



DEGREE CURRICULUM

PLANT FOOD PROCESSING TECHNOLOGY II

Coordination: ROMERO FABREGAT, MARIA PAZ

Academic year 2023-24

Subject's general information

Subject name	PLANT FOOD PROCESSING TECHNOLOGY II			
Code	102589			
Semester	2nd 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	0.6	4.4
	Number of groups	1	1	1
Coordination	ROMERO FABREGAT, MARIA PAZ			
Department	FOOD TECHNOLOGY, ENGINEERING AND SCIENCE			
Teaching load distribution between lectures and independent student work	Classroom (attendance) hours: 60 Non-contact hours: 90			
Important information on data processing	Consult this link for more information.			
Language	Spanish /Catalan			

Teaching staff	E-mail addresses	Credits taught by teacher	Office and hour of attention
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Subject's extra information

Subject in the whole curriculum

The subject "Technology of processing plant foods II" belongs to the block of Food Industries.

Impart knowledge are aimed at the student learns to define complete manufacturing process of certain foods. The study of different industries include: a) sections of the industry and its operation, b) legislative, c) characteristics and composition of raw materials, d) diagram and operations processes, e) product characteristics , f) process control parameters and product quality g) management and use of waste and by-products. The industries included in this material are the fruits and vegetables (fresh), canned juices and vegetable sector.

Learning objectives

It is intended that the student will be able, in the context of different food industries studied in this field in:

1. Describe the food manufacturing processes.
2. Manage and know how to apply the various existing provisions affecting the food industries.
3. Outline, flowchart, process of preparing and preserving food.
4. Identify raw materials, ingredients, additives and other materials for use in the food industry.
5. Assess the influence of the composition and properties of the raw material quality.
6. Final product.
7. Interpret physical and chemical changes that occur within the various food manufacturing processes.
8. Changing processes based on objectives.
9. Organize production line manufacturing in food industry.
10. Associate composition and defects in the product with the raw materials and applied technology.
11. Select equipment for production lines and food packaging.
12. Sizing production lines and estimate the capabilities of processing equipment.
13. Having ability to develop new processes and food products .
14. Plan the management and use of products.

Competences

Basic skills

CB1. That students demonstrate to have and understand knowledge in an area of study that starts from the base of general secondary education, and is usually found at a level that, while supported by advanced textbooks, also includes some aspects that involve knowledge coming from the vanguard of his field of study.

CB2. That students know how to apply their knowledge to their work or vocation in a professional way and have the skills that are usually demonstrated through the elaboration and defense of arguments and problem solving 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 convey 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 skills

CG1. Ability to prepare, design, draft and sign projects for the construction, refurbishment, repair, conservation, demolition, manufacture, installation, assembly or operation of movable or immovable property which by their nature and characteristics are included in the own technique of agricultural and livestock production (facilities or buildings, farms, infrastructures and rural roads), the agri-food industry (extractive, fermentative, dairy, canning, fruit and vegetable, meat, fishing, salting and, in general, any other dedicated industries to the elaboration and / or transformation, conservation, manipulation and distribution of food products) and gardening and landscaping (urban and / or rural green spaces, parks, gardens, nurseries, urban trees, etc., public or private sports facilities and environments subject to landscape recovery).

CG6. Ability to direct and manage all kinds of agri-food industries, with knowledge of new technologies and quality processes.

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

CG10. Ability to research and use the rules and regulations relating to its scope of action.

CG12. Ability to work in multidisciplinary and multicultural teams.

Transversal skills

CT1. Correction in oral and written expression.

CT4. Respect for 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

CT5. Apply the gender perspective to the functions of the professional field

Specific skills

CEIAA1. Ability to know, understand and use the principles of: Food engineering and technology. Basic food engineering and operations. Food technology. Processes in the agri-food industries. Modeling and optimization. Food quality and safety management. Food analysis. Traceability.

CEIAA2. Ability to know, understand and use the principles of: Engineering of the agri-food industries. Auxiliary equipment and machinery of the agri-food industry. Automation and process control. Engineering of works and facilities. Agro-industrial constructions. Waste management and use.

Subject contents

Block Fermented beverages

Topic 1 Beer

The brewing industry in Spain. Regulations of beer. Beer: definition and specifications. Permitted practices and prohibitions. Types of beer. Beer and health. General notions about the process of making beer.

Topic 2 Brewing: Raw material

Carbohydrates. Quality criteria of malting barley. Attachments: raw grains and sugary compounds. Water. Water use in the malting and brewing industries. Effect of some ions. Corrections water. Hops. Description hops. Industrial classification. Composition of hops. Quality assessment of hops. Storing hops. Commercial presentations.

Topic 3 Manufacture of beer wort

Introduction. The mashing. Crushing. Maceration. Filtering. Boil. Cooling. Composition and quality of the beer wort.

Topic 4 Beer

The fermentation: Fermentation objective. Preparation of wort for fermentation: aeration and seeding of microorganisms. Transformations during fermentation. Control of fermentation. Models of high, low and fast fermentations. Equipment for fermentation. Yeast recovery.

