetics as well as on the molecular response of oenological yeasts. Breeding techniques, with particular reference to recombinant DNA technology. Use of improved yeasts and their impact on vinification. Principles and case study of molecular techniques for quantification of yeasts using DNA analysis.
Exam achievements:	Oral examination
Forms of media:	Power point and blackboard
Literature:	KÖNIG, H. ; UNDEN, G. ; FRÖHLICH, J.: Biology of Microorganisms on Grapes, in Must and in Wine. Springer, Berlin, 2009. PRIEST, F. G. ; CAMPBELL, I.: Brewing Microbiology. Kluwer, New York, 2003. RIBEREAU-GAYON, P. ; DUBORDIEU, B. ; LONVAUD, A.: Handbook of Enology, VOL 1 & 2,. Wiley, Hoboken, 2006. ROSE, A. H.: Yeast technology. Academic Pr., London, 1993. VINCENZINI, M. ; ROMANO, P. ; FARRIS, G.: Microbiologia del vino. CEA, Milano, 2005.

Update:	September 2017

Module name	**Post-harvest physiology of grapes and non-conventional operations in enology**
Academic Year:	2nd academic year at University of Udine
Semester:	3rd Semester
Module group coordinator:	Manzano, Marisa (University of Udine)
Lecturers:	Tornielli, Giovanni Battista (University of Verona)
Language:	Italian/English
Classification within the curriculum:	Module of specialisation Research and Development in Enology Module group: Biotechnology for enological techniques (University of Udine)
Teaching format:	Regular lectures
Workload:	Face to face lectures: 40 h; Student's personal study time in the module: 60 h
Credit points:	4 ECTS
Requirements under the examination regulations:	----------
Recommended prerequisites:	Good knowledge of viticulture, grape ripening physiology and molecular biology
Targeted learning outcomes:	The students have a deep knowledge of several aspects concerning the grape post-harvest drying process for wine production. They know the physical, biological and technological aspects of grape overmaturation as well as the peculiar aspects of winemaking from semi-dried grapes.
Content:	The course gives an adequate knowledge about technological, physical, chemical, physiological and molecular aspects of the post-harvest withering of grapes for wine production, including late-harvest and overripening. A wide excursus about the most updated knowledge and literature will be presented to provide students with tools and criteria to critically evaluate the research activity in this particular winemaking practice. Dehydration kinetics, chemical and biochemical changes, cell metabolism, transcriptome rearrangements, related to environmental parameters and to grape genotypes will be discussed. The effect of *Botrytis cinerea* infection will also be described.
Exam achievements:	Oral examination
Forms of media:	visual supports (PowerPoint)
Literature:	VERSARI, A. ; PARPINELLO, G. P. ; TOMIELLI, G. B. ; FERRANI, R. ; GIULIVO, C.: Stilbene compounds and stilbene synthase expression

	during ripening, wilting, and UV treatment in grape cv Corvina. In: J. Agric. Food Chem. 2001, **49,** 5531-5536. ZAMBONI, A. ; MINOIA, L. ; FERRARINI, A. ; TOMIELLI, G. B. ; ZAGO, E. ; DELLEDONNE, M. ; PEZZOTTI, M.: Molecular analysis of post-harvest withering in grape by AFLP transcriptional profiling. In: J. Exp. Bot., 2008, **59**, 4145-59. TONUTTI, P. ; MENCARELLI, F.: Aspetti fisiologici di appassimento e disidratazione delle uve da vino. In: Scienza, A: Tra vite e vino. L'informatore Agrio, 2005, 19-21. ZIRONI, R. ; FERRARINI, R.: La surmaturazione delle uve destinate alla vinificazione. Vignevini, 1987, **14** (4), 31-45.
Update:	September 2017

Module group: Techniques of separation, stabilization and packaging in enology

Module name	**Stabilization techniques in enology**
Academic Year:	2nd academic year at University of Udine
Semester:	3rd Semester
Module group coordinator:	Celotti, Emilio (University of Udine)
Lecturers:	Celotti, Emilio (University of Udine)
Language:	Italian/English
Classification within the curriculum:	Module of specialisation Research and Development in Enology Module group: Techniques of separation, stabilisation and packaging in enology (University of Udine)
Teaching format:	Regular lectures; visits of wineries
Workload:	Face to face lectures: 32 h; Visits of wineries 8 h; Student's personal study time in the module: 60 h
Credit points:	4 ECTS
Requirements under the examination regulations:	----------
Recommended prerequisites:	----------
Targeted learning outcomes:	The students are able to manage adequately the different stabilization techniques available at present in enology.
Content:	The clarification by flotation combined with the hyperoxidation and cross-flow filtration of the musts. Winemaking in protection from oxygen, use of antioxidants and technical gases. Techniques to preserve the aroma of wine. New oenological practices recently approved for the stabilization of wines. Systems for the study and management of the colloidal stability of wines. Rapid techniques for the control of chemical and physical stability of wines. Management of yeast derivatives and polysaccharides in wine. Conservative and additional techniques for the wine stabilization. Tartaric precipitation and techniques for tartaric stabilization of wine. Use of ultrasound in the winemaking industry. Stabilization of red wine colour by the management of oxygen in maceration and aging. Filterability index of wines and sterile filtration. Practical laboratory experiments on topics and technical

	visits at specialized external companies.
Exam achievements:	Oral examination
Forms of media:	Power point and blackboard
Literature:	CELOTTI, E. ; CACCIOLA, V. ; DELL'EVA, M.: Recent acquisitions on interactions between tannins and polysaccharides. 2010. Oral communication, 60th German Grape and Wine Congress, Stuttgart march 24th to 28th, PDF 31-41 ZIRONI, R. ; CELOTTI, E. ; BATTISTUTTA, F.: Research for a marker of the hyperoxygenation treatment of musts for the production of white wines(1997). In: Am. J. Enol.Vitic., 1997, **48**, 150-156. FERRARINI, E. ; CELOTTTI, E. ; ZIRONI, R. ; Buiatti, S.: Recent advances in the process of flotation applied to the clarification of grape musts. In: Journal of Wine Research, 1995, **6**(1), 19-33 CACCIOLA, V. ; FERRAN BATLLO, I. ; FERRARETTO, P. ; VINCENZI, S. : CELOTTI, E.: Study of the Ultrasound effects on yeast lees lysis in winemaking. In: Eur. Food Res. Technol., 2013, **236**, 311-317, DOI 10.1007/s00217-012-1893-6. CELOTTI, E. ; BRANCA, G. ; MARTELLOZZO, E.: Evaluation de qualité et d'efficacité des bentonites. In: Bull. OIV, 2006, **79**, 909-910, 628-648. Journal of Enology and Viticulture, INFOWINE. Codex Enologique International, OIV (www.oiv). Codex International des Pratiques Enologiques, OIV (www.oiv).
Update:	September 2017

Module name	Conditioning and packaging in enology
Academic Year:	2nd academic year at University of Udine
Semester:	3rd Semester
Module group coordinator:	Celotti, Emilio (University of Udine)
Lecturers:	Comuzzo, Piergiorgio (University of Udine)
Language:	Italian/English
Classification within the curriculum:	Module of specialisation Research and Development in Enology Module group: Techniques of separation, stabilisation and packaging in enology (University of Udine)
Teaching format:	Regular lectures, seminar, technical visit
Workload:	Face to face lectures: 30 h; seminar: 4h; technical visit: 4h; Student's personal study time in the module: 37 h
Credit points:	3 ECTS
Requirements under the examination regulations:	----------
Recommended prerequisites:	----------
Targeted learning outcomes:	The students know how to manage conditioning and packaging in enology, choice of materials, technical solutions with an appropriate price/quality approach.
Content:	Materials for conditioning and packaging wine: vessels, bottles, closures, glues, capsule, label, their characteristics and their effect on storage of wine. Criteria to manage packaging machines and bottling lines. Criteria to manage the main parameters relevant for storage of bottled wine.
Exam achievements:	Oral examination
Forms of media:	Power point and blackboard
Literature:	RIBEREAU-GAYON, P. ; DUBORDIEU, D. ; DONECHE, B. ; LONRAU, A.: Handbook of Enology. Volume 1. The Microbiology of Wine and Vinifications (2nd Ed.). Wiley, Chichester, U.K., 2006. RIBEREAU-GAYON, P. ; GLORIES Y. ; MAUJEAN, A. ; DUBORDIEU, D.: Handbook of Enology. Volume 2. The Chemistry of Wine, Stabilization and Treatments (2nd Ed.). Wiley, Chichester, U.K, 2006. GODDEN, P. ; FRANCIS, L. ; FIELD, J. ; GISHEN, M. ; COULTER, A. ; VALENTE, P. ; HOJ, P. ; ROBINSON, E.: Wine bottle closures: physical characteristics and effect on composition and sensory properties of a Semillon wine. 1. Performance up to 20 months post-bottling. In:

	Australian Journal of Grape and Wine Research, 2001, **7**, 64-105. KARBOWIAK, T. ; GOUGEON, R. D. ; ALINC, J. B. ; BRACHAIS, L. ; DEBEAUFORT, F. ; VOILLEY, A. ; CHASSAGNE, D.: Wine Oxidation and the Role of Cork. In: Critical Reviews in Food Science and Nutrition, 2010, **50**, 20-52. BUIATTI, S. ; CELOTTI, E. ; FERRARINI, R. ; ZIRONI, R.: Wine packaging for market in containers other than glass. In: J. Agric. Food Chem., 1997, **45,** 2081-2084. SEFTON, M. ; SIMPSON, R. F.: Compounds causing cork taint and factors affecting their transfer from natural cork closures to wine - a review. In: Aust. J. Grape Wine Res., 2005, **11**, 226-240. MARGALIT, Y.: Elementi di chimica del vino. Eno-One, Reggio Emilia, 2005. DE VITA, P. ; DE VITA, G.: Corso di meccanica enological. Hoepli, Milano, 2004. TATEO, F: Detergenza e sanificazione nell'industria alimentare. Edizioni AEB, Brescia, 1977. ROGGI, C. ; VERCESI, P. ; ROSSI, M. ; PELLEREI, O. ; CORBELLINI, C.: La sanizzazione. Il sistema di sanificazione secondo il metodo HACCP. Franco Angeli Editore, Milano, 2000. ANELLI, G. ; MASSANTINI, R. ; VILLANI, R.: Prove di conservazione del vino in contenitori alternativi al vetro. In: Industrie delle Bevande, 1987, **12**, 429-438. GALASSI, S.: Studi sul confezionamento del vino in contenitori alternativi al vetro. In: Industrie delle Bevande, 1985, **2**, 30-35. LORUSSO, S.: I contenitori alternativi al vetro per il confezionamento dei vini. Caratteristiche di conservazione e costi a confronto. In: Industrie delle Bevande, 1985, **6**, 254-267. SPERA, G.: Contenitori in materia plastica per la conservazione del vino: P.E.T. e Bag in box. In: Industrie delle Bevande, 1991, **8,** 257-262. COLAGRANDE, O.: Il tappo di sughero. Chirotti Editori, Pinerolo (Torino, Italy), 1996. LIBERATI, D.: I tappi sintetici in enologia. Eno-one s.r.l., Reggio Emilia - Italy, 2005. CHATONNET, P. ; LABADIE, D. ; LANGEVIN, B. ; ESCOBESSA, J.: Eléments de controle de la qualité des bouchons synthétiques pour le boughage des vins. In: Revue des. Oenologues., 2005, **117**, 31-36. CHAMBON, H.: Chimie et technologie du bouchage à vis en aluminium. In: Revue des Œnologues, 2005, **117**, 49-52.
Update:	September 2017

Module name	Separation processes in enology
Academic Year:	2nd academic year at University of Udine
Semester:	3rd Semester
Module group coordinator:	Celotti, Emilio (University of Udine)
Lecturers:	Comuzzo, Piergiorgio (University of Udine)
Language:	Italian/English
Classification within the curriculum:	Module of specialisation Research and Development in Enology Module group: Techniques of separation, stabilisation and packaging in enology (University of Udine)
Teaching format:	Regular lectures, technical visit, laboratory course
Workload:	Face to face lectures: 30 h; technical visit 4 h; laboratory course 2 h Student's personal study time in the module: 39 h
Credit points:	3 ECTS
Requirements under the examination regulations:	----------
Recommended prerequisites:	----------
Targeted learning outcomes:	The students know about the theorical aspects of separation processes, as well as about plant and technology aspects.
Content:	Research and development activity in separation processes as applied to enology. Filtration, clarification, membrane processes, treatments with resins and polymers. Dealcolation. Other processes of separation.
Exam achievements:	Oral examination
Forms of media:	Power point and blackboard
Literature:	RIBEREAU-GAYON, P. ; DUBORDIEU, D. ; DONECHE, B. ; LONRAU, A.: Handbook of Enology. Volume 1. The Microbiology of Wine and Vinifications (2nd Ed.). Wiley, Chichester, U.K., 2006. RIBEREAU-GAYON, P. ; GLORIES Y. ; MAUJEAN, A. ; DUBORDIEU, D.: Handbook of Enology. Volume 2. The Chemistry of Wine, Stabilization and Treatments (2nd Ed.). Wiley, Chichester, U.K, 2006. PERI, C.: La filtrazione nell'industria alimentare. Edizioni AEB, Brescia, 1983. MARGALIT, Y.: Elementi di chimica del vino. Eno-One, Reggio Emilia, 2005. DE VITA, P. ; DE VITA, G.: Corso di meccanica enological. Hoepli, Milano, 2004.

