Universidad Zaragoza

Academic Year/course: 2023/24

66219 - Biochemical Engineering

Syllabus Information

Academic year: 2023/24
Subject: 66219 - Biochemical Engineering
Faculty / School: 110 - Escuela de Ingeniería y Arquitectura
Degree: 531 - Master's in Chemical Engineering
ECTS: 6.0
Year:
Semester: Second semester
Subject type: Optional
Module:

1. General information

The subject and its expected results respond to the following objectives: 1. To handle basic concepts and nomenclature in Bioprocess Engineering; 2. To pose, develop and solve kinetic models for enzymatic and microbial processes; 3. To know the mechanisms of immobilization of biocatalysts, and the phenomena of matter and energy transfer in reactors with immobilized biocatalysts; 4. To know and apply methods for design and optimization of Bioreactors; 5. To know and analyse the main industrial bioprocesses.

These objectives are aligned with the Sustainable Development Goals (SDGs) of the United Nations 2030 Agenda. (https://www.un.org/sustainabledevelopment/es/) The planned learning activities will contribute to the achievement of Objective 7.3 (Goal 7), Objectives 9.4 and 9.5 (Goal 9) and Objectives 12.4 and 12.5 (Goal 12).

2. Learning results

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

R1. To know the different types of enzyme immobilization and bioreactors, as well as their characteristics.

R2. To manage the different types of kinetic equations applicable in enzymatic and microbial processes, including inhibition and deactivation effects.

R3. To design and analyse experiments

R4. To know and analyse the main industrial bioprocesses.

3. Syllabus

Topic 1. Introduction to Bioprocess Engineering and Bioreactors.

Topic 2. Enzyme Kinetics.

Topic 3. Kinetics of Microbial Growth.

Topic 4. Design and Operation of Enzymatic Bioreactors.

Topic 5. Design and Operation of Microbial Fermenters.

Topic 6. Industrial bioprocesses.

4. Academic activities

Classes on theoretical fundamentals (32 hours) Presentation of theoretical contents and concepts necessary for the resolution of practical cases.

Problem-based learning classes (19 hours): Problems and practical cases will be developed and coordinated in content with the time evolution of the theoretical presentations.

Laboratory Practices (9 hours)

Tutored work (8 hours), individual development tasks, extension, documentation, resolution of cases proposed by the teacher. They will be distributed throughout the subject and will be captured in deliverables to be evaluated.

79 hours of personal study, spread over the academic year.

3 hours of global control test during the exam period.

5. Assessment system

1. Tutored works (35% of the global) The deliverables (2-3 assignments per academic year) will be graded on content, understanding of concepts and presentation (written/oral). Results R1, R2 and R5.

2. Tutored works (15% of the global) Active and voluntary participation in the problem-based learning classes, the exposition

and/or delivery of the resolution of the problems and cases presented will be evaluated. Results R3 and R4.

3. Final exam (50% of the global).A minimum grade of 4.0 out of 10 is required to pass the subject. Written test with two parts, which evaluates what has been seen in the master classes and in problem-based learning classes. Results R1 to R5.

3a) theoretical part (50%, minimum 3.5 out of 10 to be able to average): three applied questions to be solved, without the aid of reference material, in 1 hour.

3b) practical part (50%, minimum 3.5 out of 10 to be able to average): two numerical resolution problems to be solved, with the help of reference material, in 2 hours.

For those who do not receive a grade in any of the assignments of blocks 1 and 2, the corresponding percentage of evaluation will be increased by the relative value of the final exam.

Those who do not have grades in blocks 1 and 2 will be evaluated by means of the final written test.