Quality, Innovation and Emerging Processing Technologies

Code: 43035
ECTS Credits: 9

2024/2025

Degree	Type	Year
4313796 Quality of Food of Animal Origin	OB	0

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Teachers

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Teaching groups languages

You can view this information at the end of this document.

Prerequisites

This matter does not have any requirements.

Objectives and Contextualisation

In this module students will learn the different key stages in the innovation process and design of a new product of animal origin. They will also know the most innovative processing technologies; its validation and they will study the parameters of the process that have the greatest impact on the characteristics of the final product. Among the technologies that reduce the environmental impact of the food industry, students will study the use of co-products for the preparation of functional ingredients.

Learning Outcomes

1. CA02 (Competence) To design innovation and research projects for food companies and the livestock sector, research centres and government entities in charge of supervising food quality.
2. KA07 (Knowledge) To describe, based on technological developments, the emerging food processing procedures with the lowest environmental impact, as well as their methods for validation and implementation.
3. KA08 (Knowledge) To identify the gender gaps in access to resources and opportunities in the food of animal origin supply chain.
4. KA09 (Knowledge) To apply circular economy principles with a view to increasing the use and functionality of underused biological materials.
5. SA08 (Skill) To recognise the varying capacities of the different food processing and conservation technologies, particularly emerging technologies.
6. SA08 (Skill) To recognise the varying capacities of the different food processing and conservation technologies, particularly emerging technologies.
7. SA09 (Skill) To assess the capacity of a technological process to obtain the microbiological, physicochemical, sensory and nutritional properties that determine the quality of a food.
8. SA10 (Skill) To use mathematical models to describe a procedure and predict the effect on the characteristics of a food.
9. SA11 (Skill) To use management, implementation and documentation tools in an innovation process.

Content

• New processing, conservation and control technologies
Discussion of the bases, effects and possibilities of the processing systems introduced in food technology during the last decades. Global effects: microbiology, nutrition, functional properties. Debate on energy needs and impact on the control of greenhouse gases.
Optical sensors
Fundamentals, validation and uses. Advantages of using non-invasive and real-time systems for process control.
High isostatic pressure
Industrial equipment for treatment at room temperature or at high temperatures. Possibilities, current implementation and future projection.
Electric pulses
Industrial equipment and potential for the treatment of food fluids. Direct applications and uses as an intermediate technology for extraction, diffusion, pickling, dehydration, etc.
Homogenization at high pressure
Industrial applications for the treatment of food fluids. Microbiological and physical-chemical consequences.
Active packaging
Classic mixtures of gases and novelties in packaging proposals to improve the global characteristics of raw materials and processed products. Discussion on the possibilities of new materials used in packaging and alternatives to plastic in active packaging.
UV radiation
Direct and indirect use of the various types of UV radiation in food technology. Legislation and applications.
• Validation of technological treatments to guarantee food quality
Need and assessment tools for food processes to guarantee correct use in food processing and preservation. Mathematical models.
• Innovation management
Approach ofcompanies to face the challenges of innovation taking into account all the necessary aspects: legislation, competition, consumers, economy, etc.
• Design of new products
Foods with healthy properties
Relationship between food science and technology and dietary recommendations. Variability between types of

diets and real possibilities of large-scale application.
Recovery of traditional products
Application of genetics and production systems to improve raw materials in aspects of sustainability and sensory quality. Importance in the maintenance of rural and/or large-scale areas.
Collective restoration
Challenges of centralized processing for the supply of meals with correct sanitary quality that at the same time maintain sensory quality.
• Valuation of underutilized raw materials and co-products of the food industry
Importance of using co-products generated in the food chain to reduce food waste. And at the same time obtaining new compounds with functional and nutritional properties of impact in the food formulation.

Activities and Methodology

Title	Hours	ECTS	Learning Outcomes
Type: Directed			
Participative lectures	35	1.4	KA09, SA08, SA09
Pilot plant practices	6	0.24	SA08
Presentation/Oral presentations	14	0.56	SA11
Seminars	4	0.16	KA08, SA09, SA10
Type: Supervised			
Learning based on problem-solving	15	0.6	CA02, SA09, SA10, SA11
Unprogrammed tutoring	15	0.6	CA02, SA11
Type: Autonomous			
Reading articles and reports of interest	70	2.8	KA08, SA08
Reporting	60	2.4	KA07, SA11

- Lectures / expository classes
- Seminars
- Problem-based Learning
- Debates
- Tutoring
- Lab / Pilot Plant
- Reporting / coursework
- Reading articles / reports of interest
- Lecture / oral presentation of work

Annotation: Within the schedule set by the centre or degree programme, 15 minutes of one class will be reserved for students to evaluate their lecturers and their courses or modules through questionnaires.

