



UNIVERSIDAD DE CORDOBA

FACULTAD DE CIENCIAS
GRADO DE BIOQUÍMICA
2024/25 YEAR
INGENIERÍA BIOQUÍMICA



Course details

Course name: 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:** <https://moodle.uco.es/>

Coordinating teacher

Name: GARCIA GARCIA, ISIDORO**Department:** QUÍMICA INORGÁNICA E INGENIERÍA QUÍMICA**Office location:** Edificio Marie Curie, planta baja**E-Mail:** iq1gagai@uco.es**Phone:** 957218589

Brief description of the contents

The aim of this course is for students to gain an understanding of the main aspects that are necessary for the design of a bioprocess.

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

The analysis of the bio-reaction stage as well as several up and downstream operations, as case studies, will be considered.

Prerequisites

Prerequisites established in the study plan

English Level B1. Students may enrol in optional subjects once they have passed 60 credits of basic training and at least another 60 compulsory credits.

Recommendations

Prior knowledge in fundamentals of Industrial Microbiology is recommended.

Study programme

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.

2. Practical contents

* Numerical exercises to complete and assessing the student understanding.

* Lab seminars

* Visit to biochemical factories.

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.

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.

For students with special educational needs, the recommendations provided by the Diversity Attention Service of UCO will be followed

Face-to-face activities

Activity	Large group	Medium group	Total
<i>Assessment activities</i>	4	-	4
<i>Field trips</i>	-	8	8
<i>Oral communication activities</i>	6	-	6
<i>Practical experimentation activities</i>	-	3	3
<i>Projects based on the course contents</i>	26	-	26
<i>Tutorial action activities</i>	-	13	13
Total hours:	36	24	60

Off-site activities

Activity	Total
<i>Exercise and problem solving activities</i>	30
<i>Information processing activities</i>	50
<i>Information search activities</i>	10
Total hours	90

Results of the training and learning process**Knowledge, competencies and skills**

- 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 of biochemistry and molecular biology, including the development, writing and oral presentation of a scientific report.

Assessment methods and instruments

Intended learning outcomes	Examination	Means of practical execution	Oral means	Students assignments
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	
Total (100%)	70%	10%	10%	10%
Minimum grade (*)	4	0	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.

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 "Students assignments" and "Oral means" 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 "Examination" and "Students assignments", the student may freely use any paper material. These tests are of an individual nature; if copying is detected between students, they 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 Faculty will be followed. Additionally, special circumstances must be weighted up in each case.

For students with special educational needs, the recommendations provided by the Diversity Attention Service of UCO will be followed.

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

Sustainable development goals

Unrelated

The methodological strategies and the evaluation system contemplated in this Teaching Guide will respond to the principles of equality and non-discrimination and must be adapted according to the needs presented by students with disabilities and special educational needs in the cases that are required. Students must be informed of the risks and measures that affect them, especially those that may have serious or very serious consequences (article 6 of the Safety, Health and Welfare Policy; BOUCO 23-02-23).
