

**1. General information****Course:** FOOD PACKAGING**Type:** ELECTIVE**Degree:** 383 - UNDERGRADUATE DEGREE PROGRAMME IN FOOD SCIENCE AND TECHNOLOGY**Center:** 1 - FACULTY OF SCIENCE AND CHEMICAL TECHNOLOGY**Year:** 4**Main language:** Spanish**Use of additional languages:****Web site:****Code:** 58335**ECTS credits:** 6**Academic year:** 2023-24**Group(s):** 22**Duration:** C2**Second language:****English Friendly:** Y**Bilingual:** N**Lecturer:** EVA SANCHEZ PALOMO LORENZO - Group(s): 22

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2. Pre-Requisites

The basic knowledge that students should have, in general, and that will be of great use to them when taking the subject, can be summarized in the following points:

- Basic knowledge of the structure and properties of food components and organic food compounds, as well as mastering the chemical and sensory analysis of food. All the knowledge acquired in Food Technology II will be useful, especially the conservation aspects in which the packaging is involved.

3. Justification in the curriculum, relation to other subjects and to the profession

Modern society does not contemplate a marketed product without good packaging material, regardless of shape, size, material, graphic design, etc. Bearing in mind that the main property of a food is to provide energy and nutrients for the consumer, packaging plays a fundamental role during its commercialisation, as it becomes the main barrier between the environment and the product. It is not in vain that 60% of the packaging materials produced are destined for food because, from the moment it leaves its natural environment until its consumption, food is "attacked" by microorganisms, macroorganisms, bad handling practices, physical, chemical and physicochemical factors, as well as by the product's own changes (internal reactions) that lead to its deterioration, failures or changes in its organoleptic and microbiological properties, leading to the terrible consequence of rejection by the consumer. In short, knowledge of the materials used to manufacture containers, their interaction with the food and the quality control of the container are essential for the correct performance of the professional activity of graduates in food science and technology. In addition, the design and marketing strategies of products associated with packaging that are of vital importance to the food industry must be taken into account.

4. Degree competences achieved in this course**Course competences**

| Code | Description |
|------|---|
| CB03 | Be able to gather and process relevant information (usually within their subject area) to give opinions, including reflections on relevant social, scientific or ethical issues. |
| CB04 | Transmit information, ideas, problems and solutions for both specialist and non-specialist audiences. |
| CB05 | Have developed the necessary learning abilities to carry on studying autonomously |
| E04 | To know the basic fundamentals of instrumentation and process control in the food industry |
| E08 | To be able to apply the technological advances and the innovation in foods and food processing processes in the food industry and to evaluate their acceptability by consumers |
| E09 | To know, optimize and control the production and conservation food processes |
| E10 | To acquire knowledge on equipments and systems for the automatization and control of food processing |
| E11 | To qualify to be able to evaluate the effects of processing on the components and properties of foods |
| E22 | To perform formation of staff in the food sector |
| E23 | To acquire knowledge on culinary techniques, catering, nutrition and culture |
| G01 | To develop the aptitude to gather and interpret information and data to issue critical judgments that include a reflection on relevant topics of social, scientific or ethical nature. |
| G03 | To develop habits of excellence and quality in the professional exercise applying the fundamental human rights, the principles of equality of opportunities and the values of a culture of peace and democratic. Acquiring an ethical commitment and acting according to the professional business ethics and the respect to the environment. |
| G04 | To develop the necessary skills of learning to undertake later studies with a high degree of autonomy. |
| G07 | To possess ability of organization and planning, initiative, entrepreneurship and aptitude to be employed in teamworks. To possess capacity of resolution of specific problems of the professional area and to develop the critical reasoning and decision making. |
| G09 | To develop the motivation for quality, the capacity to adapt to new situations and the creativity. |

5. Objectives or Learning Outcomes**Course learning outcomes**

Description

To establish conclusions and to elaborate reports that allow him to expose his results adequately both in oral and written forms. Developing his capacity of synthesis, being critical and objective.

To achieve that the student is able to select the best packaging and therefore be able to offer the best quality product at the minimum cost.

To achieve that the student acquires a complete formation that allows him to choose the packing most adequate for any food and to be able to interpret the functionality and the effect that that packing is going to cause in the final characteristics of the food.

To achieve that the students know the facts, concepts and basic principles of the food packaging, from the most suitable materials for any type of food, the quality control of the packings and the design and the current trends of new packings. In such a way that the indispensable fundamentals are established in order that they could successfully face the study of the different packings that can be used for each of the food groups.

