

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

Department: QUÍMICA INORGÁNICA E INGENIERÍA QUÍMICA

Area: INGENIERÍA QUÍMICA

Office location: Edificio Marie Curie, planta baja

E-Mail: q42gogr@uco.es

Phone: 957218543

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.

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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 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, bioreactor 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 as well as an introduction to the analysis and design of the bio-reaction 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.
- * Visit to biochemical factories.

SUSTAINABLE DEVELOPMENT GOALS RELATED TO THE CONTENT

Quality education
Industry, innovation and infrastructure
Responsible consumption and production

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>	-	8	8
<i>Group presentation</i>	6	-	6
<i>Lectures</i>	26	-	26
<i>Seminar</i>	-	16	16
Total hours:	36	24	60

Off-site activities

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

WORK MATERIALS FOR STUDENTS

Dossier
Exercises and activities
Lessons summary
Oral presentations



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EVALUATION

Intended learning	Exams	Oral Presentation	Resource Bank
CB2		X	
CB4	X	X	X
CB7	X	X	X
CB9		X	X
CE15		X	X
CE22			X
CE24	X		X
CE26	X		X
CE27	X		X
CE28	X	X	
Total (100%)	60%	20%	20%
Minimum grade	4	0	0

(*)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.

Attendance will be assessed?:

No

General clarifications on instruments for evaluation:

The final examination will include numerical problems and theoretical questionnaires.

Additionally, questionnaires from a "Resources Bank" will be carry out continuously during the course. Also, "Oral presentations" will be asked to undertake during the course; this task could be developed either in groups or individually.

The instruments for evaluation: "Exams" and "Resources Bank" are individual activities; for these instruments, students can freely use any printed information. If plagiarized parts are detected, the student will fail the examination having to resit it next official call.

The assessments remain valid only for this academic course unless extraordinary calls are considered (see below).

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

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

The evaluation criteria for special calls will be the same than for the normal ones. The equivalent previous calls' marks will be used for the items "Resources Bank" and "Oral presentations"; nevertheless, an examination will be carried out in the official date for the criterium "Exams".

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

SCHEDULE

Period	Assessment activities	Excursions	Group presentation	Lectures	Seminar
1# Fortnight	0,0	0,0	0,0	3,0	2,0
2# Fortnight	0,0	0,0	0,0	3,0	2,0
3# Fortnight	0,0	0,0	0,0	3,0	2,0
4# Fortnight	0,0	0,0	0,0	3,0	2,0
5# Fortnight	0,0	0,0	0,0	3,0	2,0
6# Fortnight	0,0	0,0	0,0	3,0	2,0
7# Fortnight	2,0	4,0	3,0	4,0	2,0
8# Fortnight	2,0	4,0	3,0	4,0	2,0

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Period	Assessment activities	Excursions	Group presentation	Lectures	Seminar
Total hours:	4,0	8,0	6,0	26,0	16,0

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.

CONTINGENCY PLAN: CASE SCENARIO A

Case scenario A will correspond to a diminished on-site academic activity due to social distancing measures affecting the permitted capacity of classrooms.

METHODOLOGY

General clarifications on the methodology on case scenario A

A multimodal (hybrid) teaching system will be adopted, combining both on-site and remote classes via videoconference (synchronous) that will be held in the timetable approved by the corresponding Faculty or School. The time distribution of teaching activities (both on-site and remote) will be decided by the aforementioned Faculties and Schools bearing in mind the permitted capacity of classrooms and social distancing measures as established at that time.

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EVALUATION

Intended learnig	Exams	Oral Presentation	Resource Bank
CB2		X	
CB4	X	X	X
CB7	X	X	X
CB9		X	X
CE15		X	X
CE22			X
CE24	X		X
CE26	X		X
CE27	X		X
CE28	X		
Total (100%)	60%	20%	20%
Minimum grade	4	0	0

(*)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.

Attendance will be assessed (Scenario A)?:

No

General clarifications on instruments for evaluation (Scenario A):

If a face-to-face final examination can be carried out, it will include numerical problems and theoretical questionnaires. On the other side, if an online final examination has to be considered, it will include only questionnaires about theoretical and numerical problems.

Additionally, questionnaires from a "Resources Bank" will be carry out continuously during the course. Also, "Oral presentations" will be asked to undertake during the course; this task could be developed either in groups or individually.

The instruments for evaluation: "Exams" and "Resources Bank" are individual activities; for these instruments, students can freely use any printed information . If plagiarized parts are detected, the student will fail the examination having to resit it next official call.

The assessments remain valid only for this academic course.

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

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

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up in each case.

CONTINGENCY PLAN: CASE SCENARIO B

Case scenario B will bring about a suspension of all on-site academic activities as a consequence of health measures.

METHODOLOGY

General clarifications on the methodology on case scenario B

On-site teaching activities will be held via videoconference (synchronous) in the timetable approved by the corresponding Faculty or School. Alternative activities will be proposed for reduced groups in order to guarantee the acquisition of course competences.

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EVALUATION

Intended learnig	Exams	Oral Presentation	Resource Bank
CB2		X	
CB4	X	X	X
CB7	X	X	X
CB9		X	X
CE15		X	X
CE22			X
CE24	X		X
CE26	X		X
CE27	X		X
CE28	X		
Total (100%)	60%	20%	20%
Minimum grade	4	0	0

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Moodle Tools	Banco de recursos	Exposición oral	Exámenes
Cuestionario	X		X
Videoconferencia		X	

Attendance will be assessed (Scenario B)?:

No

General clarifications on instruments for evaluation (Scenario B):

If a face-to-face final examination can be carried out, it will include numerical problems and theoretical questionnaires. On the other side, if an online final examination has to be considered, it will include only questionnaires about theoretical and numerical problems.

Additionally, questionnaires from a "Resources Bank" will be carry out continuously during the course. Also, "Oral presentations" will be asked to undertake during the course; this task could be developed in groups or individually.

The instruments for evaluation: "Exams" and "Resources Bank" are individual activities; for these instruments, students can freely use any printed information. If plagiarized parts are detected, the student will fail the examination having to resit it next official call.

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

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