

## COURSE DESCRIPTION

### COURSE DETAILS

Title (of the course): **INGENIERÍA BIOQUÍMICA**

Code: 101871

Degree/Master: **GRADO DE BIOQUÍMICA**

Year: 4

Name of the module to which it belongs:

Field: INGENIERÍA BIOQUÍMICA

Character: OPTATIVA

Duration: FIRST TERM

ECTS Credits: 6

Classroom hours: 60

Face-to-face classroom percentage: 40%

Study hours: 90

Online platform: Moodle

### LECTURER INFORMATION

Name: GARCIA GARCIA, ISIDORO (Coordinator)

Faculty: Facultad de Ciencias

Department: QUÍMICA INORGÁNICA E INGENIERÍA QUÍMICA

Area: INGENIERÍA QUÍMICA

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Name: SANTOS DUEÑAS, INÉS MARÍA

Faculty: Facultad de Ciencias

Department: QUÍMICA INORGÁNICA E INGENIERÍA QUÍMICA

Area: INGENIERÍA QUÍMICA

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### PREREQUISITES AND RECOMMENDATIONS

#### Prerequisites established in the study plan

Optional courses can be chosen only after passing 60 credits on fundamental courses and, at least, 60 credits on compulsory courses.

#### Recommendations

Prior knowledge in fundamentals of Industrial Microbiology is recommended.

According to the UCO multilingualism plan, the English level must be at least B1 in order to obtain the certificate of passing the course in this language.

### INTENDED LEARNING OUTCOMES

- |      |   |
|------|---|
| CB2  | Be able to work collaboratively in teams and share responsibility.  |
| CB4  | Be able to learn and work in an autonomous manner.  |
| CB7  | Be able to use the basic computer tools for communication, the search for information, and data processing in professional practice.  |
| CB9  | Be able to communicate scientific information clearly and effectively, including the ability to present a paper, orally and in writing, to a professional audience, and understand the language and proposals of other specialists. |
| CE15 | Knowledge of the current problems and future challenges in the field of molecular biosciences and the ethical and social implications of the practical applications of biochemistry and biology.                                    |

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CE22	Be able to work properly in a biochemical laboratory with biological and chemical material, including safety, handling, disposal of biological and chemical waste, and record keeping.
CE24	Have mathematical, statistical and computer skills to gather, analyse and interpret data, and understand simple models of biological systems and processes at the cellular level and molecular.
CE26	Be able to raise and resolve issues and problems in the field of biochemistry and molecular biology through scientific hypotheses that can be examined empirically.
CE27	Understand the basic aspects of experimental design in the field of biochemistry and molecular biology and the limitations of experimental approaches.
CE28	Ability to transmit information within the field Ability to transmit information within the field of biochemistry and molecular biology, including the development, writing and oral presentation of a scientific report.

## OBJECTIVES

The main aim of this course is enables the students to develop a sound understanding of the engineering principles underlying the design of Biochemical Processes.

The concepts of process development, unit operation and economic analysis are introduced. The importance of the unit operation concept for the systematic design of any biochemical process will be highlighted.

Several up and downstream operations will be studied as case studies. The analysis of the bio-reaction stage has been considered previously in a core course (Industrial Biochemistry and Microbiology).

## CONTENT

### 1. Theory contents

Topic 1.- Introduction. Biotransformation and Biochemical Industries. Economical importance. Process development. Flow diagram and unit operations. Examples.

Topic 2.- Sterilization. Media sterilization by high pressure/temperature steam. Bacterial spore and kinetics of death. Equipments.

Topic 3.- Filtration. Types of filters. Pre-treatments. General filtration theory: Darcy law. Batch filtration. Continuous filtration. Rotary filters.

Topic 4.- Centrifugation. Settling and centrifugation. Types of centrifuges.

Topic 5.- Extraction. Liquid-liquid equilibrium. Batch extraction. Continuous extraction: staged and differential ones.

Topic 6.- Elution chromatography. Adsorbents. Yield and purity. Stage analysis. Kinetics. Scaling up.

