Syllabus

Kursbeschreibung

Titel der Lehrveranstaltung	Hygiene, Lebensmittelmikrobiologie und -industrie
Code der Lehrveranstaltung	40458
Zusätzlicher Titel der Lehrveranstaltung	
Wissenschaftlich-disziplinärer Bereich	
Sprache	Italienisch
Studiengang	Bachelor in Lebensmittelwissenschaften, Önologie und Gastronomie
Andere Studiengänge (gem. Lehrveranstaltung)	
Dozenten/Dozentinnen	Dr. Edoardo Longo, Edoardo.Longo@unibz.it https://www.unibz.it/en/faculties/agricultural-environmental-food-sciences/academic-staff/person/35783 Prof. Andrea Polo, Andrea.Polo@unibz.it https://www.unibz.it/en/faculties/agricultural-environmental-food-sciences/academic-staff/person/36646 Prof. Raffaella Di Cagno, Raffaella.DiCagno@unibz.it https://www.unibz.it/en/faculties/agricultural-environmental-food-sciences/academic-staff/person/37608
Wissensch. Mitarbeiter/Mitarbeiterin	
Semester	Erstes Semester
Studienjahr/e	2nd
KP	12
Vorlesungsstunden	72
Laboratoriumsstunden	48
Stunden für individuelles	180

Studium	
Vorgesehene Sprechzeiten	36
Inhaltsangabe	Module A: Hygiene and Food Microbiology (6 credits IT) • The aim of the course is to provide an integrated overview of food microbiology and hygiene covering food hygiene and safety issues in food production, distribution, and storage. In particular, the course provides insights into hygiene regulations for the prevention of food contamination, microorganisms and metabolites that are indicators of microbial quality and fermentation, pathogenic microorganisms and toxic substances associated with food, principles of physiology and biochemistry of lactic acid bacteria and yeasts and their application in traditional fermented foods (e.g. yoghurt, cheese, leavened bakery products, sauerkraut). Module B: Agro-food industries (6 credits IT) For each food supply chain listed below, the production process of the main products is illustrated using a common teaching scheme which includes: 1. Definition of the food product 2. Characteristics of raw materials 3. Description of processing technology 4. Evaluation of the quality of the food product. In detail, the course includes the following topics: Technology of oils, fats and derivatives: • Chemical and physical properties of edible oils and fats • Classification of oils and fats • Processing technologies • Quality evaluation. Wine production technology: • Characteristics of musts and wines • Winemaking technologies • Additives, coadiuvants, stabilization processes of wines • Quality evaluation. Milk and dairy products technology: • Chemical and physical properties of milk • Classification of dairy products • Dairy products processing technologies Quality evaluation Brewing technology • Characteristics of raw materials for beer production • Types of beers and processing techniques • Storage and quality assessment.
Themen der Lehrveranstaltung	Module A: Food microorganisms (lactic acid bacteria, yeasts, molds) Microbial interactions (biofilms, quorum sensing, microbial associations) Biochemical characteristics of lactic acid bacteria: carbohydrate and nitrogen metabolism, production of antimicrobial compounds, and exopolysaccharide production. Biochemical characteristics of yeasts and principles of enological microbiology.

	Microbiological aspects of major fermented foods: yogurt, cheese, leavened baked goods, table olives, and other plant-based products. Principles of food hygiene (regulations, microbiological risk analysis in foods, food contamination, and contamination prevention) Major pathogenic microorganisms and examples of biological food contaminants. Food-associated toxic substances (e.g., biogenic amines, mycotoxins). Module B: Technology and chemical/physicochemical properties of the following supply chains: 1) Oils, fats, and derived products; 2) Wine and beer; 3) Milk and dairy products. Description of processing technology. Evaluation of the quality of the food product. In detail, the course includes the following topics: Technology of oils, fats and derivatives: Chemical and physical properties of edible oils and fats. Classification of oils and fats. Processing technologies. Quality evaluation.
Stichwörter	Food Hygiene and Microbiology, Food Safety, Prevention of Pathogenic Microorganisms and Toxic Substances, Technology and Chemistry of Food Processing. Definition of the food product; Characteristics of raw materials; Description of processing technology; Quality assessment of the food product.
Empfohlene Voraussetzungen	
Propädeutische Lehrveranstaltungen	None
Unterrichtsform	Lectures, lecture recordings, practical exercises, field trips, collaborative group activities.
Anwesenheitspflicht	No
Spezifische Bildungsziele und erwartete Lernergebnisse	Upon completion of their studies, graduates with a bachelor's degree in Food and Enogastronomy Sciences will have acquired a solid foundation of scientific knowledge in disciplines such as chemistry, physics, biology, mathematics, computer science, and law, specifically applied to the food and gastronomic sector. They will gain technological skills for managing production and transformation processes, along with an integrated view of the quality, safety, and sustainability of food supply chains and

