

## COURSE DESCRIPTION

### COURSE DETAILS

Title (of the course): **BIOQUÍMICA EXPERIMENTAL II**

Code: 101856

Degree/Master: **GRADO DE BIOQUÍMICA**

Year: 3

Name of the module to which it belongs: INTEGRACIÓN FISIOLÓGICA Y APLICACIONES DE LA BIOQUÍMICA Y BIOLOGÍA

Field: BIOQUÍMICA EXPERIMENTAL II

Character: OBLIGATORIA

Duration: SECOND TERM

ECTS Credits: 6.0

Classroom hours: 60

Face-to-face classroom percentage: 40.0%

Study hours: 90

Online platform: <https://moodle.uco.es/moodlemap/>

### LECTURER INFORMATION

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### PREREQUISITES AND RECOMMENDATIONS

#### Prerequisites established in the study plan

English level B1.

#### Recommendations

B2 is highly recommended.

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### INTENDED LEARNING OUTCOMES

CB2	Knowing how to work collaboratively in a team and share responsibilities
CB4	Being able to learn and work independently
CB5	Knowing how to apply the principles of scientific approaches
CB7	To know how to use basic ICT tools for communication, research and data processing in a professional context.
CB8	To know how to read scientific texts in English.
CE17	To understand the main methods of testing the biological activity of cell components, especially of enzymes, both in vitro and in vivo.
CE20	To aid students' understanding of the manipulation of nucleic acids, as well as the principle techniques which facilitate the study of the functioning of genes.
CE21	To possess the quantitative skills required to work in a biochemical laboratory, including the ability to prepare chemical reactants for experiments in a precise and reproducible manner.
CE22	To understand how to work in a biochemical laboratory with biological and chemical material, including regarding safety, the handling of material, the disposal of biological and chemical waste and recording the activities carried out.
CE23	To know how to apply experimental laboratory protocols within the field of Biochemistry and Molecular Biology.
CE24	To possess skills in mathematics, statistics and ICT in order to obtain, analyze and interpret data and in order to understand simple models of biological systems and processes on the cellular and molecular level.
CE27	To understand the basic principles of experiment design in the field of Biochemistry and Molecular Biology, taking into consideration the limitations of experimental approaches.

### OBJECTIVES

To know the bases and the applications for the main techniques in Biochemistry and Molecular Biology.  
 To know how to: extract, manipulate and characterize nucleic acids; make subcellular fractioning and characterize the obtained fractions; perform microorganisms transformations and cultures.  
 To learn how to work safely and clean in a molecular lab with both biological and chemical substances.

### CONTENT

#### 1. Theory contents

Module 1. Isolation and characterisation of nucleic acids. Techniques for those methodologies. Detection of nucleic acids.

Module 2. Basic techniques for manipulation and quantification of nucleic acids. Gene expression quantification: real-time PCR. Promotor activity determination by gene fusions. Non-traditional cloning methodologies. Mutant construction.

Module 3: Culture and transformation of cells.

Module 4: Subcellular fractioning. Characterisation of subcellular fractions.

#### 2. Practical contents

LP1. Isolation of RNA from eukaryotic cells. Retrotranscription.

LP2. Transcript level determination by real time PCR.

LP3. Gene deletion/ gene therapy in yeast by homolog recombination.

LP4. Mammalian transformation. Gene silencing (siRNA).



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LP5. Gene therapy by CRISPR-Cas 9.

LP6. Organelle isolation from eukaryotic cells.

LP7. Characterisation of subcellular fractions by electrophoresis, metabolites analysis and enzymatic activities determination.

## SUSTAINABLE DEVELOPMENT GOALS RELATED TO THE CONTENT

Unrelated

## METHODOLOGY

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

Part-time students will be treated according to their specific case. Additionally, assistance will be provided to the group that best suits their needs.

The methodological strategies and the evaluation system contemplated in this Teaching Guide will be adapted according to the needs presented by students with disabilities and needs for special education when required. If necessary, the teacher will meet with the affected students to establish the most appropriate adaptations for each particular case, following the indications of the report issued by the Inclusive Education Unit.

