# .- EMERGING RISKS

## Prof. Pier Sandro Cocconcelli

***COURSE AIMS AND INTENDED LEARNING OUTCOMES***

The aim of the course is to provide students with in-depth knowledge on newly identified and emerging risks (NIERs) in the food systems and on the strategies to prevent them in the during food processing.

Emerging food risks are risks resulting from a newly identified hazard to which a significant exposure may occur, or from an unexpected new or increased significant exposure and/or susceptibility to a known hazard.

The course will address the available source of information on NIERs and the scientific approaches for the NIERs identification. Particular emphasis will be placed on the new knowledge of NIERs deriving from new hazards, increased exposure, new susceptible group, new driver, innovative technologies and re-emerging hazards. Moreover, the impact of new consumption habits, food frauds and global food trade will be discussed.

The principal NIERs of biological and chemical origins will be presented and discussed by analysing the most recent cases in the EU and at international levels. Prevention and anticipatory systems to mitigate the impact of NIER in the food production and the interaction with the Food Safety Management System (FSMS) plans will be addressed. How to develop a FSMS plan, with specify risk analysis of NIERs will be discussed. Moreover, the impact of genomic analyses for food safety risk assessment will be presented and used during the practical lesson by students.

At the end of the course, students should possess solid scientific basis on newly identified and emerging risks in food production and should be able to:

* carry out a critical analysis of the safety management processes in the food chain;
* develop preventive strategies to mitigate NIERs, including those deriving from changes in the consumers’ habits, from frauds and from international trade;
* understand how to respond to NIERs deriving from innovative technologies, expected to impact in the next years the food systems.

***COURSE CONTENT***

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|  | ECTS |
| Definition of newly identified and emerging risks (NIERs) in the food chain. Available source of information on NIERs at EU and supranational level. Impact of consumer habits and global food trade on Food safety and emergence of risks.  | 0.5 |
| Biological NIERs. Microbiological risks. Antimicrobial resistance in food systems. Genome editing, new plant breeding techniques and Synthetic biology.Food from Lab Cultured Animal cells and Precision fermetations | 2 |
| Chemical and physical NIERs. Nano-technologies, nanoparticles and food contact materials. Plastic recycling processes for food use. | 1 |
| Operational processes to identify and monitor vulnerabilities in food processing related to NIER. Prevention approaches and anticipatory systems to mitigate the impact of NIER. The impact of NIERs in the development of a Food Safety Management System plan for food producers.  | 1 |
| Impact of omics technologies on food safety risk assessment. Examples of genomic approaches in food risk analysis.  | 0.5 |
| **Tutorials** |  |
| In the laboratory and practical activities, the students will simulate: i) the design of Food Safety Management System plan for the prevention/mitigation of NIERs and ii) simulate a risk assessment based on genomics technologies  | 1.0 |

***READING LIST***

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

***TEACHING METHOD***

The teaching will be based on:

* frontal lectures. In order to maximise the effectiveness of the course, other figures with specific experience in risk assessment and risk management may participate at certain points alongside the lecturer;
* use of generative artificial intelligence tools for the analysis of scientific information on emerging risks;
* case studies and the simulated application of risk analysis strategies;
* simulation game for the development of FSMS plan;
* experience on genomic analyses for risk assessment.

***ASSESSMENT METHOD AND CRITERIA***

Report of the practical experiences/simulation games, discussion of case studies and oral examination. The report of practical activities should be presented at the oral examination. 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***

Lesson frequency is not mandatory, but highly recommended. Since a report of practical activities is foreseen in the final examination, in case the student cannot attend the practical classes, alternative evaluation systems will have to be agreed on with the teacher.

Professor Pier Sandro Cocconcelli is available to meet with students after class at DiSTAS -Microbiology or by mail at pier.cocconcelli@unicatt.it.