.- Food Microbiology II

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***Text under revision. Not yet approved by academic staff.***

COURSE AIMS AND INTENDED LEARNING OUTCOMES

 The aim of the course is to provide students with in-depth knowledge of food microbiology, necessary for the management of food safety and production processes. In the first part of the course, the general interactions between the food environment, technological processes and microorganisms will be explored more deeply, using the latest scientific information derived from the application of -omic sciences to microbiology. Subsequently, the following will be addressed: 1) measures to mitigate microbiological risks in foods, with particular reference to pathogenic bacteria and viruses, 2) the microbiota of food alteration and how to combat it, and 3) the role of microorganisms in food fermentation processes. The main case studies related to food safety and microbiological quality management will be presented and discussed during the course.

At the end of the course, students should possess a solid scientific base to food microbiology and be able to:

* carry out a critical analysis of the safety and microbiological quality management processes in the food chain;
* apply microbiological risk assessment, management and mitigation procedures in the food industry;
* promote food quality through the management of microbial communities.

COURSE CONTENT

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|  | ECTS |
| Food as an ecosystem: the factors that influence the survival and growth of food microbial communities. Analysis of the molecular mechanisms underlying adaptation to the food environment. | 1.0 |
| Microbiological safety of food. Insights into pathogenic bacteria and viruses in food: information deriving from genomic studies. Emerging pathogens. Quantitative analysis of microbiological risk in food (Risk Assessment). Microbiological risk management in food production chains. | 1.5 |
| Microorganisms as food spoiling agents. Key factors for the control of microbial alteration. Microbiological aspects in determining the "date marking" of foods. | 1.0 |
| The microbiota of fermented foods, biological diversity and technological properties. Adventitious, natural and selected crops for food fermentation. Fermentation of meat, dairy and vegetable products.  | 1.0 |
| Precision Fermentation and cell engineering for food production.  | 0.5 |
| Tutorials |  |
| Laboratory activities on food challenge tests and factors that modulate survival and growth. | 1.0 |

READING LIST

M.P. Doyle, F. Diez-Gonzales, C. Hill *Food microbiology: fundamentals and frontiers,* 5th ed. American Society for Microbiology, 2019.

S.J. Forsythe *The Microbiology of Safe Food* 3rd ed. Wiley, 2019.

Reading lists on specific topics, websites of interest in food microbiology and microbiological safety, E-books and \*.pdf documents will be indicated during the course.

TEACHING METHOD

The course is divided into:

* frontal lectures. In order to maximise the effectiveness of the course, other figures with specific company and/or supply chain experience may participate at certain points alongside the lecturer;
* case studies and simulations involving the application of risk analysis and mitigation strategies will be undertaken by students individually and in study groups;
* generative artificial intelligence systems will be used for the analysis of scientific information related to food microbiology;
* experimental activities in the laboratory.

ASSESSMENT METHOD AND CRITERIA

A laboratory test, discussion of case studies and oral examination. In the laboratory test, students will have to compile the laboratory book on the activities carried out and demonstrate that they have acquired the bases for the application of microbiological procedures to the food sector. In the case studies, carried out in groups, the ability of the individual student in presenting and critically analysing the subject addressed will be assessed. The oral exam is aimed at assessing the student's theoretical knowledge and reasoning skills. The final mark is based on the weighted average of the marks obtained for the laboratory activities, the classroom discussion of case studies, and the oral exam questions.

NOTES AND PREREQUISITES

Attendance at lectures, although not compulsory, is strongly recommended. Students are required to participate in the laboratory activities and study groups (if a student is unable to participate, it will be necessary to agree any alternative activities with the lecturer).

Information on office hours available on the teacher's personal page at http://docenti.unicatt.it/.