# . - Food Microbiology

## Prof. Daniela Bassi

***COURSE AIM AND INTENDED LEARNING OUTCOMES***

The course aims to provide students with the basics to understand the behaviour of microorganisms associated with food productions and the factors that modulate their growth; the aim of the course is that students acquire knowledge and understand the pro-technological role of microorganisms in the production of fermented foods as well as the negative side represented by pathogenic bacteria and deteriorating agents of food products of plant and animal origin. The main laboratory analysis protocols for the determination of microbiological criteria associated with food will also be put into practice.

At the end of the course, the student must be able to:

* determine the factors that regulate growth, survival or reduction of microorganisms in foodstuffs;
* distinguish between pathogenic and alterative microorganisms and the related foodborne diseases;
* learn the use of pro-technological microorganisms and starter cultures;
* apply, thanks to the above knowledge, the correct control criteria of microorganisms in the preparation, transformation and storage phases;
* understand how to guarantee the organoleptic characteristics of the product together with the safety and microbiological quality, thanks to practical examples, contextualised to the different production chains, and laboratory exercises.

***COURSE CONTENT:***

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|  | CFU |
| Food and role of microorganisms food-associated. Sources of food contamination. Interactions among microorganisms. Quality indexes. Growth, survival and microbial death. Factors affecting microbial growth: intrinsic, extrinsic and implicit factors. Microbial control in foodstuffs: chemical, physical and biological factors. Hurdle technology. *Shelf-life* and predictive microbiology. | 1.0 |
| Infections, poisonings and toxins. Pro-technological, alterative and pathogenic bacteria of food interest, yeasts, moulds, viruses and bacteriophages. EC Reg. 2073/2005 and subsequent amendments and additions. Phenotypic and genetic characterization of microorganisms. | 1.0 |
| Food of animal origin: meat microbiology, drinking milk, fish products and eggs. Foods of vegetable origin: fruit and vegetables, IV and V range products. Canned food. Paste and pastry. Water, juices, other beverages.  Starter cultures. Fermented beverages and foods: fermented milk, cheese, salami, fermented vegetables, bakery products. | 3.0 |
| Practical tutorials: pathogenic bacteria detection in foodstuffs. Microbiological control of water, air and surfaces. | 1.0 |

***READING LIST***

G. A. Farris-M. Gobbetti-E. Neviani-M. Vincenzini, *Microbiologia dei Prodotti Alimentari*. Casa Editrice Ambrosiana, 2012.

A. Galli Volonterio, *Microbiologia degli alimenti,* Casa Editrice Ambrosiana, 2005.

J.M.Jay-M.J. Loesser-D.A. Golden, *Microbiologia degli Alimenti*. Edizione italiana a cura di A. Pulvirenti. Ed. Springer 2009.

L.S. Cocolin-G. ComiI*, La microbiologia applicata alle industrie alimentari*. Ed. Aracne 2007.

Additional scientific literature could be suggested by the teacher.

***TEACHING METHOD***

The course will consist of:

1. lectures through the use of Power Point slides where the main aspects of food microbiology will be explained;
2. working groups where students will be involved in data collection or analysis of the main parameters that can influence the microbial growth in foodstuffs;
3. laboratory tutorials.

***ASSESSMENT METHOD AND CRITERIA***

The assessment is based on a single final test, which will be held in oral form, where the student shall demonstrate competences on the course main contents. The exam, which consists of questions related to each credit of the course, will be aimed at verifying the candidate's learning of the theoretical contents and practical tests. The student must demonstrate the ability to correctly describe contents with a technical and scientific language and critical reasoning. The final score will be expressed in 30ths.

In addition, the student is required to write a laboratory notebook concerning the protocols and the activities performed during the practical exercises that is to be delivered to the teacher before the exam.

During lessons, a working group’s activity will be organised to focus on the main microbiological risks associated to foods; students will be asked to write an essay that will be evaluated in the final assessment (15%).

***NOTES AND PREREQUISITES***

***Assumed knowledge on:*** Biology of Microorganisms.

***OFFICE HOURS FOR STUDENTS***

Prof. Daniela Bassi is available to meet students after class or in her office in times to be agreed and by email [daniela.bassi@unicatt.it](mailto:daniela.bassi@unicatt.it).