# .- Technology of Foods of Animal Origin

Prof. Lorenzo Morelli, Prof. Giuliano Dallolio

Milk Products Module

Prof. Lorenzo Morelli

COURSE AIMS AND INTENDED LEARNING OUTCOMES

 The purpose of the module is to provide students with advanced knowledge of dairy technologies, including notions of dairy microbiology.

The topics covered concern the production and technology of the various types of drinking milk, followed by the basic notions of the chemical-physical, biological and microbiological processes of the processing of milk into a dairy product.

The fundamental aspects of technologies related to dairy products obtained without rennet, such as yogurt, ricotta, butter and mascarpone, will then be introduced.

The course will then proceed with a description of the main cheese production technologies, with particular attention to Italian PDO cheeses.

For the practical part, 3 to 5 visits will be made to dairy farms specialised in different types of production.

At the end of the module, students will be able to demonstrate knowledge of the main processing technologies of the dairy production chain, with an understanding the strengths and weaknesses. Students will also be able to carry out a critical description of dairy technologies, with the ability to critically judge their technological, environmental and nutritional aspects, as well as devise possible innovations.

COURSE CONTENT

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| --- | --- |
|  | ECTS |
| * Technological characterisation of milk. Chemical-physical and microbiological aspects of dairy products.
 | 0.5 |
| * The production of drinking milk. Ready-to-drink milk, pasteurised milk, micro-filtered milk, long-life milk. Milk and whey powder.
* Butter-making technology.
* Fermented milk and yogurt: production technology.
 | 1.5 |
| * The bacteria of dairy processing.
 | 1.0 |
| * The technological process of cheesemaking as a basis for obtaining different types of cheese: classification of cheeses; milk preservation and quality; heat treatments; microbial grafts, enzymatic or acid coagulation; curd and salting treatments.
 | 1.0 |
| * Biochemical processes in the maturation of some types of cheese.
* Cheese technology: fresh and soft, semi-hard, hard.
* The main defects of cheeses: microbial and technological causes.
 | 1.0 |
| * TUTORIAL: visits to factories involved in the production of hard cheeses, soft cheeses and drinking milk.
 | 1.0 |

READING LIST

G. Mucchetti, E. Neviani

Microbiologia e tecnologia lattiero-casearia. Qualità e sicurezza

Editrice Tecniche Nuove, 2006

V. Bozzetti

Manuale Lattiero Caseario (2 volumes)

Editrice Tecniche Nuove, 2011

Farris GA,

Microbiologia dei prodotti alimentari. Microrganismi, controllo delle fermentazioni, indicatori di qualità, igiene degli alimenti fermentati e non

Casa Editrice Ambrosiana, 2012.

Web references

https://www.clal.it/

https://www.fil-idf.org/

Educational material will also be provided during lectures.

TEACHING METHOD

Frontal lectures for a total of 5 ECTS, supported by PowerPoint presentations. The frontal lectures will also involve study groups, which will conclude with the drafting of reports on specific cases.

The practical part (1 ECTS) will consist of meetings with sector operators (1-2) and educational visits (3-5) to sector industries.

The practical part will focus on PDO and PGI products.

ASSESSMENT METHOD AND CRITERIA

The assessment of the student's knowledge and skills acquired during the course will be based on two main criteria:

- their ability to describe one or more dairy processing technologies, including the presentation and discussion of a personal and/or group report;

- their ability to solve specific technological problems posed by the examiner on production aspects and processing/maturation defects of dairy products.

The two points count for 40% in the first case and 60% in the second case.

Any references to the educational visits, if relevant to the topics covered in the two previous points, will also be used in the student's assessment.

An oral exam.

NOTES AND PREREQUISITES

During the course further reading and website references will be provided.

A basic knowledge of microbiology and of food technology unit operations is required.

Should the health situation relating to the Covid-19 pandemic not allow face-to-face teaching, remote teaching in synchronous or asynchronous mode will be guaranteed; this will be communicated in good time to students.

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

Meat Products Module

Prof. Giuliano Dallolio

COURSE AIMS AND INTENDED LEARNING OUTCOMES

The course aims to provide students with basic knowledge on the processes of processing and preserving meat. Specialist knowledge will be developed in relation to the production of Italian and international cured meats, providing students with the tools and skills for using raw materials and ingredients.

The course also aims to provide skills related to the use and management of the latest generation industrial plants, used for the production of cured meats.

