Universitat Autònoma de Barcelona

2019/2020

Experimentation in Biochemical Engineering

Code: 102408
ECTS Credits: 6

Degree	Type	Year	Semester
2500897 Chemical Engineering	OT	4	0

Contact

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Use of Languages

Principal working language: catalan (cat)
Some groups entirely in English: No
Some groups entirely in Catalan: Yes
Some groups entirely in Spanish: No

Teachers

Xavier Garcia Ortega

Prerequisites

Fluid knowledge (spoken and written) of Catalan and / or Spanish

To achieve the objectives of the subject it is necessary to have completed or be studying Biochemical Engineering, Separation Operations, Reactors and Experimentation in Chemical Engineering III.

Objectives and Contextualisation

Apply the principles of Biochemical Engineering in the practical realization of microbial cultures and enzymatic reactions. Familiarize the student with the specific techniques in Biotechnology and Bioprocess Engineering, as well as the implementation, monitoring, monitoring and analysis of results in biotechnological processes. Familiarize the student with the operation at the laboratory and pilot plant level of different unit operations and reactors.

Competences

- Apply scientific method to systems in which chemical, physical or biological transformations are produced both on a microscopic and macroscopic scale.
- Apply the techniques for analysing and synthesising systems to process and product the engineering.
- Develop personal work habits.
- Develop thinking habits.
- Understand and apply the basic principles on which chemical engineering is founded, and more precisely: balances of matter, energy and thermodynamic momentum, phase equilibrium and kinetic chemical equilibrium of the physical processes of matter, energy and momentum transfer, and kinetics of chemical reactions

Learning Outcomes

1. Apply analysis techniques to bioprocess and bioproduct engineering.
2. Apply the acquired knowledge of qualitative and quantitative processing and interpretation of experimental data to resolve biochemical engineering problems.
3. Develop independent learning strategies.
4. Develop scientific thinking.
5. Use a bioreactor in the proper manner.

Content

Block 1: Specific practices of Experimentation in Biochemical Engineering:

- • Microbial cultures: Microbial kinetics. Growth tracking and yield calculation.
- • Extraction and purification of enzymes
- • Kinetic enzyme.

Block 2:

Option A) Pilot plant practices at AIGEP (Toulouse) (*)

- • Practices at the pilot plant level: unit operations of matter transfer and heat transfer, reactors.

Option B) Chemical Process Engineering Practices

- • Practices of different unit operations of matter transfer and heat transfer.

(*) This option implies an additional cost for the participating students.

Methodology

Directed activities:

Realization of laboratory practices in work groups. This activity includes experimental planning and knowledge of safety standards in the laboratory and is divided into two parts:

- The first, corresponding to half of the ECTS credits, will be allocated to specific Biochemical Engineering practices (Content Block 1).
- The second part corresponds to practices in the laboratory and pilot plant of reactors and operations of separation of use both in bioprocesses and in chemical processes in general or environmental application. This second part can be carried out both in l'Atélier Interuniversitaire de Génie des Procedés of the Universitat Paul Sabatier in Toulouse or in the UAB (Block 2 of contents)

Autonomous activities:

The student must plan the experimental activities to be carried out, analyze critically the results obtained and propose scientific conclusions and proposals for improvement.

Elaboration of practices report: group work of 2-4-students in which each group will prepare a report of each practice. With the results obtained in the laboratory of practices, the students will deliver a report to the professor in written paper format (printed) and in a format digital through the virtual campus. Each working group must prepare and submit written reports of each practice.

Activities

Title	Hours	ECTS	Learning Outcomes
Type: Directed			
Presentation, knowledge of facilities and safety regulations	2	0.08	2, 1, 4

Realization of laboratory and pilot practices	88	3.52	1, 4, 3, 5
Type: Autonomous			
Planning, analysis of data and drafting reports	56	2.24	2, 1, 4, 3

Assessment

Scheduled evaluation process and activities

The evaluation of block 1 (see contents) will consist of three sections:

- Reports of the practices: Preparation and presentation of reports that include the experimental planning, the results obtained and their critical analysis. These reports can be done by work groups in the laboratory (45%).
- Final test: Individual written exam on the theoretical and experimental contents of the practices carried out. You must obtain a minimum of 3.5 / 10 to choose to pass the subject (45%)
- Laboratory skills: Assessment of attitude and compliance with work standards in the laboratory (10%).

In block 1 (see contents), attendance at scheduled practice sessions and presentation of reports are required to pass the subject. As the subject is eminently practical, all sections of block 1 are Non-recoverable.

If any of the following circumstances occurs, it implies a non-assessable rating of block 1:

- No attendance at scheduled practice sessions
- No presentation of internship reports
- Failing to take the final test (written test)

In block 1 no notes are saved for the next course.

Each block (1 and 2) will be evaluated separately and the final grade of the subject will be the average of the two blocks (1 and 2)

Programming evaluation activities

At the beginning of the subject groups will be formed to do laboratory practices. The delivery of the internship reports will be communicated through the virtual campus.

Recovery process

As the subject is eminently practical, all sections of block 1 are Non-recoverable.

Procedure for review of qualifications

For each evaluation activity, a place, date and time of revision in which the student can review the activity with the teacher will be indicated. In this context, claims may be made on the activity grade, whichwill be evaluated by the faculty responsible for the subject. If the student does not appear in this review, this activity will not be reviewed later.

Ratings

Granting a grade of honor registration is the decision of the faculty responsible for the subject. The regulations of the UAB indicate that MH can only be granted to students who have obtained a final grade equal to or greater than 9.00. You can grant up to 5% of MH of the total number of students enrolled.

Irregularities by the student, copy and plagiarism

Without prejudice to other disciplinary measures deemed appropriate, the irregularities committed by the student that may lead to a variation of the grade of an evaluation act will be scored with a zero. Therefore,

copying, plagiarism, cheating, letting copy, etc. in any of the evaluation activities will involve suspending with a zero. The evaluation activities qualified in this way and by this procedure will not be recoverable. If it is necessary to pass any of these evaluation activities to pass the subject, this subject will be suspended directly, without the opportunity to recover it in the same course. In this situation the final grade that will be reflected in the minutes will be a 2.

Evaluation of repeating students

There is no provision for a different evaluation system for repeating students.

Assessment Activities

Title	Weighting	Hours	ECTS	Learning Outcomes
Final test	45%	4	0.16	2, 1, 4, 3
Skills in the laboratory	10%	0	0	1, 4, 5
Written reports of the practices	45%	0	0	2, 1, 4, 3, 5

Bibliography

- Blanch, H.W., Clark, D.S. Biochemical Engineering. Marcel Dekker. (1997).
- Gòdia, F., López Santín, J. (eds.) Ingeniería Bioquímica. Síntesis. (1998).
- Illanes A. (ed.) Enzyme Biocatalysis. Springer (2008)
- Wankat, P. C. Separation Process Engineering. 2nd Ed. Prentice-Hall. (2007)
- Geankoplis, C.J; Transport Processes and Unit Operations. Prentice Hall International, Inc. NewJersey (1993)
- McCabe, W. L.; Smith, J. C.; Harriott, P.; Operaciones básicas de Ingeniería Química, McGraw Hill, Madrid (1991)