
	PROCESO PARA EL DESARROLLO DE LAS ENSEÑANZAS DE LA ESCUELA DE INGENIERÍAS AGRARIAS	 Escuela de Ingenierías Agrarias
	CÓDIGO: P/CL009_D002	

COURSE PROGRAM
Academic Year: 2023/2024

VEGETABLE PRODUCTS INDUSTRIES			
Code	501254	ECTS Credits	6
Course name (English)	Vegetable Products Industries		
Course name (Spanish)	Industrias de Procesos de Materias Primas Vegetales		
Degree programs	Agricultural and Food Industries Degree		
Faculty/School	Agricultural Engineering School		
Semester	Second (6º)	Type of course	Compulsory
Module	Specific technology of agricultural and food industries		
Matter	Food industry		
Lecturer/s			
Name	Office	E-mail	Web page
María Jesús Petrón	D723 Valle del Jerte	mjpetron@unex.es	https://www.unex.es/conoce-la-uex/centros/eia
Subject Area	Food Technology		
Department	Animal Production and Food Science		
Coordinating Lecturer (If more than one)	María Jesús Petrón		

Competencies*
1. Basics: CB2, CB4, CB5
2. Generals: CG6, CG7, CG8, CG9, CG10, CG12
3. Specifics: CETE1, CETE2
Contents
Course outline*
The content included in this subject is related to fruit and vegetable processing industry and its by-products. Including, as a part, horticulture industry, fats and oils industry, cereals industry, sugar industry, coffee, cacao or tea industries, spices and

* The sections concerning competencies, course outline, educational activities, teaching methodologies, learning outcomes and assessment systems must conform to that included in the ANECA verified document of the degree program.

condimentherbs and spices industries.



Course syllabus

Section 1: Fruits and vegetables industries

Name of lesson 1.1: **Vegetables preservation.**

Contents of lesson 1.1: Raw vegetables. Causes of vegetable spoilage Factors causing vegetable spoilage. Methods Methods of for preserving vegetables.

Name of lesson 1.2: **Fresh and frozen fruits and vegetables.**

Contents of lesson 1.2: Preliminary preparation steps. Fresh fruits and vegetables. Frozen fruits and vegetables.

Name of lesson 1.3: **Modified atmosphere packaging in fruit and vegetables.**

Contents of lesson 1.3: Definition, characteristics and processing of "IV Gama".

Name of lesson 1.4: **Dried and lyophilized fruits and vegetables.**

Contents of lesson 1.4: Dried fruits and vegetables. Freeze- dried fruits and vegetables.

Name of lesson 1.5: **Fruit & vegetable juice processing.**

Contents of lesson 1.5: Definitions and types of juices. Preliminary preparation steps. Juice processing and aseptic packaging.

Name of lesson 1.6: **Jam & jelly processing.** Theoretical fundamentals. Raw material and preliminary steps. Jam processing.

Developed skills: CETE1, CETE2 , CT1, CG10, CG12, CG7,CG6, CG8, CG9, CB2, CB4, CB5

Learning results: RA137, RA138, RA139, RA140, RA141, RA142

Description of the practical activities of section 1:

Sesion 1: **Laboratory and Pilot plant tour and safe work practices.**

Standard precautions when using working at a lab or a pilot plant: minor advises in the use of facilities, equipments, materials and reactivs, both individual and team use.

Developed skills: CB2, CB5

Learning results: RA140, RA141, RA142

Sessions 2 and 3: **Vegetables preservation**

Making jalls. Dried fruits and vetetables.

Developed skills: CETE1, CETE2, CB2, CB5, CG12

Learning results: RA137, RA140, RA141, RA142

Section 2: Fats and oils Industry

Name of lesson 2.1: Olive oil production.

Contents of lesson 2.1: Geographical distribution. Olives and Olive Oils. Olive oil culture.

Name of lesson 2.2: Olive oil extraction.

Contents of lesson 2.2: Process flow chart. Preliminary preparation steps. Olive paste preparation. Extraction. Storage.

