

Syllabus

Kursbeschreibung

Titel der Lehrveranstaltung	Molecular Methods to Investigate the Microbial Diversity and Functionality
Code der Lehrveranstaltung	46091
Zusätzlicher Titel der Lehrveranstaltung	
Wissenschaftlich-disziplinärer Bereich	AGRI-08/A
Sprache	Englisch
Studiengang	Doktoratsstudium in Food Engineering and Biotechnology (Lebensmittelbiotechnologien und -Ingenieurwesen)
Andere Studiengänge (gem. Lehrveranstaltung)	
Dozenten/Dozentinnen	dr. Alessandra Gasparini, Alessandra.Gasparini@unibz.it https://www.unibz.it/en/faculties/agricultural-environmental-food-sciences/academic-staff/person/45604
Wissensch. Mitarbeiter/Mitarbeiterin	
Semester	Erstes Semester
Studienjahr/e	1
KP	3
Vorlesungsstunden	30
Laboratoriumsstunden	0
Stunden für individuelles Studium	45
Vorgesehene Sprechzeiten	9
Inhaltsangabe	This course introduces fundamental molecular techniques used for the identification of microorganisms inhabiting diverse ecosystems, with particular emphasis on fermented foods and the gut microbiota. The course also explores methods for characterizing microbial metabolic activities that influence their functional roles

	within these environments. Selected case studies will be examined and critically discussed, with reference to relevant scientific literature.
Themen der Lehrveranstaltung	The course will start with an overview on the fundamentals DNA and RNA. The principal techniques and challenges associated with the isolation and purification of DNA and RNA from various biological sources will be discussed. The principles and application of gel electrophoresis analysis for DNA and RNA fragments separation will be presented, including denaturing gradient gel electrophoresis (DGGE) analysis and pulsed-field gel electrophoresis (PFGE) analysis for DNA fingerprinting and for studying the diversity of the microbial community. Gene sequencing and Polymerase Chain Reaction (PCR)-based methods will be explored, fundamentals of DNA and RNA sequences amplification along with different techniques developed will be discussed. Principles of Amplified ribosomal DNA restriction analysis (ARDRA), PCR-Restriction analysis (PRA-PCR), Random Amplified Polymorphic DNA-PCR (RAPD-PCR), and Real Time-PCR (qPCR) will be included. Through the course, case studies will be presented to show the applications of the principles and the methods discussed for the investigation of microbial diversity and functionality in various research topics.
Stichwörter	DNA fingerprinting, amplification, sequencing,
Empfohlene Voraussetzungen	Basic knowledge of molecular biology and microbiology
Propädeutische Lehrveranstaltungen	no
Unterrichtsform	frontal lectures
Anwesenheitspflicht	compulsary
Spezifische Bildungsziele und erwartete Lernergebnisse	Knowledge and understanding of the principles, strengths, and limitations of various molecular methods for studying microbial diversity and functionality. Applying knowledge and understanding to effectively select and apply appropriate molecular techniques to address specific research questions in microbial ecology, food safety, or biotechnology.

	Making judgments to critically evaluate experimental designs and interpret results from molecular analyses, drawing sound conclusions regarding microbial populations and their activities. Communication skills to clearly communicate scientific findings and methodologies using language pertinent to this field. Learning skills to effectively master the fundamental concepts of the principal molecular techniques applied for microbial investigation.
Spezifisches Bildungsziel und erwartete Lernergebnisse (zusätzliche Informationen)	N/A
Art der Prüfung	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 or biotechnology, (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.
Bewertungskriterien	Criteria for evaluation include the clarity of responses, appropriateness of vocabulary, ability to synthesize information, relevance of addressed topics, and capacity for elaboration.
Pfichtliteratur	Molecular Biology (5th edition), Robert F Weaver, McGraw-Hill Education, 978-0073525327. Molecular Techniques in Food Biology, El Sheika AF, Levin R, Jianping X, Wiley, 978-1-119-37460-2.
Weiterführende Literatur	N/A
Weitere Informationen	N/A
Ziele für nachhaltige Entwicklung (SDGs)	Hochwertige Bildung