Update:	September 2017

Specialisation: Research and development in Viticulture (UDINE) (20 ECTS)

	Credit points
Module group: Grapevine physiology 2	**10**
Topics in applied physiology	4
Topics in genomics	3
Cell physiology	3
Module group: Agronomical techniques and territory	**10**
Vineyard mechanization and quality	4
Fertilizers and grapevine nutrition	3
Soil and irrigation management	3

Module group: Grapevine physiology 2

Module name	**Topics in applied physiology**
Academic Year:	2nd academic year at University of Udine
Semester:	3rd Semester
Module group coordinator:	Peterlunger, Enrico (University of Udine)
Lecturers:	Peterlunger, Enrico (University of Udine)
Language:	Italian/English
Classification within the curriculum:	Module of specialisation Research and Development in Viticulture Module group: Grapevine physiology 2 (University Udine)
Teaching format:	Regular lectures; student's team work in small groups
Workload:	Face to face lectures: 32 h; student's team work in small groups: 8 h; Student's personal study time in the module: 60 h
Credit points:	4 ECTS
Requirements under the examination regulations:	----------
Recommended prerequisites:	----------
Targeted learning outcomes:	The students can apply tools and criteria to evaluate research activity in plant physiology related to grapevine. They can analyse experimental data, published papers, graduation theses and use them to judge critically the research activity and its development. They have experience in team work.
Content:	Contents are analysis of research papers about plant gas exchanges, plant-water relationship, annual energetic cycle, maturation processes, compounds relevant for grape and wine quality. Particular attention will be given to application of results to normal cultivation practices.
Exam achievements:	Oral examination
Forms of media:	Power point and blackboard and internet
Literature:	MULLINS, M. G. ; BOUQUET, A. ; WILLIAMS, L. E.: Biology of the grapevine. Cambridge University Press, 1992. SKINKIS P. A.; BORDELON, B. P. ; BUTZ, E. M.: Effects of sunlight exposure on berry and wine monoterpenes and sensory characteristics of Traminette. In: American Journal of Enology and Viticulture, 2010, **61**(2), 147-156. PONI, S. ; CASALINI, L. ; BEMIZZONI, F. ; CIVARDI S. ; INTRIERI, C.: Effects of early defoliation on shoot photosynthesis, yield components,

	and grape composition. In: American Journal of Enology and Viticulture, 2006, **57**(4), 397-407. BUCCHETTI, B. ; MATTHEWS, M. A. ; FALGINELLA, L. ; PETERLUNGER, E. ; CASTELLARIN, S. D.: Effect of water deficit on Merlot grape tannins and anthocyanins across four seasons. In: Scientia Horticulturae20122, **128**, 297-305. SIVILOTTI, P. ; BONETTO, C. ; PALADIN, M. ; PETERLUNGER, E.: Effect of soil moisture availability on *Vitis vinifera* cv. Merlot: from leaf water potential to grape composition. In: American Journal of Enology and Viticulture, 2005, **56**(1), 9-18.
Update:	September 2017

Module name	Topics in genomics
Academic Year:	2nd academic year at University of Udine
Semester:	3rd Semester
Module group coordinator:	Peterlunger, Enrico (University of Udine)
Lecturers:	Di Gaspero, Gabriele (University of Udine)
Language:	Italian/English
Classification within the curriculum:	Module of specialisation Research and Development in Viticulture Module group: Grapevine physiology 2 (University Udine)
Teaching format:	Regular lectures; student's team work in small groups
Workload:	Face to face lectures: 25 h; student's team work in small groups: 10 h; Student's personal study time in the module: 40 h
Credit points:	3 ECTS
Requirements under the examination regulations:	----------
Recommended prerequisites:	----------
Targeted learning outcomes:	The students know the tools and criteria to evaluate research activity in plant genomics as applied to grapevine. They are able to analyse critically experimental data, published papers, graduation theses to take them to know critically the research activity in its development.
Content:	Contents are analysis of genome evolution in the grapevine lineage, gene families involved in metabolic pathways controlling phenotypic traits, nucleotide diversity and structural variation among grapevine cultivars.
Exam achievements:	Oral examination
Forms of media:	Power point and blackboard
Literature:	CIPRIANI, G. ; MARRAZZO, M. T. ; DI GASPERO, G; PFEIFFER, A: ; MORGANTE, M. ; TESTOLIN, R: A set of microsatellite markers with long core repeat optimized for grape (*Vitis spp*.) genotyping. In: BMC Plant Biology, 2008, **8**, 127. MOROLDO, M. ; PAILLARD, S, ; MARCONI, R. ; LEGEAI, F. ; CANAGUIER, A. ; CRUAUD, C. ; DE BERARDINIS, V. ; GUICHARD, C. ; BRUNAUD, V. ; LE CLAINCHE, I. ; SCALABRIN, S. ; TESTOLIN, R. ; DI GASPERO, G. ; MORGANTE, M. ; ADAM-BLONDON, A. F.: A physical map of the heterozygous grapevine 'Cabernet Sauvignon' allows mapping candidate genes for disease resistance. In: BMC Plant Biology, 2008, **8**, 66.

	HOFFMANN, S. ; DI GASPERO, G. ; KÜVACS, L. ; HOWARD, S. ; KISS, E. ; GALBACS, Z. ; TESTOLIN, R. ; KOZMA, P.: Resistance to Erysiphe necator in the grapevine 'Kishmish vatkana' is controlled by a single locus through restriction of hyphal growth. In: Theoretical & Applied Genetics, 2008, **116,** 427-438. JAILLON. O. et al.: The grapevine genome sequence suggests ancestral hexaploidization in major angiosperm phyla. In: Nature, 2007, **449**, 463-468. CASTELLARIN, S. D. ; DI GASPERO, G.: Transcriptional control of anthocyanin biosynthetic genes in extreme phenotypes for berry pigmentation of naturally occurring grapevines. In: BMC Plant Biology, 2007, **7**, 46.
Update:	September 2017

Module name	**Cell physiology**
Academic Year:	2nd academic year at University of Udine)
Semester:	3rd Semester
Module group coordinator:	Peterlunger, Enrico (University of Udine)
Lecturers:	Braidot, Enrico (University of Udine)
Language:	Italian/English
Classification within the curriculum:	Module of specialisation Research and Development in Viticulture Module group: Grapevine physiology 2 (University Udine)
Teaching format:	Regular lectures, laboratory course
Workload:	Face to face lectures: 25 h; in vitro laboratory course: 5 h; Student's personal study time in the module: 40 h
Credit points:	3 ECTS
Requirements under the examination regulations:	----------
Recommended prerequisites:	----------
Targeted learning outcomes:	The students know about risks linked to the alterations (imbalances) of the oxidative metabolism.
Content:	The physiological responses of grape plants will be analyzed, in relation to main environmental stresses causing the production of the reactive oxygen species (ROS). The effects of protecting factors limiting damages induced by oxidative alterations will be discussed; their action will be distinguished on the basis of preventive or curative activities. Furthermore widespread laboratory techniques useful to characterize and to quantify the amount of oxidative stresses in grapevine tissues and cells will be shown. In particular the attention will be focused on the detection of anti-oxidant metabolites and "scavenger" enzymes.
Exam achievements:	Oral examination
Forms of media:	Power point and blackboard
Literature:	ALBERTS, B. et al.: Essential cell biology. Garland Science, New York, 2013. GECHEV, T. S. ; VAN BREUSEGEM, F. ; Stone, J. M. ; DENEV, I. ; LALOI, C.: Reactive oxygen species as signals that modulate plant stress responses and programmed cell death. In: BioEssays, 2006, **28**, 1091–1101. PARVAIZ, A. ; CHERUTH, A. J. ; SALEM, M. A. ; NABI, G. ; Sharma, S.: Roles of enzymatic and nonenzymatic antioxidants in plants during

	abiotic stress. In: Critical Reviews in Biotechnology, 2010; **30**(3), 161–175. GILL, S. S. ; TUTEJA, N.: Reactive oxygen species and antioxidant machinery in abiotic stress tolerance in crop plants. In: Plant Physiology and Biochemistry, 2010, **48**, 909-930.
Update:	September 2017

Module group: Agronomical techniques and territory

Module name	**Vineyard mechanization and quality**
Academic Year:	2nd academic year at University of Udine)
Semester:	3rd Semester
Module group coordinator:	Pergher, Gianfranco (University of Udine)
Lecturers:	Pergher, Gianfranco (University of Udine)
Language:	Italian/English
Classification within the curriculum:	Module of specialisation Research and Development in Viticulture Module group: Agronomical techniques and territory (University of Udine)
Teaching format:	Regular lectures, laboratory and field exercises during the semester
Workload:	Face to face lectures: 25 h; laboratory and field exercises: 15 h; Student's personal study time in the module: 60 h
Credit points:	4 ECTS
Requirements under the examination regulations:	----------
Recommended prerequisites:	----------
Targeted learning outcomes:	The students are able to choose and manage the viticultural machinery of a winery, considering productivity, expected income, environmental impact and territory conservation, both in his own vineyard and as a consultant.
Content:	Planning, planting and managing a vineyard, considering training system, soil preparation, mechanization level, trellis materials. Criteria to choose and to dimension operating machines, with analysis of timing, working efficiency, cost. Case studies. Impact on production and on environment, in particular for soil management, fertilization and pesticide application.
Exam achievements:	Oral examination
Forms of media:	Power point and blackboard
Literature:	MORRIS, J. R. ; BRADY, P. L.: Vineyard Mechanization: Development and Status in the United States and in Major Grape Producing Regions of the World. American Society for Horticultural Science, 2008. BALDINI, E. ; INTRIERI, C.: Viticoltura meccanizzata. Il Sole 24 ore – Edagricole, 2004.
Update:	September 2017

Module name	Fertilizers and grapevine nutrition
Academic Year:	2nd academic year at University of Udine
Semester:	3rd Semester
Module group coordinator:	Pergher, Gianfranco (University of Udine)
Lecturers:	Contin, Marco (University of Udine)
Language:	Italian/English
Classification within the curriculum:	Module of specialisation Research and Development in Viticulture Module group: Agronomical techniques and territory (University of Udine)
Teaching format:	Regular lectures, laboratory exercises during the semester
Workload:	Face to face lectures: 25 h; laboratory exercises: 5 h; Student's personal study time in the module: 45 h
Credit points:	3 ECTS
Requirements under the examination regulations:	----------
Recommended prerequisites:	----------
Targeted learning outcomes:	The students have deep knowledge on the chemical and biochemical aspects of grapevine mineral nutrition, availability and uptake of macro- and micro- nutrients, The course will afford the basis for the interpretation of soil and plant analyses in order to know the nutritional conditions of soil and plants and to define the optimal fertilizer strategy.
Content:	The use of mineral and organic fertilizers and amendments in viticulture. Knowledge of Italian and European legislation related to production, commercialization and utilization of fertilizers. Trends of advanced scientific research in grapevine mineral and organic nutrition.
Exam achievements:	Oral examination
Forms of media:	Power point and blackboard
Literature:	BARBER, S. A.: Soil nutrient bioavailability. Wiley, 1995. MARSCHNER, H.: Marschner's mineral nutrition in higher plants. Elsevier, Academic Press. 2012. BARKER, A. V. ; PILBEAM, D. J.: Handbook of plant nutrition. CRC, 2015. BOHN, H. L. ; MCNEAL, B. L. ; O'CONNOR, G. A.: Soil chemistry. Wiley, 2001. FOLLET, R. H. ; MURPHY, L. S. ; DONAHUE, R. L.: Fertilizers and soil

	amendments. Prentice-Hall, 1981. ALLOWAY, B. J.: Micronutrient Deficiencies in Global Crop Production, Springer, 2010. ISHERWOOD, K. F: Mineral fertilizer distribution and the environment. IFA/UNEP, 2000. CALZAVARA, R. ; GRAZIANO, P. L. ; PERELLI, M.: La grande guida dei Fertilizzanti. Arvan, 2002. BENEDETTI, A. : SEQUI, P.: I fertilizzanti organici. Vol.1 - Edizioni L'Informatore Agrario, 1998.
Update:	September 2017