Name of lesson 2.3: Filtration and packaging.

Contents of lesson 2.3: Filtration and packaging. Filtration and types of filter. Packaging and types of containers.

Name of lesson 2.4: Getting olive oil by-products.

Contents of lesson 2.4: Getting pomace oil. Vegetable waters treatment.

Name of lesson 2.5: Olive oil quality.

Contents of lesson 2.5: Classification of olive oil. Effect of processing on Olive Oil Quality

Name of lesson 2.6: Seed oil and refining process.

Contents of lesson 2.6: Seed oil extraction. Refining techniques. Hydrogenation. "Winterization".

Developed skills: CETE1, CETE2, CT1, CG10, CG12, CG7, CG6, CG8, CG9, CB2, CB4, CB5

Learning results: RA137, RA138, RA139, RA140, RA141, RA142

Sustainable Development Goals: 12 Responsible consumption and production.

Description of the practical activities of section 2:

Sessions 4 and 5: Virgin olive oil processing.

Making olive oil by ABENCOR processing. Effect of processing in the quality of oil.

Developed skills: CETE1, CETE2, CB2, CB5, CG12,

Learning results: RA137, RA138, RA139, RA140, RA141, RA142

Section 3: Industry of cereals and derivatives

Name of lesson 3.1: Structure and composition of cereals.

Contents of lesson 3.1: Structure of cereals. Starch and gluten. Storage of cereals.

Name of lesson 3.2: The flour milling industry.

Contents of lesson 3.2: Objectives of dry milling. Preliminary steps: cleaning and preparation. Dry milling.

Name of lesson 3.3: Starch production.

Contents of lesson 3.3: Wet milling. Getting starch and gluten. Applications on food industry.

Name of lesson 3.4: Breakfast cereals.

Contents of lesson 3.4: Expanded and flaked cereals.

Name of lesson 3.5: Bread and confectionery Industry.

Contents of lesson 3.5: Bread processing. Confectionery processing.

Name of lesson 3.6: Pasta industry.

Contents of lesson 3.6: Pasta processing.

Name of lesson 3.7: **Rice industry.**

Contents of lesson 3.7: Types of rice. White Rice processing. Parboiled rice.

Developed skills: CETE1, CETE2, CT1, CG10, CG12, CG6, CG7, CG8, CG9, CB2, CB4, CB5

Learning results: RA137, RA138, RA139, RA140, RA141, RA142

Description of the practical activities of section 3:

Sessions 6 and 7: **Processing of cereal based food products**

Making bread and pasta. Effect of processing in the quality of products.

Developed skills: CETE1, CETE2, CB2, CB5, CG12

Learning results: RA137, RA138, RA139, RA140, RA141, RA142

Sustainable Development Goals: 12 Responsible consumption and production.

Section 4: Other vegetable industries

Name of lesson 4.1: **Sugar industry.**

Contents of lesson 4.1: Sugar beet industry. Beet composition. Sugar beet processing. Types of sugar. Getting sugar by-products.

Name of lesson 4.2: **Coffee and tea Industries.**

Contents of lesson 4.2: Definition and types. Coffee processing. "Torrefacto", soluble and decaffeinated process. Tea processing.

Name of lesson 4.3: **Cacao and chocolate processing.**

Contents of lesson 4.3: Raw material and manufactured products. Cacao processing. Chocolate processing.

Name of lesson 4.4: **Herbs and spices industries.**

Contents of lesson 4.4: Types of spices and processing.

Developed skills: CETE1, CETE2, CT1, CG10, CG12, CG6, CG7, CG8, CG9, CB2, CB4, CB5

Learning results: RA137, RA138, RA139, RA140, RA141, RA142

Description of the practical activities of section 4:

Session 8: **Innovative food products**

Development of new food products. Research and development of a new food product using facilities and equipments of EIA. Search for information and make an oral presentation working in team.

