



Course guide

390216 - IAB1 - Food and Bioprocess Engineering: Context and Specificity

Last modified: 06/06/2023

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).
MASTER'S DEGREE IN ENABLING TECHNOLOGIES FOR THE FOOD AND BIOPROCESSING INDUSTRY (Syllabus 2020). (Compulsory subject).

Academic year: 2023 **ECTS Credits:** 5.0 **Languages:** Spanish

LECTURER

Coordinating lecturer: Gorchs Altarriba, Gil

Others: GIL GORCHS ALTARRIBA - INGMAR HARALD HUISMAN - MIRIAM CERRILLO MORENO

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 ETCS.

REQUIREMENTS

Presentiality. Participation in solving problem exercises throughout the sessions.

DEGREE COMPETENCES TO WHICH THE SUBJECT CONTRIBUTES

Specific:

9. Innovation of new materials and processes for food and bioproducts. Designing of processes improving health, efficiency and environmental impact requirements.
10. Identification of the materials, processes and equipments required for the treatment of food, bioproducts and packaging.
11. 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.
12. 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.

Generical:

1. Ability to apply the language and techniques of industrial management in the agrifood and biotechnological sector
2. Conceptualization of engineering in the agri-food and biotechnological industries.
3. Ability to define, coordinate and implant new productive processes in the agri-food and biotechnological industries.
4. Coordination and direction of complete engineering projects in the field of agri-food and bioprocesses.
5. Identification of the technological, health and environmental requirements in food and bioproducts production.
6. Identification of the industrial technologies with larger future impact and develop new applications of such technologies in the food and biotechnological industry.
7. Ability to assess and improve the design of processes and products considering social and environmental impacts.

Transversal:

8. 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

This subject aims at focusing the student on the thematic working areas while homogenizing the group and acquiring a common working language. It also provides the student with a clear panoramic view of the sector.

The content of this first subject is designed to establish a solid knowledge, partially learnt in previous university degrees in some cases, on which the food industry and biotechnology are based. In parallel, the subject seeks to provide self-assurance in the use of appropriate terminology. Thus, the fundamental concepts and the specificity of the sector will be reinforced. The new processes and products will be justified, stressing the quality management, food safety and environmental impact.

STUDY LOAD

Type	Hours	Percentage
Hours large group	35,0	28.00
Self study	90,0	72.00

Total learning time: 125 h

CONTENTS

Chapter 1

Description:

The raw materials of food processing industry and biotechnology. Crops and vegetable productions. Technology, recolection and transformation. Non destructive measurements of yield and maturity and quality parameters.

Full-or-part-time: 8h 20m

Theory classes: 8h 20m



Chapter 2

Description:

Process and reactor engineering. Process dynamics. Velocity of reaction. Reactors: classification, characterization and design. Applications, parameters, basic configurations. Management and treatment of residual flows. Classification of solid, liquid and gas waste. Processes for treatment.

Full-or-part-time: 13h 20m

Theory classes: 13h 20m

Chapter 3

Description:

Basic principles of food and bioproducts process technology. Thermal processing, processing by removal of heat and processing by removal of water. Techniques for separation and concentration of food components. Specificities of food industries and biotechnology. Justification of new processes and products.

Full-or-part-time: 13h 20m

Theory classes: 13h 20m

GRADING SYSTEM

The final mark for the course will take into account the following partial assessments (exam and deliverables):

- N1 is the mark for raw materials
- N2 is the mark for processing technology
- N3 is the mark for process and reactor engineering

Final mark = $0,30 \cdot N1 + 0,35 \cdot N2 + 0,35 \cdot N3$

EXAMINATION RULES.

Presentiality. Continuous monitoring. Three deliveries.

BIBLIOGRAPHY

Basic:

- Randhawa, L. S; Basra, Amarjit Singh. Quality improvement in field crops. New York [etc.]: Food Products Press, cop. 2002. ISBN 1560221003.
- Fellows, Peter. Tecnología del procesado de los alimentos : principios y prácticas. 2a ed. Zaragoza: Acríbia, DL 2007. ISBN 9788420010939.
- Díaz Fernández, Mario. Ingeniería de bioprocesos. Madrid: Paraninfo, 2012. ISBN 9788428381239.
- López Santín-Bellaterra, José; Casas Alvero, Carles; Gòdia i Casablanques, Francesc. Ingeniería bioquímica. Madrid: Síntesis, DL 1998. ISBN 8477386110.

Complementary:

- Singh, R. Paul; Heldman, Dennis R. Introduction to food engineering. 5th ed. Burlington [etc.]: Elsevier Academic Press, cop. 2014. ISBN 9780123985309.
- Doran, Pauline M. Bioprocess engineering principles [on line]. London [etc.]: Academic Press, cop. 1995 [Consultation: 16/06/2021]. Available on: <https://www.sciencedirect.com/science/book/9780122208515>. ISBN 0122208560.