

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%

Study hours: 90

Online platform: Moodle

LECTURER INFORMATION

Name: GARCIA GARCIA, ISIDORO (Coordinador)

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

Recommendations

Prior knowledge in fundamentals of Industrial Microbiology is recommended.

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.

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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.

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

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Activity	Large group	Medium group	Total
<i>Total hours:</i>	36	24	60

Off-site activities

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

WORK MATERIALS FOR STUDENTS

Dossier
Exercises and activities

EVALUATION

Intended learnig	Exams	Oral Presentation	Problem solving
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	
Total (100%)	35%	30%	35%
Minimum grade	4	4	4

(*)Minimum grade necessary to pass the course

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¿Valora la asistencia?:

No

General clarifications on instruments for evaluation:

For the short answer (exams) 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

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	Assessment activities	Excursions	Group presentation	Lectures	Seminar
1# Week	0.0	0.0	0.0	2.0	0.0
2# Week	0.0	0.0	0.0	2.0	0.0
3# Week	0.0	0.0	2.0	2.0	0.0
4# Week	0.0	0.0	2.0	0.0	0.0
5# Week	0.0	0.0	2.0	2.0	0.0

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Period	Assessment activities	Excursions	Group presentation	Lectures	Seminar
6# Week	0.0	0.0	2.0	2.0	0.0
7# Week	0.0	0.0	0.0	2.0	2.0
8# Week	0.0	0.0	0.0	2.0	2.0
9# Week	0.0	0.0	0.0	2.0	2.0
10# Week	0.0	0.0	0.0	2.0	2.0
11# Week	0.0	4.0	0.0	2.0	0.0
12# Week	0.0	4.0	0.0	2.0	0.0
13# Week	0.0	4.0	0.0	2.0	0.0
14# Week	0.0	0.0	0.0	0.0	2.0
15# Week	4.0	0.0	0.0	0.0	2.0
Total hours:	4.0	12.0	8.0	24.0	12.0

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.