Module name	Soil and irrigation management
Academic Year:	2nd academic year at University of Udine
Semester:	3rd Semester
Module group coordinator:	Pergher, Gianfranco (University of Udine)
Lecturers:	Delle Vedove, Gemini (University of Udine)
Language:	Italian/English
Classification within the curriculum:	Module of specialisation Research and Development in Viticulture Module group: Agronomical techniques and territory (University Udine)
Teaching format:	Regular lectures, exercises with models, vineyard visits
Workload:	Face to face lectures: 20 h; exercises: 10 h; Student's personal study time in the module: 45 h
Credit points:	3 ECTS
Requirements under the examination regulations:	----------
Recommended prerequisites:	Basics in soil science.
Targeted learning outcomes:	The students possess the capacity to evaluate different techniques aimed at enhancing soil and water conservation in a high quality production system.
Content:	Basics of soil physics: pseudotransfer functions to estimate, density and soil hydrological parameters. Control of erosion runoff and drainage in plain and sloping fields. Land improvement: Land levelling, terracing, drainage. Soil management. Cover-cropping and weed control. Soil water status monitoring and modelling water requirements for Vineyard. Water sources and storage: groundwater, runoff water, dams Irrigation methods, irrigation equipments, and quality of irrigation water.
Exam achievements:	Oral examination
Forms of media:	Power point and blackboard
Literature:	ALLEN, R G. ; PEREIRA, L. S. ; RAES, D. ; SMITH, M.: Crop Evapotrans-piration. Guidelines for computing crop water requirements. FAO Irrigation and Drainage Paper, 56, 1998. RAMOS, M. C.: Soil water balance in rainfed vineyards of the Penedès region (Northeastern Spain) affected by rainfall characteristics and land levelling: influence on grape yield. In: Plant Soil, 2010, **333**, 375–

	389. DOI 10.1007/s11104-010-0353-y CELETTE, F. ; GARY, C.: Dynamics of water and nitrogen stress along the grapevine cycle as affected by cover cropping. In: Eur. J. Agr., 2013, **45**,142-152. . http://dx.doi.org/10.1016/j.eja.2012.10.001 AUDE RIPOCHE, A. et al.: Design of intercrop management plans to fulfil production and environmentalobjectives in vineyards. In: Eur. J. Agr. 2010, **32**, 30-39. doi:10.1016/j.eja.2009.05.00 ACEVEDO-OPAZO, C. et al.: Effects of grapevine (Vitis vinifera L.) water status on water consumption, vegetative growth and grape quality: An irrigation scheduling application to achieve regulated deficit irrigation. In: Agr. Water Mngt., 2010, **97**, 955-964. doi:10.1016/j.agwat.2010.01.025. PIERCE, L. ; NEMANI, R. ; JOHNSON, L.: VSIM - Vineyard Soil Irrigation Model – release 5/01/03 - User Guide. PETERLUNGER, E. et al.: Deficit idrico e qualità dell'uva. In: L'Informatore Agrario, 2012, **15**. 46-52. SCALABRELLI, G. et al.: Qualità dell'uva e del vino ed interventi irrigui. In: L'inf. Agr., 2011, **20**, 38-44. Guida per il viticulture. 2004. Veneto Agricoltura. Download: http://www.venetoagricoltura.org/basic.php?ID=1066
Update:	September 2017

Specialisation: Research and development in Wine Economics (VERONA) (20 ECTS)

	Credit points
Module group: Marketing and communication of wine	**10**
Advanced tools of marketing and communication	5
New tools of marketing of wine and related products	5
Module group: Winery management tools	**10**
Financial statement analysis and planning	5
Investments and real estate valuation of the wine sector	5

Module group: Marketing and communication of wine

Module name	**Advanced tools of marketing and communication**
Academic Year:	2nd academic year at University of Verona
Semester:	3rd Semester
Module group coordinator:	Begalli, Diego (University of Verona)
Lecturers:	Rossato, Chiara and Castellani, Paola (University of Verona)
Language:	Italian/English
Classification within the curriculum:	Module of specialisation Research and Development in Wine Economics Module group: Marketing and Communication of Wine (University of Verona)
Teaching format:	Regular lectures; guest lectures
Workload:	Face to face lectures: 50 h; Student's personal study time in the module: 75 h (including student's research project on a topic of the module)
Credit points:	5 ECTS
Requirements under the examination regulations:	----------
Recommended prerequisites:	Basic knowledge of marketing communication -
Targeted learning outcomes:	Students have a good knowledge of the strategic role and of the implementation of marketing and communication process in the field of business management and decision-making process..
Content:	Evolution of enterprise orientation. Relationship between marketing and enterprise strategies. Ethics, social responsibility of enterprise and marketing. Marketing survey. Consumer's behaviour. Market segmentation. Development and launching of new products. Management of products and brands. The communication process (components and goals), the value of listening, the objectives and the stakeholders of internal communication, the strategic role of public relations (objectives, stakeholders and instruments), introduction to event management and its important role in the relationship between company, market and local community, web and social networking communication.
Exam achievements:	Practical work followed by discussion and oral examination on the whole program.
Forms of media:	Power point and other audio-visual support, blackboard

Literature:	KERIN, R. A. ; HARLEY, S. W. ; RUDELIUS, W.: Marketing, McGraw-Hill Irving, New York, 2014. THOMAS, G. F. ; ZOLIN, R. ; HARTMAN, J.: The central role of communication in developing trust and its effect on employee involvement. In: Journal of Business Communication, 2009, **46**, 287-310. ANG, L.: Community relationship management and social media. In: Database Marketing & Customer Strategy Management, 2011, **18**, 31-38. THACH, L.: Wine 2.0 – The Next Phase of Wine Marketing? Exploring US Winery Adoption of Wine 2.0 Components. In: Journal of Wine Research, 2009, **20**, 143-157. DAUGHERTY, E.: Strategic Planning in Public Relations: A Matrix That Ensures Tactical Soundness. In: Public Relations Quarterly, 2003, 22-26. YU, T. ; LESTER, R. H.: Moving Beyond Firm Boundaries: A Social Network Perspective on Reputation Spillover. In: Corporate Reputation Review, 2008, **11**, 94-108. VIRTUANI, E. ; ZUCCHELLA, A.: New Leverages in customer/place oriented wine branding strategies. The case of wine architecture in experiential approaches to wine marketing", 4th International Conference of the Academy of Wine Business research, Siena, 17-19 July, 2008. DOWLING; G. ; MORAN, P.: Corporate Reputation: Built in or Bolten on? In: California Management Review, **54**, 2012.
Update:	September 2017

Module name	New tools of marketing of wine and related products
Academic Year:	2nd academic year at University of Verona
Semester:	3rd Semester
Module group coordinator:	Begalli, Diego (University of Verona)
Lecturers:	Capitello, Roberta (University of Verona)
Language:	Italian/English
Classification within the curriculum:	Module of specialisation Research and Development in Wine Economics Module group: Marketing and Communication of Wine (University of Verona)
Teaching format:	Regular lectures
Workload:	Face to face lectures: 50 h; Student's personal study time in the module: 75 h
Credit points:	5 ECTS
Requirements under the examination regulations:	----------
Recommended prerequisites:	Basic knowledge of marketing and communication
Targeted learning outcomes:	The students know the specific elements of wine marketing and the new approaches of the analysis, to examine the strategies and innovative marketing policies in Old and New World countries.
Content:	Methods to analyse wine demand, differentiation strategies and territory identity, strategies and commercial policies on national and international market, typical local systems and tools to valorise productions, territory marketing, case study.
Exam achievements:	Oral examination
Forms of media:	Power point and blackboard
Literature:	HALL, M. C. ;, MITCHELL, R.: Wine Marketing. A practical guide, Butterworth-Heinemann, Elsevier, 2008. CHARTERS, S.: Wine and Society. The social and cultural context of a drink. Butterworth-Heinemann, Elsevier, 2006. HALL, M. C. ; SHARPLES, L.: Food and wine festivals and events around the world. Butterworth-Heinemann, Elsevier, 2008. CARLSEN, J. ; CHARTERS, S.: Global wine tourism. Research, Management and Marketing. Cabi, 2006.
Update:	September 2017

Module group: Winery management tools

Module name	**Financial statement analysis and planning**
Academic Year:	2nd academic year at University of Verona
Semester:	3rd Semester
Module group coordinator:	Begalli, Diego (University of Verona)
Lecturers:	Moggi, Sara (University of Verona)
Language:	English
Classification within the curriculum:	Module of specialisation Research and Development in Wine Economics Module group: Winery management tools (University Verona)
Teaching format:	Regular lectures
Workload:	Face to face lectures: 50 h; Student's personal study time in the module: 75 h
Credit points:	5 ECTS
Requirements under the examination regulations:	----------
Recommended prerequisites:	----------
Targeted learning outcomes:	The students understand the methodology of the financial statement analysis and annual planning for a winery.
Content:	– The economy of firms: the management cycles – The basic concepts of income and capital – The financial statements: general principles – The contents of the financial statements: asset & liabilities statement, income statement and notes – The financial statement analysis: aims and tools – The reclassification of the financial statement – The ratio analysis and the cash flow statement – The management control systems – Cost: terminology, concepts and classification. – The different systems of costing – Costs analysis.
Exam achievements:	Written examination
Forms of media:	Power point, blackboard
Literature:	ATKINSON, A. A.: Management accounting. Prentice Hall international, 2011. BAUER, L. ; BUSHE, D.: Managing the Modern Farm Business: Agricultural Investment Analysis, Faculty of Extension, University of

	Alberta, 2005 HALL, M. C. ; MITCHELL, R.: Wine Marketing. A practical guide. Butterworth-Heinemann, Elsevier, 2008. ANTHONY, R. A. ; BREITNER, L. K. ; BARTOLINI, M.: Il bilancio : misurazione e analisi della performance, Milano : Pearson, 2009.
Update:	September 2017

Module name:	**Investments and real estate valuation of the wine sector**
Sub-heading:	
Abbreviation:	
Academic Year:	2nd academic year at University of Verona
Semester:	3rd Semester
Module group coordinator:	Begalli, Diego (University of Verona)
Lecturers:	Begalli, Diego (University of Verona)
Language:	Italian/English
Classification within the curriculum:	Module of specialisation Research and Development in Wine Economics Module group: Winery management tools (University Verona)
Teaching format:	Regular lectures
Workload:	Face to face lectures: 50 h; Student's personal study time in the module: 75 h
Credit points:	5 ECTS
Requirements under the examination regulations:	----------
Recommended prerequisites:	----------
Targeted learning outcomes:	The students are able to examine the estimation of value as related to investments, real estate valuation and rights, at present more relevant for wineries.
Content:	Methods of assessment of property, income, financial, mixed and goodwill to evaluate a winery. Methods of assessment of land tenure improvement and investments in viticulture and enology. Real estate valuation, land annuity. Land rights. Succession and donation. Valuation for succession and donation taxes.
Exam achievements:	Oral examination
Forms of media:	Power point and blackboard
Literature:	SHERRICK, B. J. ; ELLINGER, P. N. ; LINS, D.: A.: Time Value of Money and Investment Analysis, Dept. of Agricultural and Consumer Economics and Dept. of Finance, University of Illinois, Urbana – Champaign, 2000. BAUER, L. ; BUSHE, D.: Managing the Modern Farm Business: Agricultural Investment Analysis, Faculty of Extension, University of

	Alberta, 2005. BAUER. L.: Agricultural Investment Analysis, Faculty of Extension, University of Alberta, 2005.
Update:	September 2017

