

## COURSE DESCRIPTION

### COURSE DETAILS

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

Code: 101871

Degree/Master: **GRADO DE BIOQUÍMICA**

Year: 4

Field: INGENIERÍA BIOQUÍMICA

Character: OPTATIVA

Duration: FIRST TERM

ECTS Credits: 6.0

Classroom hours: 60

Face-to-face classroom percentage: 40.0%

Study hours: 90

Online platform: Moodle

### LECTURER INFORMATION

Name: GARCIA GARCIA, ISIDORO (Coordinator)

Department: QUÍMICA INORGÁNICA E INGENIERÍA QUÍMICA

Area: INGENIERÍA QUÍMICA

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Name: GONZÁLEZ GRANADOS, ZOILO

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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.

English Level B1

#### 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.

## COURSE DESCRIPTION

### 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.
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 aim of this course is to provide the student with a good understanding of the fundamental principles behind biochemical processes.

An introduction to the concepts of process development, unit operation, bioreactor and economic analysis will be given. In particular, the concept of unit operation will be emphasized to facilitate the systematic development of any biochemical process. As an example, several up and downstream unit operations will be studied as well as an introduction to the analysis and design of the biotransformation stage.

### 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.- Introduction to bioreactors. General aspects. Type of bioreactors

Topic 4.- Design and modelling of bioreactors.

Topic 5.- Microbial kinetics.

Topic 6.- Filtration. Types of filters. Pre-treatments. General filtration theory: Darcy law. Batch filtration. Continuous filtration. Rotary filters.

Topic 7.- Extraction. Liquid-liquid equilibrium. Batch extraction. Continuous extraction: staged and differential ones.



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### 2. Practical contents

- \* Numerical exercises to complete and assessing the student understanding.
- \* Lab seminars
- \* Visit to biochemical factories.

## SUSTAINABLE DEVELOPMENT GOALS RELATED TO THE CONTENT

Unrelated

## METHODOLOGY

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

The specific rules laid down by the University of Cordoba 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>	-	8	8
<i>Group presentation</i>	6	-	6
<i>Lab practice</i>	-	3	3
<i>Lectures</i>	26	-	26
<i>Seminar</i>	-	13	13
<b>Total hours:</b>	<b>36</b>	<b>24</b>	<b>60</b>

### Off-site activities

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

## COURSE DESCRIPTION

### WORK MATERIALS FOR STUDENTS

Dossier

Exercises and activities

Lessons summary

Oral presentations

### EVALUATION

Intended learning	Exams	Laboratory Practice	Oral Presentation	Resource Bank
CB2		X	X	
CB4	X		X	X
CB7	X		X	X
CB9	X		X	X
CE15	X	X	X	X
CE22		X		
CE24	X			
CE26	X	X		X
CE27	X	X		X
CE28	X		X	
<b>Total (100%)</b>	<b>70%</b>	<b>10%</b>	<b>10%</b>	<b>10%</b>
<b>Minimum grade</b>	<b>4</b>	<b>0</b>	<b>0</b>	<b>0</b>

(\*)Minimum mark (out of 10) needed for the assessment tool to be weighted in the course final mark. In any case, final mark must be 5,0 or higher to pass the course.

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**Attendance will be assessed?:**

No

**General clarifications on instruments for evaluation:**

The final exam will include numerical problems and questionnaires on theory and will only be valid for the current call. The "Resource Bank" and "Oral Presentations" assessment instruments will be carried out throughout the course; the latter may be carried out in groups or individually; the marks for these two assessment instruments may be kept indefinitely if the student so wishes. For the tests of the instruments "Exams" and "Resource Bank", the student may freely use any paper material. These tests are of an individual nature; if copying is detected between students, the student will fail the exam.

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

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

**Clarifications on the evaluation of the extraordinary call and extra-ordinary call for completion studies:**

The evaluation criteria for special calls will be the same than for the normal ones.

**Qualifying criteria for obtaining honors:**

*According to the Article 80 paragraph 3 of the University of Cordoba Academic Regulations. In any case, a rate, at least, close to 9.5 would be necessary*

## BIBLIOGRAPHY

**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

## COURSE DESCRIPTION

## SCHEDULE

Period	Assessment activities	Excursions	Group presentation	Lab practice	Lectures	Seminar
1# Fortnight	0,0	0,0	0,0	0,0	4,0	2,0
2# Fortnight	0,0	0,0	0,0	0,0	4,0	3,0
3# Fortnight	0,0	0,0	3,0	0,0	3,0	2,0
4# Fortnight	0,0	0,0	3,0	0,0	3,0	2,0
5# Fortnight	0,0	0,0	0,0	3,0	4,0	0,0
6# Fortnight	0,0	4,0	0,0	0,0	4,0	2,0
7# Fortnight	4,0	4,0	0,0	0,0	4,0	2,0
<b>Total hours:</b>	<b>4,0</b>	<b>8,0</b>	<b>6,0</b>	<b>3,0</b>	<b>26,0</b>	<b>13,0</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.