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|------------------|---------------------------------------|---------------|----------------|-----------------------|---------------------|
| Course Unit | Emerging Technologies and Investments | | Field of study | Food industries | |
| Bachelor in | Food Engineering | | School | School of Agriculture | |
| Academic Year | 2022/2023 | Year of study | 3 | Level | 1-3 |
| Type | Semestral | Semester | 2 | Code | 9087-641-3203-00-22 |
| Workload (hours) | 162 | Contact hours | T - | TP - | PL - |
| | | | TC - | S - | E - |
| | | | OT - | O - | |

T - Lectures; TP - Lectures and problem-solving; PL - Problem-solving, project or laboratory; TC - Fieldwork; S - Seminar; E - Placement; OT - Tutorial; O - Other

Name(s) of lecturer(s) **Clementina Maria Moreira dos Santos**

Learning outcomes and competences

At the end of the course unit the learner is expected to be able to:

1. Know the main used types of packing in food industry, the materials of that are constituted and its main applications
2. Recognise packaging materials used as well as the techniques and systems packaging (MAP VP, active packaging, etc.).
3. Describe new food preservation technologies and select(s) the most appropriate(s) to a particular food processing.

Prerequisites

Before the course unit the learner is expected to be able to:
The students will have to possess knowledge in mathematics and chemistry.

Course contents

Main types of packaging: basic concepts, definitions and classification. Functions of the packaging. Types of wraps. Labels. Description of the main packaging systems. Packaging/food Interactions. Active packaging. Intelligent packaging. New methods for preservations of foodstuffs.

Course contents (extended version)

1. Packaging materials used for packaging foodstuffs.
 - Properties and characteristics of glass, metal, plastic, paper and board.
2. Labels. Types of wraps.
3. Active packaging systems (MAP VP, flexible film with selective permeability, etc.).
4. Smart packaging systems (TTI's, RFID, . . .).
5. Biopolymers in the production of coatings, packaging and edible films.
6. Migration of substances from packaging materials in contact with food.
7. Novel techniques for food preservation:
 - Ohmic heating, HPP, heating by microwave and radio frequency.
 - Pulsed electric field and irradiation.

Recommended reading

1. A. Gomes de Castro, A. S. Pouzada, (1991). As Embalagens Para a Indústria Alimentar. INTELECTO, Gondomar.
2. C. I. G. L. Saratópoulos, L. M. de Oliveira, M. Padula, L. Coltro, R. M. V. Alves, E. E. C. Garcia (2002). Embalagens Plásticas flexíveis, CETEA.
3. I. Castro, (2008). Aquecimento óhmico. Segurança e Qualidade Alimentar, 4: 38.
4. J. A. Torres, G. Velazquez (2005). Commercial opportunities and research challenges in the high pressure processing of foods. Journal of Food Engineering 67: 95.
5. K. L. Yam, P. T. Takhistov, J. Miltz, (2005). Intelligent Packaging: Concepts and Applications. Journal of Food Science 70(1): 1.

Teaching and learning methods

Theoretical lessons in equipped classrooms with audiovisuals resources, such as acetate projector or datashow; Practical lessons with resolution of exercises approaching the contents presented in theoretical lessons and also executing works in adjusted installations, appealing to its equipment, using the expositive and demonstrative methods .

Assessment methods

1. Alternative 1 - (Regular) (Final, Supplementary, Special)
 - Reports and Guides - 30% (Laboratorial reports, research work and performance in the assisted classes)
 - Final Written Exam - 70% (Final theoretical-practical exam)
2. Alternative 2 - (Student Worker) (Final, Supplementary, Special)
 - Development Topics - 30% (Research work)
 - Final Written Exam - 70% (Final theoretical-practical exam)

Language of instruction

1. Portuguese
2. Portuguese, with additional English support for foreign students.

Electronic validation

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|-------------------------------------|---|--------------------------------|-----------------------------------|
| Clementina Maria Moreira dos Santos | Maria Fátima Alves Pinto Lopes da Silva | Elsa Cristina Dantas Ramalhosa | José Carlos Batista Couto Barbosa |
| 07-12-2022 | 08-12-2022 | 09-12-2022 | 09-12-2022 |