

## 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:

### LECTURER INFORMATION

Name: MICHAN DOÑA, CARMEN MARIA (Coordinator)

Department: BIOQUÍMICA Y BIOLOGÍA MOLECULAR

Area: BIOQUÍMICA Y BIOLOGÍA MOLECULAR

Office location: Edificio Severo Ochoa, 2ª Planta

E-Mail: bb2midoc@uco.es

Phone: 8082

Name: REQUEJO AGUILAR, RAQUEL

Department: BIOQUÍMICA Y BIOLOGÍA MOLECULAR

Area: BIOQUÍMICA Y BIOLOGÍA MOLECULAR

Office location: Edificio Severo Ochoa, 1ª Planta

E-Mail: bb2reagr@uco.es

Phone: 8317

Name: ROMERO RUIZ, ANTONIO

Department: BIOQUÍMICA Y BIOLOGÍA MOLECULAR

Area: BIOQUÍMICA Y BIOLOGÍA MOLECULAR

Office location: Edificio Severo Ochoa, 1ª Planta

E-Mail: b72rorua@uco.es

Phone: 957218082

### PREREQUISITES AND RECOMMENDATIONS

#### Prerequisites established in the study plan

English level B1.

#### Recommendations

B2 is highly recommended.

## COURSE DESCRIPTION

### 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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## COURSE DESCRIPTION

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

Good health and well-being

Quality education

Gender equality

Decent work and economic growth

Industry, innovation and infrastructure

Responsible consumption and production

## METHODOLOGY

### Methodological adaptations 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.

### 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>

## COURSE DESCRIPTION

### WORK MATERIALS FOR STUDENTS

Case studies  
Coursebook  
Dossier  
Oral presentations  
Placement booklet  
References

### 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.

## COURSE DESCRIPTION

### 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.

### 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 first extraordinary call and extra-ordinary call for completion studies:

Marks of continuous evaluation that appear specifically in the educational guide of the previous academic year, will be considered.

### 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

### Clarifications

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

## COURSE DESCRIPTION

## 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.

## 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.

## COURSE DESCRIPTION

The theoretical bases will be taught in the classroom through master classes. In case the simultaneous presence of all students enrolled in the subject is not possible, the theoretical teaching will be carried out by synchronous videoconference. Students will complete these classes by consulting the recommended bibliography for each topic. The practical classes will be taught in the laboratories of the Department of Biochemistry and Molecular Biology of the UCO, in the Severo Ochoa building. The sanitary measures of interpersonal distance will be maintained, and in cases where that distance cannot be maintained, the use of a mask will be mandatory. The individual tutorials will be developed in person in the University spaces, always keeping the interpersonal distance, and in the event that attendance is not possible, through videoconference that will be agreed with the student.

## EVALUATION

Intended learnig	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.

### Attendance will be assessed (Scenario A)?:

No

### General clarifications on instruments for evaluation (Scenario A):

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

## COURSE DESCRIPTION

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

Repeater students will be evaluated using the same parameters as new ones.

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

Partial-time student needs will be analysed individually.

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

## 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.

The classroom teaching activity will be carried out by videoconference (synchronous sessions) at the same corresponding times. Alternative activities will be proposed for small groups that guarantee the acquisition of the competences of the subject. The theoretical foundations will be taught by synchronous videoconference. The students will complete these classes consulting the recommended bibliography for each topic. The laboratory practices will be taught synchronously through videoconference. The students will have available a copy of all the audiovisual material used, which may also be accompanied specific material prepared by the teacher to facilitate monitoring. The individual tutorials will be developed through videoconference that will be agreed with the students.



## COURSE DESCRIPTION

## 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.

Moodle Tools	Exámenes	Informes/memorias de prácticas	Supuesto práctico/discusión caso clínico/discusión trabajo científico
Asistencia		X	
Cuestionario			X
Participación			X
Pruebas simultáneas por videoconferencia	X		
Rúbrica de evaluación		X	X
Talleres			X
Tarea		X	X
Videoconferencia		X	X

## COURSE DESCRIPTION

### Attendance will be assessed (Scenario B)?:

No

### General clarifications on instruments for evaluation (Scenario B):

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. Marks of continuous evaluation will be considered during all convocatories of the academic year. 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

Repeater students will be evaluated using the same parameters as new ones.

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

Partial-time student needs will be analysed individually.

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