The maturation of beer, final treatment and shipping: Introduction. Second fermentation. Preventing turbidity. Cooling resistance. Artificial carbonation and standardization. Maturation of taste. Incorporation of additives. Models saved driving. Filtration: filter media in the brewing industry, filter selection for the beer industry. Pasteurization. Packaged.

OENOLOGY

Topic 5 Wine

Definition of wine and other enological products according to the OIV. Wines. Wine composition. Nutritional quality of the wine. Outline the process of winemaking. Legal issues affecting winemaking.

Topic 6 Harvest, shipping and receiving.

The wine grape: varieties. The bunch of grapes: composition. Study ripening of the grapes. Assessment of the quality of the grapes. Harvest. Transport of grapes to the winery. Facilities at the front desk controls. Control of raw materials. Discharge systems.

Topic 7 Technology must extraction.

Introduction. Crushing and stemming. Pumping whole or crushed grape pulp. Maceration and drained. Pressing. Analysis of alternatives in the process of extraction of must.

Topic 8 Conditioning musts.

The sulphite in winemaking. State of sulphite in musts and wines. Legal aspects of the use of sulphite. Substitute or complementary products. Clarification of musts. Effects of racking. Aids for racking: clarifiers and enzymes. Settling techniques: static and dynamic.

Topic 9 Technology fermentation of white wines.

Physical and chemical changes during fermentation. Importance of the fermentation temperature. Controlled fermentation. Interventions during fermentation. Facilities for controlled fermentation.

Topic 10 Red wines maceration and fermentation

Fermentation and maceration contemporary: Physical and chemical modifications. Control of maceration. Descube. Exhaustion of skins. Carbonic maceration. Thermovinification. Facilities traditional maceration. Current trends in equipment for maceration. The malolactic fermentation changes. Ideal conditions for malolactic fermentation. Use of bacterial cultures.

Topic 11 Maturation and aging of wines.

The role of oxygen in wine storage. Changes in aging. Aging in barrels. Bottle aging. Technical innovations and aging wine.

Topic 12 Clarification. Filtration and centrifugation.

Introduction. The colloids in wine. The actions of the fining agents: mechanism and effects on clarifying wines. Fining: Inorganic and protein complexes. The practice of clarification. The filter media in oenology. Filtration techniques in the wine industry. Filtration land and precast beds. Sterile filtration membranes. Tangential filtration. Selection filtering technique. Spin wine.

Topic 13 Stabilization

Stabilization:objective. Demetallating Treatments: Potassium ferrocyanide and phytates. Correction of acidity. Color Correction. Stabilization cooling: tartaric stabilization. Stabilization by heating: pasteurization. Adding stabilizer enological products with purpose.

OLIVE OIL

Topic 14 Olive oil

Composition of olive oil - Classification of virgin olive oils - Quality olive oils - Considerations on the physicochemical and organoleptic parameters - Preparation of the olive oil: flowcharts - Typical sections in a industry

Topic 15 -. Preliminary operations.

The olive. Structure and composition -. Ripening fruit -. Variety -. Influence of climatic and agronomic factors. -. Collection and transportation of olives -. Reception of olives -. Cleaning and washing the olives -. Storing olives -. Controls -. Milling fruit. Types of mills -. Malaxation of the paste. Mixers -. Properties of paste -. Difficult paste. Addition of processing aids.

Topic 16 - Extraction of oil. Traditional systems.

Fundamentals of partial extraction -. Characteristics of partial extraction equipment -. Factors influencing extraction -. Processing aids -.

Handling partial extraction process -. Advantages and disadvantages of partial extraction system -. Pressing system. Fundamentals -. Hydraulic press description -. Operation pressing -. Factors influencing pressing -. Difficult Paste. Processing aids -. Advantages and disadvantages of the press -. Controls and regulation of the press system.

Topic 17 - Extraction of oil. Continuous systems by centrifugation.

Theoretical Foundations of centrifugation -. Centrifugal description. Operation - Factors affecting the operation - Processing aids - Advantages and disadvantages of the centrifuge system - Controls and regulation centrifuge system - System 2-phase centrifugation. - Advantages and disadvantages of centrifugation 2 phase -. Controls and regulation of 2-phase system.

Topic 18 -. Separation of liquid phases and final operations.

Separation of liquid phase by decantation. Factors -. Facilities decantation -. Separation of liquid phase by centrifugation. - Vertical Centrifuges -. Mixed system -. Conservation oil. Alterations -. Properties of stores and deposits -. Filtration of oils. Types of filters and application -. Packaging oils. Conditions and types of packaging -. Labelling.

Topic 19 -. Disposal and utilization of by-products.

The byproducts of the manufacturing process of olive oil. Quantities and characteristics - The pomace. Exploitation -. 2-phase pomace. Exploitation -. The waste water. Environmental problems -. Disposal and utilization of waste water -. Wastes the process of making olive oil.

CEREAL TECHNOLOGY

Topic 20 Cereal storage and dry milling

The grain and conditioning. Factors affecting grain quality. Treatments to stored grains. Grain drying and aeration. Definitions and specifications of the mill products. Dry milling process: fundamentals. Cleaning and conditioning of the wheat. Grinding and classification. Storage and flour treatment.

