



Universitat de Lleida

DEGREE CURRICULUM
**ANIMAL FOOD PROCESSING
TECHNOLOGY**

Coordination: TEIXIDO ORRIES, IRENE

Academic year 2023-24

Subject's general information

Subject name	ANIMAL FOOD PROCESSING TECHNOLOGY			
Code	102588			
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)	6			
Type of activity, credits, and groups	Activity type	PRALAB	PRAULA	TEORIA
	Number of credits	1.6	1.4	3
	Number of groups	1	1	1
Coordination	TEIXIDO ORRIES, IRENE			
Department	FOOD TECHNOLOGY, ENGINEERING AND SCIENCE			
Teaching load distribution between lectures and independent student work	Attendance-based time: 60 h Non attendance-based time: 90 h			
Important information on data processing	Consult this link for more information.			
Language	Spanish: 50 % Catalanish: 50 %			

Teaching staff	E-mail addresses	Credits taught by teacher	Office and hour of attention
MORALES DE LA PEÑA, MARIANA	mariana.morales@udl.cat	3	
TEIXIDO ORRIES, IRENE	irene.teixido@udl.cat	3	

Subject's extra information

DEGREE IN FOOD SCIENCE AND TECHNOLOGY

This subject is part of a block of Food Technology subjects that are taken during the third year of the undergraduate studies. This block of subjects is oriented to the study of food manufacturing processes applying the knowledge acquired in cross-cutting subjects, specifically, in the subjects of Foundations of Food Engineering and Processes in the Food Industry. In this specific subject, the transformation processes of meat and meat products are studied.

These processes range from slaughter technologies for obtaining fresh meat to specific technologies as well as the production of cured and cooked meat products. The knowledge that is taught in this subject is oriented so that the student, analyzing unit operations and auxiliary systems, learns to define, design and dimension the complete manufacturing processes of the different meat products.

Recommendations

It is recommended to have passed, or at least have completed the following subjects: Physics and Chemistry of Food I and II, Microbiology and Parasitology of Food, Production of Raw Materials of Animal Origin, Foundations of Food Engineering and Processes of the Food Industry.

Note

The scheduled hours and activities, as well as the evaluation methodology and procedure, may be modified for extraordinary reasons.

DEGREE IN AGRICULTURAL AND FOOD ENGINEERING

Academic framework of this subject

The subject "Animal Food Processing Technology" is included in the set of food Industries. The skills of this subject will come in useful to student for to defining completely the processes to manufacture foods related to meat industries and to dairy industries. The study will involve: a) sections of the industries and their functioning, b) regulatory aspects, c) characteristics and composition of raw materials, d) flow chart and operations involved in their manufacture processes, e) characteristics of intermediate and final products, f) control parameters and quality control of the processes and products g) management and exploitation of by-products.

Note

The scheduled hours and activities, as well as the evaluation methodology and procedure may be modified for extraordinary reasons.

Learning objectives

OBJECTIVES

In the field of the food industries studied in this field, it is intended that the student be able to:

- Describe the processes of obtaining and transforming meats, meat products, milk and dairy products.
- To handle and know how to apply the various current provisions that are applicable.
- Outline, in flow diagrams, the manufacturing processes of these industries.
- Identify raw materials, ingredients, additives and other materials used in the meat and dairy industries.
- Assess the influence of the composition and properties of raw materials on the quality of final products.
- Interpret the physical and chemical changes that occur within the various processes of preparation and transformation.
- Modify the manufacturing processes of meat and dairy products.
- Organize the production of production lines.
- Associate composition and defects in the final product with the raw materials and applied technology.
- Select equipment for manufacturing lines.
- Dimension production lines and estimate the capabilities of their main and auxiliary equipment.

Competences

COMPETENCES

Specific

CE1. Select and apply the physical and mathematical foundations necessary for the development of other disciplines and the activities of the profession.

CE2. Identify and apply the chemical foundations necessary for the development of other disciplines and the activities of the profession.

CE4. Select and apply the basic concepts of the statistical method, being able to statistically analyze the results of studies and interpret them critically.

CE5. Apply the basic processes of a laboratory and use equipment, handle reagents, meet safety conditions and prepare reports.