	systems. In addition, graduates will understand the principles related to waste reduction, resource optimization, and the reconciliation of economics and ethics, which are central elements for addressing the modern challenges of the agri-food system. The knowledge and understanding skills mentioned above are acquired through participation in lectures, practical exercises, seminars, and through guided personal study and individual study as provided by the activated educational activities. The verification of the achievement of learning outcomes is mainly carried out through exams and any interim tests. The tests may be written and/or oral, and may also consist of reports and oral presentations of projects or seminars. Students will be able to practically apply the knowledge they have acquired, developing the ability to solve complex problems in the food and gastronomic sector. Thanks to a wide range of practical activities, such as laboratories, internships, workshops, and seminars, they will be able to use chemical, physical, sensory, and microbiological analysis methods to evaluate the quality and safety of food and production processes. Graduates of the first profile will be able to manage food processing and preservation processes, design new technological solutions, and apply knowledge of plant genetics and process planning to ensure the quality of the final product. Graduates of the second profile will have advanced skills in managing restaurant businesses, promoting gastronomic heritage, and applying fermentation techniques and food design. In both paths, the ability to enhance by-products and reduce waste will be central, contributing to the sustainable innovation of the sector. The educational activities are designed to strengthen the autonomy of judgment and the ability to make decisions in complex contexts, as well as to develop communication skills and the ability to work in multidisciplinary and international teams. At the end of the program, graduates will be able to independently apply their knowledge in professional contexts, promoting innovative and sustainable solutions for the challenges of the agri-food and gastronomic system. The achievement of the ability to apply knowledge is accomplished through critical reflection on the texts proposed for individual study, stimulated by classroom activities, the study of research and

	application cases presented by the professors, the performance of practical laboratory exercises, fieldwork, bibliographic research, the completion of individual and/or group projects included in the core and elective courses of the curriculum, as well as during internships and the preparation of the final exam. The assessments, carried out through written and/or oral exams, reports, and exercises, involve the completion of specific tasks in which the student demonstrates mastery of tools, methodologies, and critical autonomy. During internships, the assessment is conducted through the presentation of a report by the student to the supervising professor. Evaluate and critically analyze the quality, safety, and sustainability of production processes and food products, considering scientific, technological, economic, and cultural aspects. Students will be able to make informed decisions based on scientific data and the analysis of production contexts to ensure the excellence of the final product. Apply ethical and sustainable approaches, reconciling economic needs with environmental and social requirements. Graduates will be able to identify solutions to reduce waste, enhance by-products, and optimize resource use, proposing food production models in line with the principles of the circular economy. Express independent judgments regarding innovative techniques for the transformation and enhancement of food and gastronomic productions, evaluating the risks and opportunities associated with the introduction of new technologies or business models, both locally and internationally. Interpret and manage complex data collected through chemical, physical, microbiological, and sensory analyses, in order to improve the quality of food products and effectively respond to food safety needs and regulatory requirements of the sector. "Communicate effectively and appropriately with both technical and non-technical interlocutors, including professionals in the food and gastronomic sector, public and private institutions, and the general public. This includes the ability to adapt the communication style based on the audience, using the specific technical language of the food and gastronomic sector when necessary. Present and discuss the results of their analyses and research in both written and oral form, using technological and multimedia