Developed skills: CETE1, CETE2, CB2, CB5, CG10, CG12, CG6,

Learning results: RA137, RA138, RA139, RA140, RA141, RA142

Educational activities *

Student workload in hours by lesson		Lectures	Practical activities				Monitoring activity	Homework
Lesson	Total	L	HI	LAB	COM	SEM	SGT	PS
1	39	10		6			2	21
2	39	10		6			2	21

3	39	10		6			2	21
4	31	5,5		2		2,5	1,5	19,5
Assessment **	2	2						
TOTAL	150	37,5		20		2,5	7,5	82,5

L: Lectures (85 students)

HI: Hospital internships (7 students)

LAB: Laboratory or field practices (15 students)

COM: Computer room or language laboratory practices (20 students)

SEM: Problem classes or seminars or case studies (40 students)

SGT: Scheduled group tutorials (educational monitoring, ECTS type tutorials)

PS: Personal study, individual or group work and reading of bibliography

Teaching Methodologies*

1. Lectures and discussion of theoretical contents
2. Development and presentation of seminars
3. Use of the virtual classroom (<https://campusvirtual.unex.es/portal/>)
3. Laboratory practices, pilot plants and field
4. Study of the subject
5. Search and management of scientific literature
6. Exams

Learning outcomes *

RA137, RA138, RA139, RA140, RA141, RA142

Assessment systems *

A) CONTINUOUS EVALUATION

1. Final exam (70%): theoretical knowledge acquired during the course delivery by a written final exam consisting of quiz questions and/or short questions. Test-type questions will only have a true answer; Those questions answered incorrectly will subtract 1/2 from the value of the question, that is, two wrong answers cancel a successful one. To pass the theoretical part it is necessary to obtain a grade of 5 points or higher in this exam. Evaluated skills: CETE1, CETE2, CG6, CG7, CG8, CG9, CG10, CG12, CB2, CB4, CB5

2. Continuous evaluation (20%, non-recoverable activity): practical skills and ability to integrate with theoretical knowledge. Participation in the classes through direct questions and discussion of results. Preparation of an individual written work for each practical section. Evaluated skills: CETE1, CETE2, CG8, CG9, CG10, CG12

3. Attendance with academic achievement (10%, non-recoverable activity): Innovation, creativity and resource consultation in solving activities during the lessons. Evaluated skills: CT1, CB2, CB4, CB5, CG8, CG9, CG10, CG12

B) ALTERNATIVE SYTEM WITH A GLOBAL EXAM

** Indicate the total number of evaluation hours of this subject.

1. Final exam (100%).

The choice of the global exam modality corresponds to the students, who will be able to carry it out, during the first quarter of the period of teaching the subject. Applications will be made through a specific space created for this in the Virtual Campus. In the absence of an express request by the student, the assigned modality will be that of continuous evaluation.

Evaluated skills: CETE1, CETE2, CG6, CG7, CG8, CG9, CG10, CG12, CG8, CG9, CB2, CB4, CB5, CT1.

Bibliography (basic and complementary)

Basic

- APARICIO, R. y HARWOOD, J. (2003). Manual del aceite de oliva. Ediciones Mundi-Prensa.
- ARTHEY, D y ASHURST, P.R. (1997). Procesado de frutas. Editorial Acribia, S.A. Zaragoza.
- ARTHEY, D. y DENNIS, C. (1992). Procesado de Hortalizas. Ed. Acribia S.A. Zaragoza.
- CABELLOS, P.J, GARCÍA, M., MARTÍNEZ, M., HERNÁNDEZ, B., GARCÍA A. (2005). Manual de aplicación del Sistema APPCC en industrias de aceites vegetales comestibles de Castilla-La Mancha.
- DENDY, D. A.V. (2004). Cereales y productos derivados : química y tecnología. Ed. Acribia, Zaragoza.
- GUÍA DE MEJORES TÉCNICAS DISPONIBLES EN ESPAÑA DEL SECTOR AZUCARERO (2005). Ministerio de Agricultura, Pesca y Alimentación.
- JUNTA DE EXTREMADURA. (2007). De verde y oro. Guía del aceite de oliva virgen extra y la aceituna en Extremadura. Ediciones Junta de Extremadura (Consejería de Economía y Trabajo).
- RAUCH, G. (1986). Fabricación de mermelada. Editorial Acribia, S.A.
- WILEY, C. (1997). Frutas y hortalizas mínimamente procesadas y refrigeradas. Editorial Acribia, S.A.

