Syllabus

Course Description

Course Title	Meta-omics approaches to study the food fermentations
Course Code	46028
Course Title Additional	
Scientific-Disciplinary Sector	AGRI-08/A
Language	English
Degree Course	PhD Programme in Food Engineering and Biotechnology
Other Degree Courses (Loaned)	
Lecturers	dr. Alessandra Gasparini, Alessandra.Gasparini@unibz.it https://www.unibz.it/en/faculties/agricultural-environmental-food-sciences/academic-staff/person/45604
Teaching Assistant	
Semester	Second semester
Course Year/s	1
CP	3
Teaching Hours	30
Lab Hours	0
Individual Study Hours	0
Planned Office Hours	9
Contents Summary	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.
Course Topics	The course will start with an overview of the fundamental principles of fermentation processes and of various 'omics' methodologies applied in food fermentation. Subsequently, metagenomics approaches and data analysis workflow applied to understand the diversity and functionality of microbial communities will be explored in depth. Other topics that will be covered by the course include: phenomics techniques, focusing on Omnilog microarray, which is used to analyse microbial phenotypic characteristics by assessing metabolic capabilities; proteomics and metabolomics approaches applied in food fermentation; transcriptomic and meta-transcriptomic techniques, which provide information on gene expression patterns and regulatory mechanisms, as well as on the functional activities and adaptive responses of microbial communities. Cases of study on the applications of the techniques in food fermentation will be presented and discussed for all the topics covered in the course.
Keywords	Fermentation, Proteomics, Metabolomics Metagenomic, Phenomics
Recommended Prerequisites	Basic knowledge of analytical chemistry, molecular biology and microbiology
Propaedeutic Courses	
Teaching Format	frontal lectures
Mandatory Attendance	compulsary
Specific Educational Objectives and Learning Outcomes	Knowledge and understanding of the meta-omicsapproaches 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.
Specific Educational Objectives and Learning Outcomes (additional info.)	N/A
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.
Evaluation Criteria	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	N/A
Further Information	N/A
Sustainable Development Goals (SDGs)	Quality education