To develop his aptitude to be a member of a teamwork.

To provoke and to promote in the student all those values and attitudes inherent to the scientific activity.

To develop in the student the capacity of initiative to propose and solve concrete problems of the food industry, as well as of interpreting the obtained results.

6. Units / Contents

Unit 1: Basic concepts. Definitions: Wrapping, packaging, packing, wrapping, coating and covering. Functions of the container. Evolution and Trend of Packaging. Classification of containers and packaging.

Unit 2: Packaging materials. Introduction. Metallic. Glass. Paper and Cardboard. Wooden Containers. Plastic Containers and Complex Materials.

Unit 3: Wood, textile, cardboard and paper packaging. Structure and properties of interest. Manufacturing process. Types of cellulose containers.

Unit 4: Packaging of food in glass containers and ceramic materials. Structural chemical characteristics. Manufacture of glass containers. Closures for glass containers

Unit 5: Metallic containers. Types of containers (steel, tinplate, black plate, TFS, aluminium). Properties of interest. Joints and welds. Closure systems. Coating and internal protectors. Types, properties and function. Corrosion of containers. Passivation.

Unit 6: Plastic containers. Types of plastics of interest in food packaging. Additives. Properties of plastics in food packaging. Manufacture of flexible and rigid plastic containers.

Unit 7: Edible coatings and films. Adhesives. Properties of interest. Types. Applications.

Unit 8: Caps, stoppers, closures and seals. Materials. Characteristics. Aerosols.

Unit 9: Combined packaging systems. Equipment to form-fill-seal containers. Aseptic packaging.

Unit 10: Labelling and printing systems. Printing processes of packaging materials. Labels. Inks.

Unit 11: Interaction between packaging and food. Migration phenomena. Methods of analysis of interactions. Migration processes. Evaluation of the causes and effects of interactions. Active and intelligent packaging systems.

Unit 12: Quality control of packaging. Laboratory tests for packaging materials. Loading and unloading and transport tests. Technical specifications.

Unit 13: Legislation on food packaging. Food/packaging compatibility. Regulations on materials in contact with food.

Unit 14: Packaging Design. Phases of Packaging Design. Packaging and Economy. Packaging and Marketing.

Unit 15: Packaging and the environment. Reuse. Recovery. Recycling.

7. Activities, Units/Modules and Methodology

| Training Activity | Methodology | Related Competences (only degrees before RD 822/2021) | ECTS | Hours | As | Com | Description |
|---|----------------------------------|---|---|------------|----|-----|---|
| Class Attendance (theory) [ON-SITE] | Lectures | | 1.08 | 27 | Y | N | |
| Laboratory practice or sessions [ON-SITE] | Practical or hands-on activities | | 0.6 | 15 | Y | Y | Some technical visits to industries and/or virtual visits will be made. |
| Practicum and practical activities report writing or preparation [OFF-SITE] | Group Work | | 0.38 | 9.5 | Y | Y | |
| Workshops or seminars [ON-SITE] | Problem solving and exercises | | 0.4 | 10 | Y | Y | |
| Group tutoring sessions [ON-SITE] | Group tutoring sessions | | 0.2 | 5 | Y | N | |
| Writing of reports or projects [OFF-SITE] | Guided or supervised work | | 0.12 | 3 | Y | N | |
| Final test [ON-SITE] | Assessment tests | | 0.12 | 3 | Y | N | |
| Study and Exam Preparation [OFF-SITE] | Self-study | | 3.1 | 77.5 | N | - | |
| Total: | | | 6 | 150 | | | |
| Total credits of in-class work: 2.4 | | | Total class time hours: 60 | | | | |
| Total credits of out of class work: 3.6 | | | Total hours of out of class work: 90 | | | | |

As: Assessable training activity

Com: Training activity of compulsory overcoming (It will be essential to overcome both continuous and non-continuous assessment).

8. Evaluation criteria and Grading System

| Evaluation System | Continuous assessment | Non-continuous evaluation* | Description |
|---|-----------------------|----------------------------|---|
| Test | 70.00% | 85.00% | Theoretical teaching will be evaluated by means of a written exam that will be carried out in the ordinary and / or extraordinary official calls. |
| Laboratory sessions | 15.00% | 15.00% | Carrying out of laboratory practices. The laboratory practices will be evaluated taking into account the attitude of the student in the laboratory, the skills they have acquired during their practice period and their practice notebook. |
| Assessment of problem solving and/or case studies | 15.00% | 0.00% | Resolution of problems, cases, jobs. |
| Total: | 100.00% | 100.00% | |

According to art. 4 of the UCLM Student Evaluation Regulations, it must be provided to students who cannot regularly attend face-to-face training activities the

passing of the subject, having the right (art. 12.2) to be globally graded, in 2 annual calls per subject, an ordinary and an extraordinary one (evaluating 100% of the competences).