Module name	**Language Training – Italian as a foreign language at Udine-Padova-Verona**
Module coordinator:	Sbrizzai Elena (University of Udine)
Supervisors:	Sbrizzai Elena (University of Udine)
Language:	Italian
Classification within the curriculum:	Mandatory module
Teaching format:	Regular lectures (including conversation and written exercises)
Workload:	75 hours
Credit points:	3 ECTS
Requirements under the examination regulations:	----------
Recommended prerequisites:	Italian level A2 (e.g. obtained during M1)
Targeted learning outcomes:	Students understand the main points of clear standard input on familiar matters regularly encountered in work, school, leisure, etc. Can deal with most situations likely to arise whilst travelling in an area where the language is spoken. They can produce simple connected text on topics which are familiar or of personal interest. They are able to describe experiences and events, dreams, hopes and ambitions and briefly give reasons and explanations for opinions and plans.
Content:	Elements of Italian grammar, structure of the sentence, dictionary. Conversation practice.
Exam achievements:	written and oral tests
Forms of media:	Newspapers, internet, video, photography, power point presentations
Literature:	Various Authors „Rete! 1“, Italian course for foreigners
Update:	September 2017

Module name	**Master Thesis** **at the Consortium among the universities of Udine, Padova, Verona**
Academic Year:	2nd academic year at Udine (Viticulture, Enology) or Verona (Wine economy)
Semester:	4th semester
Module coordinator:	General coordination by Prof. Enrico Peterlunger, and Dr. Sabrina Di Santolo (Dean's office, Faculty of agriculture, University of Udine)
Supervisors:	Academic staff the consortium among the University of Udine, University of Verona and University of Padova, and academic staff members of the EMaVE Consortium and associated partners.
Language:	English
Classification within the curriculum:	Core module
Teaching format	The Thesis consists of the elaboration of a written report about an independent scientific work of the student and a defense.
Workload:	22 weeks for the elaboration of the thesis; plus adequate time (at least 2 weeks) for personal preparation for the defence.
Credit points:	28
Requirements under the examination regulations:	Admission to the thesis is granted, if the student has - successfully completed the modules of the first academic year Admission to the defence is granted under the condition that: - the written report was evaluated at least with the grade "E - pass"; - the student has completed all other compulsory modules of the second academic year successfully and obtained at least 120 ECTS (including the ECTS allocated to the Master Thesis)
Recommended prerequisites:	----------
Targeted learning outcomes:	The student is able to carry out scientific research independently in a given time implementing adequate scientific methods. In addition the student is able to present his/her results to a jury and answers questions related to the field of research.
Content:	Thesis document
Exam achievements:	Delivery of a written thesis report at the submission date , prepared under formal requirements of the University of Udine. Thesis defence in front of an examination jury of at least 3 academic members according to no 13.2 of the Study and Examination Regulations of the Vinifera EuroMaster degree programme.

Forms of media:	Research methods depending on the topic of the thesis. Written report; presentation media for the defence.
Literature:	Books and scientific papers related to the topic of the thesis. The literature research is part of the Master Thesis.
Update:	September 2017

Module name:	**Vineyard and / or Winery Internship at Udine-Padova-Verona-Bolzano**
Academic Year:	2nd academic year
Semester:	during Vinifera EuroMaster degree programme, 2nd academic year – internship can be done before or after the lessons which take place in January-June of each year
Module coordinator:	Master thesis tutor
Lecturers:	----------
Language:	Italian/English
Classification within the curriculum:	All specializations
Teaching format / class hours per week during the semester:	Internship
Workload:	200 h
Credit points:	8 ECTS (included in the ECTS of the thesis)
Requirements under the examination regulations:	----------
Recommended prerequisites:	----------
Targeted learning outcomes:	Internship linked to the Master thesis
Content:	Internship in winery is intended to allow the student having a direct experience about grapevine cultivation, grape production, harvest, wine making, wine stabilization. The student participates to the different operations working manually but also being part of the decisional processes, verifying the criteria of decision in relation to the type of wine to be produced. The internship activity can be part of the thesis activity and the credits are included in thesis credits. Internship can be done in small wineries as well as great wineries, and more than one internship may be done, in the region Friuli Venezia Giulia, in other Italian regions, in Europe or overseas.
Exam achievements:	----------
Forms of media:	----------
Literature:	----------
Update:	September 2017

Specialisation: Sustainable Management of Mountain Viticulture within the Alpine Landscape Valorization (BOLZANO) (20 ECTS)

Module group: Agrochemicals in vineyard pest-management and environment-landscape in mountain areas

Module name	**Plant pathology defence in vineyards in mountain areas**
Academic Year:	2nd academic year at the Free University of Bozen-Bolzano
Semester:	1st semester
Module group coordinator:	Pii, Youry (Free University of Bozen-Bolzano)
Lecturers:	Baric, Sanja (Free University of Bozen-Bolzano)
Language:	English
Classification within the curriculum:	Module of specialization: Sustainable Management of Mountain Viticulture within the Alpine Landscape Valorization Module group: Agrochemicals in vineyard pest-management and environment-landscape in mountain areas (Free University of Bozen-Bolzano)
Teaching format:	The frontal lectures are combined with interactive elements, such as descriptive case examples and discussions. In the practical part, selected contents covered in the lectures, are examined in greater depth in the field and/or in the laboratory. Short project papers on a topic of choice will be prepared by the students and presented to the class.
Workload:	Frontal lectures: 18 h; Laboratory exercises and field trips: 12 h; Student's personal study time in the module: 45 h
Credit points:	3 ECTS
Requirements under the examination regulations:	----------
Recommended prerequisites:	----------
Targeted learning outcomes:	Students will gain in-depth knowledge on abiotic disorders and on the biology of the most important pathogens and parasites of grapevine, and understand how plant pathogens and their host plants interact in the environment. They will also be able to recognise and identify symptoms of disorders and symptoms and signs of diseases, and formulate hypotheses about the causes of disorders and diseases.

	Furthermore, students will gain the ability to make informed judgments about the appropriate diagnostic technique and develop a strategy for control of grapevine disorders and diseases.
Content:	The course will start with an outline of grapevine disorders and diseases with epidemic potential. Subsequently the course will focus on grapevine disorders caused by environmental factors and put special emphasis on the situation in mountain areas. An in-depth treatment of the most important grapevine diseases caused by viruses and viroids, bacteria and phytoplasmas, oomycetes and fungi, and nematodes will follow, with special focus on disease epidemiology and the environmental factors potentially favouring the development of infectious grapevine diseases in mountain areas. Disease control strategies in integrated and organic farming systems will be covered including the application of disease forecasting and expert systems. Finally, the importance of advanced diagnostic tools for the prevention and containment of grapevine diseases will be discussed and implemented in the laboratory.
Exam achievements:	Written exam (70%) and students' project work (30%) assessed through a presentation and a short paper. To pass the module, both the written exam and the project work must be assessed with a positive mark.
Forms of media:	PowerPoint presentations and case studies
Literature:	Agrios, GN (2005). Plant Pathology, Fifth edition. Elsevier LDT, Oxford, 921 pages. ISBN 978-0120445653 Bettiga, LJ (Ed.). (2013). Grape Pest Management, Third edition. University of California - Agriculture and Natural Resources Publications, 609 pages. ISBN 978-1601078001 Wilcox, WF, Gubler, WD, Uyemoto JK (Eds.). (2015). Compendium of Grape Diseases, Disorders, and Pests, Second edition APS Press. 232 pages, ISBN 978-0890544792 Additional reviews and articles related to the topics of the module will be provided by the lecturer
Update:	September 2017

Module name	**Management and use of agrochemicals and their fate in the environment**
Academic Year:	2nd academic year at University of Bolzano
Semester:	3rd Semester
Module group coordinator:	Youry Pii (Free University of Bolzano)
Lecturers:	Youry Pii (Free University of Bolzano)
Language:	English
Classification within the curriculum:	Module of specialization: Sustainable Management of Mountain Viticulture within the Alpine Landscape Valorization Module group: Agrochemicals in vineyard pest-management and environment-landscape in mountains areas (Free University of Bolzano)
Teaching format:	Regular lectures
Workload:	Face to face lectures: 18 h; Laboratory exercise: 12 h; Student's personal study time in the module: 45 h
Credit points:	3 ECTS
Requirements under the examination regulations:	----------
Recommended prerequisites:	----------
Targeted learning outcomes:	The course aims at providing students with the knowledge and expertise on the agrochemicals modes of action and the fate of these chemicals in the agro-ecosystem, with specific reference to vineyard applications. This knowledge will allow the sustainable management of this agricultural practice for the protection of grapevine.
Content:	Classification of agrochemicals. Agrochemicals and their metabolism within cells: mode of action of fungicides (interference with respiration, biosynthesis of sterols, chitin, tubulin and nucleic acids); mode of action of insecticides (neurotoxic and decoupling insecticides); mode of action of herbicides (interference with photosynthesis, biosynthesis of amino acids and biosynthesis of lipids). Agrochemicals metabolism in plants: reactions of oxidations, reduction, hydrolysis and conjugation. Agrochemicals fate in soil: movement (leaching, run-off, volatilization), adsorption (adsorption isotherms and adsorption coefficients) and degradation (photodecomposition, chemical and microbiological degradations).

	Management of the principal diseases and parasites in vineyards through the distribution of phytosanitary products. Formulation of agrochemicals and labeling. Practical exercise: determination of agrochemical adsorption and agrochemical degradation in soils.
Exam achievements:	The final assessment will consist in an oral exam, which will consist in a) questions to evaluate the knowledge and understanding of the topics discussed during the classes and b) questions aimed at establishing the ability to apply such knowledge to hypothetical case studies in grapevine production. The ability to rework the experience acquired during laboratory exercises will also be evaluated. The final mark will be awarded based on the following criteria: the clarity of the response, the ability to summarize, evaluate, and establish relationships between topics.
Forms of media:	Power point presentation and blackboard
Literature:	Müller F. “Agrochemicals : composition, production, toxicology, applications” ISBN 3-527-29852-5 Roberts T.R. “Metabolic pathways of agrochemicals” ISBN 0-85404-494-9;ISBN 0-85404-499-X
Update:	September 2017

Module name	Mountain viticulture and landscape
Academic Year:	2nd academic year at University of Bolzano
Semester:	3rd Semester
Module group coordinator:	Youry Pii (Free University of Bolzano)
Lecturers:	Contract Professor (Free University of Bolzano)
Language:	English
Classification within the curriculum:	Module of specialization: Sustainable Management of Mountain Viticulture within the Alpine Landscape Valorization Module group: Agrochemicals in vineyard pest-management and environment-landscape in mountains areas (Free University of Bolzano)
Teaching format:	Regular lectures
Workload:	Face to face lectures: 24 h; Laboratory exercise / study visits: 16 h; Student's personal study time in the module: 60 h
Credit points:	4 ECTS
Requirements under the examination regulations:	----------
Recommended prerequisites:	----------
Targeted learning outcomes:	The course aims at providing students with the knowledge and expertise on the harmonization of the instrumental buildings (cellars and storage warehouses) and any process plants destined to remain in outdoor areas with the typical rural architecture of a given territory. The landscape design of the resources in charge of a winery will necessarily have to concern also the integration of all the infrastructural aspects of the land structures that must be carefully integrated with the existing environment, minimizing the negative effects related to visual quality, as well as any acoustic and olfactory impacts.
Content:	Definition of the concept of "landscape unit", to be analyzed through multidimensional methods by first evaluating indicators related to the so-called "structural factors" (degree of incorporation into the plot of the building, degree of isolation from the rest of the local agro-eco-landscape, dimensional classes of the company's structural resources) to be combined with other indicators of different nature (related to natural, environmental, historical and aesthetic aspects). Aspects of deepening in terms of infrastructure resources will concern, for example, the adjustment of the rural road network on farm roads to be integrated with the existing road network to allow the transit of agricultural vehicles without damage to the road cover due to the presence of tracks (very recurrent in the hilly and mountainous area).