Topic 21 Breadmaking process

Bread: definition and types. Diagram of the process. Mixing Operations: purpose, methods and equipment. Operations on mass: rest, division, and formed. Fermentation operation: principles, steps, factors and machinery. Controlled fermentation. Process and equipment. Cooking. Phenomena in the dough. Ovens. Conservation bread. Aging. Example baking industry.

Topic 22 Process of making pasta

Definition and types of pasta. Specifications of raw materials for the production of pasta. Pulping process: Mixing and kneading, extrusion and cutting, drying. Equipment: Mixers, Extruders, Dryers. Parameters of quality pasta. Example pasta processing plant.

Topic 23 Process of making cookies

Definition and types. Specifications flour cookie. Chemical agent. Process of making cookies: cookies, crackers and wafers. Example biscuit industry.

Topic 24 Process of making breakfast cereals

Definition and types. Process of making flakes and puffed cereals. Enrichment of cereal.

Practical activities

Practice 1: Brewing

The practice is the development of a beer, so that will be implemented knowledge related to various operations that are common with other processed products studied in this field:

- Physical control of malta
- Grinding grain
- Enzyme activity: modulation and control
- Fermentation. Seeding and control yeast fermentation
- Filtration

Practice 2: Extraction of olive oil in pilot plant

The extraction of virgin olive oil is made by the centrifugation, assessing the influence of various factors: type of olives, addition of adjuvants and temperature. Quality parameters in oils (degree of acidity, color, sensory attributes, ...) are valued.

Methodology

Tipus d'activitat	Descripció	Activitat presencial alumne		Activitat no presencial alumne		Avaluació	Temps total/ECTS
		Objectius	Hores	Treball alumne	Hores	Hores	Hores
Lliçó magistral	Classe magistral (Aula. Grup gran)	Explicació dels principals conceptes	38	Estudi: Conèixer, comprendre i sintetitzar coneixements	59	6	103h/4.12
Problemes i casos	Classe participativa (Aula. Grup gran)	Aplicació dels conceptes teòrics impartits a les classes magistrals	6	Resoldre problemes i casos	12		18h/0.72
Visites a indústries	Visita a dues empreses	Conèixer in situ els processos	6		4		10h/0.4
Laboratori	Pràctiques de laboratori (grup gran)		10	Redactar memòria	15		40h/1.6
Totals			60		82	8	150h/6 ECTS

Observations

25 hours of total activity per ECTS credit.

Evaluation

	Avaluació			
Activity	Procedure	Quantity	Weight rating	
Master class	Written tests on the theory of the subject program. Short test at the end of each block.	2 3	60 (30/30) 15	
Test and cases	Evaluation of the reports delivered.		10	
Laboratory and Pilot Plant	Evaluation of the reports delivered. Test about laboratory and pilot plant activities.		5	
Others	Assistance, participation in discussions and commitment to learning		5	
Total			100	

Observaciones

Attendance at all problem and case sessions, visits and internships is mandatory.

There will be two written theory tests and a written test to assess practices, problems and cases. For the purposes of the final grade, to pass the subject it will be necessary to have obtained at least a 4 in each of the written tests. To pass the course it is necessary to obtain an overall grade equal to or higher than 5, considering all the activities evaluable with their weight.

Bibliography

The bibliography of technological subjects requires continuous review. However, we cite below some manuals that despite having been written in some cases more than a decade ago, their content is suitable for a first contact with the study of processes in the food industries. At the beginning of the course teachers will provide a more complete list of bibliographic sources, including portals and internet addresses with sectoral information.

Basic bibliography

CASP, A. (coord.), 2014. Tecnología de los alimentos de origen vegetal. Vol 1 y 2. Editorial Síntesis, Madrid.

AINIA Mejores técnicas disponibles en el sector cervecero. Ministerio de Medio ambiente(disponible en biblioteca, descargado pdf de Internet en campus virtual) HIDALGO, J. 2003 "Tratado de enología" Ed. MundiPrensa. Madrid. KUNZE, W. (2006) "Tecnología para cerveceros y malteros". VLB Berlin.

HIDALGO, J. 2018 "Tratado de Enología Vol I y II". 3º ed. Ed. Mundi Prensa. Madrid.

BLOUIN, J., PEYNAUD, E. 2003 Enología práctica: Conocimiento y elaboración del vino.4ª ed . Ed. Mundi-Prensa. Madrid.

CALAVERAS, J. (2004) "Nuevo Tratado de Panificación y Bollería" Ed. Mundi Prensa. Madrid.

CALLEJO, M.J.; RODRÍGUEZ, G.; GIL, M (2001) Industrias de Cereales y Derivados. Ed.Mundi Prensa. Madrid

CIVANTOS, L.,1999. Obtención del aceite de oliva virgen. Ed. Agrícola Española, S.A., Madrid.

BOCKISCH, M Fats and oils Handbook. AOCS Press

GUPTA, M (2017) Practical Guide to Vegetable Oil Processing 2nd Edition 2017. AOCS Press ISBN: 9781630670504