- Food Technology Processes 2

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

Dairy Module

Prof. Bruno Rossi

COURSE AIMS AND INTENDED LEARNING OUTCOMES

**Course aims:** to provide students with the basic principles and illustrate the technologies that govern certain methods of production, separation, stabilisation and preservation of dairy products, exploring in-depth adoptable plant solutions.

**Expected learning outcomes**: at the end of the course, students will be able to:

1) present in writing the production process strategy according to the characteristics of the raw materials and finished product; 2) identify the optimal technological process to be adopted according to the required characteristics; 3) understand and discuss the production process strategy developed in collaboration with industry professionals. 4) appreciate the relevance of the energy needs associated with the technological process adopted.

COURSE CONTENT

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|  | ECTS |
| **Food plant engineering.** Regulatory aspects, plant layouts of equipment and components. Materials used in the food sector. | 0.5 |
| **Membrane filtration techniques**. Tangential filtration, filtering spectrum, types of membranes, mass balances. Reverse osmosis, nanofiltration, ultrafiltration, microfiltration, continuous and discontinuous plants: applications to the food sector. Washing and sanitising methods. | 0.5 |
| **Drinking milk.** Receipt, cooling and storage. Pasteurisation heat treatment, centrifugal separation, bactofugation, homogenisation. Milk standardisation. Heat treatment of UHT milk. Sterilisation methods: direct and indirect. Washing and sanitising methods. Powdered milk. | 1.0 |
| **Dairy Technology**. Coagulation of milk. The different types of cheeses.Machines and plants for dairy processing. The salting and ageing of cheeses. Washing and sanitising methods. | 0.5 |
| **Practical activities.** Sizing of specific plant components. | 0.5 |

READING LIST

H.G. Kessler, *Food Engineering and Dairy Tecnology,* Verlag A. Kessler, Freising, Germany, 1981.

C.R. Lerici-G. Lercker, *Principi di Tecnologie Alimentari,* Editrice CLUEB, Bologna, 1993.

H. Burton, *Ultra-high temperature processing for milk and milk products,* Elsevier Applied Science, London, 1988.

O. Salvatori del Prato, *Tecnologie del latte,* Edagricole, Bologna, 2005.

O. Salvatori del Prato, *Trattato di Tecnologia Casearia,* Edagricole, Bologna, 1998.

V. Westergaard, *Tecnologia del latte in polvere,* Niro A/S- Copenhagen, Denmark, 1995. (Translation: Paolo Monti, Dr Pierluigi Vecchia, Alberto Mari).

TEACHING METHOD

Lectures using video projection support.

Depending on the educational needs, the opportunity for educational trips to companies in the sector will be considered.

Students will be provided with the teaching material used in lectures.

ASSESSMENT METHOD AND CRITERIA

Oral exam.

Three questions will be formulated, each with a mark from 1 to 10.

Each question covers a topic in two ways: **-** general description of a process and a listing of the main technological and plant parameters: mark from 1 to 5;
- identification and analysis of the critical points of the process: mark from 1 to 5.
An orderly, clear, critical and comprehensive presentation will result in the attribution of honours.
The exam duration will be on average from 20 to 30 minutes**.**

NOTES AND PREREQUISITES

Students must have a basic knowledge of the unit operations of food technology, a fair knowledge of the methods relating to the writing and resolution of material and energy balances, and basic knowledge of machines and systems.

Aids will be provided to students during the course.

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

Bakery Products Module

Prof. Gianluca Giuberti

COURSE AIMS AND INTENDED LEARNING OUTCOMES

 The course aims to teach students the basic principles and illustrate the fundamental technologies of the production techniques used for the main bakery products as well as dry and fresh pasta; particular attention will be paid to the supply chain and process aspects, with applied references to some products of great interest. Through knowledge of the process phases and parameters, students will acquire the tools for agri-food production chain interventions aimed at optimising the process and proposing innovative technologies. At the end of the course, students will possess the technical and scientific know-how for controlling the food process, including the use of innovative methodologies. Students will be able to: 1) define and identify the technological conditions to apply at each stage of the production process in order to guarantee the nutritional and/or technological quality of the finished product and minimise negative processing; 2) identify the quality parameters in different food products; 3) identify the relationship between qualitative characteristics and the technological conditions adopted; 4) collaborate with food technologists and sector operators both in choosing the optimal preservation and processing conditions, and in conducting the processes; 5) acquire an appropriate technical language.

COURSE CONTENT

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| --- | --- |
|  | ECTS |
| General section |  |
| Milling industry: raw materials, chemical composition, quality criteria, characterisation of ingredients according to technological and nutritional parameters, and the role of grinding. | 1.0 |
| Starch, proteins, lipids, fibre: structural changes during the process phases and study of their interactions.  | 1.0 |
| Applied section |  |
| Pasta production: main technological processes with particular attention to the definition of the characteristics that illustrate compositional, structural and nutritional quality in the traditional and gluten-free sectors. | 0.5 |
| Bakery products: main technological processes with particular attention to the definition of the characteristics that illustrate compositional, structural and nutritional quality in the traditional and gluten-free sectors. | 0.5 |
| Practical activities | 1.0 |
| Experiences in the production of baked goods on a pilot scale. |  |

READING LIST

Cauvan-P. Stanley-L.S. You, *Bakery food manufacture and quality: water control and effects,* Osney, Med., Oxford, Blackwell Science, copyright 2000.

J.E. Kruger, R.B. Matsuo, J.W. Dick, *Pasta and Noodle Technology,* St. Paul, Minn., American Association of Cereal Chemists, 1996.

L. Milatovich-G. Mondelli, *La Tecnologia della pasta alimentare,* Chiriotti Editori, Pinerolo, 1990.

RP Singh-DR Heldman, *Introduction to Food Engineering. Fourth edition*. Academic Press, Burlington, USA, 2009.

H. Ramaswamy-M. Marcotte, *Food Processing. Principles and Applications,* Taylor& Francis Group, New York, 2006.

DR Heldman-RW Hartel, *Principles of food processing,* Chapman&Hall, New York, copyright 1997.

JM Connor-WA Schiek, *Food Processing: an industrial powerhouse in transition,* New York [etc.], John Wiley & Sons, copyright 1997.

TEACHING METHOD

Lectures in class using video projection support. The teaching materials used during lectures will be provided.

ASSESSMENT METHOD AND CRITERIA

A final written exam. Students will be given 90 minutes to answer open and closed theoretical questions on the course topics covered. On average 5 open questions will be included (maximum 4 marks each depending on the completeness) and 10 closed questions of equal weight (1 mark each). In case of no answer, no marks will be awarded. In the event that group work is carried out during the scheduled tutorial hours, students will be assessed on their final PowerPoint presentation of this work (from 0 to 2 marks, depending on the completeness and clarity of the presentation). The final mark will take into account both the written exam and the group work assessment.

NOTES AND PREREQUISITES

The course requires a knowledge of chemistry, food microbiology and food industry facilities.

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