

## COURSE DESCRIPTION

### COURSE DETAILS

Title (of the course): **REACTORES BIOLÓGICOS**

Code: 102257

Degree/Master: **GRADO DE CIENCIA Y TECNOLOGÍA DE LOS ALIMENTOS** Year: 4

Name of the module to which it belongs: OPTATIVIDAD / RECONOCIMIENTO

Field: OPTATIVIDAD

Character: OPTATIVA

Duration:

ECTS Credits: 3.0

Classroom hours: 30

Face-to-face classroom percentage: 40.0%

Study hours: 45

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

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Phone: 957218543

### PREREQUISITES AND RECOMMENDATIONS

#### Prerequisites established in the study plan

English B1 level certificate

#### Recommendations

A previous course on Industrial Fermentations is advisable

## COURSE DESCRIPTION

### INTENDED LEARNING OUTCOMES

CB2	To know how to apply knowledge to their work or vacation in a professional way. To have the skills that are usually demonstrated through the elaboration and defence of arguments and the resolution of problems within their area of study.
CB5	To develop the the skills necessary to undertake further studies with a high degree of autonomy.
CU2	To know and improve the user's level in the field of ICT.
CT2	Ability to resolve problems.
CT4	Ability to apply theoretical knowledge to your practice.
CT7	Ability to analyse and summarise.
CE1	To recognise and apply the basics of physics, chemistry, biology, physiology, mathematics, and statistics necessary for the comprehension and development of Science and Technology.
CE4	To recognise and apply the main basic operations of industrial processes to ensure the control of processes and food products intended for human consumption.
CE6	To know, understand and apply the classic methodology and the new technological processes aimed at improving the production and treatment of food.
CE16	To put into practice the principles and methodologies that define the professional profile of the food scientist and technologist, demonstrating in an integrated way the acquisition of the skills and competencies that are looked at throughout the degree.

### OBJECTIVES

Many food industries carry out microbial biotransformation operations; the design and basic working aspects of the bioreactors involved in the processes use to have a strong influence in the global results. For that reason, this course is aimed:

- To realise the importance of bioreactors in Food Industries.
- To know the most frequent type of bioreactors.
- To introduce the basic issues for the design and analysis of a bioreactor.

### CONTENT

#### 1. Theory contents

- Topic 1.- Bioreactors in Food Industries.
- Topic 2.- Type of bioreactors.
- Topic 3.- Design and modelling of bioreactors.
- Topic 4.- Kinetics.
- Topic 5.- Example of batch process
- Topic 6.- Example of semi-batch process.

#### 2. Practical contents

- Numerical problems
- Laboratory bioreactors
- Visiting industrial plants

## COURSE DESCRIPTION

### SUSTAINABLE DEVELOPMENT GOALS RELATED TO THE CONTENT

Zero hunger  
 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>Examinations</i>	3	-	3
<i>Excursions</i>	3	-	3
<i>Lab practice</i>	-	4	4
<i>Lectures</i>	12	-	12
<i>Seminar</i>	-	8	8
<b>Total hours:</b>	<b>18</b>	<b>12</b>	<b>30</b>

#### Off-site activities

Activity	Total
<i>Exercises</i>	20
<i>Information search</i>	5
<i>Self-study</i>	20
<b>Total hours</b>	<b>45</b>

**COURSE DESCRIPTION****WORK MATERIALS FOR STUDENTS**

Dossier  
 Exercises and activities  
 Lessons summary  
 References

**EVALUATION**

<b>Intended learning</b>	<b>Debate</b>	<b>Exams</b>	<b>Resource Bank</b>
CB2	X	X	X
CB5		X	X
CE1	X	X	X
CE16		X	X
CE4		X	X
CE6		X	
CT2			X
CT4	X		X
CT7	X		X
CU2			X
<b>Total (100%)</b>	<b>10%</b>	<b>60%</b>	<b>30%</b>
<b>Minimum grade</b>	<b>0</b>	<b>4</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.

## COURSE DESCRIPTION

### Attendance will be assessed?:

No

### General clarifications on instruments for evaluation:

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. During the lectures, the students´debate capability will be assessed.

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.

### 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.

### 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 "Debate"; nevertheless, an examination will be carried out in the official date for the criterium "Exams".

### Qualifying criteria for obtaining honors:

*In accordance with the Article 80 paragraph 3 of the University of Cordoba Academic Regulations*

## BIBLIOGRAPHY

### 1. Basic Bibliography

- BASIC BIOTECHNOLOGY. J. Bu'lock & B. Kristiansen. Academic Press Inc. London. 1987
- INGENIERÍA BIOQUÍMICA. F. Gòdia Casablancas y J. López Santín. Editorial Síntesis. 1998
- INGENIERÍA DE BIOPROCESOS. Mario Díaz. Ediciones Paraninfo. 2012.
- BIOPROCESS ENGINEERING PRINCIPLES. P.A. Doran. Academic Press. (London), 1995

### 2. Further reading

None

## COURSE DESCRIPTION

### COORDINATION CRITERIA

Visits organization

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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**COURSE DESCRIPTION****EVALUATION**

<b>Intended learnig</b>	<b>Debate</b>	<b>Exams</b>	<b>Resource Bank</b>
CB2	X	X	X
CB5		X	X
CE1	X	X	X
CE16		X	X
CE4		X	X
CE6		X	
CT2			X
CT4	X		X
CT7	X		X
CU2			X
<b>Total (100%)</b>	<b>10%</b>	<b>60%</b>	<b>30%</b>
<b>Minimum grade</b>	<b>0</b>	<b>4</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.

**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. During the lectures, the students' debate capability will be assessed.

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.

**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 up in each case.

## COURSE DESCRIPTION

### 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	Debate	Exams	Resource Bank
CB2	X	X	X
CB5		X	X
CE1	X	X	X
CE16		X	X
CE4		X	X
CE6		X	
CT2			X
CT4	X		X
CT7	X		X
CU2			X
<b>Total (100%)</b>	<b>10%</b>	<b>60%</b>	<b>30%</b>
<b>Minimum grade</b>	<b>0</b>	<b>4</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.

Moodle Tools	Banco de recursos	Debate	Exámenes
Cuestionario	X		X

## COURSE DESCRIPTION

Moodle Tools	Banco de recursos	Debate	Exámenes
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. During the lectures, the students' debate capability will be assessed.

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.

### 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.