Students will also acquire skills in managing the role of corporate "Research and Development" in the meat and derivatives sector.

General skills related to the business and management of the cured meat sector income statement will be provided.

For the practical part there will be an educational visit (compulsory) to the Ermes Fontana salami factory in Sala Baganza (PR). Students will view, analyse and touch with their own hands the production of raw ham, salami, cooked ham and mortadella. Also in Sala Baganza, on the same day, we will view an HPP cold cuts plant at Certosa Salumi.

At the end of the course, students will be able to:

- describe the production flow of the main meat products, and identify and control critical process points;

- know the legislative and sanitary aspects of the sector;

- know and know how to use the main additives for meat products;

- create the meat and non-meat recipes of the main delicatessen products;

- examine and resolve the main problems related to the quality of cold cuts;

- choose and manage the main machinery used for the production and packaging of meat products;

- analyse market demands and improve or develop new products;

- evaluate the technical-economic problems and support management, including in the choices of company strategy.

COURSE CONTENT

|  |  |
| --- | --- |
|  | ECTS |
| General Section |  |
| Basic notes on the structure and chemical composition of meat.Basic notes on the biochemistry of pre- and post-mortem muscle.Microbiological and technological quality of meat.Meat preservation techniques. | 1.0 |
| Non-meat ingredients: technological and functional action.Flow-chart and HACCP. Hurdle technology. | 1.0 |
| Special Section |  |
| Technology of cooked meat products: cooked ham, mortadella, wurstel, zampone and cotechino.Technology of salted, fermented and seasoned meat products: salami. | 1.0 |
| Technology of salted and seasoned meat products: bresaola, prosciutto, culatello, coppa and pancetta.Technology for certain special meat preparations: "fresh processed", restructured meat products (cutlets, hamburgers, etc.), liver pate. | 1.0 |
| Ready-to-eat product technology: cold cuts.Methodology for the research, development and industrialisation of new products.Brief notes on aromatisation techniques for meat products. | 1.0 |
| TUTORIAL: visits to specialised plants for the production of cold cuts. | 1.0 |

READING LIST

G. Feiner, *Meat products handbook: Practical science and technology,* CRC Press, New York, 2006.

LS Cocolin-G. Comi, *La microbiologia applicata alle industrie alimentari,* Aracne editrice S.r.l., Rome, 2007.

G. Colavita, *Igiene e tecnologia degli alimenti di origine animale,* Le Point Vétérinaire Italie s.r.l., Milan, 2008.

P. Cappelli-V. Vannucchi, *Chimica degli alimenti,* Zanichelli, Bologna, 2005.

RA Lawrie, *Scienza della Carne,* Edagricole, 1983.

JM Jay-M. Loessner-DA Golden, *Microbiologia degli alimenti,* Italian edition edited by Andrea Pulvirenti, Springer-Verlag Italia, Milan, 2009.

Various Authors, *Atlante dei prodotti tipici “I salumi”,* Agra, 2002.

L. Grazia-F. Coloretti- C. Zambonelli*, Tecnologie dei salumi,* Edagricole, 2011.

Various Authors (Academia Universa Press), *La scienza degli alimenti,* Edizioni Plan, Milan, 2013.

Dario Bressanini*, La scienza della carne,* Edizioni Gribaudo, 2016

David M. Carlberg *Cleanroom Microbiology*, CRC Press, New York, 2005

F. Gardini-E. Parente Manuale di Microbiologia Predittiva Springer-Verlag Italia, Milan, 2013

M. Melis *Additivi e Tossici negli alimenti,* Libreria Universitaria, Padua, 2014

GV Barbosa-Canovas, AJ Fontana, SJ Schmidt, TP Labuza, *Water activity in Foods*, Blackwell Publishing Professional, Iowa USA

- Educational materials will be provided during lectures.

TEACHING METHOD

Lectures and educational visits to sector industries.

ASSESSMENT METHOD AND CRITERIA

A final oral exam in which the student will have to answer four questions:

* two will cover the general theoretical section, aimed at assessing the student's basic scientific knowledge;
* two will cover the special technology processes, aimed at assessing both the student's specific knowledge and their analytical and reasoning skills.

The first two questions will carry a maximum mark of 12/30 (6 + 6), while the two questions on the special section will carry a maximum mark of 18/30 (9 + 9).

***NOTES AND PREREQUISITES***

In order to benefit from the course, it is useful for students to possess a basic knowledge of food microbiology, inorganic chemistry, organic chemistry and biochemistry.

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