### 2. Practical contents

\* Numerical exercises to complete and assessing the student understanding.

\* Visit to biochemical factories.

## METHODOLOGY

### Methodological adaptations for part-time students and students with disabilities and special educational needs

The specific rules laid down by the Faculty will be followed. Additionally, special circumstances must be weighted up in each case.

### Face-to-face activities

Activity	Large group	Medium group	Total
<i>Assessment activities</i>	4	-	4
<i>Excursions</i>	-	12	12
<i>Group presentation</i>	8	-	8
<i>Lectures</i>	24	-	24
<i>Seminar</i>	-	12	12
<b>Total hours:</b>	<b>36</b>	<b>24</b>	<b>60</b>

## COURSE DESCRIPTION

### Off-site activities

Activity	Total
Activities	30
Group work	10
Self-study	50
<b>Total hours:</b>	<b>90</b>

## WORK MATERIALS FOR STUDENTS

Dossier  
Exercises and activities

## EVALUATION

Intended learnig outcomes	Tools		
	Oral presentations	Problem solving	Short answer tests
CB2	x		
CB4	x	x	x
CB7	x	x	
CB9	x		
CE15		x	x
CE22			x
CE24		x	
CE26		x	x
CE27		x	
CE28	x		x
<b>Total (100%)</b>	<b>30%</b>	<b>40%</b>	<b>30%</b>
<b>Minimum grade.(*)</b>	<b>3</b>	<b>4</b>	<b>3</b>

(\*) Minimum grade necessary to pass the course

◆ Valora la asistencia?: No

General clarifications on instruments for evaluation:

For the short answer and problem solving tests, the student could use freely any paper printed material.

The oral presentations marks will be indefinitely kept, nevertheless the short answer and the problem solving tests only will be valid for each call.

Clarifications on the methodology for part-time students and students with disabilities and special educational needs:

The specific rules laid down by the Faculty will be followed. Additionally, special circumstances must be weighted up in each case.

Qualifying criteria for obtaining honors: *Qualifying criteria for obtaining honors: In accordance with the Article 30 paragraph 3 of the University of Cordoba Academic Regulations*

## BIBLIOGRAPHY



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INFORMACIÓN SOBRE TITULACIONES  
DE LA UNIVERSIDAD DE CÓRDOBA

[uco.es/grados](http://uco.es/grados)

## COURSE DESCRIPTION

### 1. Basic Bibliography:

BIOSEPARATIONS. Downstream processing for biotechnology. P.A. Belter, E.L. Cussler & W-H Hu. Ed. John Wiley & Sons, Inc. New York. 1988.  
 BIOPROCESS ENGINEERING PRINCIPLES. P.A. Doran. Academic Press. London. 1995  
 BIOCHEMICAL ENGINEERING FUNDAMENTALS. J.E. Bailey & D.F. Ollis. McGraw-Hill, Inc. Singapore. 1986.  
 INGENIERÍA DE BIOPROCESOS. Mario Díaz. Ediciones Paraninfo. 2012.

### 2. Further reading:

None.

## COORDINATION CRITERIA

- Visits organization

## SCHEDULE

Period	Activity				
	Assessment activities	Excursions	Group presentation	Lectures	Seminar
1# Week	0	0	0	2	0
2# Week	0	0	0	2	0
3# Week	0	0	0	2	0
4# Week	0	0	2	0	0
5# Week	0	0	0	2	3
6# Week	0	0	0	2	3
7# Week	0	0	0	2	3
8# Week	0	0	0	2	3
9# Week	0	3	0	2	0
10# Week	0	3	0	2	0
11# Week	0	3	0	2	0
12# Week	0	3	0	2	0
13# Week	0	0	3	2	0
14# Week	0	0	3	0	0
15# Week	4	0	0	0	0
<b>Total hours:</b>	<b>4</b>	<b>12</b>	<b>8</b>	<b>24</b>	<b>12</b>

The methodological strategies and the evaluation system contemplated in this Course Description will be adapted according to the needs presented by students with disabilities and special educational needs in the cases that are required.