

## 28940 - Biochemical engineering for the agri-food industry

### Syllabus Information

**Academic year:** 2023/24

**Subject:** 28940 - Biochemical engineering for the agri-food industry

**Faculty / School:** 201 - Escuela Politécnica Superior

**Degree:** 583 - Degree in Rural and Agri-Food Engineering

**ECTS:** 6.0

**Year:**

**Semester:** Second semester

**Subject type:** Optional

**Module:**

### 1. General information

The subject Agri-Food Industries Engineering aims to introduce students to the biotechnological industry so that, during their future professional activity, they will be able to identify and quantify the type of bioreactor used and the operating variables in its design, but it is also intended to be able to compare different types of bioreactors, the effects of the operating variables and propose corrective measures to improve their performance.

These approaches and objectives are aligned with some of the Sustainable Development Goals (SDGs) of the 2030 Agenda and certain specific targets (<https://www.un.org/sustainabledevelopment/es/>): Goal 4 (Target 4.3) and Goal 9 (Target 9.4), using resources more efficiently and promoting the adoption of clean and environmentally sound agroindustrial technologies and processes.

### 2. Learning results

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

1. Identify the most important aspects of biochemical processes and specify the different industrial applications.
2. Identify the operating variables that most affect the design of the biochemical reactor and to synthesize the most important characteristics of the different types of bioreactors.
3. Solve questions or problems related to the balance of matter and energy that take place in a biochemical conversion process.
4. Analyze and evaluate the rate at which biochemical processes occur.
5. To size the ideal bioreactors used in industrial processes and to know the most common operations to be performed in a biotechnological process.

The learning results of the subject encourage students to develop their sensitivity and critical capacity in relation to essential aspects for the optimization of resources, as well as the implementation of environmentally friendly agro-industrial technologies and processes. Therefore, learning results 1 to 5 are aligned with the SDGs, in particular with Target 9.4, which seeks to modernize infrastructure and convert industries to make them sustainable, using resources more efficiently and promoting the adoption of clean and environmentally sound technologies and industrial processes, with all countries taking action in accordance with their respective capacities.

### 3. Syllabus

Unit 1. Introduction to biotechnological processes.

Unit 2. Balances of matter with steady-state biochemical reaction.

Unit 3. Energy balances with steady state biochemical reaction.

Unit 4. Non-steady state balances of matter and energy.

Unit 5. Enzymatic transformations.

Unit 6. Microbial bioreactions.

Unit 7. Main types of fermenters.

Unit 8. Basic aspects of bioreactors.

### 4. Academic activities

**Lectures:** 26 hours.

Theoretical sessions in which the contents of the course will be developed.

**Problems and cases:** 20 hours.

Solving problems related to the contents of the subject.

**Practical sessions:** 10 hours.

Practical problems will be solved using EES software and Excel solver.

**Technical visits:** 4 hours.

These activities are subject to the budget available for their implementation.

**Teaching assignments:** 12 hours

Resolution of computer-assessable cases (EES and Excel solver) and preparation of associated reports.

**Personal study:** 84 hours.

**Assessment tests:** 6 hours.

(1 ECTS is equivalent to 10 teaching hours)

## 5. Assessment system

It will be evaluated in the form of **global assessment** through the following activities:

**1. Theory exam and problems.** 60% of the final grade, minimum 4/10.

Written test consisting of two parts: theory and practice, according to the contents of the program.

The grade of the theory and problems exam will be determined as the weighted average of the grades obtained in the theory (40%) and problems (60%).

*Passing this written test will partially accredit the achievement of learning results 1, 2, 3, 4 and 5.*

**2. Tasks.** 40% of the final grade, minimum 4/10

There will be 3 assignments submitted throughout the semester on the scheduled dates.

Each activity will be graded from 0 to 10 and the overall grade will be the weighted average of all the programmed activities. If you do not pass this activity, you will have the opportunity to do so by means of a global test in the two official calls.

*Passing these activities will partially accredit the achievement of learning results 3, 4 and 5.*

*The detailed definition of the evaluation system will be explained in the presentation of the subject.*

### **Success rate in previous years**

2019/20	2020/21	2021/22
91,76%	100%	100%