Exam achievements:	The final assessment will consist in an oral and/or written exam, which will consist in a) questions to evaluate the knowledge and understanding of the topics discussed during the classes and b) questions aimed at establishing the ability to apply such knowledge to hypothetical case studies. The final mark will be awarded based on the following criteria: the clarity of the response, the ability to summarize, evaluate, and establish relationships between topics.
Forms of media:	Power point presentation and blackboard
Literature:	Keynotes provided by the lecturer; Mountain and Steep Slope Viticulture (ISBN 9788890233036) http://vit.entecra.it/sito_cong2/atti_en.html
Update:	September 2017

Module group: Vineyard management and wine production in mountain areas

Module name	**Vineyard Management in Mountain Areas**
Academic Year:	2nd academic year at the Free University of Bozen-Bolzano
Semester:	3rd Semester
Module group coordinator:	Carlo Andreotti (Free University of Bozen-Bolzano)
Lecturers:	Carlo Andreotti (Free University of Bozen-Bolzano)
Language:	English
Classification within the curriculum:	Module of specialization: Sustainable Management of Mountain Viticulture within the Alpine Landscape Valorization Module group: Vineyard management and wine production in mountain areas (Free University of Bozen-Bolzano)
Teaching format:	Regular lectures, exercises in open field (vineyards) and visits to wine producing farms in mountain areas
Workload:	Lectures: 18 hours; Exercises: 12 hours; Student's personal study time in the module: 45 h
Credit points:	3 ECTS
Requirements under the examination regulations:	----------
Recommended prerequisites:	Students should have at least a basic knowledge of arboriculture and general viticulture.
Targeted learning outcomes:	The course will provide students with scientific and technical knowledge on the main aspects related to the management of vineyards located in mountain areas. Students will understand and critically consider the main factors involved in mountain environment and their consequences on grapevine physiology and cultural management. Finally, students will learn how the exploitation of the mountain conditions can lead to an enhancement of the final quality of grapes, while maintaining yield level and overall sustainability.
Content:	Course contents are as follows: - The altitude effect on vineyard microclimatic conditions: role of temperature, daily temperature excursion, light intensity and quality, exposition. - The effect of altitude on grape quality. - Cultural management of mountain vineyards: site preparation in

	steep slope conditions (contour farming, up- down the slope, terracing systems), means against soil erosion (cover crops, tilling, etc.), canopy management (grapevine training systems for steep slopes conditions and in relation with vineyard exposition). - Protection against adverse meteorological conditions (late frost, early frost, too high radiation, sunburn damages). - Sustainable use of water and nutrients inputs in sloped vineyards. - Climate change and mountain viticulture (DOC modification, adaptation to warmer conditions, control of ripening dynamic of grapes, exploitation of new areas at higher altitudes). - Selection of new cultivars potentially suitable for mountain environment.
Exam achievements:	Oral exam
Forms of media:	Power point slides
Literature:	There are no specific textbooks on the course topics. The lecturer will provide students with the pdf of the lectures and with selected papers from the international literature on the subject.
Update:	September 2017

Module name	Vineyard Mechanization in Mountain Areas
Academic Year:	2nd academic year at the Free University of Bozen-Bolzano
Semester:	3rd Semester
Module group coordinator:	Andreotti, Carlo (Free University of Bozen-Bolzano)
Lecturers:	Liberatori, Sandro (Free University of Bozen-Bolzano)
Language:	English
Classification within the curriculum:	Module of specialization: Sustainable Management of Mountain Viticulture within the Alpine Landscape Valorization Module group: Vineyard management and wine production in mountain areas (Free University of Bozen-Bolzano)
Teaching format:	Regular lectures, web platform, team working and group project, visit of manufacturing plants and farms.
Workload:	Lectures: 24 hours; Exercises: 16 hours; Student's personal study time in the module: 60 h
Credit points:	4 ECTS
Requirements under the examination regulations:	----------
Recommended prerequisites:	----------
Targeted learning outcomes:	Provide students with basic knowledge on mechanization in mountain areas, specific knowledge on safety requirements and performances of machines, homologations and use according to environment protection and high quality production, evaluation of innovation and transfer of technologies. Being able to apply standard requirements in the design and evaluation of machines, provide for a proper use of machines, to measure the level of innovation and provide for technology transfer.
Content:	International standards and their application in the field of performances, safety and environment protection related to machines, the use of machines for quality production, measurement of the level of innovation of machines, technology transfer.
Exam achievements:	1/3 oral examination, 1/3 group work, 1/3 written examination; 25% skill to properly set a problem, 25% skill to find a solution, 25% level of knowledge of the topics, 25% ability for presentations
Forms of media:	Power point slides, web platform
Literature:	Course material by the lecturer
Update:	September 2017

Module name	**Wine production processes and plants**
Academic Year:	2nd academic year at the Free University of Bozen-Bolzano
Semester:	3rd Semester
Module group coordinator:	Andreotti, Carlo (Free University of Bozen-Bolzano)
Lecturers:	Boselli, Emanuele (Free University of Bozen-Bolzano)
Language:	English
Classification within the curriculum:	Module of specialisation Sustainable Management of Mountain Viticulture within the Alpine Landscape Valorization Module group: Vineyard management and wine production in mountain areas (Free University of Bozen-Bolzano)
Teaching format:	Regular lectures; laboratory practice, visits to wineries and specialized companies
Workload:	Face to face lectures: 18 h; Visits of wineries, specialized companies and/or laboratory practice 12 h; Student's personal study time in the module: 45 h
Credit points:	3 ECTS
Requirements under the examination regulations:	----------
Recommended prerequisites:	----------
Targeted learning outcomes:	The students can manage adequately the different wine production processes and plants with emphasis on *extreme wines*
Content:	Fundamentals of wine production processes and related plants: red-wine like, white-wine like, rosè wines, carbonic maceration, natural sparkling wines, special wines such as raisin wines and fortified wines. Applications of winemaking processes to areas where altitude leads to difficult climatic conditions, and steep slopes (even at lower altitude) limit the possibilities for using the land and lead to an increase in the cost of working. Key features of *extreme wines* produced with white (Gewürztraminer, Chardonnay, Pinot blanc, Pinot gris, Sauvignon, Müller-Thurgau, Sylvaner, Kerner, Riesling, Veltliner, Moscato) and red (Lagrein, Pinot Noir, Merlot, Cabernet Sauvignon, Cabernet Franc and Moscato rosa) varieties. Production processes of other *extreme wines* of the world (Beaujolais, Port wine, Cinque Terre, Eiswein/ice wine, Pecorino and *spumante* wines). Techniques to preserve the aroma of extreme wines and to prevent the defects. Practical laboratory experiments and technical visits to specialized external companies and wineries.

Exam achievements:	Team project work: power point presentation done in groups on a topic related to the course combined with an individual interview
Forms of media:	Power point and blackboard
Literature:	Key notes provided by the lecturer in the E-learning platform of UNIBZ; Ribéreau-Gayon P., Dubourdieu D., Donèche B., Lonvaud A. – Handbook of Enology – Vol. I and II – free pdf version available in internet OIV technical standards and documents http://www.oiv.int/en/technical-standards-and-documents Cervim website: http://www.cervim.org/
Update:	September 2017

Optative courses

Module name	**Marketing of Mountain Products** (Vermarktung von Bergprodukten) (optative)
Academic Year:	2nd academic year at the Free University of Bozen-Bolzano
Semester:	3rd Semester
Module group coordinator:	-
Lecturers:	Fischer, Christian or Busch, Gesa (Free University of Bozen-Bolzano)
Language:	English
Classification within the curriculum:	Module of specialization: Sustainable Management of Mountain Viticulture within the Alpine Landscape Valorization Module group: optional
Teaching format:	Lectures, group work and excursions
Workload:	Lectures: 24 hours; Exercises: 16 hours; Student's personal study time in the module: 60 hours
Credit points:	4 ECTS
Requirements under the examination regulations:	----------
Recommended prerequisites:	Basics of economics and marketing
Targeted learning outcomes:	Upon successful completion of the course, students will be able to: • Demonstrate in-depth knowledge of important features of the markets for mountain commodities and products (Knowing and Understanding). • Describe the basic concepts of agricultural marketing and consumer behaviour theory and to discuss them critically (Knowing, Understanding and Judging). Be able to conduct independently simple analyses of agricultural markets (Applying).
Content:	The course teaches the fundamentals of agricultural and food marketing with special focus on mountain products, in particular mountain food and drink products. In addition to the lectures, accompanying exercises will repeat and deepen the lecture content. External speakers will speak on selected topics that are of particular relevance to the South Tyrolean mountain agriculture. The course aim is the transfer of general research-based knowledge, regulations and methods.

	1. Basics of marketing 2. Definition of mountain products 3. Labelling of food products 4. Mountain product value chains 5. Mountain tourism and gastronomy
Exam achievements:	Written exam and oral presentation of study projects (group work)
Forms of media:	Lecture slides and materials
Literature:	Rob McMorran, Fabien Santini, Fatmir Guri, Sergio Gomez-y-Paloma, Martin Price, Olivier Beucherie, Christine Monticelli, Alexia Rouby, Delphine Vitrolles and Guillaume Cloye: A mountain food label for Europe?, *Journal of Alpine Research | Revue de géographie alpine* [Online], 103-4 | 2015. URL: http://rga.revues.org/2654; DOI: 10.4000/ rga.2654. Santini, F., Guri, F., Gomez Y. Paloma, S., 2013: Labelling of agricultural and food products of mountain farming. European Commission, Joint Research Centre, Institute for Prospective Technological Studies, Seville, 156 pages. Matscher, A., Schermer, M., 2009: Zusatznutzen Berg? Argumente für den Konsum von Bergprodukten. *Agrarwirtschaft*, Vol. 58, No. 2, pp. 125–134. Martin, B., Coppa, M., Verdier-Metz, I., Montel, M.C., Joy, M., Casasús, I., Blanco, M., 2016: The contribution of mountain pastures to the link to terroir in dairy and meat products. *Options Méditerranéennes*, No. 116: Mountain pastures and livestock farming facing uncertainty: environmental, technical and socio economic challenges. www.mountainpartnership.org. FAO, 2015. Promoting mountain products for better livelihoods. http://www.fao.org/documents/card/en/c/1014d6eb-7cd3-4acd-96c0-6184436b21dd/
Update:	September 2017

Module name	**Law on Cooperatives** (Genossenschaftsrecht) (optative)
Academic Year:	2nd academic year at the Free University of Bozen-Bolzano
Semester:	3rd Semester
Module group coordinator:	-
Lecturers:	Miribung, Georg (Free University of Bozen-Bolzano)
Language:	English
Classification within the curriculum:	Module of specialization: Sustainable Management of Mountain Viticulture within the Alpine Landscape Valorization Module group: optional
Teaching format:	Lectures and excursions
Workload:	Lectures: 24 hours; Exercises: 16 hours; Student's personal study time in the module: 60 hours
Credit points:	4 ECTS
Requirements under the examination regulations:	----------
Recommended prerequisites:	----------
Targeted learning outcomes:	Knowledge and understanding: - Knowledge and understanding of the institutional framework. - Knowledge of national and international aspects of cooperative law and cooperative governance. Applying knowledge and understanding: - Ability to understand the effectiveness of the legal concepts and their effects on individuals and institutions. - Ability to analyze and make a critical evaluation of company processes and dynamics with respect to cooperative law. Making judgments: - Ability to evaluate relevant contractual and regulatory provisions to inform judgments about cooperative law and cooperative governance. - Ability to read and evaluate information in journals, newspapers, cases and legal transactions using correct legal concepts, and to formulate opinions. Communication skills: - Ability to present with technical language topics concerning cooperatives and cooperative governance. Learning skills: Ability to access law materials, to research on cooperative law and finance.

