Freie Universität Bozen
Libera Università di Bolzano
Università Liedia de Bulsan

# Syllabus
# Course description

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| **Course Title** | Innovation and Authenticity in Food Processing |
| **Course code** | 44700 |
| **Scientific sector** | AGR/15 |
| **Degree** | Food Sciences for Innovation and Authenticity |
| **Semester** | I |
| **Year** | I |
| **Academic year** | 2020/21 |
| **Credits** | 12 |
| **Modular** | Yes |

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| **Module title** | Unit Operations in Food Processing |
| **Module code** | 44700A |
| **Scientific sector** | AGR/15 |
| **Degree** | Food Sciences for Innovation and Authenticity |
| **Semester** | I |
| **Year** | I |
| **Academic year** | 2020/21 |
| **Credits** | 6 |
| **Modular** | Yes |

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| **Total lecturing hours** | 36 |
| **Total exercise hours** | 24 |
| **Attendance** | Strongly recommended |
| **Prerequisites** | Knowledge of food technology |
| **Course page** | https://www.unibz.it/en/faculties/sciencetechnology/master-food-sciences-innovation-authenticity/courses-offered/?academicYear=2019 |

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| **Specific educational objectives** | **Aims**<br><br>The course aims to provide concepts related to the phenomenological understanding of the main unit operations of the food industry. It is mainly focused on the description of the operating principles of the equipment used in the processing of foods.<br>The analysis of the unit operation provides the basic background to understand food processes and their impact on the product quality. Mass and energy balances are applied to the main unit operations as evaporation, distillation, extraction, and drying. Examples applied to different foods are incorporated to ensure that the student gains an understanding of the relationship between foods and processes. |

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| | **Educational objectives:**<br><br>1) The student is able to represent the unit operations of a food process<br><br>2) Given a unit operation, the student is able to understand the main processing parameters<br><br>3) Given a unit operation, the student is able to describe the theory and the phenomena occurring during the process<br><br>4) Given a unit operation, the student is able to analyze the process, describe the variables governing it, write and solve the energy and mass balances, predict the changes occurring to foods |

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| **Lecturer** | Giovanna Ferrentino, NOI Technology Park, via Ipazia 1, Bolzano, giovanna.ferrentino@unibz.it https://www.unibz.it/en/faculties/sciencetechnology/academic-staff/person/36045-giovanna-ferrentino |
| **Scientific sector of the lecturer** | AGR/15 |
| **Teaching language** | English |
| **Office hours** | before and after the lectures or upon appointment |
| **Teaching assistant (if any )** | Dr. Stefan Klettenhammer |
| **Office hours** | before and after the lectures or upon appointment |
| **List of topics covered** | Element of basic food technologies: definition of a unit operation, mass and energy balances applied on single or combined unit operations. Unit operation principles of different food processing methods including thermal pasteurization and innovative non-thermal pasteurization (i.e. high hydrostatic pressure, dense phase carbon dioxide, pulsed electric field, pulsed light); extraction technologies using organic solvents and innovative solvent-free extraction technologies (i.e. Soxhlet type extraction, supercritical fluid extraction, ultrasounds and microwaves assisted extraction); separation and concentration technologies such as distillation, evaporation and drying. |
| **Teaching format** | Classroom learning and/or distance learning, exercises, projects. |

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| **Learning outcomes** | **Knowledge and understanding**<br>The student will gain knowledge on the main unit operations applied in the food industry. He will get familiar with simplified |

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| | models correlating processing parameters and their effects on the energy and mass balances.<br><br>**Applying knowledge and understanding**<br>The student will be able to apply the theoretical knowledge of the course to practical problems.<br><br>**Making judgments**<br>The student will be able to assess the applicability of the unit operations by highlighting the advantages and disadvantages deriving from their use.<br><br>**Communication skills**<br>The student will develop a report on a topic concerning the unit operations described during the course using an appropriate technical-scientific terminology.<br><br>**Learning skills**<br>The student will learn how to solve mass and energy balances applied to unit operations by means of calculations and graphics. |

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| **Assessment** | The final assessment includes a written and an oral exam. The written part includes the resolution of numerical problems while the oral part comprises answers to theoretical questions or presentation of a topic to test the knowledge and the skills acquired during the course. |
| **Assessment language** | English |
| **Evaluation criteria and criteria for awarding marks** | Successful completion of the examination will lead to grades ranging from 18 to 30 with honors.<br><br>Relevant for the exam: clarity of answers, mastery of language (also with respect to teaching language), ability to summarize, evaluate, and establish relationships between topics; critical thinking. |

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| **Required readings** | Slides discussed during the lecture<br><br>R. L. EARLE. Unit operations in food processing. (www.nzifst.org.nz/foodreactiontechnology/index.htm)<br><br>R Paul Singh; Dennis R Heldman. Introduction to food engineering. Elsevier. |
| **Supplementary readings** | McCabe Warren L., Smith J.C., Harriott P. Unit operations of chemical engineering. McGraw-Hill International Editions.<br><br>R.H. Perry, D.W. Green: Perry's Chemical Engineer' Handbook, Mc Gaw-Hill |

