



Universitat de Lleida

DEGREE CURRICULUM **FOOD INDUSTRIES**

Coordination: LOPEZ FRUCTUOSO, MARIA LUISA

Academic year 2022-23

Subject's general information

Subject name	FOOD INDUSTRIES			
Code	102582			
Semester	1st Q(SEMESTER) CONTINUED EVALUATION			
Typology	Degree	Course	Character	Modality
	Bachelor's Degree in Agricultural and Food Engineering	3	COMPULSORY	Attendance-based
Course number of credits (ECTS)	9			
Type of activity, credits, and groups	Activity type	PRACAMP	PRAULA	TEORIA
	Number of credits	0.2	2.8	6
	Number of groups	1	1	1
Coordination	LOPEZ FRUCTUOSO, MARIA LUISA			
Department	FOOD TECHNOLOGY, ENGINEERING AND SCIENCE			
Teaching load distribution between lectures and independent student work	The course is taught in the first semester, and is divided into 5 cr theory, plus 3 cr problems and 1 cr deliverable personal work. Independent workload estimated at least 1.5 times the time to attend classes.			
Important information on data processing	Consult this link for more information.			
Language	Catalan 50% Spanish 50%			
Distribution of credits	Theory: 5 cr. Problems:3 cr. Practical personal work: 1 cr.			

Teaching staff	E-mail addresses	Credits taught by teacher	Office and hour of attention
ESTARAN JUSTRIBO, CARLOS	carlos.estaran@udl.cat	1	
ISLA LLANES, ALFREDO	alfred.isla@udl.cat	1	
LOPEZ FRUCTUOSO, MARIA LUISA	marialuisa.lopez@udl.cat	4	
SERRA MAQUEDA, AIDA	aida.serra@udl.cat	3	

Subject's extra information

The food processing industry is based on a knowledge of the technical, legal and financial features of food products and the raw materials from which they result.

This course provides knowledge on food processing lines and their equipment, and calculation tools for the design and selection of common facilities in the food industry.

The skills taught in this course are necessary for the proper sizing of auxiliary systems, processing plant design, projects and final project work related to the manufacturing processes carried out in the food industries.

Learning objectives

- Conèixer la metodologia d'anàlisi dels processos de fabricació d'aliments.
- Aplicar la tecnologia i enginyeria necessària per al correcte funcionament d'una indústria alimentària.
- Conèixer els equips de processat dels aliments segons els diversos tipus d'operacions comuns a la indústria alimentària.
- Calcular els barems d'esterilització tèrmica en aliments.

Competences

CB1. Students must demonstrate to have and to understand the bases of knowledge in a study field that arises from general secondary education, and that is taught at a level including knowledge at the frontiers of its own field of study.

CB2. Students have to be able to apply their knowledge in a professional way and must be able to develop competences in elaborating and defending arguments and problem solving within their own study field.

CB3. Students must be able to gather and interpret relevant data (normally within their own study field), in order to

make judgements including relevant social, scientific and ethical issues.

CB4. Students must be able to transmit ideas, problems and solutions both to specialised and non-specialised audiences.

CB5. Students must acquire enough abilities as to face further studies with a high degree of autonomy.

CG1. Capacity to preview and outline projects that can be included within the agrifood industry. (extractive, fermentative, dairy, canning, packinghouses, meat, fish, salted products and, in general, any other that manufactures, transforms, cans, handles and distributes food products)

CG6. Capacity for managing all kinds of agrifood industries, with knowledge of new technologies, and quality processing.

CG8. Capacity to solve problems with creativity, initiative, methodology and critical reasoning.

CG10. Capacity to search and apply legislation and regulations affecting its own field.

CG12. Capacity for working in multidisciplinary and multicultural teams.

CG13. Correctness in oral and written expression

Specific competences

CEIAA1. Food technology and engineering: Modelling and optimization.

CEIAA2. Food industries engineering. Equipment and machinery for agrifood industries. Process automation and control. Facilities and buildings engineering.

CEMC9. Decision making using tools available for multidisciplinary groups.

CEIAA1. Food technology and engineering: Food Technology. Processing in the agrifood industries.

Subject contents

Syllabus

1.Introduction. (0,7 ECTS; Prof. M.L. López)

1.1.Agrifood industries: structura, sectorial importance, legislation.

1.2.Processes and facilities in food industries.

Fundamentals of food processing operations: manufacturing, preservation and packing. Techniques for process analysis. Products. Raw materials. Materials and equipment for the food industry. Auxiliary facilities. Introduction to inner organization and design of a food industry: personnel, sections, layout.

1.3.Aptitude of raw materials.

Vegetal raw materials. Animal raw materials. Characteristics of raw materials. Additives and coadjuvants in the food industry.

2.Processing at room temperature. (0,8 cr.; Prof. M.L.López)

2.1.Preparing raw materials. Cleaning. Sorting. Peeling.

2.2.Size reduction and mixing.

2.3.Mechanical and physical separations at room temperature.

Filtration. Pressing. Centrifugation. Membrane separation. Extraction solid-liquid.

2.4.Fermentations and enzyme technology.

Kinds of fermentations. Industrial enzymes. Fermenters and reactors.

3.High temperature processing. (2 cr; Prof. E.Fons)

3.1.Pasteurization and thermal sterilisation.

Fundamentals: thermoresistance parameters, heating curves, calculations. Equipment for thermal pasterization and sterilization.

3.2.Other processes using steam.

Blanching, evaporation, extrusion. Principles, equipment and applications.

3.3.Hot air processing.

Deshydration, baking. Principles, equipment and applications.

3.4.Other processes using heat or close techniques.

