Syllabus

Descrizione corso

Titolo insegnamento	Molecular Methods to Investigate the Microbial Diversity and Functionality
Codice insegnamento	46091
Titolo aggiuntivo	
Settore Scientifico-Disciplinare	AGRI-08/A
Lingua	Inglese
Corso di Studio	Corso di Dottorato di ricerca in Food Engineering and Biotechnology (Ingegneria e biotecnologia degli alimenti)
Altri Corsi di Studio (mutuati)	
Docenti	dr. Alessandra Gasparini, Alessandra.Gasparini@unibz.it https://www.unibz.it/en/faculties/agricultural-environmental-food-sciences/academic-staff/person/45604
Assistente	
Semestre	Primo semestre
Anno/i di corso	1
CFU	3
Ore didattica frontale	30
Ore di laboratorio	0
Ore di studio individuale	45
Ore di ricevimento previste	9
Sintesi contenuti	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.

Argomenti dell'insegnamento	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.
Parole chiave	DNA fingerprinting, amplification, sequencing,
Prerequisiti	Basic knowledge of molecular biology and microbiology
Insegnamenti propedeutici	no
Modalità di insegnamento	frontal lectures
Obbligo di frequenza	compulsary
Obiettivi formativi specifici e risultati di apprendimento attesi	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.
Obiettivi formativi specifici e risultati di apprendimento attesi (ulteriori info.)	N/A
Modalità di esame	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.
Criteri di valutazione	Criteria for evaluation include the clarity of responses, appropriateness of vocabulary, ability to synthesize information, relevance of addressed topics, and capacity for elaboration.
Bibliografia obbligatoria	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.
Bibliografia facoltativa	N/A
Altre informazioni	N/A
Obiettivi di Sviluppo Sostenibile (SDGs)	Istruzione di qualità