Complementary

A. General

- • AGUADO ALONSO, J. RODRIGUEZ SOMOLINOS, F. (2002). Ingeniería en la industria alimentaria. Ed. Síntesis. Madrid.
- ALEIXANDRE, J.L. y GARCÍA, M.J. (1999). Industrias agroalimentarias. Servicio de publicaciones de la Universidad Politécnica de Valencia, Valencia.
- ALEIXANDRE, J.L. y GARCÍA, M.J. (1999). Prácticas de procesos de elaboración y conservación de alimentos. Servicio de publicaciones de la Universidad Politécnica de Valencia, Valencia.
- BARBOSA, G.V., POTHAKAMURY, U.R., PALOU, E. y SWANSON, B.G. (1999). Conservación no térmica de alimentos. Acribia, Zaragoza.
- CASP, A. (2003). Procesos de conservación de alimentos. 2ª Ed. A. Madrid

Vicente, Madrid.

- FELLOWS, P. (2007). Los alimentos: su elaboración y transformación. Organización de las Naciones Unidas para la Agricultura y la Alimentación, Roma. [Recurso electrónico].
- FENNEMA, O. (2000). Introducción a la ciencia de los alimentos. 2ª edición. Editorial Reverté, S.A. Barcelona.
- GOBANTES, I. (2002). Aspectos técnicos del envasado a vacío y bajo atmósfera protectora". Alimentación, Equipos y Tecnología. p, 75-80.
- INSTITUTO NACIONAL DE INVESTIGACIONES AGRARIAS (España) (2008). Actividades I+D+I del INIA 2006. Instituto Nacional de Investigación y Tecnología Agraria y Alimentaria, D.L. Madrid.
- POTTER, N.N. y HOTCHKISS, J.H. (1999). Ciencia de los Alimentos. Acribia, Zaragoza.
- RAVENTÓS SANTAMARÍA, M. (2005). Industria alimentaria, tecnologías emergentes. Edicions UPC. Barcelona.
- SUBDIRECCIÓN GENERAL DE INDUSTRIAS, COMERCIALIZACIÓN Y DISTRIBUCIÓN AGROALIMENTARIA. (2005). Las industrias alimentarias, agrarias y forestales en España. Ministerio de Agricultura, Pesca y Navegación. Madrid.

B. Fruit and vegetable industries

- • ALZAMORA, S.M., TAPIA, M.S., LÓPEZ-MALO, A. (2000). Minimally processed fruits and vegetables: fundamental aspects and applications. Gainthersburg (Maryland): Aspen Publisher
- ALZAMORA, S.M. (2004). Conservación de frutas y hortalizas mediante tecnologías combinadas. Roma: Organización de las Naciones Unidas para la Agricultura y la Alimentación; 2004.
- ARTÉS, F. (2004). Reducción de daños por el frío en la refrigeración hortofrutícola. Alimentación, Equipos y Tecnología. p. 56-64.
- MADRID, A. (2003). Refrigeración, congelación y envasado de los alimentos. A.
- PASTOR, C., VARGAS, M. GONZÁLEZ-MARTÍNEZ, C. (2005). Recubrimientos comestibles: aplicación a frutas y hortalizas. Alimentación, Equipos y Tecnología. p, 130-135.
- PÉREZ, L. (2003). Calidad de frutas mínimamente procesadas (I). Pardeamiento no enzimático. Alimentación, Equipos y Tecnología. p, 81-84.
- PORTU, J. (2000). La importancia de la operación de enfriado tras la esterilización en las conservas vegetales". Alimentación, Equipos y Tecnología. p, 69-73.
- REID, D.S. (2006). Factores que influyen en el proceso de congelación: nuevas perspectivas". Alimentación, Equipos y Tecnología. P, 63-68.
- SÁNCHEZ, M.C. (2001). Aplicación de atmósferas modificadas y/o controladas a la conservación de vegetales. Alimentación, Equipos y

Tecnología. P, 51-58.

