Syllabus

Course Description

Course Title	Cocoa and coffee fermentations
Course Code	44726
Course Title Additional	
Scientific-Disciplinary Sector	AGR/16
Language	English
Degree Course	Master in Food Sciences for Innovation and Authenticity
Other Degree Courses (Loaned)	
Lecturers	Dott. Ali Zein Alabiden Tlais, AliZeinAlabiden.Tlais@unibz.it https://www.unibz.it/en/faculties/agricultural-environmental-food-sciences/academic-staff/person/38700
Teaching Assistant	
Semester	First semester
Course Year/s	-
CP	3
Teaching Hours	18
Lab Hours	12
Individual Study Hours	45
Planned Office Hours	9
Contents Summary	Production, processing and fermentation of cocoa and coffee; fermentation methods and microorganisms involved in the fermentation process, metabolites produced during the fermentation, functional nutrients and/or metabolites, problems related to an unsuccessful fermentation, safety and quality of cocoa- and coffee- derived products.
Course Topics	The first part of the course offers a comprehensive overview of cocoa production and fermentation, beginning with an exploration of the geographical regions where cocoa is cultivated and the

	biological characteristics of the cocoa tree and its beans. Students will then delve into the post-harvest processing of cocoa beans, with a particular focus on fermentation as a critical step for developing flavor, quality, and safety. The course examines the purpose and mechanisms of cocoa fermentation, detailing the sequential stages, microbial succession, and metabolic activities of key microorganisms involved. Emphasis is placed on comparing traditional versus industrial fermentation practices, and on understanding how microbial and cocoa-derived metabolites, particularly those with functional properties, contribute to the overall quality of the final product. The implications of failed fermentation are also addressed, highlighting its impact on both safety and sensory characteristics. Finally, students will study cocoa processing beyond fermentation and engage in sensory analysis to evaluate the effects of microbial transformation on the aroma, taste, and texture of cocoa and its derivatives. The second part of the course focuses on the coffee production chain, starting with an introduction to the coffee plant, berries, and global production regions. Students will explore post-harvest processing methods, with particular emphasis on fermentation as a crucial step for enhancing both the quality and safety of coffee. The course addresses the steps and types of coffee fermentation, comparing traditional and industrial approaches, while analyzing the role of microbial communities and their metabolic contributions, including the generation of functional compounds. Attention is also given to the consequences of failed fermentation and its impact on the final product. The module concludes with an overview of sensory analysis, highlighting how fermentation shapes the flavor profile and consumer perception of coffee.
Keywords	Cocoa, Coffee, Fermentation, Functionality, Safety
Recommended Prerequisites	To effectively follow this course, students should have a basic understanding of microbiology, biochemistry, and food science. Familiarity with microbial metabolism, fermentation processes, and the role of microorganisms in food transformation is essential. A general knowledge of biomolecules such as carbohydrates, organic acids, and enzymes will also support learning
Propaedeutic Courses	None
Teaching Format	Frontal lectures (Power point and blackboard), exercises, labs, projects, etc. Presentations, scientific papers and bibliography used

	during the course are provided to students
Mandatory Attendance	No
Specific Educational Objectives and Learning Outcomes	-
Specific Educational Objectives and Learning Outcomes (additional info.)	Knowledge and understanding: adequate knowledge and understanding about the fermentation process, and the role of microorganisms during the fermentation process, and the external factors related to the outcome of the fermentation. Applying knowledge and understanding: - developing the capability of integration of information, searching and analyzing the most recent studies performed by the scientific community - developing the capability of creation of strategies for carrying out an effective fermentation process, considering both biological, microbiological, chemical and environmental factors. Making judegments: Capability of identifying the information needed to develop or evaluate strategies of fermentation. Communication skills: capability of clearly and exhaustively disseminate knowledge, ideas, problems and strategies to professional or non-professional audience.
Assessment	Oral examination. The level of knowledge and understanding of the topics addressed during the course will be evaluated. The ability to disseminate the information, the ability to establish relationship between topics and the ability to give practical solutions to a problem will be considered.
Evaluation Criteria	Successful completion of the examination will lead to grades ranging from 18 to 30 with honors. The following aspects will be evaluated: clarity of answers, ability to summarize, evaluate, and establish relationships between topics.
Required Readings	Power point presented during the lectures, papers and key notes

	will be provided in the E-learning platform of UNIBZ
Supplementary Readings	Schwan, Rosane F., and Graham H. Fleet, eds. Cocoa and coffee fermentations. CRC Press, 2014
Further Information	No
Sustainable Development Goals (SDGs)	Good health and well-being