	tools. Graduates will be able to draft technical reports, research papers, and scientific documents, as well as present their results clearly and structured, for example during conferences, seminars, or business meetings. Actively participate in discussions and group work in multidisciplinary and international contexts, demonstrating active listening, negotiation, and collaboration skills. Practical experiences and internships will provide students with the abilities to work effectively in teams and contribute to solving complex problems in the sector. Use the three languages of instruction of the course (Italian, German, and English) fluently and confidently, both for written and oral communication. Thanks to the trilingual approach of the Free University of Bozen-Bolzano, graduates will be able to face international work contexts, participate in global networks, and contribute to the development of international cooperation projects to address the challenges of the food and gastronomic sector." "At the end of the degree program, graduates will have developed strong learning skills, essential for successfully continuing academic studies and entering the workforce. In particular, they will be able to: Learn autonomously and continuously, keeping up to date with scientific and technological advancements in the food and gastronomic sector. Graduates will have acquired study methods and research tools that will allow them to independently update their skills, critically interpreting new knowledge. Effectively manage the learning of complex concepts by integrating the various scientific and technical disciplines covered in the degree program, such as chemistry, biology, food technologies, economics, and law. They will be able to identify the most relevant sources, understand and apply new methodologies, and adapt to sector developments. Develop collaborative learning strategies, thanks to the experience gained through group work, internships, and laboratory activities. Graduates will be able to share their knowledge and learn from others, demonstrating adaptability and teamwork skills. Continue their studies independently in Master's degree programs (such as the LM-70 class, Food Science and Technology, currently offered at the same university) or in other related fields, using the

	skills and methods acquired during the bachelor's degree to tackle new learning challenges, even in high-level academic and professional contexts.
Spezifisches Bildungsziel und erwartete Lernergebnisse (zusätzliche Informationen)	
Art der Prüfung	Module A: Assessment of laboratory activities according to the procedures communicated by the instructor during the course, and an exam (written test). Module B: Exam (written test with multiple-choice and open-ended questions). A single final grade will be awarded, calculated as the weighted average of the grades obtained in the two modules.
Bewertungskriterien	Assessment will be based on knowledge and understanding of the course content, the ability to apply theoretical concepts and experimental procedures, interpret results, and provide accurate and clear answers using appropriate scientific terminology.
Pflichtliteratur	Materials provided by the instructors, lecture slides.
Weiterführende Literatur	Module A: Handbook of Hygiene Control in the Food Industry. Eds. H.L.M. Lelieveld, M.A. Mostert, and J. Holah. CRC Press Guida Pratica d'Igiene e di Legislazione [Practical Guide to Hygiene and Legislation]. Eds. C. Correra and G. Ottogalli. Tecniche Nuove Handbook of Hygiene Control in the Food Industry. DOI: © Elsevier Ltd. All rights reserved. http://dx.doi.org/10.1016/B978-0-08-100155-4.00001-7 Microbiologia Alimentare Applicata [Applied Food Microbiology]. Eds. L. Cocolin, M. Gobbetti, and E. Neviani. 2022 | Casa Editrice Ambrosiana. Exclusive distribution by Zanichelli Module B:

	P. Cabras, C.I.G. Tuberoso. Analisi dei Prodotti Alimentari [Analysis of Food Products]. Piccin P. Cabras, A. Martelli. Chimica degli Alimenti [Food Chemistry]. Piccin
Weitere Informationen	
Ziele für nachhaltige Entwicklung (SDGs)	Kein Hunger, Nachhaltiger Konsum und Produktion, Gesundheit und Wohlergehen

Kursmodul

Titel des Bestandteils der Lehrveranstaltung	Hygiene und Lebensmittelmikrobiologie
Code der Lehrveranstaltung	40458A
Wissenschaftlich-disziplinärer Bereich	AGRI-08/A
Sprache	Italienisch
Dozenten/Dozentinnen	Prof. Andrea Polo, Andrea.Polo@unibz.it https://www.unibz.it/en/faculties/agricultural-environmental-food-sciences/academic-staff/person/36646 Prof. Raffaella Di Cagno, Raffaella.DiCagno@unibz.it https://www.unibz.it/en/faculties/agricultural-environmental-food-sciences/academic-staff/person/37608
Wissensch. Mitarbeiter/Mitarbeiterin	
Semester	Erstes Semester
KP	6
Verantwortliche/r Dozent/in	
Vorlesungsstunden	36
Laboratoriumsstunden	24
Stunden für individuelles Studium	90