Evaluation criteria for the final exam:

Continuous assessment:

Both in the progress tests (problems-practical cases-assignments) and in the final exam a minimum of 4/10 will be required in each of the parts and a grade equal or higher than 5/10 applying the percentages.

To pass the laboratory practices a minimum of 4/10 will be required (report-practice notebook) and a grade equal or superior to 5/10 applying the percentages.

Non-continuous evaluation:

Students who do not opt for the continuous evaluation system, assessments indicated above, will take a final test, corresponding to 85% of the grade. The remaining 15% corresponds to the qualification of the practices. In order to pass the course a minimum of 4/10 will be required in each of the parts and a grade equal or higher than 5/10 applying the percentages.

Specifications for the resit/retake exam:

The same criteria will be followed as in the ordinary evaluation

Specifications for the second resit / retake exam:

It will be evaluated by means of a written test in which 85% will correspond to the theory exam and 15% to the practical exam. In order to pass the course a minimum of 4/10 in each of the parts and a grade equal to or higher than 5/10 is required, applying the following percentages

| 9. Assignments, course calendar and important dates | |
|---|--------------|
| Not related to the syllabus/contents | |
| Hours | hours |
| Unit 1 (de 15): Basic concepts. Definitions: Wrapping, packaging, packing, wrapping, coating and covering. Functions of the container. Evolution and Trend of Packaging. Classification of containers and packaging. | |
| Activities | Hours |
| Class Attendance (theory) [PRESENCIAL][Lectures] | 30 |
| Laboratory practice or sessions [PRESENCIAL][Practical or hands-on activities] | 15 |
| Practicum and practical activities report writing or preparation [AUTÓNOMA][Group Work] | 7.5 |
| Workshops or seminars [PRESENCIAL][Problem solving and exercises] | 12.5 |
| Group tutoring sessions [PRESENCIAL][Group tutoring sessions] | 5 |
| Writing of reports or projects [AUTÓNOMA][Guided or supervised work] | 3 |
| Final test [PRESENCIAL][Assessment tests] | 3 |
| Study and Exam Preparation [AUTÓNOMA][Self-study] | 74 |
| Global activity | |
| Activities | hours |
| Laboratory practice or sessions [PRESENCIAL][Practical or hands-on activities] | 15 |
| Workshops or seminars [PRESENCIAL][Problem solving and exercises] | 12.5 |
| Class Attendance (theory) [PRESENCIAL][Lectures] | 30 |
| Practicum and practical activities report writing or preparation [AUTÓNOMA][Group Work] | 7.5 |
| Study and Exam Preparation [AUTÓNOMA][Self-study] | 74 |
| Group tutoring sessions [PRESENCIAL][Group tutoring sessions] | 5 |
| Writing of reports or projects [AUTÓNOMA][Guided or supervised work] | 3 |
| Final test [PRESENCIAL][Assessment tests] | 3 |
| Total horas: 150 | |

| 10. Bibliography and Sources | | | | | | |
|---------------------------------------|---|--------------------------------------|----------|----------------------|------|-------------|
| Author(s) | Title/Link | Publishing house | Citv | ISBN | Year | Description |
| Ahvenainen, R. | Novel food packaging techniques | Woodhead Publishing | Finland | 1 85573 675 6 | 2003 | |
| Coles, R., McDowell, D., M.J. Kirwan, | Manual del envasado de alimentos y bebidas, | A. Madrid-Vicente (Mundi-Prensa) | | | 2004 | |
| F. Paine, H. Paine, A. | Manual del envasado de alimentos | A. Madrid Vicente. Ediciones. 2ª Ed. | Madrid | | 1992 | |
| F.W. Billmeyer. | Textbook of polymer Science | Wiley 3ª Ed. | | 978-0-471-03196-3 | 1984 | |
| G. Bureau; J.L. Multon. | Embalaje de los alimentos de gran consumo | Acibia | Zaragoza | 842000782X, 97884200 | 1995 | |
| J.A. Rodríguez Tarango | Manual de Ingeniería y Diseño en Envase y Embalaje | IMPEFE | MEXICO | | 2005 | |
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| | Alimentación ,equipos y tecnología | Reed Business Information, S.A.U. | | | | |

