### Study Plan

**School:** School of Sciences and Technology  
**Degree:** Master  
**Course:** Viticulture and Oenology (cód. 136)

#### 1st Year - 1st Semester

<table>
<thead>
<tr>
<th>Component code</th>
<th>Name</th>
<th>Scientific Area Field</th>
<th>ECTS</th>
<th>Duration</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>GES7357M</td>
<td>Wine Marketing</td>
<td>Management</td>
<td>4</td>
<td>Semester</td>
<td>104</td>
</tr>
<tr>
<td>BIO7358M</td>
<td>Vine Physiology</td>
<td>*** TRANSLATE ME: Agronomia e Biologia ***</td>
<td>5</td>
<td>Semester</td>
<td>130</td>
</tr>
<tr>
<td>FIT7359M</td>
<td>Vineyards Planting Material</td>
<td>Agronomy</td>
<td>4</td>
<td>Semester</td>
<td>104</td>
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<tr>
<td>QUI7360M</td>
<td>Microbiology of fermentation</td>
<td>*** TRANSLATE ME: Quimica e Bioquimica ***</td>
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<tr>
<td>FIT7361M</td>
<td>Soils, Installation and Maintenance</td>
<td>Agronomy</td>
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<td>Semester</td>
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<tr>
<td>FIT7362M</td>
<td>Winemaking Technologies</td>
<td>*** TRANSLATE ME: Engenharia Alimentar e Agronomia ***</td>
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#### 1st Year - 2nd Semester

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<th>Hours</th>
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<tbody>
<tr>
<td>FIT7363M</td>
<td>Stabilisation and Packaging</td>
<td>*** TRANSLATE ME: Engenharia Alimentar e Agronomia ***</td>
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<td>Vineyards Diseases and Pest Control</td>
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<td>QUI7365M</td>
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<td>FIT7366M</td>
<td>Plant Training Systems</td>
<td>Agronomy</td>
<td>5</td>
<td>Semester</td>
<td>130</td>
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<tr>
<td>FIT8079M</td>
<td>Vineyard/Winery Traineeship</td>
<td>*** TRANSLATE ME: Agronomia, Engenharia Alimentar, Engenharia Rural e Engenharia dos Recursos Hídricos ***</td>
<td>12</td>
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#### 2nd Year - 3rd Semester

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<tbody>
<tr>
<td>ERU7353M</td>
<td>Wineries and Equipments</td>
<td>Engineering</td>
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<td>ERU7355M</td>
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Last update 20/05/2019
### 2nd Year - 3rd Semester

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<th>Hours</th>
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<tbody>
<tr>
<td>FIT7356M</td>
<td>Table Grapes and Raisin Production</td>
<td>Agronomy</td>
<td>4</td>
<td>Semester</td>
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### 2nd Year - 4th Semester

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<td>Internship</td>
<td>Project Work</td>
<td>Dissertation</td>
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### Conditions for obtaining the Degree:

*** TRANSLATE ME: Para aprovação na componente curricular é necessário a aprovação (através de avaliação ou creditação) das seguintes unidades curriculares: ***

<table>
<thead>
<tr>
<th>1º Semestre</th>
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<tbody>
<tr>
<td>6 UC obrigatórias num total de 28 Ects</td>
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<table>
<thead>
<tr>
<th>2º Semestre</th>
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<tbody>
<tr>
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<table>
<thead>
<tr>
<th>3º Semestre</th>
</tr>
</thead>
<tbody>
<tr>
<td>4 UC num total de 18 Ects</td>
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</table>

Para a obtenção do grau é necessária a aprovação na Dissertação ou Estágio ou Trabalho de Projecto, no 4º semestre com o total de 42 ECTS.