### Face-to-face activities

Activity	Large group	Medium group	Total
<i>Assessment activities</i>	6	-	6
<i>Lab practice</i>	-	42	42
<i>Lectures</i>	9	-	9
<i>Tutorials</i>	-	3	3
<b>Total hours:</b>	<b>15</b>	<b>45</b>	<b>60</b>

### Off-site activities

Activity	Total
<i>Analysis</i>	20
<i>Information search</i>	20
<i>Reference search</i>	20
<i>Self-study</i>	30
<b>Total hours</b>	<b>90</b>

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### WORK MATERIALS FOR STUDENTS

Case studies - <https://moodle.uco.es/>

Coursebook - <https://moodle.uco.es/>

Dossier - <https://moodle.uco.es/>

Oral presentations - <https://moodle.uco.es/>

Placement booklet - <https://moodle.uco.es/>

References - <https://moodle.uco.es/>

### EVALUATION

Intended learning	Case study/clinical case discussion/scientific work discussion	Exams	Placement reports
CB2	X	X	X
CB4	X		X
CB5	X	X	X
CB7	X		X
CB8	X	X	X
CE17	X	X	X
CE20	X	X	X
CE21			X
CE22			X
CE23	X		X
CE24	X		X
CE27			X
<b>Total (100%)</b>	<b>25%</b>	<b>50%</b>	<b>25%</b>
<b>Minimum grade</b>	<b>4</b>	<b>4</b>	<b>4</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:

There will be a continuous evaluation during the practical sessions that will cover 50% of the final qualification, that will be divided in 25% for reports and 25% for case studies for each practical sessions. The remaining 50 % will be evaluated by a final exam that will cover both theoretical and practical issues.

Assistance is mandatory for all practical sessions. Assistance to theoretical sessions will be considered positively in the continuous evaluation.

Teachers may decide to examine certain students exclusively orally and even take a second oral exam to confirm the results of the written exams, when well-founded suspicions of fraud.

Repeater students will be evaluated using the same parameters as new ones. Continuous marks will be maintained during all the course.

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

Partial-time student needs will be analysed individually.

Methodologies and evaluation parameters will be adapted to students with special needs.

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

In the extraordinary call, the partial qualifications of the continuous evaluation instruments of this course (evaluation of the practical sessions and answers to short questions) are maintained. In the extraordinary call for completion of studies, the marks obtained by the student in the continuous assessment tests that appear specifically in the teaching guide of the previous academic year will be kept.

### Qualifying criteria for obtaining honors:

According to the UCO Regulation

## BIBLIOGRAPHY

### 1. Basic Bibliography

Molecular Cloning: A Laboratory Manual (4th Edition) Michael R. Green; Joseph Sambrook Cold Spring Harbor Laboratory Press 978-1-936113-42-2 (2012).

Principles and Techniques of Biochemistry and Molecular Biology. 2010. Edited by Keith Wilson & John Walker. ISBN: 978-0-521-51635-6.

Protocolos Cold Spring Harbor: <http://cshprotocols.cshlp.org/>

### 2. Further reading

Specific bibliography will be recommended for each module.

## COORDINATION CRITERIA

Common evaluation criteria



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### Clarifications

This subject content is coordinated with \\\\\"MIC\\\\\\" and \\\\\"Bioquímica Experimental I\\\\\\".

## SCHEDULE

Period	Assessment activities	Lab practice	Lectures	Tutorials
1# Week	0,0	3,0	1,5	0,0
2# Week	0,0	3,0	0,0	0,0
3# Week	0,0	3,0	1,5	0,0
4# Week	0,0	3,0	0,0	0,0
5# Week	1,0	3,0	1,5	0,0
6# Week	0,0	3,0	0,0	0,0
7# Week	0,0	3,0	1,5	0,0
8# Week	0,0	3,0	0,0	0,0
9# Week	0,0	3,0	0,0	0,0
10# Week	1,0	3,0	1,5	0,0
11# Week	0,0	3,0	0,0	0,0
12# Week	0,0	3,0	1,5	0,0
13# Week	0,0	3,0	0,0	0,0
14# Week	4,0	3,0	0,0	3,0
<b>Total hours:</b>	<b>6,0</b>	<b>42,0</b>	<b>9,0</b>	<b>3,0</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.