Content:	The course is aimed at providing a core knowledge of cooperative law. Students will understand how cooperatives work in real practice, how they are governed and financed, and which are the features of cooperative contracts and regulation around Europe. - Introduction to law - Structure and Sources of Cooperative Law - Functions of Cooperative Law and Cooperative Identity - Cooperative Objective - Cooperative Financial Structure - Cooperative Governance - Cooperatives and Tax Law
Exam achievements:	Written examination. The answer must be relevant to the question asked; irrelevancies will not be taken into account. The marking criteria for high class answers will take into consideration comprehensiveness, accuracy, clarity of argument and expression, insight into conceptual issues, critical evaluation.
Forms of media:	Lecture slides and/or other material
Literature:	To be mentioned at the start of the course
Update:	September 2017

Module group: Management of soil fertility in mountain vineyards (optative)

Module name	**Chemistry of fertilizers and mineral nutrition of grapevine (optative)**
Academic Year:	2nd academic year at University of Bolzano
Semester:	3rd Semester
Module group coordinator:	Stefano Cesco (Free University of Bolzano)
Lecturers:	Stefano Cesco (Free University of Bolzano)
Language:	English
Classification within the curriculum:	Module of specialization: Sustainable Management of Mountain Viticulture within the Alpine Landscape Valorization Module group: *Management of soil fertility in mountain vineyards* (Free University of Bolzano) (optional)
Teaching format:	Regular lectures
Workload:	Face to face lectures: 18 h; Laboratory exercise: 12 h; Student's personal study time in the module: 45 h
Credit points:	3 ECTS
Requirements under the examination regulations:	----------
Recommended prerequisites:	----------
Targeted learning outcomes:	The course aims at improving the knowledge about the mechanisms underlying the soil availability, root uptake, translocation and allocation of mineral nutrients in grapevine plants. This knowledge will allow the students to manage the fertilization practices in vineyards according to the physiological needs of plants.
Content:	General aspects of ion uptake mechanisms in plants: short (roots) and long (xylem and phloem) transport and allocation. Ion uptake by leaves (mechanisms underlying foliar fertilization). Usable forms in the soil-plant system, specific mechanisms of acquisition, plant contents, metabolic functions, symptoms of deficiency/excess, fertilizers and their field application of macro (N, P, K, Ca, Mg, S) and micronutrients (B, Zn, Fe, Cu) in relation to a sustainable and efficient use of the sources. Practical laboratory exercise on topics discussed during the classes.
Exam achievements:	Assessment (*at the end of the course*) is conducted via oral examination that includes a) questions to assess the knowledge and understanding of the course topics and b) questions designed to

	assess the ability to transfer these skills to case studies of grapevine production. Space will also be dedicated to the evaluation of the ability to rework the experience of the laboratory. Attribution of a single final mark awarded based on the following criteria: the clarity of the response, the ability to summarize, evaluate, and establish relationships between topics, the independence of judgment, the ability to rework.
Forms of media:	Power point presentation and blackboard
Literature:	Mineral Nutrition of Higher Plants, Ed: Petra Marschner, Academic press, 2012, ISBN: 978-0-12-384905-2 The Science of Grapevines, Anatomy and Physiology. Second Edition. Markus Keller Published by Elsevier Inc. 2015, ISBN: 978-0-12-419987-3
Update:	September 2017

Module name	**Soil and Water Management in Grapevine Production (optative)**
Academic Year:	2nd academic year at the Free University of Bozen-Bolzano
Semester:	3rd Semester
Module group coordinator:	Cesco, Stefano (Free University of Bozen-Bolzano)
Lecturers:	Lecturer of the Free University of Bozen-Bolzano
Language:	English
Classification within the curriculum:	Module of specialization: Sustainable Management of Mountain Viticulture within the Alpine Landscape Valorization Module group: Management of soil fertility in mountain vineyards (Free University of Bozen-Bolzano) (optional)
Teaching format:	Regular lectures, exercises in open field (vineyards) and visits to wine producing farms in mountain areas
Workload:	Lectures: 12 hours; Exercises: 8 hours; Student's personal study time in the module: 30 hours
Credit points:	2 ECTS
Requirements under the examination regulations:	----------
Recommended prerequisites:	Students should have at least a basic knowledge of arboriculture and general viticulture.
Targeted learning outcomes:	The course will provide students with scientific and technical knowledge on the main aspects related to soil and water management in vineyards located in mountain areas. Students will consider different irrigation methods and new emerging water management technics which are used to increase water use efficiency, to help regulating canopy vigour and possibly to increase grape quality. Regarding the soil management, students will be provided with knowledge on the current grass management practices in mountain viticulture and the possible benefits deriving from soil amendments application.
Content:	The course consists of two sections: <u>Section 1: water management</u> - Overview of irrigation methods applied in mountain viticulture (drip, subsurface irrigation, fertigation) - Irrigation water management techniques capable to save water, increase its use efficiency and provide other benefits such as control of canopy vigour and possibly improve grape quality (deficit irrigation (DI), regulated deficit irrigation (RDI)

	and partial root drying) - Sensors and technology available to monitor soil water content in the vineyard as well as the soil-plant water status <u>Section 2: soil management</u> - Overview of mechanical and technical methods for the grass management of both row and inter-row in mountain viticulture. - Possible benefits for soil and water management related to the application of soil amendments
Exam achievements:	Oral exam
Forms of media:	Power point slides
Literature:	There are no specific textbooks on the course topics. The lecturer will provide students with the pdf of the lectures and with selected papers from the international literature on the subject.
Update:	September 2017

Module group: Characterization of mountain wines (optative)

Module name	**Fermentation processes for the production of mountain wines (optative)**
Academic Year:	2nd academic year at the Free University of Bozen-Bolzano
Semester:	3rd Semester
Module group coordinator:	Boselli, Emanuele (Free University of Bozen-Bolzano)
Lecturers:	Di Cagno, Raffaella (Free University of Bolzano)
Language:	English
Classification within the curriculum:	Module of specialization: Sustainable Management of Mountain Viticulture within the Alpine Landscape Valorization Module group: Characterization of mountain wines (Free University of Bozen-Bolzano)
Teaching format:	Regular lectures; visits of mountain wineries
Workload:	Face to face lectures: 16 h; Visits of wineries 4 h;
Credit points:	2 ECTS
Requirements under the examination regulations:	----------
Recommended prerequisites:	----------
Targeted learning outcomes:	Knowledge and understanding of the role of yeasts and lactic acid bacteria in the wine fermentation processes. The students will be enabled to manage the principles of the fermentation process
Content:	Ecophysiology and metabolism of wine yeasts. Yeast selection and their use in wine making. Technology and sensory features of selected yeasts. Lactic acid bacteria and malo-lactic acid fermentation. Selection of lactic acid bacteria and their use in wine making. Effects of the mountain environment on the overall quality of wines.
Exam achievements:	The exam consists of a written test
Forms of media:	The course is presented in digital format. Presentations, scientific papers and spreadsheets used during the course are provided to students.
Literature:	Wine Microbiology: Practical Applications and Procedures, Eds. K.C. Fugelsang and C.G. Edwards, Springer.
Update:	September 2017

Module name	**Sensory analysis approaches for mountain wines (optative)**
Academic Year:	2nd academic year at the Free University of Bozen-Bolzano
Semester:	3rd Semester
Module group coordinator:	Boselli, Emanuele (Free University of Bozen-Bolzano)
Lecturers:	Boselli, Emanuele (Free University of Bozen-Bolzano)
Language:	English
Classification within the curriculum:	Module of specialization: Sustainable Management of Mountain Viticulture within the Alpine Landscape Valorization Module group: Characterization of mountain wines (Free University of Bozen-Bolzano)
Teaching format:	Regular lectures; laboratory practice, visits of wineries
Workload:	Face to face lectures: 18 h; Visits of wineries or specialized companies and/or laboratory practice 12 h; Student's personal study time in the module: 45 h
Credit points:	3 ECTS
Requirements under the examination regulations:	----------
Recommended prerequisites:	----------
Targeted learning outcomes:	The students can manage adequately the sensory analysis of wines and other winery products with emphasis on *extreme wines*
Content:	Fundamentals of wine sensory analysis. Physiology of human senses; descriptive analysis; effects of the winemaking technology on the sensory properties of wines. Sensory evaluation of mountain (*extreme*) wines chosen among Gewürztraminer, Chardonnay, Pinot blanc, Pinot gris, Sauvignon, Müller-Thurgau, Sylvaner, Kerner, Riesling, Veltliner, Moscato (white) and Lagrein, Pinot Noir, Merlot, Cabernet Sauvignon, Cabernet Franc and Moscato rosa (red wines). Sensory evaluation of other *extreme wines* of the world chosen among Beaujolais, Port wine, Cinque Terre, Eiswein/ice wine, Pecorino and *spumante* wines. Practical laboratory experiments and technical visits to specialized external companies.
Exam achievements:	Team project work: power point presentation done in groups on a topic related to the course combined with an individual interview
Forms of media:	Power point and blackboard
Literature:	Key notes provided by the lecturer in the E-learning platform of UNIBZ; Review document on sensory analysis of wine by OIV (free pdf file download) Ribéreau-Gayon P., Dubourdieu D., Donèche B., Lonvaud A. –

	Handbook of Enology – Vol. I and II (free pdf file download) OIV technical standards and documents http://www.oiv.int/en/technical-standards-and-documents Cervim website: http://www.cervim.org/
Update:	September 2017

Modules offered by
Universidade de Lisboa
&
Universidade do Porto

Students of the Vinifera EuroMaster degree programme have to attend the following modules in the second academic year (M2):

• 3 Core modules of 6 credits each	18 ECTS
• 3 Core modules of 3 credits each	9 ECTS
• 1 Core modules of 3 credits (Professional Training and Study Visit)	3 ECTS
• Master Thesis	30 ECTS
TOTAL	60 ECTS

Modules

Module	ECTS points
Advanced Viticulture	6
Stabilisation and Wine Aging	6
Professional (Winery) Training and Study Visit	3
Mountain and Semi-Arid Tropical Viticulture	3
Grape and Wine Derived Products and By-products	3
Fortified Wines	3
Master Seminar (in Viticulture and Enology Engineering – Vinifera EuroMaster)	6
Dissertations (in Viticulture and Enology Engineering – Vinifera EuroMaster)	30
Total	60

Module name:	**Advanced Viticulture**
Academic Year:	2nd academic year at Universidade de Lisboa
Semester:	3rd semester
Module coordinator:	Carlos Lopes (ISA)
Lecturer:	Carlos Lopes (coordinator), Miguel Costa, Luisa Carvalho, Ricardo Ferreira, Eiras Dias (INIAV) & Ricardo Braga .
Language:	English
Classification within the curriculum:	Module of Specialization (compulsory module)
Teaching format:	Regular lectures and workshops with seminars given by invited researchers and other professionals. Study trip at several Portuguese winegrowing regions
Workload:	Face to face lectures and seminars: 70 h Student's personal study time in the module: 98 h
Credit points:	6 ECTS
Requirements under the examination regulations:	----------
Recommended prerequisites:	Viticulture
Targeted learning outcomes:	The students will get a deeper understanding of the main chalenges of the XXI century Viticulture by updating and improve their knowledge in currently relevant topics such as vineyard mechanization, yield forecast, precision viticulture, the impacts of climate change on viticulture and the use of biotechnology in the grape and wine industry. Furthermore, they will learn how to critically evaluate and integrate the knowledge obtained from previous Viticulture courses and from recent scientific literature in order to be able to deal with and to promote the sustainability of the grape and wine production industry.
Content:	Vineyard mechanization; Crop development and yield forecast; Implications of climate change for viticulture and wine production; Precision Viticulture; Grapevine Biotechnology: main applications in viticulture; Sustainable Viticulture
Study / exam achievements:	Evaluation by a written report based on a literature review of a given topic (1/3) and by a final examination (2/3).
Forms of media:	Power point, black board, scientific and technological articles, data bases
Literature:	Chaves MM, Costa JM, Zarrouk O, Pinheiro C, Lopes CM and Pereira JS 2016. Controlling stomatal aperture in semi-arid regions - The dilemma of saving water or being cool? Plant Science, 251, 54–64. Chaves MM, Santos TP, Souza CR, Ortuño MF, Rodrigues ML, Lopes CM, Maroco JP, Pereira JS, 2007. Deficit irrigation in grapevine improves water-use efficiency while controlling vigour and

	production quality. Ann Appl Biol., 150: 237-252. Chaves, MM;. Zarrouk, O.; Francisco, R.; Costa, JM; Santos, T.P.; Regalado, AP; Rodrigues, ML; Lopes, CM 2010. Grapevine under deficit irrigation: hints from physiological and molecular data. Annals of Botany 105: 661–676. Costa, J.M, Vaz, M., Escalona, J., Egipto, R., Lopes, CM., Medrano, H., Chaves, M.M. 2016. Modern viticulture in southern Europe: Vulnerabilities and strategies for adaptation to water scarcity. Agricultural Water Management 164, (1), 5–18. Gerós, H. et al. 2015. Grapevine in a Changing Environment. A Molecular and Ecophysiological Perspective. Wiley & Sons Ltd. Gladstones, J. 2011. Wine, Terroir and Climate Change. Wakefield Press, Adelaide, South Austrália. Iland, P. et al. 2011. The Grapevine: from the science to the practice of growing vines for wine. Patrick Iland Wine Promotions Pty, Austrália. Jones, G. 2012. Climate Assessment for the Douro Wine Region: An Examination for the Past, Present and Future Conditions for Wine Production. ADVID, Régua, Portugal. Lopes, C.M., Santos, T., Monteiro, A.; Rodrigues, M.L, Costa, J.M. & Chaves, M.M. 2011. Combining cover cropping with deficit irrigation in a Mediterranean low vigor vineyard. Scientia Horticulturae , 129:603-612. Monteiro, A.; Lopes, C.M. 2007. Influence of cover crop on water use and performance of vineyard in Mediterranean Portugal. Agri. Ecosyst. Environ., 121:336-342. O.I.V. 2008. Guidelines for Sustainable Vitiviniculture: Production, processing and packaging of products. International Organisation of Vine and Wine, Resolution CST 1/2008, Paris, 2008. Proc. 1st International Workshop on Vineyard Mechanization & Grape & Wine Quality. Ed.: S. Poni. Acta Horticulturae, 978, ISHS 2013. Proc. IX Int. Symp. on Grapevine Physiology and Biotechnology. Ed.: M. Pinto. Acta Hortic. 1157, ISHS 2017. Profit, T. et al. 2006. Precision Viticulture. A new era in vineyard management and wine production. Winetitles, Ashford, South Australia. Furthermore, other specific literature will be provided at the beginning of each chapter.
Update	September 2017