Vorgesehene Sprechzeiten	18
Inhaltsangabe	The aim of the course is to provide an integrated overview of food microbiology and hygiene covering food hygiene and safety issues in food production, distribution, and storage. In particular, the course provides insights into hygiene regulations for the prevention of food contamination, microorganisms and metabolites that are indicators of microbial quality and fermentation, pathogenic microorganisms and toxic substances associated with food, principles of physiology and biochemistry of lactic acid bacteria and yeasts and their application in traditional fermented foods (e.g. yoghurt, cheese, leavened bakery products, sauerkraut).
Themen der Lehrveranstaltung	Food related microorganisms (lactic acid bacteria, yeasts, moulds) Interaction between micro-organisms (biofilms, quorum sensing, microbial associations) Biochemical characteristics of lactic acid bacteria: metabolism of carbohydrates and nitrogenous substances, production of antimicrobial compounds, production of exopolysaccharides. Biochemical characteristics of yeasts and principles of oenological microbiology. Microbiological aspects of the main fermented foods: yoghurt, cheeses, leavened baked goods, table olives and other plant-based products. Principles of food hygiene (regulations, microbiological risk analysis in food, food contamination, prevention of contamination) Major pathogens and examples of agents causing biological contamination of food. Toxic substances associated with food (e.g. biogenic amines, mycotoxins)
Unterrichtsform	Lectures and laboratory activities. Recording of lectures. Group activities among participants (collaborative problem solving), seminars, external visits
Pflichtliteratur	lecture notes, PowerPoint presentations handed out by the lecturers, presentations on laboratory work
Weiterführende Literatur	• Handbook of hygiene control in the food industry. Ed. by H.L.M. Lelieveld, M.A. Mostert and J. Holah. CRC press • Guida Pratica d'igiene e di legislazione. Ed. C. Correra e G. Ottogalli. Tecniche Nuove • Handbook of Hygiene Control in the Food Industry. DOI: ©

	Elsevier Ltd. All rights reserved. http://dx.doi.org/10.1016/B978-0-08-100155-4.00001-7 • Microbiologia alimentare applicata- Ed. L. Cocolin, M. Gobbetti, E. Neviani. 2022 | Casa Editrice Ambrosiana. Distribuzione esclusiva Zanichelli •

Kursmodul

Titel des Bestandteils der Lehrveranstaltung	Agrarindustrie
Code der Lehrveranstaltung	40458B
Wissenschaftlich-disziplinärer Bereich	AGRI-07/A
Sprache	Italienisch
Dozenten/Dozentinnen	
Wissensch. Mitarbeiter/Mitarbeiterin	
Semester	Erstes Semester
KP	6
Verantwortliche/r Dozent/in	
Vorlesungsstunden	36
Laboratoriumsstunden	24
Stunden für individuelles Studium	90
Vorgesehene Sprechzeiten	18
Inhaltsangabe	For each food supply chain listed below, the production process of the main products is illustrated using a common teaching scheme which includes: 1. Definition of the food product 2. Characteristics of raw materials 3. Description of processing technology 4. Evaluation of the quality of the food product. In detail, the course includes the following topics: Technology of oils, fats and derivatives: • Chemical and physical properties of edible oils and fats

	• Classification of oils and fats • Processing technologies • Quality evaluation Wine production technology: • Characteristics of musts and wines • Winemaking technologies • Additives, coadiuvants, stabilization processes of wines • Quality evaluation. Milk and dairy products technology: • Chemical and physical properties of milk • Classification of dairy products • Dairy products processing technologies Quality evaluation Brewing technology • Characteristics of raw materials for beer production • Types of beers and processing techniques • Storage and quality assessment.
Themen der Lehrveranstaltung	Technology and chemical and physicochemical properties of the following supply chains: 1) Oils, fats, and derived products; 2) Wine and beer; 3) Milk and dairy products. Description of processing technology. Evaluation of the quality of the food product. In detail, the course includes the following topics: Technology of oils, fats and derivatives: Chemical and physical properties of edible oils and fats, Classification of oils and fats, Processing technologies, Quality evaluation.
Unterrichtsform	Lectures covering the course topics, alongside practical laboratory exercises to explore aspects of product quality assessment in greater depth. The lectures will also be recorded and made available.
Pflichtliteratur	Material and keynotes provided during the Course
Weiterführende Literatur	P. Cabras, C.I.G: Tuberoso. Analisi dei Prodotti Alimentari, Piccin P. Cabras, A. Martelli. Chimica degli Alimenti, Piccin