

Course guide

390217 - IAB2 - Technical Innovations in Agri-Food and Biotechnological Processes

Last modified: 26/05/2026

Unit in charge: Barcelona School of Agri-Food and Biosystems Engineering
Teaching unit: 745 - DEAB - Department of Agri-Food Engineering and Biotechnology.

Degree: MASTER'S DEGREE IN ENABLING TECHNOLOGIES FOR THE FOOD AND BIOPROCESSING INDUSTRY (Syllabus 2014). (Compulsory subject).

Academic year: 2026 **ECTS Credits:** 5.0 **Languages:** Spanish

LECTURER

Coordinating lecturer: Achaerandio Puente, Maria Isabel

Others: Colomer Xena, Yvonne, León Albiter, Noel, Santana Pérez, Orlando, Conde Bilbao, Luis Antonio, Codina Torrella, Idoia

PRIOR SKILLS

Graduate students in science, engineering or technology disciplines with a diploma in areas close to agricultural engineering, food engineering, chemical or biosystems engineering, equivalent to 240 ECTS.

DEGREE COMPETENCES TO WHICH THE SUBJECT CONTRIBUTES

Specific:

- CE01. Identification of the materials, processes and equipments required for the treatment of food, bioproducts and packaging.
- CE02. Identification of the production systems of raw materials. Identification of the effects caused by the production processes in the composition and properties of the raw materials and their appropriateness for a given transformation process.
- CE03. Innovation of new materials and processes for food and bioproducts. Designing of processes improving health, efficiency and environmental impact requirements.
- CE09. Identification of the opportunities and knowledge of the scientific basis of nanotechnology application in the treatment of bioproducts. Identification of the benefits and risks of nanotechnology applied to food packaging and conservation.

Generical:

- CG02. Identification of the technological, health and environmental requirements in food and bioproducts production.
- CG01. Conceptualization of engineering in the agri-food and biotechnological industries.
- CG03. Ability to apply the language and techniques of industrial management in the agrifood and biotechnological sector
- CG06. Ability to define, coordinate and implant new productive processes in the agri-food and biotechnological industries.
- CG08. Ability to assess and improve the design of processes and products considering social and environmental impacts.
- CG09. Identification of the industrial technologies with larger future impact and develop new applications of such technologies in the food and biotechnological industry.

Transversal:

CT2. SUSTAINABILITY AND SOCIAL COMMITMENT: Being aware of and understanding the complexity of the economic and social phenomena typical of a welfare society, and being able to relate social welfare to globalisation and sustainability and to use technique, technology, economics and sustainability in a balanced and compatible manner.

TEACHING METHODOLOGY

We indicate here the repertoire of teaching methods to be applied in the different training activities according to the teaching plans of the subject.

Lecture or conference: presentation of knowledge by university professors or by external specialists.

Participative classes: collective solving of exercises, conducted group discussions with the lecturer and other students in the classroom; classroom presentation of an activity individually or in small groups.

Project or short works: based on the realization, individually or in groups, of a work of reduced complexity or scope.

Information search: Information search by students, it allows the acquisition of knowledge, skills and attitudes related to obtaining information.

Visit: Visit of a group of students, conducted by professors, to an external facility, company or laboratory.

Evaluation activities.

LEARNING OBJECTIVES OF THE SUBJECT

Training activities according to the educational plan of the course:

Magisterial class or conference: exposition of teacher skills from magisterial classes or from external collaborators.

Participative classes: collective resolution of exercises, directed activities and group dynamics with the teacher and other students at the classroom; presentation in the classroom of an activity developed either individually or in small groups

Project or work with limited extension: learning based on the accomplishment, individual or in group, of a work of limited complexity or extension, applying the acquired knowledge and presentation of the results

Research of information: organized as a research of information in an active way from the student, allows the acquisition of knowledge either in direct form but also by means of the acquisition of skills and attitudes related on the obtaining of information.

Visits: Activity of a group of students, directed by the teacher, consisting on a visit of a facility or place to obtain direct information enhancing the learning process.

STUDY LOAD

Type	Hours	Percentage
Hours large group	40,0	32.00
Guided activities	5,0	4.00
Self study	80,0	64.00

Total learning time: 125 h

CONTENTS

Chapter 1

Description:

Technical innovations in agricultural and biotechnological processes. Technologies for the improvement of the food processes: solid, liquid and packaged products. Non-thermal technologies. Combined techniques.

Full-or-part-time: 20h

Theory classes: 20h



Chapter 2

Description:

Manufacturing processes of food plastic containers. Common plastics for food packaging. Bioplastics. Nanocomposites.

Environmental aspects: ecodesign of packaging concepts, reciclage, compostage. Normative. Active packaging. Smart labelling.

New trends in food packaging.

Full-or-part-time: 20h

Theory classes: 20h

GRADING SYSTEM

Continuous assessment

Course Grade (CG) is calculated according to the formula:

G1: Class activities

G2: Course assignment (Executive summary and report)

G3: Oral defense

$CG = 0,40G1 + 0,40G2 + 0,20G3$

EXAMINATION RULES.

Continuous assessment, short tests, presentation and discussion of exercises in class.

BIBLIOGRAPHY

Basic:

- Brennan, J.G; Grandison, Alistair S. Food processing handbook [Recurso electrónico] [on line]. 2nd ed. Weinheim, Germany: Wiley-VCH, 2012 [Consultation: 25/07/2022]. Available on:

<https://onlinelibrary-wiley-com.recursos.biblioteca.upc.edu/doi/book/10.1002/9783527634361>. ISBN 9783527634361.

- Brennan, J.G. Manual del procesamiento de los alimentos. Zaragoza: Acribia, 2007. ISBN 9788420010991.

- Osswald, Tim A.; Giménez, Enrique. Procesado de polímeros: fundamentos. Cúcuta, Colombia: Guaduales, 2008. ISBN 9789584432025.

- Casp Vanaclocha, Ana. Tecnología de los alimentos de origen vegetal (vol. I). Madrid: Síntesis, 2014. ISBN 9788499588322.

- Raventós Santamaria, Mercè. Industria alimentaria, tecnologías emergentes [on line]. Barcelona: Edicions UPC, 2005 [Consultation: 15/04/2020]. Available on: <http://hdl.handle.net/2099.3/36183>. ISBN 8483017903.

- Raventós Santamaria, Mercè. Indústria alimentària, tecnologies emergents [on line]. Barcelona: Edicions UPC, 2003 [Consultation: 15/04/2020]. Available on: <http://ebooks.upc.edu/product/industria-alimentaria-tecnologies-emergents>. ISBN 8483015617.