Module name:	**Stabilization and Wine Aging**
Academic Year:	2nd academic year at Universidade de Lisboa
Semester:	3rd semester
Module coordinator:	Sofia Catarino, Prof. Ph.D (Universidade de Lisboa)
Lecturer:	Sofia Catarino, Prof. Ph.D (Universidade de Lisboa); Sofia Knapic, Ph.D (guest)
Language:	English
Classification within the curriculum:	Core module of the second academic year
Teaching format:	Regular lectures, laboratory exercises and tutorial during the semester
Workload:	Face to face lectures and seminars: 40 h; laboratory exercises: 30 h; tutorial: 14 h Student's personal study time in the module: 84 h
Credit points:	6 ECTS
Requirements under the examination regulations:	----------
Recommended prerequisites:	Enology, wine making and wine analysis modules
Targeted learning outcomes:	Understanding of the different physical-chemical phenomena which take place during the conservation, aging, and stabilization of wines. Development of judgement abilities on wine treatments, according to the type of wine intended. Knowledge on the tests to assess the main risks, and on the stabilization methods available to prevent them. Capacity for team work and critical analysis skills.
Content:	Wines, quality and quality control: quality characteristics (legal and commercial specifications); quality management; types of Portuguese wines. Physicochemical characterization of wines. Evolution and physicochemical modifications of wines: colloidal phenomena and main mechanisms involved; colouring matter composition and influence of the winemaking technology; evolution of the phenolic compounds during wine ageing (influence of pH, oxygen, sulphur dioxide and temperature); characteristics and evolution of aroma compounds. Wine aging in wood barrels and vat/bottle. Micro-oxygenation. Oak alternatives. Wines stabilization: protein, coloring matter, metallic and tartaric precipitations; stabilization processes; other treatments; stability tests. Clarification of wines: fining operation, mechanisms involved, fining agents; filtration, mechanisms of filtration; products used in filtration, types of filters.

	Membrane separation processes in Enology. Cork and corks for wine industry. Other oenological practices: OIV International Code of Oenological Practices.
Study / exam achievements:	Written examination and on the discussion of a report by a group of four students.
Forms of media:	Power point, whiteboard, scientific and technical articles data base, industry films, study visits to wineries
Literature:	<u>Main Bibliography:</u> Boulton et al., 1996. Principles and Practices of Winemaking. Chapman and Hall, New York. Curvelo-Garcia AS, 1989. Controlo de Qualidade dos Vinhos. Instituto da Vinha e do Vinho, Lisboa. Curvelo-Garcia AS, Barros P (Eds), 2015. Química Enológica – métodos analíticos. Avanços recentes no controlo da qualidade de vinho e de outros produtos vitivinícolas. Publindústria, Porto. Flanzy C, 1998. Oenologie. Fondements scientifiques et technologiques. Tec & Doc. Lavoisier, Paris. OIV, 2017. International Code of Oenological Practices. OIV, Paris. OIV, 2017. International Oenological Codex. OIV, Paris. OIV, 2017. Compendium of International Methods of Wine and Must Analysis. Vol. 1 and 2. OIV, Paris. Ribéreau-Gayon et al. (Eds.), 2006. Handbook of Enology. Vol. 2. The chemistry of wine. Stabilization and treatments. 2nd edition. Wiley, England. Reynolds AG (Ed.), 2010. Managing wine quality. Vol. 2: Oenology and wine quality. Woodhead Publishing Ltd., Cambridge. <u>Other Bibliography:</u> Braga A, Cosme F, Ricardo-da-Silva JM, Laureano O, 2007. Gelatine, casein, and potassium caseinate as distinct wine fining agents. J. Int. Sci. Vigne Vin, 41 (4), 203-214. Cabrita MJ, Garcia R, Catarino S, 2016. Recent developments in wine tartaric stabilization. In *Recent advances in wine stabilization and conservation technologies*, 49-63. Nova Science Publishers, New York. Catarino S, Madeira M, Monteiro F, Rocha F, Curvelo-Garcia AS, Bruno de Sousa R, 2008. Effect of bentonite characteristics on the elemental composition of wine. J. Agric. Food Chem., 56, 158-165. Cosme F, Ricardo-da-Silva JM, Laureano O, 2008. Interactions between protein fining agents and proanthocyanidins in white wine. Food Chem., 106 (2), 2008, 536-544. Dallas C, Laureano O, 1994. Effects of pH, sulfur dioxide, alcohol content, temperature and storage time on the colour composition on a young Portuguese red wine. J. Sci. Food Agric., 65, 477-484. Kaya A, Bruno de Sousa R, Curvelo-Garcia AS, Ricardo-da-Silva J, Catarino S, 2017**.** Effect of wood aging on mineral composition and wine $^{87}Sr/^{86}Sr$ isotopic ratio. J. Agric. Food Chem., 65, 4766-4776. Mira H, Leite P, Catarino S, Ricardo-da-Silva JM, Curvelo-Garcia AS, 2007. Use of PVI-PVP copolymer for wine metal reduction effects on wine characteristics. Vitis, 46 (3), 138-147. <u>SCI Journals for complementary references</u>:

	Am. J. Enol. Vitic.; Aust. J. Grape Wine Res.; Ciência Téc. Vitiv.; Food Chem.; J. Agric. Food Chem.; J. Int. Sci. Vigne Vin; J. Sci. Food Agric.; S. Afr. J. Enol. Vitic.; Vitis
Update	September 2017

Module name:	**Professional (Winery) Training and Study Visit**
Academic Year:	2nd academic year at Universidade de Lisboa
Semester:	3rd semester
Module coordinator:	Jorge M. Ricardo da Silva (Universidade de Lisboa)
Lecturer:	Jorge M. Ricardo-da-Silva, Prof. Ph.D (Universidade de Lisboa) Manuel Malfeito Ferreira, Prof. Ph.D (Universidade de Lisboa); Jorge Queiroz, Prof. Ph.D (Universidade de Porto)
Language:	English
Classification within the curriculum:	Module of Specialisation
Teaching format:	Period: from the end of July to the beginning of October (Compulsory module). The students should spend at least one month in a winery during harvest time.
Workload:	Total work load: 84 h
Credit points:	3 ECTS
Requirements under the examination regulations:	----------
Recommended prerequisites:	Vinification, Viticulture, Wine Microbiology modules
Targeted learning outcomes:	Students have practical experience concerning the operational procedures in a winery during the harvest and vinification period. They are able to combine the theoretical knowledge with the constraints of practical implementation. Students have an impression of the special characteristics of the main Portuguese vine growing regions and their wines.
Content:	Contact of the students with the practical of wine company, during harvest and vinification Participation of the students during grape maturation controls until the end of the fermentations/1st racking of the wines. (Grape maturation survey; Harvest decision; Definition of a concept related to the production of a certain wine style; Hygiene of the winery and equipment preparation; Corrections and pre-fermentative operations; Choice of the grapes, crushing, destemming; draining, pressing, Clarification of white and rose musts; Fermentative process; yeast application; maceration/remontage, Fermentation temperature control; Decision about malolactic fermentation; draining and pomace out from the tanks. Wine survey until the end of fermentations; racking. Yields, costs and by-products) Integrated study visit to vineyards and wineries of the main Portuguese wine regions.
Study / exam achievements:	Report on the training period in a winery with an oral presentation and discussion. Report on the study visit.

Forms of media:	Machinery and equipment of the winery, power point
Literature:	All Enology literature references recommended in the other Enology modules
Update	September 2017
Module name:	**Mountain and Semi-Arid Tropical Viticulture**
Academic Year:	2nd academic year at Universidade de Lisboa & Porto
Semester:	3rd semester
Module coordinator:	Jorge Queiroz Prof. Ph.D (Universidade de Porto)
Lecturer:	Carlos Lopes Prof. Ph.D (Universidade Técnica de Lisboa)
Language:	English
Classification within the curriculum:	Module of Specialisation (elective module)
Teaching format:	Regular and tutorial lectures; study trip to the Douro Valley in Portugal and Seminars given by Brasilian researchers
Workload:	Face to face lectures and practical exercises: 35 h; tutorial: 7 h Student's personal study time in the module: 42 h
Credit points:	3 ECTS
Requirements under the examination regulations:	----------
Recommended prerequisites:	----------
Targeted learning outcomes:	Upon completion of the course it is expect that the students will be able to: - Find out the geographical locations of the main current worldwide regions for Mountain and Semi-Arid and Tropical grape production - learn about the specificities of Mountain Viticulture regarding soil preparation, leveling, training systems, soil management and mechanization; - understand the effects of Semi-Arid and Tropical Climate on grapevine biology, vigour and berry health and composition and learn how to use management tools and practices to overcome those problems.
Content:	1-Mountain Viticulture Main regions of Mountain Viticulture in the winegrowing world. Hillside systematization for grapevine planting in Mountain Viticulture. Specific training systems for Mountain Viticulture. Control of erosion and soil management. Vineyard mechanization for steep slope Viticulture 2- Semi-Arid and Tropical Viticulture Worldwide Semi-Arid and Tropical Viticulture regions; Climate constraints and Bioclimatic indices. Grapevine Biology in tropical semi-arid climate: bud dormancy, shoot development, apical dominance, carbon reserves and fruitfulness;

	Vineyard management in Semi-Arid and Tropical Viticulture: The training and pruning systems: From pergolas to vertical shoot positioning canopies. Vigour control, canopy microclimate and berry health and composition, water management and pruning opportunity. From seasonal harvest to continuous harvest. Influence of the tropical and semi-arid conditions in grape and wine composition. Seminar: The Brazilian winegrowing regions and the tropical wines produced.
Study / exam achievements:	Written examination
Forms of media:	Power point, black board, scientific and technological articles
Literature:	Albuquerque J. A. S., Vieira S. M. (1987). Efeitos da cianamida hidrogenada na brotação da videira cv. Itália na região Semi-árida do Vale do São Francisco. In: Congresso Brasileiro de Fruticultura, 9, 739-744. Campinas-SP. Sociedade Brasileira de Fruticultura (ed). Campinas. Carbonneau, A. 2010. La viticulture tropicale mondiale. Le point de son évolution au IIème Symposium International des Vins Tropicaux, Petrolina, Brésil. Progrès Agricole et Viticole, 127(13-14), 281-283. Carbonneau, A. 2011. Tropical Viticulture: Specificities and Challenges for a Quality Viticulture. Acta Hort. 910, 15-34. Cruz, A.; Santos, J.; Gomes, C.; Castro, R. (2008). Tempranillo in semi-arid tropical climate (Pernambuco – Brazil). Adaptation of some clones and their affinity to different rootstoks. VIIth International Terroir Congress 2008, Nyon, Suisse. Marin FR, Lopes AML, Pacheco LRF, Pilau FG, Silveira PH, Conceição MAF, Tonietto J, Mandelli F. 2008. Soil and climate potential for grape crop in the São Paulo state, Brazil. Revista Brasileira de Agrometeorologia, 16(2), 163-174. Pereira GE, Santos JO, Guerra CC, Alves LA, 2008. Évaluation de la qualité des raisins et des vins selon la période de vendage, dans une région tropicale au Nord-Est du Brésil. In: Congrés International des Terroirs Viticoles, Nyon, Suisse. Comptes rendus. Pully, Suisse: Agroscope Changins Wädenswill, p. 536-539. Possingham J.V. 2008. Developments in the production of tablegrapes, wine and raisins in tropical regions of the world. Acta Horticulturae, , 785, 45-50. Queiroz J, Cunha M; Fonseca A; Machado M, Sousa M, Borges L, Castro R, Magalhaes A; Guimaraens D. 2010.: Vine Spacing in steep slope viticulture: narrow terraces, Douro region. Viticulture en fort pente et densité de plantation: banquettes, étroites, région de Douro. CERVIM, Troisième Congrès International Viticulture de Montagne et/ou En Forte Pente, Castiglione di Sicilia, Catania, Itália. Queiroz, J; Cunha, M; Magalhaes, A; Guimaraens, D ; Sousa, M; Borges, L; Castro, R..Mountain viticulture and new training systems in narrow terraces - Douro region". 16th International GESCO Symposium, University of Califórnia, Davis, USA, 2009, 487-492. Schaefer WW. 2008. Hot climate/Tropical wine making. Acta Horticulturae, 785, 477-481. Tonietto J., Teixeira AHC, 2004. Zonage climatique des periodes viticoles de production dans l'année en zone tropicale: application de la méthodologie du Sistème CCM Géoviticole.p.193–201. In: Proceedings. Joint International Conference on Viticultural Zoning, 15 a 19 Nov. 2004. Cape Town, South Africa.