Frying. Food irradiation. Principles, equipment and applications.

4.Low temperature processing. (1 cr; Prof. E.Fons)

4.1.Refrigeration and controlled atmosphere.

Principles of food refrigeration. Cooling facilities. Modified atmospheres: effects on food, equipment, applications.

4.2.Freezing and operations at very low temperatures.

Principles and equipment for freezing. Crioconcentration and freeze drying.

5.Post-processing operations and others. (0,5 cr; Prof. M.L. López)

5.1.Packaging and other operations.

6.Production management (1 cr; Prof. T. Ramo)

7.By-products and residues: productin and management (1 cr; Prof. R. Teira)

Practical activities

1.Class practices (problems and cases)

Resolution of cases and problems including calculations on transformation and conservation of foods. Included in former epigraphs.

2.Subject work (1 cr.; Prof. M.L. López)

Personal work describing a food processing line, following the guidelines given along the subject.

REMARK: workload assigned to each part is orientative.

Activitats pràctiques

Pràctiques en aula (problemes i casos)

Resolució de casos i problemes sobre diversos aspectes propis del càlcul en operacions de transformació i conservació d'aliments.

Treball

Treball personal descriptiu d'una línia de processat d'aliments, d'acord amb les pautes que es donaran al llarg de l'assignatura.

Visita

Visita a indústries per visualitzar per part dels alumnes els processos existents en les mateixes.

Methodology

Kind of activity	Description	Presential activity			No presential activity	Total time
		Objectives	Workload	Student work	Workload	Hours/ECTS
Lectures	master class	Main concepts explained	50	Study: Know and understand; synthesise knowledge	75	125h / 5
Exercises and cases	Collaborative class	Solving exercises and cases	30	learning to solve exercises and cases	45	75h / 3
Directed activity	Personal work	Subject work	10	Write memory	15	25h / 1
Total			90		135	225h / 9

Remarks

A total of 25 h of activity per ECTS have been considered

Evaluation

Learning activity	Assesment activity		Weight
		Procedure	Number
Theory, exercises and cases	Written assessment on theory, exercises and cases	2	90
Personal activity	Dossier and oral defense	1	10
TOTAL			100

Remarks

As a global grade to pass the subject, the final mark must be 5 or higher.

Bibliography

Basic references

BRENNAN, J.G.; J.R. BUTTERS; N.D. COWELL i A.E.V. LILLY (1998) **Las operaciones de la ingeniería de los**

alimentos. Ed. Acribia. Zaragoza.

BRENNAN, J.G. (ed.) (2008) **Manual del procesado de los alimentos.** Ed. Acribia. Zaragoza.

CASP, A.; ABRIL, J. (1998) **Procesos de conservación de alimentos.** AMV Ed. y Mundi- Prensa. Madrid.

EARLE, R.L. (1988) **Ingeniería de los alimentos.** Ed. Acribia. Zaragoza.

FELLOWS, P. (2000) **Food processing technology: principles and practices** (2dn Ed) Woodhead Pub.Ltd. Cambridge, UK. [traducción de la primera edición: (1994) **Tecnología del procesado de los alimentos: Principios i prácticas.** Ed. Acribia. Zaragoza.]

IBARZ, A. y BARBOSA-CÁNOVAS, G.V. (2005). Operaciones Unitarias en la Ingeniería de Alimentos. MundiPrensa, Madrid.

IBARZ, A. y BARBOSA-CÁNOVAS, G.V. (2002). Unit Operations in Food Engineering". CRC Press, Boca Ratón, Fl.

MAFART, P.; BELIARD, E. (1994) **Ingeniería industrial alimentaria (2 vol.)** Ed. Acribia. Zaragoza.

ORDÓÑEZ, J.A.; CAMBERO, I.; FERNÁNDEZ, L.; GARCÍA, ML.; GARCÍA DE F., G.; SELGAS, MD. **Tecnología de los Alimentos. Vol I: Componentes de los alimentos y los procesos.** Ed. Síntesis. Madrid. (1998).

SINGH, R.P; HELDMAN, D.R. (1998) **Introducción a la ingeniería de los alimentos.** Ed. Acribia. Zaragoza.

Complementary references

BARBOSA-CÁNOVAS, G.V.; VEGA-MERCADO, H. (2000) **Deshidratación de alimentos.** Ed. Acribia. Zaragoza.

BARTHOLOMAI, A. (1991) **Fábricas de alimentos.** Ed. Acribia. Zaragoza.

CENZANO, I; Madrid, A.; Vicente, J.M.; (1993) **Nuevo manual de industrias alimentarias.** Ed. Mundi-Prensa. Madrid.

GARCÍA-VAQUERO, E.; AYUGA, F. (1992) **Diseño y construcción de industrias agroalimentarias.** Mundi-Prensa. Madrid.

GRUDA, Z.; POSTOLSKI, J. (1986) **Tecnología de la congelación de los alimentos.** Ed Acribia. Zaragoza.

LEWIS, M.J. (1993) **Propiedades físicas de los alimentos y de los sistemas de procesado.** Ed. Acribia. Zaragoza.

LÓPEZ, A. (1990) **Diseño de industrias agroalimentarias.** AMV ed. Madrid.

PAINE, F.; PAINE, H. (1995) **Manual de envasado de los alimentos.** AMV ediciones. Madrid.

PERRY, R.H.; CHILTON, C.H. (1992) **Manual del ingeniero químico (2 vol).** Ed. McGraw-Hill.

PRIMO-YÚFERA, E. (1982) **Química agrícola III. Alimentos.** Ed. Alhambra. Madrid.