Universidad Zaragoza

Academic Year/course: 2024/25

60569 - Systems and processes of food industries

Syllabus Information

Academic year: 2024/25
Subject: 60569 - Systems and processes of food industries
Faculty / School: 201 - Escuela Politécnica Superior
Degree: 546 - Master in Agricultural Engineering
ECTS: 6.0
Year: 1
Semester: Second semester
Subject type: Compulsory
Module:

1. General information

The purpose of this subject is for students to know, understand and use the principles of basic food engineering and operations, apply the basic principles of unit operations used in the agri-food industry, select the unit operations that constitute a specific agri-food process, develop block and flow diagrams of agri-food processes and apply the concepts acquired on basic operations in specific agri-food processes. All of this aligned with the Sustainable Development Goals developed by the UN, specifically Goal 9 and Objective 9.4. related to modernizing infrastructure and reconverting industries to make them sustainable, using resources more efficiently and promoting the adoption of clean and environmentally sound technologies and industrial processes.

It is very convenient that the students have taken the subjects of the training module "Agricultural and Food Industries" of the Degree in Agri-Food and Rural Engineering, since the contents of this subject require the application of the concepts learned in them.

2. Learning results

The student, in order to pass this subject, must demonstrate the following learning results:

- To be able to propose the design of a complete agri-food process, including the dimensioning of the main equipment and auxiliary installations.
- To be able to propose alternatives for the improvement of performance, product quality, safety and environmental impact.
- To be able to estimate the investment and operating costs of an agri-food facility.
- To be able to propose automation and control systems applied to individual processes as well as to the entire production plant.
- To be able to propose actions to improve the energy efficiency of the process.

They all involve the acquisition of knowledge and the ability to address issues related to the targets associated with SDG 9 (Industry, Innovation and Infrastructure) and more specifically Objective 9.4.

3. Syllabus

THEORY PROGRAM

Block I. PROCESSES OF THE AGRICULTURAL FOOD INDUSTRY

Topic 1. Dairy industry.

Topic 2. Beer industry.

Topic 3. Juice production.

Topic 4. Flour industry.

Block II. DESIGN OF AN AGRICULTURAL FOOD INDUSTRY

Topic 1. Establishment of the minimum requirements of an agri-food system: production capacity, raw materials, product specifications.

Topic 2. Preliminary design: flow diagram, basic operations, biochemical processes that integrate the system, material and energy balances.

Topic 3. Plant simulation and optimization:

- Sizing and/or selection of the main equipment (reactors, heat exchangers, separation equipment, etc.).
- Study of the needs of installations and auxiliary equipment (pumps and compressors, cooling production, etc.).
- Choice and design of control and automation systems.
- Energy integration (pinch analysis and optimization of the exchanger network).

PRACTICAL SESSIONS PROGRAM

1. Design of a pasteurized milk production system.
2. Design of a juice production system.
3. Design of a beer production system.

The design of one of these three agri-food processes will be carried out.

4. Academic activities

- **Participative lecture: 30 hours.** Theory and problem sessions where the teacher explains the contents of the subject.
- **Seminars(10 sessions): 20 hours,** focused on the development and application of practical cases by the students under the guidance of the teacher (see the practical sessions program).
- **Visits to different agri-food industries:** 10 **hours.** If these visits cannot be made, they will be replaced by other teaching activities with similar objectives.

5. Assessment system

ASSESSMENT by means of the following activities:

Activity 1. Written theory exam (50% of the final grade)**.**

This exam will include questions of a theoretical-practical nature (short and essay questions), on the global matter that has been covered during the lectures of the subject (see theory program). It will be valued that the answers are expressed in a clear and simple way and the argumentation and technical content are correct. The exam will also contain questions related to the visits carried out to different agri-food industries. The use of any type of documentation other than that provided in the exam will not be allowed.

The grade for activity 1 must be higher than 4 to mediate with activity 2.

Assessment of the practical part of the subject(50% of the final grade)**.**

Those students who attend 90% of the practical sessions will be able to undergo the evaluation of this part of the subject through the writing of a report and the oral defence of the industry design developed in the practical sessions. There is the possibility of undergoing the assessment of this part of the subject before the date of the global test. This option is recommended by the faculty of the subject.

Students who do not attend 90% of the practical sessions will take a written practical exam. This exam will include questions and problems related to the corresponding practical sessions.

In order to pass activity 2 and mediate with the other activities, the grade of the practical part must be higher than 5.

These assessment activities include content related to SDG 9.4 since their objective is to achieve the learning results of the subject, which are linked to these goals.

Success rates in previous years

2020/2021	**2021/2022**	**2022/2023**
87,50%	90,00%	91,67%

6. Sustainable Development Goals

9 - Industry, Innovation and Infrastructure