	Tonietto, J. and Mandelli, F. 2007. Study of the inter-annual variability of the viticultural climate in Brazilian regions by the Geoviticulture MCC system. CR GESCO, 15(1):285-293. Tonietto, J., and Carbonneau, A. (2004). A multicriteria climatic classification system for grape-growing regions worldwide. Agric. For. Meteorol. 124 (1-2).
Update	September, 2017

Module name:	**Grape and Wine Derived Products and By-Products**
Academic Year:	2nd academic year at Universidade de Lisboa
Semester:	3rd semester
Module coordinator:	Jorge M. Ricardo-da-Silva, Prof. Ph.D (Universidade de Lisboa)
Lecturer:	Jorge M. Ricardo-da-Silva, Prof. Ph.D (Universidade de Lisboa), Ilda Caldeira PhD (INIAV), Sara Canas, Ph.D (INIAV)
Language:	English
Classification within the curriculum:	Core Module
Teaching format:	Regular lectures, laboratory exercises and tutorial during the semester
Workload:	Face to face lectures: 21 h; laboratory exercises: 14 h; tutorial: 7 h Student's personal study time in the module: 42 h
Credit points:	3 ECTS
Requirements under the examination regulations:	----------
Recommended prerequisites:	Vinification, composition and physico-chemical and sensory control of wines
Targeted learning outcomes:	Students know the grape and wine alternative products and by-products. They are able to characterize these products in order to obtain a valorization, in comparison to the main products of the sector: Grapes and wines.
Content:	Short historical description of the grape and wine alternative products and by-products. Actual interest. Grape alternative products: juices, production diagram and equipment. Raisins, production diagram and equipment. Polysaccharides gelification: processes and products. Jams, production diagram and equipment, particular case of "uvada". Jellies, production diagram and equipment, particular case of hypocaloric jellies. Liquors, production diagram and equipment. Concentrated must: economic importance and production, equipment and rectification. Other grape alternative products. Wine derived products: brandies, types, distillation and alembics, aging technology, the barrels- chemical composition, botanical and geographical origin of the wood, cooperage. Vinegars: types, production technology, fermentation systems, fining. Other wine derived (alternative) products. By-products valorization: stems, marcs, seeds, lees, tartar, distillation residues. Biological, nutriceutical, and pharmacological aspects of the vine products: nutriceutical products, main responsible constituents.
Study / exam achievements:	Written examination
Forms of media:	Power point, black board, scientific and technological articles data

	base
Literature:	CANAS, S. et al.: Effect of heat treatment on the thermal and chemical modifications of oak and chestnut wood used in brandy ageing. In: Ciência Téc Vitiv., **22** (1), 2007, 5-14. LÉAUTÉ, R.: Distillation in alambic. In: Am. J. Enol. Vit., **41,** 1990, 90-103. GASPAR, C. ; SOUSA, I. ; LAUREANO, O.: Production of reduced – calorie grape juice jelly with gellan, xanthan and locust bean gums: sensory analysis and objective texture. In: Z. Lebensm. Unters. Forsch., **207**, 1998, 91-96 LARANJEIRA, C.: Introdução monográfica à indústria vinagreira. Aproveitamento de vinhaços de aguardentes vínicas em acetificação: um valor de opção para a indústria vinagreira. Tese de Mestrado em Ciência e Tecnologia de Alimentosl, Instituto Superior de Agronomia, UTL, 1998. CALDEIRA, I.: Uvada – recuperação de um doce tradicional de uva e maçã. Tese de Mestrado em Viticultura e Enologia, Instituto Superior de Agronomia, UTL, 1995. CALDEIRA, I.: O aroma de aguardentes vínicas envelhecidas em madeira. Tese de Doutoramento em Engenharia Agro-Industrial, Instituto Superior de Agronomia, UTL, 2004. CANAS, S.: Estudo dos compostos extraíveis de madeira (Carvalho e Castanheiro) e dos processos de extracção na perspectiva do envelhecimento em Enologia. Tese de Doutoramento em Engenharia Agro-Industrial, Instituto Superior de Agronomia, UTL., 2003. CANTAGREL, R.: Elaboration et Connaissance des Spiritueux (1º Simpósio Científico International do Congresso). Tec. & Doc. Lavoisier, Paris, 1993. CHATONNET, P.: Influence des procédés de tonnellerie et des conditions d'élevage sur la composition et la qualité des vins élevés en fûts de chêne. Thèse Doctorat, Université de Bordeaux II, 1995.
Update	September 2017

Module name:	**Fortified Wines**
Academic Year:	2nd academic year at Universidade de Lisboa
Semester:	3rd semester
Module coordinator:	Jorge M. Ricardo-da-Silva, Prof. Ph.D (Universidade de Lisboa)
Lecturer:	Jorge Queiroz Prof. Ph.D (Universidade de Porto), Jorge M. Ricardo-da-Silva, Prof. Ph.D (Universidade de Lisboa)
Language:	Portuguese and English
Classification within the curriculum:	Core Module (compulsory module)
Teaching format:	Regular lectures, practical exercises and tutorial during the semester
Workload:	Face to face lectures and practical exercises: 35 h; tutorial: 7 h Student's personal study time in the module: 42 h
Credit points:	3 ECTS
Requirements under the examination regulations:	----------
Recommended prerequisites:	Vinification, Wine Microbiology, Basic Viticulture
Targeted learning outcomes:	The students understand the distinct steps from grape maturation to the ageing of the wine under fortified winemaking conditions. They know about fortified wines of the world.
Content:	Grape maturation survey; Harvest decision in order to obtain a fortified wine. Corrections and pre-fermentative operations; Fermentative process; yeast application; maceration/remontage, Fermentation temperature control; Decision about brandy addition; draining and pomace out from the tanks Wine survey during storage, maturation and ageing. The fortified wines from Portugal with special emphasis in Port Wine. The fortified wines around the world. Study visit at two fortified wine companies.
Study / exam achievements:	Written examination
Forms of media:	Power point, black board, scientific and technological articles data base
Literature:	BOULTON, R. B. ; SINGLETON, V. L. ; BISSON, L. F. ; KUNKEE, R.: Principles and Practices of Winemaking. Chapman & Hall, 1995. JACKSON, R.: Wine Science. Principles and Applications. Academic Press, New York, 2008. RIBEREAU-GAYON, P. ; DUBOURDIEU, D. ; DONÉCHE, B. ; LONVAUD, A.: Handbook of Enology. Vol. 1. The Microbiology of wine and vinifications. Wiley, London, 2000. MENCARELLI F., TONUTTI, P.: Sweet, Reinforced and Fortified Wines: Grape Biochemistry, Technology and Vinification. Ed.

	Wiley-Blackwell, London, pp372, 2013.
Update	September 2017

Module name:	**Master Seminar (in Viticulture and Enology Engineering – Vinifera EuroMaster)**
Academic Year:	2nd academic year at University of Lisbon
Semester:	3rd semester
Module coordinator:	Carlos Lopes (ISA)
Lecturer:	Carlos Lopes (coordinator), other ISA staff.
Language:	English
Classification within the curriculum:	Core Module (compulsory module)
Teaching format:	Theoretical-Practical, Seminars and Tutorial Lectures
Workload:	Lectures, seminars and tutorial: 84 h Student's personal study time: 84 h
Credit points:	6 ECTS
Requirements under the examination regulations:	----------
Recommended prerequisites:	----------
Targeted learning outcomes:	The students will learn and improve their skills on the use of computer tools to search for scientific literature and to manage bibliographic references. They also will be able to make use of visual, audio and audio-visual material to support their thesis presentation. By the successful completion of this module the students will develop skills that will enable them to organize and conduct the research project of the Master thesis and to review critically, analyse and synthetize scientific knowledge for the corresponding state of the art.
Content:	- Organization, writing and presentation of scientific documents; - Structure of scientific articles and dissertations; - Rules for bibliographic citation and for the list of references; - Bibliographic sources and computer tools to search, manage and create the list of references; - Audio-visual communication techniques; - Selection of thesis topics and preparation of thesis structure; - Criteria to elaborate the state of the art of the Master thesis; - Workshops and Seminars.
Study / exam achievements:	The evaluation is composed of two components: an oral presentation (40%) and a written report (60%) synthetizing the state of the art of the Master thesis subject.
Forms of media:	Power point and other software to manage references, scientific papers and technical articles.
Literature:	Bui, YN, 2014. How to Write a Master's Thesis. 2nd edition. SAGE Publications, Inc, CA, USA. Doumont, J, 2010. English Communication for Scientists. Cambridge, MA. NPG Education. Madeira AC, Abreu MM, 2004. Comunicar em Ciência: como Redigir e Apresentar Trabalhos Científicos. Lisboa: Escolar Editora. Malmfors B, Garnsworthy P, Grossman M, 2004. Writing and

	presenting scientific papers. 2nd Edition. Notthingham University Press. Notthingham, UK. Ruxton GD, Colegrave N, 2006. Experimental design for the life sciences. 2nd edition, Oxford University Press, Oxford, UK. Schimel J, 2012 Writing Science. Oxford University Press. Oxford, UK.
Update	September 2017

Module name:	**Dissertation (in Viticulture and Enology Engeneering – Vinifera EuroMaster)**
Academic Year:	2nd academic year
Semester:	4th semester
Module coordinator:	General coordination by the Master Course Committee
Supervisors:	Academic staff of the University of Lisbon and University of Porto and INIAV and academic staff members of the EMaVE Consortium and associated partners.
Language:	English
Classification within the curriculum:	Core module
Teaching format	The Dissertation consists of the elaboration of a written report about an independent scientific work, a professional training or a Project of the student and a defense.
Workload:	840 h
Credit points:	30 ECTS
Requirements under the examination regulations:	Admission to the Dissertation is granted if the student has - completed at least 48 ECTS of the Master degree programme. Requirements for the submission of the written report: The student has to have successfully completed: - the first academic year (M1) - all the core modules of the second academic year (M2) of the Vinifera degree programme in Lisbon. - The written report has to be submitted within 3 months following the last examination of the course in which the student is enrolled. Admission to the defence is granted under the condition that - the written report was evaluated at least with the grade "E - pass" - the student has completed all other compulsory modules of the second academic year successfully and obtained at least 120 ECTS (including the ECTS allocated to the Dissertation).
Recommended prerequisites:	Not applicable
Targeted learning outcomes:	The student will be able to carry out scientific research or a project or a professional stage independently in a given time implementing adequate scientific methods. In addition the student is able to present his/her results to a jury and answers questions related to the dissertation contents.
Content:	Dissertation document
Exam achievements:	Delivery of a written dissertation report at the submission date. The written report has to be prepared under consideration of the

	formal requirements of the University of Lisbon/University of Porto. Dissertation defense in front of an examination jury of at least 3 academic members according to no 13.2 of the Study and Examination Regulations of the Vinifera EuroMaster degree programme.
Forms of media:	Research methods depending on the topic of the thesis. Written report; presentation media for the defense
Literature:	Literature research is based on books and scientific papers related to the topic of the thesis.
Update	September 2017