CE6. Posing and solving problems by correctly applying the concepts acquired to specific situations.

CE19. Analyze the technological aspects of animal production that determine the quality of raw materials for subsequent transformation.

CE21. Discuss the rationale and apply basic operations to food manufacturing processes.

- CE22. Recognize food processing equipment and know how to use it.
- CE23. Outline, based on flow diagrams, the processes of food preparation and preservation.
- CE24. Identify and evaluate raw materials, ingredients, additives and technological aids for use in the agri-food industry.
- CE25. Explain the role of ingredients and food additives.
- CE26. Apply basic knowledge about raw materials, ingredients and additives to food formulation.
- CE27. Interpret the physical and chemical changes that occur during the different food-making processes.
- CE28. Modify the processes of making a food based on some objectives.
- CE29. Select equipment and organize food preparation and packaging lines.
- CE30. Develop new processes and products.
- CE31. Identify and assess the various parts of a project of an agri-food industry.
- CE32. Sizing production lines.
- CE33. Estimate equipment capabilities for production lines and auxiliary systems needs.

Basic

- CB1. That students have demonstrated to possess and understand knowledge from the base of general secondary education at a level that, while supported by advanced textbooks, also includes some aspects that involve knowledge from the forefront of their field of study
- CB2. That students know how to apply their knowledge to their work or vocation in a professional way and possess the competencies that are usually demonstrated through the elaboration and defense of arguments and the resolution of problems within their area of study.
- CB3. That students have the ability to gather and interpret relevant data (usually within their area of study) to make judgments that include reflection on relevant issues of a social, scientific or ethical nature.
- CB4. That students can transmit information, ideas, problems and solutions to both specialized and non-specialized audiences.
- CB5. That students have developed those learning skills necessary to undertake further studies with a high degree of autonomy.

General

- CG1. Analyze specific situations, define problems, make decisions and implement action plans in search of solutions.
- CG2. Interpret studies, reports, data and analyze them numerically.
- CG3. Select and manage the available written and computerized sources of information related to the professional activity.
- CG4. Work alone and in a multidisciplinary team.
- CG5. Understand and express themselves with the appropriate terminology.

CG6. Discuss and argue in various forums.

CG7. Recycle in new technological advances through continuous learning.

CG8. Value comprehensive training, personal motivation and mobility.

CG9. Analyze and assess the social and ethical implications of professional activity.

CG10. Have a critical and innovative spirit.

CG11. Analyze and assess the environmental implications in professional activity.

Transversal

CT1. Correctly present information orally and in writing.

CT3. Use existing IT and communication tools as support for the development of their professional activity.

CT4. Respect the fundamental rights of equality between men and women, the promotion of Human Rights and the values of a culture of peace and democratic values.

Subject contents

SYLLABUS

BLOCK 1: MEAT INDUSTRIES

UNIT 1.1.- Presentation and introduction. (2h)

Presentation of the subject. Introduction to the Spanish meat sector. General information of the sector. Meat products.

SUBJECT 1.2.- Legislation. (2h)

RD 474/2014.

UNIT 1.3.- Slaughterhouses, classification of carcasses and by-products. (2h)

Slaughterhouses. Sacrifice and manipulation. Carcass classification. By-products and SANDACH.

UNIT 1.4.- Fresh meat products. (2h)

Characteristics, composition and properties of meat and meat products. Meat quality.

UNIT 1.5.- Carcass cooling. (2h)

Fundamentals of carcass cooling. Cold shortening. Cooling systems. Carcass cooling time calculation.

UNIT 1.6.- Cured ham. (2h)

Production. First matter. Elaboration process. Serrano ham. Differentiated quality.

UNIT 1.7.- Cured sausages. (2h)

Quality standard and classification. Raw material, additives and starter cultures. Elaboration process. Technological advances.

UNIT 1.8.- Starter cultures. (2h)

Introduction. Raw material. Generic process. Microbiology. Production and new trends in starter cultures.

UNIT 1.9.- Cooked ham. (2h)

Introduction. Classification and quality standard. Elaboration process. Other products. Calculation brines.

UNIT 1.10.- Other cooked products. (2h)

Quality standard. Emulsion. Hot dog. Mortadella. Pate.

