

**Experimentation in Biochemical Engineering**

Code: 102408  
ECTS Credits: 6

Degree	Type	Year	Semester
2500897 Chemical Engineering	OT	4	1

### 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

Montserrat Sarra Adroguer  
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

#### Block 1: Specific Practices of Experimentation in Biochemical Engineering:

- Apply the principles of Biochemical Engineering to the realization of Upstream and Downstream processes.- Specifically, this practice will include microbial cultures, extraction and purification of an enzyme, as well as the determination of enzymatic activity.
- Familiarize the student with the specific techniques in Biotechnology and Engineering of bioprocesses, as well as the implementation, follow-up, monitoring and analysis of results in biotechnological processes.
- Critical analysis of results and preparation of an internship report.

#### Block 2: Chemical Process Engineering Practices

- Put into practice concepts acquired in basic and optional subjects of the degree of chemical engineering
- Become familiar with experimental techniques and assemblies
- Consolidate the theoretical foundations acquired
- Specifically, the objective of the block 2 will be to study:
  - Adsorption of a dye on active carbon
  - Corrosion of metals in aqueous media
  - Mass transfer operations
  - Coagulation - flocculation of some components of wastewater
  - Water purification for active sludge

### Competences

- Apply scientific method to systems in which chemical, physical or biological transformations are produced both on a microscopic and macroscopic scale.
- Develop personal work habits.
- Develop thinking habits.
- Work in a team.

## Learning Outcomes

1. Apply the acquired knowledge of qualitative and quantitative processing and interpretation of experimental data to resolve biochemical engineering problems.
2. Assume social, ethical, professional and legal responsibility, if applicable, derived from professional exercise.
3. Critically evaluate the work done.
4. Develop independent learning strategies.
5. Develop scientific thinking.
6. Manage available time and resources. Work in an organised manner.
7. Work cooperatively.

## Content

### Block 1: Specific Practices of Experimentation in Biochemical Engineering:

The objective of the Block 1 will be to study:

- Yeast growth monitoring, by determining microbial kinetics for growth and calculation of yields.
- Extraction and purification of enzymes
- Determination of kinetics in enzymatic reactions.

### Block 2: Chemical Process Engineering Practices

The objective of the Block 2 will be to study:

- Adsorption of a dye on active carbon
- Corrosion of metals in aqueous medi
- Subject transfer operations
- Coagulation - flocculation of some components of wastewater
- Water purification for active sludge

## Methodology

### Directed activities:

Realization of laboratory practices in working 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 used for specific practices in Biochemical Engineering (Block 1 of contents).
- The second part corresponds to laboratory practices and pilot plants of reactors and separation operations for use both in bioprocesses and in chemical processes in general or environmental application (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:

- The students will be divided into working groups of 2-4 students
- Each group will prepare a report of each practice with the results obtained in the laboratory practices and their

discussion.

- These will be delivered to the professor the report in written paper format (printed) and in digital format through the virtual campus .

Annotation: Within the schedule set by the centre or degree programme, 15 minutes of one class will be reserved for students to evaluate their lecturers and their courses or modules through questionnaires.

## Activities

Title	Hours	ECTS	Learning Outcomes
Type: Directed			
Presentation, knowledge of facilities and safety regulations	2	0.08	5
Realization of laboratory and pilot practices	88	3.52	5, 4
Type: Autonomous			
Planning, analysis of data and drafting reports	56	2.24	5, 4

## Assessment

Scheduled evaluation process and activities

The evaluation of block 1 and 2 (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 will 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 4 / 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&2 (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&2 are Non-recoverable.

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

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

In block 1&2 no grades 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 blocks 1&2 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, which will 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	1, 3, 5, 4, 6
Skills in the laboratory	10%	0	0	2, 5, 6, 7
Written reports of the practices	45%	0	0	1, 2, 3, 5, 7

## 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. New Jersey (1993)
- McCabe, W. L.; Smith, J. C.; Harriott, P.; Operaciones básicas de Ingeniería Química, McGraw Hill, Madrid (1991)

## Software

It is not planned to use any specific software during the course.