- SÁNCHEZ PINEDA, M.T. (2001). Tratamientos térmicos de escaldado y congelación. Alimentación, Equipos y Tecnología. P, 51-58.
- SÁNCHEZ PINEDA, M.T. (2004). Procesos de conservación poscosecha de productos vegetales. Madrid: AMV.
- THOMPSON. A.K. (2003). Almacenamiento en atmósferas controladas de frutas y hortalizas. Editorial Acribia, S.A.
- VINIEGRA, V. (2001). Minimización de la contaminación y del consumo de agua en el proceso de fabricación del tomate en conserva". Alimentación, Equipos y Tecnología. p, 117-123.

C. Fat and Oil Industries

- APARICIO R, HAEWOOD J. (2003). Manual del aceite de oliva. Madrid: Madrid Vicente.
- CABELLOS SÁNCHEZ PJ. (2006). Manual de aplicación del sistema APPCC en industrias de aceites vegetales comestibles de Castilla-La Mancha.
- KIRITSAKIS, A.K. (1992). El Aceite de Oliva. Mundi-Prensa. Madrid.
- LAWSON, H. (1995). Food Oils and Fats. Technology, Utilization and Nutrition. Chapman&Hall. New York.
- MADRID, A.; CENZANO, I. y J.M. VICENTE (1994). Manual de Aceites y Grasas Comestibles. AMV Ediciones Madrid.
- MURILLO RAMOS, R. (1992). El Aceite de Oliva Virgen. Aceite de Oliva. Actas de las Jornadas "Fronteras de la Ciencia". Mundi-Prensa. Madrid.
- TYMAN, J.H.P. y M.H. GORDON (1994). Development in the Analysis of Lipids. Royal Society of Chemistry. Cambridge.

D. Cereal based food Industry.

- CALLEJO GONZÁLEZ, M. J. (2002). Industrias de cereales y derivados. Ed. Madrid Vicente: Mundi-Prensa, Madrid.
- CALAVERAS, J. (1995). Tratado de Panificación y Bollería. AMV Ediciones. Madrid.
- DENDI, D.A.V, DOBRASZCZYK BJ. (2004). Cereales y productos derivados : química y tecnología. Zaragoza: Acribia.
- FAST, R.B. y E.F. CALDWELL (1990). Breakfast Cereals and How they are Made. AACC. St. Paul.
- KENT, N.L. (1994). Technology of Cereals: An Introduction for Students of food Science and Agriculture. 4 ed. Pergamon Press. Oxford.
- MADRID, A. (1999). Confitería y Pastelería: Manual de Formación. Mundi-Prensa AMV Ediciones. Madrid.

E. Other industries

- • BECKETT ST. (2001). La ciencia del chocolate. Zaragoza: Acribia.
- CANALES CANALES C. (2005). Guía de mejores técnicas disponibles en España del sector azucarero. Madrid: Ministerio de Medio Ambiente.
- Guía de mejores técnicas disponibles en España del sector azucarero. Madrid: Ministerio de Medio Ambiente. (2007).
- DEBRY, G. (1993). Le café et le santé. Jhon Libbey.
- EDWARDS, W.P. (2000). The science of sugar confectionery. Díaz de Santos, Madrid.
- TAINTER, D.R. y A.T. GREINS (1995). Especies y Aromatizantes Alimentarios. Acribia. Zaragoza.

Other resources and complementary educational materials

Prior to the explanation of the lesson It will be provided with a summary of the lesson in which the main content to be taught is included. For your disposal will be deposited within each thematic block in the moodle. For this purpose, extension material, both bibliographical and other documentation (eg web pages) may be used to develop other transverse or specific degree qualifications. All this on the moodle virtual campus platform.

Virtual classroom of the subject in the virtual campus of the Uex.
(<http://campusvirtual.unex.es/portal/>)