UNIT 1.11.- Slicing of meat products. (2h)

Introduction. Trends. Objectives. Processing phases.

UNIT 1.12.- Packaging and clean rooms. (2h)

Introduction and objectives. White rooms. Plastic bottles. Packaging gases. Packaging equipment.

UNIT 1.13.- Egg products. (2h)

Introduction. Importance. Preliminary operations. Manufacturing technology.

UNIT 1.14.- Environmental impact of meat industries. (2h)

ODS and circular economy. ISO 14001. Environmental classification. Emissions. Production processes and environmental aspects of the activity. Initiatives of the meat industry.

UNIT 1.15.- Traceability. (2h)

Important aspects. Implementation phases. Backward, internal and forward traceability. Examples and exercises. Certifications. Innovation.

BLOCK 2: DAIRY INDUSTRIES

UNIT 2.1.- Introduction. (1 hour)

Historical evolution of dairy technology. Characteristics of dairy industries. Dairy products. Economic importance and structure of the sector. Legal regulations of the sector.

UNIT 2.2.- Characteristics, composition and properties of milk. (3 hours)

Definition and essential characteristics of milk. Major components of milk. Structure and properties of interest of milk. Factors of variability in the composition of milk. Milk carbohydrates: classification; physical-chemical characteristics of lactose. Milk fat: fractions; characteristics of the fat globule. Nitrogenous compounds classification; casein micelles. Enzymes: importance; main enzymes of technological interest. Salts and minerals: macro and microelements. vitamins.

UNIT 2.3.- Milk quality. (2 hours)

Factors that determine the quality of milk. milk contaminants. Origin and main microbial alterations of milk. Manipulations and more frequent frauds. Sampling and main analytical determinations.

UNIT 2.4.- Operations and general previous treatments. (2 hours)

Milking. Milk filtration. Milk refrigeration: factors that determine its effectiveness. Milk refrigeration and storage systems on the farm. Milk collection. Quality controls in the collection. Reception and storage of milk in the industry. Quality controls in the reception and traceability of the milk. Milk deaeration. Milk clarification. Skimming and standardization of milk. Skimmers; factors that affect skimming. Homogenization of milk: types and effects.

UNIT 2.5.- Liquid milk for consumption. (2 hours)

Pasteurized milk: definition. denominations, treatments, prohibitions. Methods, conditions, equipment and pasteurization lines. Conventional sterilized milk and UHT milk: definitions, denominations, equipment and

production lines. Effects of heat treatments on milk. Defects and quality controls of these products.

UNIT 2.6.- Concentrated milk. (1 hour)

Definitions, denominations, composition. Treatments. Modifications due to the concentration of milk. Stabilization of concentrated milk. Selection of milk to concentrate. Standardization of milk to concentrate. Concentration methods and equipment. Sweetened concentrated milk. Manufacturing lines. Major flaws. Quality controls.

UNIT 2.7.- Milk powder. (1 hour)

Definition, denominations. composition. Additives. Drying by contact: equipment and operating conditions. Spray drying: equipment and operating conditions. instantaneuous milk. Properties and quality control of milk powder.

UNIT 2.8.- Fermented milks. (1 hour)

Classification of fermented milks. Yogurt: definition; denominations; raw materials and additives. Main processing stages and yogurt manufacturing lines. Manufacturing controls, raw materials and finished product. Other fermented milks: kefir, acidophilic milks; koumiss.

UNIT 2.9.- Elaboration of creams and butters. (1 hour)

Definition and types of cream: pasteurized cream; sterilized cream; whipped cream; clotted cream; powdered cream; frozen cream. Definition and types of butters. Butter manufacturing procedures. Manufacture of anhydrous butter. Most frequent defects and alterations.

UNIT 2.10.- Cheese making. (4 hours)

Definition and classifications of cheeses. General flow diagram of cheese making. Coagulation of milk: type of curds. Draining and complementary operations of the curd. Ripening, packaging and quality control of cheeses. Processed cheeses technology. Utilization of whey.

