



26514 - BIOCHEMISTRY I (2018-19)

General

Code: 26514

Lecturer responsible:

CAMACHO CARRASCO, MONICA LOURDES

Credits ECTS:	6
Theoretical credits:	1,32
Practical credits:	1,08
Distance-base hours:	3,6

Departments involved

- **Dept:** AGROCHEMISTRY AND BIOCHEMISTRY
Area: BIOCHEMISTRY AND MOLECULAR BIOLOGY
Theoretical credits: 1,32
Practical credits: 1,08
This Dept. is responsible for the course.
This Dept. is responsible for the final mark record.

Study programmes where this course is taught

- DEGREE IN BIOLOGY
Course type: CORE (Year: 1)

Competencies and objectives

Course context for academic year 2018-19

Biochemistry I is a basic training course of the Degree in Biology which has a main aim that is to provide a general view of the most important biomolecules found in nature, as well as to establish the chemical, molecular and genetic basis of the biological processes. Through the history of this scientific discipline, the biochemists have worked to reveal the chemical and physical principles that support the biological processes. Therefore, Biochemistry establishes the knowledge basis to be able to identify these processes. This course provides the basis both for the comprehension of other courses of the Degree as well as for the development of the future career of the graduate in Biology.

Course content (verified by ANECA in official undergraduate and Master's degrees)

Generic Degree Course Competences

- **CG1** : Develop capacity for analysis, synthesis and critical reasoning.
- **CG10** : Develop knowledge-based critical attitudes.
- **CG3** : Solve problems effectively.
- **CG4** : Show capacity for teamwork.
- **CG5** : Commitment to ethics and the values of equality, as well as social responsibility as a citizen and as a professional.
- **CG6** : Learn autonomously.
- **CG7** : Show the ability to adapt to new situations.
- **CG8** : Acquire a permanent concern for quality, the environment and health and safety at work.
- **CG9** : Show the ability to transmit information, ideas, problems and solutions to both specialist and non-specialist audiences.

Specific Competences:>>Theoretical

- **CE13** : Study the structure and function of biomolecules and understand their function in biological processes.
- **CE14** : Understand the fundamentals of replication, transcription, translation and modification of genetic material.

Specific Competences:>> Ability

- **CE30** : Interpret, evaluate, process and synthesis Biological data and information.
- **CE31** : Recognise and implement good scientific practices for measurement and experimentation.
- **CE35** : