COURSE DESCRIPTION

COURSE DETAILS

Title (of the course): **BIOQUÍMICA Y BIOLOGÍA MOLECULAR**
Code: 100464
Degree/Master: **GRADO DE QUÍMICA** Year: 3
Name of the module to which it belongs: FUNDAMENTAL
Field: BIOQUÍMICA Y QUÍMICA BIOLÓGICA
Character: OBLIGATORIA Duration: FIRST TERM
ECTS Credits: 3.0 Classroom hours: 30
Face-to-face classroom percentage: 40.0% Study hours: 45
Online platform: http://moodle.uco.es/moodlemap/

LECTURER INFORMATION

Name: LLAMAS AZUA, ÁNGEL (Coordinator)
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PREREQUISITES AND RECOMMENDATIONS

Prerequisites established in the study plan

The same requirements as for the subject in Spanish must be considered

Recommendations

For optimal monitoring and use of the subject, it is recommended to have a basic knowledge of biochemistry and biology. Likewise, it is important the student´s attendance to the different activities of the subject.

COURSE DESCRIPTION

INTENDED LEARNING OUTCOMES

CB3	Demonstrating the ability to communicate in oral and written formats in the native language
CB4	Being familiar with a foreign language
CB8	To demonstrate the ability to interact effectively and to work in a group.
CE15	To understand the structure and reactivity of the main types of biomolecules and the chemistry of biological processes.
CE21	To be able to demonstrate knowledge and understanding of the key principles, concepts and theories of Chemistry.
CE29	To give students skills in observation, in tracking and in measuring chemical properties, events or changes, in taking systematic and reliable records for corresponding documentation.
CE31	To interpret data based on observations in the laboratory in terms of their importance and supporting theories.
CU2	Improving user-level skills in ICT

OBJECTIVES

The purpose of this course is to train students in molecular approaches related to genetic material, the organization of genomes, the flow of genetic information, the repair of DNA lesions, etc. In addition, it is a fundamental objective to initiate and train in the methodology and techniques that allow DNA manipulation and its routine use in Biosciences.

CONTENT

1. Theory contents

1. Introduction and Organization of genetic material. Contents Goals. Future perspectives of molecular knowledge in Biosciences. Complexity of genomes. Structures of nucleic acids. Physicochemical properties.
2. Supercoiling of DNA and its biological importance. Supramolecular complexes of nucleic acids and proteins.

TRANSMISSION OF GENETIC INFORMATION

3. Replication of prokaryotic and eukaryotic genomes. Replication characteristics. DNA polymerases structure and function, proofreading activity. Telomeres and telomerase.
4. Transcription of prokaryotic and eukaryotic genes. Stages of transcription. Structure of the promoters. The termination of the dependent and independent rho transcription.
5. Maturation of the hnRNA The promoters, their importance and study methods. Differential maturation. mRNA Editing
6. Biosynthesis of proteins in prokaryotes and eukaryotes. Inhibitors of translation. Regulation of the start of translation in eukaryotes. Post-translational modifications

DNA REORGANIZATIONS AND REPAIR OF INJURIES

7. Recombination in DNA. Homologous recombination. Intermediate of Holliday. Specific site recomposition. Recomposition by transposition.
8. Mutation and repair of DNA lesions. Classification of the mutations according to the cell type, magnitude and effect on the protein. Repair by excision of bases and nucleotides. The photolyase. Alkyltransferases.

REGULATION OF GENE EXPRESSION

9. Introduction to the regulation of gene expression. Types of transcription factors, helix / loop / helix, helix / spin / helix, leucine zipper, Zn fingers and homeodominiums.
10. Regulation of gene expression in prokaryotes. The operon of lactose, arabinose and tryptophan.
11. Regulation of gene expression in eukaryotes. Pretranscriptional. Transcriptional. Postranscriptional. Translational. Post-translational. The epigenetics.

RECOMBINANT DNA TECHNOLOGY

COURSE DESCRIPTION

12. Cloning. Restriction enzymes. Vectors. DNA modifying enzymes. Cloning vectors.
13. Gene isolation. Genomic DNA and cDNA libraries. Southern, Northern, Western.
14. Genetic technology. Gene expression. Transgenic organisms. Ethics

2. Practical contents

1.- Analysis of Genomes and genomics.
2.- Analysis of DNA and RNA sequences.
3.- The PCR technique.
4.- Cell cloning strategies.
5.- Methods of DNA isolation.
6.- Transformation of E. coli.

SUSTAINABLE DEVELOPMENT GOALS RELATED TO THE CONTENT

Good health and well-being

METHODOLOGY

General clarifications on the methodology (optional)

Students will have all the material used in the teaching of the classes accessible in the Moodle virtual classroom where they will also have discussion forums on related topics and a self-evaluation system.
Repeating students are exempt from repeating laboratory and classroom practices, if approved.

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

Attendance to full group classes will not be compulsory for the part-time student. The material used in these classes will be available on the Moodle platform.
However, the adaptations of the didactic and evaluation methodology for students with disabilities and special educational needs students will be specified once their specific circunstances are known.

Face-to-face activities

Activity	Large group	Medium group	Total
Assessment activities	3	1	4
Lab practice	-	5	5
Lectures	13	1	14
Tutorials	1	1	2
Workshop	-	5	5
Total hours:	***17***	***13***	***30***

COURSE DESCRIPTION

Off-site activities

Activity	Total
Analysis	2
Exercises	6
Group work	5
Reference search	2
Self-study	30
Total hours	***45***

WORK MATERIALS FOR STUDENTS

Case studies - *Plataforma e-learnig Universidad de Córdoba (http://www3.uco.es/moodle/)*
Coursebook - *Plataforma e-learnig Universidad de Córdoba (http://www3.uco.es/moodle/)*
Dossier - *Plataforma e-learnig Universidad de Córdoba (http://www3.uco.es/moodle/)*
Exercises and activities - *Plataforma e-learnig Universidad de Córdoba (http://www3.uco.es/moodle/)*
Oral presentations - *Plataforma e-learnig Universidad de Córdoba (http://www3.uco.es/moodle/)*
Placement booklet - *Plataforma e-learnig Universidad de Córdoba (http://www3.uco.es/moodle/)*
References - *Plataforma e-learnig Universidad de Córdoba (http://www3.uco.es/moodle/)*

EVALUATION

Intended learning	Exams	Laboratory Practice	Problem solving
CB3	X		X
CB4	X		
CB8	X		X
CE15	X	X	X
CE21		X	
CE29		X	X
CE31		X	X
CU2	X		
Total (100%)	***60%***	***10%***	***30%***
Minimum grade	***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.

COURSE DESCRIPTION

Attendance will be assessed?:

No

General clarifications on instruments for evaluation:

There will be a continuous evaluation and a final exam.
The final exam will consist of multiple choice questions, problems, short and long answer questions, and will represent 60% of the final grade.
The continuous evaluation will be done by means of the realization of questionnaires through the moodle or face-to-face, on the knowledge acquired during the realization of the classroom and laboratory practices, and will suppose 40% of the grade.
Teachers can decide to examine certain students exclusively orally, and even perform a second oral examination to confirm the results of written examinations, when there is suspicion of fraud.

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

The particular considerations of the students who are studing the degree part-time degree and of those with disabilities and Special educational needs will be taken into account. Those students who are part-time, or have a disability, or special educational needs and that for such reasons cannot practice laboratory, for the evaluation of laboratory practices the teachers will propose a bibliographical work on the subject of such practices.

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

In this call the same assessment instruments will be considered as in the ordinary calls (exam, laboratory practices and problem solving). For this purpose, the qualifications obtained in the laboratory practices and the resolution of problems from previous calls will be maintained.

Qualifying criteria for obtaining honors:

According to article 80.3 of the Regulations of the University of Córdoba, the mention of \\

BIBLIOGRAPHY

1. Basic Bibliography

- Devlin TM. Bioquímica. Libro de Texto con Aplicaciones Clínicas. Ed. Reverté, 2004
- Stryer L. Bioquímica, Ed. Reverté, 2007
- McKee T., McKee JR. Bioquìmica. La base molecular de la vida. MacGrawHill- Interamericana, 2003
- Alberts B, Bray D, Johson S, Lewis J, Raff M, Roberts K y Water, P. Introducción a la Biología Celular. Ed. Omega, 1999
- Matthew CK, VanHolde KE, Ahern KG. Bioquímica, Ed. McGraw-Hill Interamericana, 2005
- Cox TM y Sinclair J. Biología Molecular en Medicina. Ed. Panamericana, 1998
- Rawn JD. Bioquímica, Ed. McGraw Hill-Interamericana, Madrid, 1989
- Voet D y Voet JG. Fundamentals Biochemistry Update, Ed.Omega, 2002

2. Further reading

Web directions:

COURSE DESCRIPTION

http://www3.usal.es/~dbbm/clasmed/clasmed.html http://www.ebi.ac.uk/
http://www.ncbi.nlm.nih.gov/
http://www.protocol-online.net/cellbio
http://dir.yahoo.com/Science/Chemistry/Biochemistry/

http://www.universia.net
http://www.biology.arizona.edu

COORDINATION CRITERIA

Common learning outcomes
Joint activities: lectures, seminars, visits ...
Tasks performance

SCHEDULE

Period	Assessment activities	Lab practice	Lectures	Tutorials	Workshop
20210913#	0,0	0,0	2,0	0,0	0,0
20210927#	0,0	0,0	2,0	0,0	0,0
20211011#	0,0	0,0	2,0	0,0	2,0
20211025#	1,0	0,0	2,0	1,0	2,0
20211108#	0,0	2,0	2,0	0,0	0,0
20211122#	1,0	2,0	2,0	0,0	0,0
20211206#	0,0	1,0	1,0	0,0	1,0
20211220#	2,0	0,0	1,0	1,0	0,0
Total hours:	***4,0***	***5,0***	***14,0***	***2,0***	***5,0***

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.

COURSE DESCRIPTION

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.

A multimodal or hybrid teaching system will be adopted that combines, as much as possible, the classes classroom and classroom videoconference classes (synchronous sessions) to be held at the hours approved by the Center. The temporary distribution of the activities that will be carried out in a classroom and face-to-face by videoconference will be determined by the Center depending on the capacity allowed in teaching spaces and sanitary measures of interpersonal distancing that are in force.
The methodology used allows the student to acquire the basic knowledge of biochemistry and molecular biology and its applications, simultaneously using master classes with abundant and diverse activities in small groups that allow the student to learn for himself.
The theoretical foundations will be taught in the classroom through master classes. In case you can't guarantee the simultaneous presence of all students enrolled in the subject, the theoretical teaching is It will be carried out in person by synchronous video-conference. Students will complete these classes consulting the recommended bibliography for each topic.
All audiovisual materials used in class are available to students through the page moodle, which will also be used to carry out and correct activities and evaluations, which will allow that repeating or part-time students can also actively participate in all activities (except exams, necessarily face-to-face activities) and answer your questions through the forums enabled for this purpose.
The practical classes will be taught in: (i) the laboratories of the Department of Biochemistry and Molecular Biology of the UCO, in the Severo Ochoa building; (ii) the computer rooms on the Rabanales campus; (iii) the laboratories of the classroom. The sanitary measures of interpersonal distance will be maintained, and in those cases in which it cannot be maintained distance, in laboratory practices the use of a mask will be compulsory and in bioinformatics practices mask or they will be carried out by synchronous video-conference, previously making available to students the specific free sotfware that they might need to carry out these activities.
The particular considerations of the students who have the official consideration of part-time students, students with special needs, or those in need technical / technological, so that the methodological adaptations for these students will be decided in meetings between teachers and interested students in order to personalize the possible cases that arise and following the UCO guidelines. This will be valid for both the teaching methodology and the evaluation.

COURSE DESCRIPTION

EVALUATION

Intended learnig	Exams	Laboratory Practice	Problem solving
CB3	X		X
CB4	X		
CB8	X		X
CE15	X	X	
CE21		X	
CE29		X	
CE31		X	X
CU2	X		X
Total (100%)	***60%***	***10%***	***30%***
Minimum grade	***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.

