UNIVERSITÀ
DEGLI STUDI DI MILANO-BICOCCA

SYLLABUS DEL CORSO

Food, Microbes and Human Health

2526-1-F7603Q025-F7603Q02501

Aims

This module provides an in-depth understanding of the complex interactions between microorganisms, food and human health, with a focus on their role in sustainable food systems and public health. It examines the application of microorganisms in food production, preservation and waste reduction, while addressing the regulatory and safety aspects of microbial-based products, including probiotics and nutraceuticals. Special emphasis is placed on the challenges of foodborne diseases, antimicrobial resistance and biome depletion theory, linking these issues to a broader One Health perspective. Through an integrated approach that combines microbiology, food science and sustainability, students will develop the ability to critically evaluate microbial applications, design and optimize food processes based on microbial technologies and translate scientific knowledge into innovative and actionable solutions. The course also aims to enhance students' science communication skills, promoting interdisciplinary thinking and a systemic approach to solving problems in the food and health sectors.

The students are invited to consult the syllabus of the entire course for details regarding learning- and skill-related objectives.

Contents

• Microbiology and One Health approach.
• Fundamentals of food fermentation and microbial applications.
• Microbial starters and their industrial applications.
• Microorganisms in food preservation and waste reduction strategies.
• Regulatory aspects and safety of microbial applications in food.
• Microorganisms and health: probiotics, antimicrobial resistance, and biome depletion theory.

Detailed program

Microbiology in the One Health context

Food fermentations
• origins of food fermentation;
• definition of fermented food;
• types of fermented products (spontaneous and inoculated fermentations).

Microbial starters in the food industry
• evolution, definition, and classification of starter cultures;
• microbial starters and public health: regulatory context, QPS status, and emerging safety concerns.

Food waste reduction
• role of microorganisms in food preservation;
• role of microorganisms in reducing and reusing food waste.

Probiotics, prebiotics, and microbial-based nutraceuticals
• scientific and legal definitions of probiotics;
• the probiotic industry: safety and regulations.

Environmental and food-associated microorganisms in human health
• foodborne diseases: types and socio-economic impact;
• containment of foodborne diseases;
• spread of antimicrobial resistance genes and strategies to reduce antibiotic use;
• biome depletion theory and non-communicable diseases.

Prerequisites

• Basic knowledge of biology.
• Basic knowledge of chemistry.

Teaching form

4 CFUs of mixed theoretical and interactive lessons in the classroom (40 hours):
• 15 two-hour lectures, in person, Delivered Didactics;
• 5 two-hour lectures, in person, with interviews, exercises and debates, case studies, Interactive Didactics.

Attendance to lectures and interactive exercises is highly recommended.

Textbook and teaching resource

Lecture slides and additional reading materials made available on the e-learning platform of the course.

Semester

II semestre (March - June)

Assessment method

The final exam consists of a written test covering key topics of the course.

The final score will be between 18/30 and 30/30 *cum laude*, based on the overall assessment considering the following criteria:
(1) knowledge and understanding;
(2) ability to connect different concepts;
(3) autonomy of analysis and judgment;
(4) ability to correctly use scientific language.

Office hours

Always, after scheduling an appointment *via* phone or e-mail.

Sustainable Development Goals

GOOD HEALTH AND WELL-BEING | QUALITY EDUCATION