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

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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

It is necessary to prove a B1 level of English.

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

In the case of part-time students will be facilitated attendance to the group that best suits your 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.
In the case of students with needs special educational activities, 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. 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	***4***	***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 faceto-face, on the knowledge acquired during the realization of the classroom (Problem solving) and laboratory practices (Laboratory Practice), and will suppose 30 y 10% of the grade, respectively.
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.
Those evaluation activities in which the student for supervening and justified reasons (illness or similar) has not been able to perform them will be susceptible to recovery. The activities of the different evaluation criteria may be carried out both in the sessions of GG, GM or ordinary and/or extraordinary official calls.

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 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 Academic Regime Regulations of the University of Córdoba, the *

BIBLIOGRAPHY

1. Basic Bibliography

- Principios de bioquímica 7ª edición Lehninger, editorial Omega (2018).

2. Further reading

Web directions:
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

COURSE DESCRIPTION

COORDINATION CRITERIA

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

SCHEDULE

Period	Assessment activities	Lab practice	Lectures	Tutorials	Workshop
1# Week	0,0	0,0	1,0	0,0	0,0
2# Week	0,0	0,0	1,0	0,0	0,0
3# Week	0,0	0,0	1,0	0,0	0,0
4# Week	1,0	0,0	1,0	0,0	1,0
5# Week	0,0	0,0	1,0	0,0	1,0
6# Week	0,0	0,0	1,0	0,0	0,0
7# Week	0,0	0,0	1,0	0,0	0,0
8# Week	1,0	0,0	1,0	0,0	0,0
9# Week	0,0	0,0	1,0	0,0	1,0
10# Week	0,0	2,5	1,0	0,0	0,0
11# Week	0,0	2,5	1,0	0,0	0,0
12# Week	0,0	0,0	1,0	0,0	1,0
13# Week	0,0	0,0	1,0	1,0	1,0
14# Week	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.