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**Program Contents**
Wine Marketing (GES7357M)
1. The commercialization and marketing global context
   1.1. Trade and marketing
   1.2. The marketing concept and its evolution
   1.3. The wine marketing environment
   1.4. The wine marketing system
   1.5. Wine associative cooperation and intersectorial cooperation
   1.6. e-agro-food marketing
2. The wine market
   2.1. Characteristics, Organizational Forms and Operation
   2.2. Methods of analysis, evaluation and market prevision
   2.3. The international market context
   2.4. Market research
3. Marketing strategy, plan and control
   3.1. Analysis diagnostic
   3.2. Marketing objectives
   3.3. Marketing strategy
   3.4. Wine Marketing-mix
      3.4.1 Managing the wine product, the brand and the innovation process
      3.4.2. Wine Communication
      3.4.3. Wine Distribution and Sales
      3.4.4. Set the price of wine
   3.5. The Marketing plan

Vine Physiology (BIO7358M)
1- Anatomy and morphology of root, stem, leaf and vine buds. Growth and annual cycle. Floral differentiation, fertility and fruit set.
3- Microclimate on the vine: Distribution of radiation and energy balance.
5-Composition and development of fruits. Factors that influence the different chemical compounds in fruits.

Vineyards Planting Material (FIT7359M)
1- Origin, distribution and botanical classification in Vitis spp.
   -Identification and ampelographic characterization of grapevine cultivars and rootstocks using the UPOV/OIV method.
   - A new ampelographic perspective; Molecular characterization of cultivars and clones.
2- From the variety to the clone: The evolution of the plant material in grapevine; Clonal Selection, classic breeding, marker assisted selection and biotechnology.
3- National and world-wide grape cultivars. Their agronomic and oenological aptitudes. Groups of grape cultivars from several winemaker regions; Tradition or innovation.
4-Grapevine rootstocks. Grafting compatibility with Vitis vinifera and major agronomic characteristics.
Back

Microbiology of fermentation (QUI7360M)
Microbiology Overview of fermentation processes. Microorganisms of interest in fermentation processes. Importance of Micro-
Microorganisms.of wine spoilage.
Practical: Isolation of microorganisms from a spontaneous fermentation of grape juice. Characterizationof the performance of a
yeast strain during grape fermentation.

Back

Soils, Installation and Maintenance (FIT7361M)
Soil Use Capacity in vineyard. Soil characteristics and the concept of terroir. Installation of vineyard. Plantation design. Technical
itineraries. Irrigation project, Soil preparation.
Vines nutrition, soil fertility and vineyard fertilization.
Soil maintenance and weed control.
Soil quality in vineyards, degradation process and resistance and resilience of soils to degradation.

Back

Winemaking Technologies (FIT7362M)
Grape berry composition: changes in berrycomposition during ripening, the harvest decision
The winemaking process: grape and mustprocessing, juice treatment and juice additions
Vinification of white wines - hiperoxigenation,oak barrels fermentation, pré-fermentative maceration
Vinification of roses wines
Vinification of red wines - thermovinification,thermoflash maceration, carbonic maceration, fermentation on the skins, rotary tanks
Special vinification: sparkling wines, sweet wines
Chemical analysis of musts and wines

Back

Stabilisation and Packaging (FIT7363M)
Wine clarification: natural settling, finning process, conditions and agents.
Filtration and centrifugation of wines: theoretical concepts, type of filters
Wine stability - chemical instability of wines(tartaric, proteins, colour, metallic). The use of
temperature as a wine stability treatment.
Ageing process: influence on wine characteristic, the effect of oxygen, the microxigenation
 technique.
The use of wood in winemaking: oak barrels, staves...
Packing, bottling and closures: the use of cork.

