Freie Universität Bozen
Libera Università di Bolzano
Università Liedia de Bulsan

Syllabus
Course description

Course title	Meta-omics approaches to study the food fermentations
Course code	46028
Scientific sector	AGR16
Degree	PhD in Food Engineering and Biotechnology
Semester	2
Year	1
Credits	2023/2024
Modular	*No*

Total lecturing hours	30

Specific educational objectives	This class will commence by exploring fundamental biological principles such as DNA and RNA. Throughout the course, numerous case studies will be presented, showcasing how omics technologies can provide insights into the dynamics of microorganisms in the context of fermentation processes. Comprising a single module with 30 hours of frontal lectures, the course will delve into practical examples where meta-omics is employed to unravel the formation and functionality of microbial consortia in food-related settings. The primary educational goal is to equip students with the skills to navigate the realm of omics, focusing particularly on understanding its basic operational principles and their combination. Moreover, students will gain knowledge on integrating various principles and domains of food engineering and biotechnology in the context of omics.

Lecturer	Dr. Olga Nikoloudaki Noitech Park A2.2.9 Olga.Nikoloudaki@unibz.it
Scientific sector of the lecturer	AGR/16
Teaching language	English
Office hours	From Monday to Friday as indicated in the timetable
List of topics covered	Introduction to fermentation Introduction to omics approaches; Metagenomics and case studies; Meatagenomics data analysis worklows; Phenomics (Use of Omnilog microarray) and case studies; Proteomics and case studies; Metabolomics and case studies; Transcriptomics and case studies;

	Meta-transcriptomics and case studies.
Teaching format	*Frontal lectures*

Learning outcomes	**Knowledge and understanding** of the meta-omics approaches to investigate the food fermentations. **Applying knowledge and understanding** capability to access information effectively, empowering individuals to adeptly navigate and apply the principles of omics in the management of food fermentations. **Making judgments** through the practical and theoretical knowledge achieved during the course, to transform the acquired knowledge applicable to further domains of food engineering and biotechnology. **Communication skills** to present knowledge with a language pertinent to this specific field. **Learning skills** to effectively navigate the fundamental concepts of meta-omics approaches as they are applied to food fermentations.

Assessment	Student preparation is evaluated through an oral examination, encompassing three components: (i) the presentation of a scientific work by the students, focusing on course topics that could also be extended to other domains of food engineering, (ii) inquiries aimed at assessing their knowledge and understanding of the course material, and (iii) questions designed to evaluate their capacity to apply acquired skills to real-world case studies.
Assessment language	English
Evaluation criteria and criteria for awarding marks	Criteria for evaluation include the clarity of responses, appropriateness of vocabulary, ability to synthesize information, relevance of addressed topics, and capacity for elaboration.

Required readings	OMICs Technologies: Tools for Food Science, edited by CRC Press; 1 edition (27 Jan. 2012)
Supplementary readings	Meta-omics insights in the microbial community profiling and functional characterization of fermented foods. Gu Chen, Congcong Chen, Zhonghua Lei 2017. https://doi.org/10.1016/j.tifs.2017.05.002 Next-Generation Food Research: Use of Meta-Omic Approaches for Characterizing Microbial Communities Along the Food Chain. Min Yap, Danilo Ercolini, Avelino Álvarez-Ordóñez, Paul W. O'Toole, Orla O'Sullivan, and Paul D. Cotter 2022. https://doi.org/10.1146/annurev-food-052720-010751