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| **Module title** | Innovation and authenticity for winery products (6 ECTS) |
| **Course code** | 44700B |
| **Scientific sector** | AGR/15 Food Science and Technology |
| **Degree** | Master in Food Science for Innovation and Authenticity |
| **Semester** | 1st |
| **Year** | I |
| **Academic year** | 2020/21 |
| **Credits** | 6 |
| **Modular** | Yes |

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| **Total lecturing hours** | 40 |
| **Total exercise hours** | 20 |
| **Attendance** | Strongly recommended |
| **Prerequisites** | Knowledge of food chemistry and technology |
| **Course page** | https://www.unibz.it/en/faculties/sciencetechnology/master-food-sciences-innovation-authenticity/courses-offered/?academicYear=2018 |

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| **Specific educational objectives** | • type of course: *area caratterizzante*<br>• the scientific area: Innovation and authenticity in food processing<br>• the course is part of the common study programme<br><br>The course gives a general overview of scientific contents and is designed for acquiring professional skills and knowledge<br><br>Educational objectives<br>(a) provide an adequate knowledge and critical approach to develop projects related to the production of various types of wine and other winery products, taking into account innovative technologies and the official wine regulations; (b) provide an adequate knowledge of the authenticity aspects of wines and chemical/instrumental approaches to determine it |

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| **Lecturer** | Emanuele Boselli, BZ L5.00, emanuele.boselli@unibz.it, +390471017217, https://www.unibz.it/en/faculties/sciencetechnology/academic-staff/person/37607-emanuele-boselli<br>Edoardo Longo, BZ L5.00, edoardo.longo@unibz.it, +39 0471 017691, https://www.unibz.it/it/faculties/sciencetechnology/academic-staff/person/35783-edoardo-longo |
| **Scientific sector of the lecturer** | AGR/15 |
| **Teaching language** | English |
| **Office hours** | before and after the lectures or upon appointment |

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| **Teaching assistant (if any )** | to be appointed |
| **Office hours** | before and after the lectures or upon appointment |
| **List of topics covered** | Elements of basic wine enology: grape berry composition, traditional winemaking techniques, treatments for wine stabilization. Innovative technologies and products: techniques for lowering or replacing chemical additives in wines with natural approaches; alcohol reduction; no/low sulfite wines; vegan wines; inert atmospheres and vacuum; other innovations.<br>Introduction to wine laboratory practices and procedures; basics of wine chemistry; conventional analytical procedures from berry to bottle; innovative approaches for the evaluation of authenticity of wines (for the determination of grape blends, geographical origin, winemaking practices).<br>Elements of sensory analysis of wines |
| **Teaching format** | Classroom learning and/or distance learning, exercises, projects. |

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| **Learning outcomes** | Knowledge and understanding<br>(a) adequate knowledge and understanding about the development of projects related to the production of various types of wine and other winery products, taking into account innovative technologies and the official wine regulation; (b) provide an adequate knowledge of the authenticity aspects of wines and chemical/instrumental approaches to determine it.<br><br>Applying knowledge and understanding<br>(a) developing the capability of integration of information, both in horizontal way (technological, chemical, biological, and regulatory aspects involved in each innovative processing technology) and in vertical way (reasonable sequence of processes along the innovative wine production chain); (b) capability of carrying out strategies for the introduction of innovative processes in the wine sector; (c) capability of evaluating the potentiality of innovative technologies; (d) capability of applying the right chemical/instrumental technique to assess wine authenticity.<br><br>Making judegments<br>Capability of identifying the information needed to introduce sustainable innovations and to ensure/evaluate authenticity of wines and winery products with instrumental techniques.<br><br>Communication skills<br>capability of clearly and exhaustively communicate notions, ideas, problems and technical solutions to interlocutors, either professional or not, representative of the various and specific competencies in the wine supply chain (agronomists, engineers, biologists, chemists, nutritionists, administrators). |

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| | Learning skills<br>To get the learning skills that are necessary to update the winery plants and to obtain wine products with innovative technologies without loss of authenticity and with a good level of autonomy. |

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| **Assessment** | Written exam including a theoretical question and multiple choice questions related to the program |
| **Assessment language** | English |
| **Evaluation criteria and criteria for awarding marks** | Successful completion of the examination will lead to grades ranging from 18 to 30 with honors.<br>• relevant for written exam: clarity of answers, mastery of language (also with respect to teaching language), ability to summarize, evaluate, and establish relationships between topics; critical thinking |

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| **Required readings** | Keynotes and scientific papers provided by the lecturers |
| **Supplementary readings** | Ribéreau-Gayon P., Dubourdieu D., Donèche B., Lonvaud A. – Handbook of Enology – Vol. I and II – free pdf version available in the internet<br>OIV technical standards and documents<br>http://www.oiv.int/en/technical-standards-and-documents<br>Introduction to Wine laboratory practices and procedures, JL Jacobson, Springer |