Syllabus

Kursbeschreibung

Titel der Lehrveranstaltung	Mikrobielle Fermentationen in der Gastronomie und Verfahren zur Rückgewinnung von Agrar-von Lebensmittelnebenprodukten
Code der Lehrveranstaltung	40417
Zusätzlicher Titel der Lehrveranstaltung	
Wissenschaftlich-disziplinärer Bereich	AGRI-08/A
Sprache	Englisch
Studiengang	Bachelor in Gastronomie und Önologie in Bergregionen
Andere Studiengänge (gem. Lehrveranstaltung)	
Dozenten/Dozentinnen	Prof. Raffaella Di Cagno, Raffaella.DiCagno@unibz.it https://www.unibz.it/en/faculties/agricultural-environmental-food-sciences/academic-staff/person/37608 dr. Olga Nikoloudaki, Olga.Nikoloudaki@unibz.it https://www.unibz.it/en/faculties/agricultural-environmental-food-sciences/academic-staff/person/38535 Dott. Ali Zein Alabiden Tlais, AliZeinAlabiden.Tlais@unibz.it https://www.unibz.it/en/faculties/agricultural-environmental-food-sciences/academic-staff/person/38700
Wissensch. Mitarbeiter/Mitarbeiterin	
Semester	Erstes Semester
Studienjahr/e	3rd
KP	9
Vorlesungsstunden	54
Laboratoriumsstunden	36
Stunden für individuelles	135

Studium	
Vorgesehene Sprechzeiten	27
Inhaltsangabe	Part 1: Introduction to fermentation and examples of traditional foods in gastronomy; Introduction, history and applications of precision fermentation; Ethical constrains and regulation; Challenges and opportunities for future fermented foods; Laboratory activity involves: Application of fermentation to produce fermented beverage. Part 2: Introduction to enzymes in food processing; Mechanisms of enzyme action in nutrient bioavailability; Enzyme-assisted fermentation for enhancing flavors and bioactive compounds with gastronomic benefits; Optimization of microbial enzymes in food biotechnology. Laboratory activity involves: Effect of enzymatic digestion on food sugars (food-grade enzymes and HPLC); Testing enzymatic activities of microbial starters; Plant-based fermentation applications. Part 3: Case studies on methods to recover agro-food by-products and further use for making food and beverages; Case studies on use of fermentation in gastronomy; Industrial application. Laboratory activity involves: external visit, practical exercise dealing with the case studies and use of fermentation to exploit agro-food by products
Themen der Lehrveranstaltung	Part 1 - Introduction to fermentation: definition, principles, and microbial ecology. - Examples of traditional fermented foods in gastronomy (e.g., wine, cheese, bread, yogurt, kimchi). - Historical evolution of fermentation practices from traditional to modern biotechnologies. - Precision fermentation: definition, development, and applications in food, pharma, and cosmetics. - Ethical constraints and societal perception of precision

	fermentation and novel foods. - Regulatory frameworks at EU and international level for traditional and precision-fermented foods. - Challenges and opportunities for the future of fermented foods: sustainability, scalability, consumer acceptance. Part 2 - Introduction to enzymes in food processing. - Mechanisms of enzyme action in nutrient bioavailability. - Enzyme-assisted fermentation for enhancing flavors and bioactive compounds with gastronomic benefits. - Optimization of microbial enzymes in food biotechnology. - Laboratory activity (Effect of enzymatic digestion on food sugars (food-grade enzymes and HPLC); Testing enzymatic activities of microbial starters; Plant-based fermentation applications). Part 3 - Definition of food wastes, food by-products and secondary raw materials. - Solutions for food wastes: use of food-grade enzymes, Upstream and downstream phases of a microorganism-mediated process - Cell recycle biomass recirculation and immobilization - Fermentation as method to recover agro-food by-products - General criteria of starter selection - Side streams/food by-products as ingredient - Case Studies (e.g., Apple by-products, date seeds, milling by-products, bread and pasta wastes) - Gastronomy and fermented foods
Stichwörter	Food wastes - by-products, food-grade enzymes; flavors; precision fermentation, sustainability.
Empfohlene Voraussetzungen	
Propädeutische Lehrveranstaltungen	None
Unterrichtsform	lectures, laboratory activity, external visits, in person teaching
Anwesenheitspflicht	No
Spezifische Bildungsziele und erwartete	The course is designed for acquiring professional skills and knowledge in the field of food fermentations including the precision

Lernergebnisse	fermentation and biotechnology. It aims to provide knowledges on the role of microbial fermentation in the production of the main typical fermented foods and how tailored fermentations can give distinctive features and flavors. Moreover, the course provides the basic concepts on the exploitation agro-food by-products through biotechnological processes including the fermentation and use of food-grade enzymes. It is divided into three parts, one related to precision fermentation and typical fermented foods, the second related to enzyme biotechnology and the other related to case studies. Educational objectives (a) provide an adequate knowledge and critical approach to develop projects related to the exploitation of agro-food by products taking into account biotechnologies currently applied; (b) provide an adequate knowledge on precision fermentation to develop distinctive flavor traits for fermented foods.
Spezifisches Bildungsziel und erwartete Lernergebnisse (zusätzliche Informationen)	
Art der Prüfung	Student preparation is evaluated through an oral examination and power point presentation 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; (ii) inquiries aimed at assessing their knowledge and understanding of the course material; (iii) questions designed to evaluate their capacity to apply acquired skills to real-world case studies.
Bewertungskriterien	Criteria for evaluation include the clarity of responses, appropriateness of vocabulary, ability to synthesize information, relevance of addressed topics, and capacity for elaboration.
Pflichtliteratur	Prasath, C. S., Sivadas, C. A., Chandran, C. H., & Suchithra, T. V. (2024). Precision fermentation of sustainable products in the food industry. In *Entrepreneurship with microorganisms* (pp. 163-177). Academic Press. Terefe, N. S. (2022). Recent developments in fermentation technology: toward the next revolution in food production. Food engineering innovations across the food supply chain, 89-106.

Weiterführende Literatur	
Weitere Informationen	
Ziele für nachhaltige Entwicklung (SDGs)	Keine Armut, Industrie, Innovation und Infrastruktur, Bezahlbare und saubere Energie, Kein Hunger