Food Microbiology

Prof. Vania Patrone

*COURSE AIMS AND INTENDED LEARNING OUTCOMES*

The course aims to provide students with a general understanding of the role played by microorganisms in the preparation, transformation, preservation and microbiological quality of foods of animal and plant origin. The course will provide basic information on the main microbial groups for pro-technological use, the micro-organisms responsible for spoiling, and the pathogens related to the main food chains. The analysis protocols used in defining the microbiological aspect of food will also be presented.

At the end of the course, students will be able to: understand the principles that regulate the survival and development of microorganisms in food; appreciate the relevance of the pro-technological role played by the different microbial groups in fermented foods and the use of starter cultures; describe the alterations in foods of microbial origin and the main diseases transmitted by food pathogens. Knowledge of these principles will allow students to identify the most suitable preservation techniques and control methods of microorganisms in food products and processes for food safety management. Students will also be able to define the microbiological quality of food production by applying analytical methods to determine the main virtuous, altering and pathogenic microorganisms.

*COURSE CONTENT*

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|  | ECTS |
| Food-associated microorganisms and their role. Sources of microbial contamination. Quality indicators. |  |
| Factors influencing microbial development: intrinsic, extrinsic and implicit factors. Control of microorganisms in food: chemical, physical and biological factors. Barrier theory. Shelf-life and predictive microbiology. | 1.5 |
| Major microorganisms of interest in the food industry. Pro-technological, alterative and pathogenic bacteria, yeasts, moulds, viruses and bacteriophages. EU Reg. 2073/2005 with subsequent amendments and additions. Phenotypic and genetic characterisation of microorganisms. | 1.5 |
| Unfermented drinks and foods: water, juices, other beverages. Foods of animal origin: microbiology of meats, drinking milk, fish products and eggs. Foods of vegetable origin: fruit and vegetables, fourth and fifth range products. | 2.0 |
| Starter cultures. Fermented drinks and foods: fermented milks, cheeses, salami, fermented vegetables, bakery products, wine, vinegar and beer. |  |
| Practical activities: Determination of the main pathogenic bacteria in food. Microbiological control of water, air and surfaces. | 1.0 |

*READING LIST*

Luca Cocolin, Marco Gobbetti, Erasmo Neviani. *Microbiologia alimentare applicate.* Casa Editrice Ambrosiana, 2022.

J.m.jay, m.j. Loesser, d.a. Golden. *Microbiologia degli alimenti*. Ed. Springer, 2009.

*TEACHING METHOD*

Frontal lectures in which the theoretical discussion will be integrated with application examples. The lectures will take place with the support of PowerPoint presentations which will be provided by the lecturer on the Blackboard platform and which are to be considered an integral part of the teaching material. The course will also include practical laboratory activities in which the main analytical methods for microbiological control will be illustrated, and which students will then, in groups of 2-3, apply to various types of food. Students are required to fill out forms, provided by the lecturer, with a description of the activities carried out during the practical activities; these will have to be handed in at the end of the course.

*ASSESSMENT METHOD AND CRITERIA*

A final exam, which the student can choose to take either orally or in written form. The exam consists of at least three questions aimed at ascertaining the student's level of knowledge, understanding and linking skills regarding the topics covered. Students must demonstrate an ability to correctly use the language and scientific terminology of the discipline. The final mark will be based on the average of the marks obtained for each of the questions.

*NOTES AND PREREQUISITES*

Students must possess a basic knowledge of general microbiology. Attendance at lectures, although not compulsory, is recommended. Participation of students in laboratory activities is required.

*OFFICE HOURS FOR STUDENTS*

Prof. Vania Patrone is available to meet students at the Department for Sustainable food process (ex Istituto di Microbiologia). To schedule a meeting, students should email the professor for an appointment.