Back

Vineyards Diseases and Pest Control (FIT7364M)
1. Study of main grapediseases due to fungi and bacteria and reference to others due to phytoplasm, virus and nematodes.
Symptoms, biological cycle and disease control 2. Study of the main pests due to insects and mites in grapes. Symptoms, biology,
and use of Riskassesssmett and of Economicinjurylevel. Means of control available to protect the grapecropagainst major enemies.
5. Practicalaplication of acquiredknowledge to a particularvineyard, with identification of predominantdiseases and pests, analysis
of applicable control means and selection of appropriate pesticides to use in accordance to an integrated pest management program.
Oenological Chemistry and Biochemistry (QUI7365M)
Chemical characterization of grapes and wines: organic acids, sugar compounds, alcohols, nitrogen compounds, phenolic compounds, aromatic compounds and minerals.
Compound evolution and transformations during winemaking and wine aging.
Enzymatic transformations and oxidation processes occurring in musts and wines.
The role of enzymes and its use in oenology.
Chemical and biochemical aspects of wine instability.
Colloids and colloidal phenomena occurring in wines.
The chemistry of alcoholic and malolactic fermentations.
Analytical methodology used for identifying different chemical compounds in grapes and wines.

Plant Training Systems (FIT7366M)
- Planting and training young vines
- Influence of different training factors in grapevine productivity and quality. Vine spacing, canopy expansion, rootstock vigour, soil fertility and water availability.
- Study of different training systems in different viticultural systems.
- Field oriented practices in grapevine production, including pruning weed identification, vine training, trellising, canopy management, water stress measurement, and sampling techniques.
- Fundamental parameters of the soil to consider when working with irrigation and water management Obtaining the crop water requirements and deriving the need irrigation water applications. Use of the concepts of ETo, ETc and transpiration to calculate the crop requirements and irrigation amounts. Use of FAO crop coefficients

Vineyard/Winery Traineeship (FIT8079M)
1. Mission and organization of the company. Understand what is the purpose that the company pursues, as it is structured, what are the services, the organizational structure, existing powers and contracted abroad, differentiation of its products, etc.
2. The Main functional areas. Monitor the activity of the major areas of the company: vines, wine-making, treatments and packaging, quality control and management. Knowing the specifications of each activity, resources available and its timing. Participation in the implementation of the various operations. Critical analysis of the performance achieved in relation to the objectives. Understand the strengths and weaknesses of the organization for the achievement of its objectives.
3. Description of the different routine operations at the company, from the performer point of view: objectives, needed and existing resources, needs concerning technical preparation, control and reporting to the head of the sector.

Winery design.
Cleaning and sanitizing systems. Characterisation of waste and residuals

Quality Control and Sensorial Analysis (FIT7354M)
1. The concept of quality. Application and organization of a quality control plan.
Identification of critical control points in a winery. Statistical methods for quality control.
2. The senses in sensorial evaluation. The aroma and the taste of wines. Facilities and sample preparation for wine sensorial analysis. Descriptive and hedonic tests. The panel. Wine positive characteristics and defects. Statistical analysis of sensory data
Mechanisation and Precision Viticulture (ERU7355M)
The program of the course is organized into two parts:
Part 1: Mechanization in Viticulture, and Part 2: Precision Viticulture (PV);
Themes Part 1: harvesting equipment; pre-pruning and pruning equipment; equipment for management of soil and vegetation;
fertilization equipment; protect health equipment; vegetation control equipment, organization of mechanization work in vineyards.
Themes Part 2: The principles of PV, PV Tools, Analysis of practical cases in PV, seminars and presentation of papers.

Table Grapes and Raisin Production (FIT7356M)
1. Commercialization and marketing of table grapes
Main production regions in the globe, China as the great production country and Turkey as the main raisins production country.
Table grapes in Portugal and work developed until 1990.
2. Table grapes attributes
Main seeded and non-seeded varieties, physiology of grape ripening and maturity indexes, NIR spectroscopy as a tool to evaluate
maturity in grapes. Evolution of Phenolic compounds during ripening. Main problems during postharvest storage. Packing and
commercialization of table grapes.
Main concepts of table Grape breeding.
3. Production techniques of table grapes and raisins
Main rootstocks used in table grapes production. Trellis systems used and its implications in fruit quality. Effect of growth
regulators in grapes.
4. Drying table grapes, different drying technology, quality standards to raisins.