Assessment

Continous Assessment Activities

Title	Weighting	Hours	ECTS	Learning Outcomes
Active performance during course sessions	5-10%	0	0	KA07, SA11
Delivery of problems and written exercises	20-30%	1	0.04	KA08, SA09, SA10
Oral defense of problems	20-30%	1	0.04	SA08
Peer co-evaluation	15-20%	0	0	SA09
Test	20-30%	1	0.04	KA09, SA08
Tutorial activities attendance	10-15%	3	0.12	CA02

At the beginning of each block, the responsible professor will inform about the activities to be carried out and the relative weight of the activities and assistance in the note.

Final grades will be calculated as follows:

- New technologies to process food(24%)

- Validation of food process in order to guarantee food safety (20%)

- Innovation management (22%)

- Food packaging (12%)

- Co-products uses and imrovements (12%)

- Sensors (10%)

To pass the module you also need a minimum average grade of 5 out of 10.

The present matter does not have a single assessment.

Bibliography

Generics: Online books on UAB intranet

www.knovel.com

www.sciencedirect.com (Encyclopedia "of dairy sciencies", "of meat sciencies" "of food sciences and nutrition")

Specifics:

Ahvenainen, Raija (2003). Novel Food Packaging Techniques. Woodhead Publishing.
http://www.knovel.com/web/portal/browse/display?_EXT_KNOVEL_DISPLAY_bookid=914&VerticalID=0

Baldwin, Cheryl (2009). Sustainability in the Food Industry. John Wiley & Sons.
http://www.knovel.com/web/portal/browse/display?_EXT_KNOVEL_DISPLAY_bookid=5063&VerticalID=0

Breivik, H. (2007). Long-Chain Omega-3 Specialty Oils. Breivik, Harald (2007). Woodhead Publishing.
http://app.knovel.com/web/toc.v/cid:kpLCOSO002/viewerType:toc/root_slug:long-chain-omega-3-specialty-oils

Campus, M. (2010). High Pressure Processing of Meat, Meat Products and Seafood. Food Eng. Rev. 2, 256-273.

Chemat F & Vorobiev E (eds.) (2020). Green Food Processing Techniques. Preservation, Transformation and Extraction.

4 - High hydrostatic pressure processing of foods

5 - High-pressure homogenization in food processing

14 - Pulsed light as a new treatment to maintain physical and nutritional quality of food

15 - Pulsed electric field in green processing and preservation of food products

Decker, E.A.; Elias, R.J.; McClements, D.J. (2010). Oxidation in Foods and Beverages and Antioxidant Applications, Volume 2 - Management in Different Industry Sectors. Woodhead Publishing. http://app.knovel.com/web/toc.v/cid:kpOFBAAVMK/viewerType:toc/root_slug:oxidation-in-foods-beverages/url_sl

Doona, Christopher J.; Kustin, Kenneth; Feeherry, Florence E. (2010). CaseStudies in Novel Food Processing Technologies - Innovations in Processing, Packaging and Predictive Modelling. Woodhead Publishing. http://www.knovel.com/web/portal/browse/display?_EXT_KNOVEL_DISPLAY_bookid=3882&VerticalID=0

Martin, R.E., Carter, E.P., Flick, G.J.., Davis, L.M. (2000). Marine & freshwater products handbook, CRC Press.

Medina-Meza, I.G., Barnaba, C., Barbosa-Cánovas, G.V. (2014). Effects of high pressure processing on lipid oxidation: A review. Innovative Food Science and Emerging Technologies 22, 1-10.

Peter W.B. Phillips, Jeremy Karwandy, Graeme Webb andCamilleD. Ryan (2012). Innovation in Agri-food Clusters. Theory and Case Studies. CABI https://xpv.uab.cat/cabebooks/FullTextPDF/2012/,DanaInfo=.awxyCgfhpHx1r+20123378738.pdf

Zhang ZH, Wang LH, Zeng XA, Han Z & Brennan CH (2019). Non-thermal technologies and its current and future application inthe food industry: a review. Food Sc. & Tech. 54: 1-13. https://doi-org.are.uab.cat/10.1111/ijfs.13903

Software

Free software provided by professors.

Language list

Name	Group	Language	Semester	Turn
(PAULm) Classroom practices (master)	1	Spanish	second semester	morning-mixed
(PLABm) Practical laboratories (master)	1	Spanish	second semester	morning-mixed
(SEMm) Seminars (master)	1	Spanish	second semester	morning-mixed
(TEm) Theory (master)	1	Spanish	second semester	morning-mixed