Attendance will be assessed (Scenario A)?:

No

General clarifications on instruments for evaluation (Scenario A):

There will be a continuous evaluation and a final exam.
The final exam will consist of multiple choice questions, problems, short and long answer questions, and will represent 60% of the final grade.
The continuous evaluation will be done by means of the realization of questionnaires through the moodle or face-to-face, on the knowledge acquired during the realization of the classroom and laboratory practices, and will suppose 40% of the grade.
Teachers can decide to examine certain students exclusively orally, and even perform a second oral examination to confirm the results of written examinations, when there is suspicion of fraud.
Students with second registration or higher, will keep the grade optain the first year of the lab evaluation, the rest of the evaluation will be the same.

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

The particular considerations of the students who are studing the degree part-time degree and of those with disabilities and Special educational needs will be taken into account. Those students who are part-time, or have a disability, or special educational needs and that for such reasons cannot practice laboratory, for the evaluation of laboratory practices the teachers will propose a bibliographical work on the subject of such practices.

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.

The classroom teaching activity will be carried out by videoconference (synchronous sessions) at the time approved by the Center. Alternative activities will be proposed for small groups that guarantee the acquisition of the skills of that subject.
The methodology used allows the student to acquire the basic knowledge of biochemistry and molecular biology and its applications, simultaneously using master classes with abundant and diverse activities in small groups that allow the student to learn for himself.
The theoretical foundations will be taught in person by synchronous video-conference. The students
They will complete these classes consulting the recommended bibliography for each topic.
All audiovisual materials used in class are available to students through the page
moodle, which will also be used to carry out and correct activities and evaluations, which will allow
that repeating or part-time students can also actively participate in all activities and
Solve your doubts through the forums enabled for this purpose. Both laboratory and classroom practices will be taught synchronously through videoconference. Students will have a copy of all the audiovisual material used, which may also be accompanied by teaching material specifically prepared for facilitate monitoring, especially of laboratory practices.
The particular considerations of the students who have the official consideration of part-time students, students with special needs, or those in need technical / technological, so that the methodological adaptations for these students will be decided in virtual meetings between the teachers and the interested students in order to personalize the possible cases that arise and following the guidelines of the UCO. This will be valid for both the teaching methodology and the evaluation.

COURSE DESCRIPTION

EVALUATION

Intended learnig	Exams	Laboratory Practice	Problem solving
CB3	X		X
CB4	X		
CB8	X		X
CE15	X	X	
CE21		X	
CE29		X	
CE31		X	X
CU2	X		X
Total (100%)	***60%***	***10%***	***30%***
Minimum grade	***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.

Moodle Tools	Exámenes	Prácticas de laboratorio	Resolución de problemas
Chat		X	X
Cuestionario	X	X	X
Foro		X	
Pruebas simultáneas por videoconferencia	X	X	
Talleres		X	X
Tarea		X	X
Videoconferencia	X	X	X

Attendance will be assessed (Scenario B)?:

No

General clarifications on instruments for evaluation (Scenario B):

There will be a continuous evaluation and a final exam.

The final exam will consist of multiple choice questions, problems, short and long answer questions, and will

COURSE DESCRIPTION

represent 60% of the final grade.
The continuous evaluation will be done by means of the realization of questionnaires through the moodle, on the knowledge acquired during the realization of the classroom and laboratory practices, and will suppose 40% of the grade.
Teachers can decide to examine certain students exclusively orally, and even perform a second oral examination to confirm the results of written examinations, when there is suspicion of fraud.
Students with second registration or higher, will keep the grade optain the first year of the lab evaluation, the rest of the evaluation will be the same.

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

The particular considerations of the students who are studing the degree part-time degree and of those with disabilities and Special educational needs will be taken into account. Those students who are part-time, or have a disability, or special educational needs and that for such reasons cannot practice laboratory, for the evaluation of laboratory practices the teachers will propose a bibliographical work on the subject of such practices.