Syllabus

Course Description

Course Title	Molecular Techniques in Food Technologies: from Biotechnology to Authenticity
Course Code	44725
Course Title Additional	
Scientific-Disciplinary Sector	AGRI-06/B
Language	English
Degree Course	Master in Food Sciences for Innovation and Authenticity
Other Degree Courses (Loaned)	
Lecturers	Prof. Youry Pii, Youry.Pii@unibz.it https://www.unibz.it/en/faculties/agricultural-environmental-food-sciences/academic-staff/person/33704
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	- Food authenticity and frauds - DNA-based methods for food authenticity - DNA molecular markers - Hybridization-based markers - PCR-based markers
Course Topics	Food authenticity: definition, quality and safety certifications, geographical indications. • Food frauds. • Analytical Chemistry methods for food traceability and

	authenticity. • DNA-based methods for food authenticity: 1. Introduction to DNA structure. 2. DNA extraction methods: qualitative and quantitative assessments. 3. The use of molecular markers for DNA profiling: hybridization-based markers and PCR-based markers. - Restriction Fragment Length Polymorphism (RFLP) - PCR, Touch-Down PCR, Nested PCR - PCR-RFLP - Random Amplified Polymorphic DNA (RAPD) - Amplified Fragment Length Polymorphism (AFLP) - Inter simple Sequence Repeats (ISSR) - Real Time PCR - High Resolution Melting Analysis (HRMA) - Digital PCR (dPCR) - Arrays
Keywords	Food authenticity, Food traceability, Molecular markers, Hybridization-based markers, PCR-based markers, omics approaches
Recommended Prerequisites	Basic knowledge of genetics and molecular biology
Propaedeutic Courses	None
Teaching Format	The course consists of lectures (18 hours of frontal lectures) during which the different topics will be presented and discussed. Practical lessons and laboratory activities (12 hours), conducted by the Teacher, are also foreseen. Course topics will be presented using Power Point presentations. Power Point presentations using during frontal lectures will be made available to the students through the Microsoft Teams platform in advance. Frontal lectures will be audio-video recorded and made available through the same platform.
Mandatory Attendance	No
Specific Educational Objectives and Learning Outcomes	The course belongs to the area of learning that is affine to the Study Course (area affine integrativa) and specifically in the context of the disciplines of Food Sciences. The aim of the course is to provide students with an adequate mastership of general scientific principles at the base and methods exploited within this

	discipline as well as some specific professional knowledge. The aim of the course is to give an overview of the up-to-date molecular methods used to assess the authenticity of foodstuff, further completed with the analyses of case studies published in the literature. In particular, it is expected that the student acquires knowledge on the different molecular methods available and the specific characteristics of each one, so that he/she could become an autonomous user.
Specific Educational Objectives and Learning Outcomes (additional info.)	
Assessment	The final examination will consist of two components: Written exam (multiple-choice test): designed to assess knowledge and understanding of the theoretical principles of molecular techniques, as well as the ability to apply such knowledge to case studies in food authenticity. The test will assign +1 point for each correct answer, –0.25 points for each incorrect answer, and 0 points for omitted answers. The written exam will contribute 80% of the final grade. Laboratory report: students are required to prepare a detailed written report on the laboratory activities carried out during the course. The report will be evaluated with respect to the accuracy and completeness of the description, the correct interpretation of experimental results, and the clarity of scientific writing. The laboratory report will contribute 20% of the final grade. The overall grade will be determined by combining the two components, expressed on a 30/30 scale.
Evaluation Criteria	The evaluation will be based on the extent to which students demonstrate the knowledge and understanding of the molecular methods used in food authenticity and their underlying scientific principles. The multiple-choice exam will assess the accuracy, breadth, and integration of theoretical knowledge, as well as the ability to apply such knowledge to case studies. The laboratory report will be used to evaluate students' capacity to correctly describe experimental procedures, to interpret results in a

	critical manner, and to communicate their findings with clarity and precision. Overall, students will be assessed on their ability to link theoretical knowledge with practical applications, to show autonomy in the use of molecular techniques, and to present scientific information in a clear and structured way.
Required Readings	Slides used during frontal lectures Sforza S. “Food authentication using bioorganic molecules” ISBN 978-1-60595-045-7
Supplementary Readings	Scientific papers suggested by the lecturer during lectures
Further Information	
Sustainable Development Goals (SDGs)	Responsible consumption and production, Good health and well-being