UNIT 2.11.- Ice cream and other dairy products. (2 hours)

Ice cream: definition and classification of ice cream. Basic stages in the production of gelats. Raw materials and formulation of mixtures. Optimum upload. Ice cream structure. Raw material storage conditions. Evolution of the mixture during the various manufacturing stages. Ice cream manufacturing lines. Quality controls. Recombined and reconstituted milk and milk products. Jellied milks, creams and foams ("mousses").

Possible visits to industries:

1. Industries that manufacture consumer milk, cream and/or butter.
2. Meat processing industry.

Methodology

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Teaching activity	Description	Classroom classes		Non-attending classes		Evaluation	Total time / ECTS
		Objectives	Hours	Load of work for the student	Hours	Hours	Hours
Magistral lessons	Magistral classess (Classroom big group)	Explanation of the main principles	36	By studying: To know, understand and resume knowledges	60	4	96 h/ 3.84

Problems and cases	Participatory classes (Medium group)	Application of the theoretical concepts explained in classroom	6	Solving of problems and cases	14		20 h/ 0.72
Leaded activities	Treball individual o grup	To orient the student in work (during tutorial time)	2	Consulting of documents and bibliographic sources Redaction and presentation of informs and reports	22		12 h/ 0.48
Visits	Visits to 2 factories	To have a visual and direct knowledge of food processes	8	Redaction of informs	4		12 h/ 0.48
Total			56		90	4	150 h/ 6

If, for health reasons, or other unforeseen circumstances, teaching activities cannot be carried out in the classroom, they will take place remotely.

Development plan

Teaching activity	Description	Classroom classes		Non-attending classes		Evaluation	Total time / ECTS
		Objectives	Hours	Load of work for the student	Hours	Hours	Hours
Magistral lessons	Magistral class (Classroom big group)	Explanation of the main principles	36	By studying: To know, understand and resume knowledges	60	4	96 h/ 3.84
Problems and cases	Participatory classes (Medium group)	Application of the theoretical concepts explained in classroom	6	Solving of problems and cases	14		20 h/ 0.72
Leaded activities	Treball individual o grup	To orient the student in work (during tutorial time)	2	Consulting of documents and bibliographic sources Redaction and presentation of informs and reports	22		12 h/ 0.48
Visits*	Visits to 2 factories	To have a visual and direct knowledge of food processes	8	Redaction of informs	4		12 h/ 0.48
Total			56		90	4	150 h/ 6

*If these activities would not be carried out for unforeseen circumstances, they will be replaced by leaded activities.

Note: 25 hours of total activity is equivalent to one ECTS credit.

Evaluation

Kind of activity	Evaluation	Number	Weight on the final grade
Master classes	Tests mid-term 1	2	35
Master classes	Tests mid-term 2	2	35
Solving of cases and problems	Delivering of reports and attendance and participation in presentations (Mid-term 1)	Minimum 2	15
Solving of cases and problems	Delivering of reports and attendance and participation in presentations (Mid-term 2)	Minimum 2	15
Total			100

Notes

For the purposes of the final grade, to pass the course it will be necessary to have obtained in the set of tests a cumulative total equal to or greater than 5.0 points out of 10.

The average grade of Partial I and Partial II must be equal to or greater than 5 out of 10 to pass the course and, in turn, compute the rest of the activities. The grades of the partials I and II must be greater than 4 out of 10 for these to be averaged.

Attitude to follow in the event of a voluntary or accidental infringement of the rules for conducting the exam:

The voluntary or accidental infringement of the rules for carrying out the exam prevents its assessment. Therefore, the offender fails the subject without the option of recovery with a "0". If intentionality in the deception is confirmed, it will be considered a very serious ethical misconduct, and the Services Inspection will be informed to take the disciplinary measures it deems appropriate.

The student has the right to carry out an alternative evaluation to the continuous evaluation as long as he follows the regulations regarding said evaluation process. This evaluation will consist of a single test-type exam (and its recovery) and with short questions on all the contents of the subject (theory, seminar and practices).

Bibliography

SECTION I: MEAT INDUSTRIES

Basic Bibliography

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SECTION II: DAIRY INDUSTRIES

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Magazines:

Industrias lácteas españolas (I.L.E.)

Le lait

Il latte

Tecnología láctea

International dairy journal

Journal dairy science

Netherland milk dairy

Journal dairy research

Milchwissenschaft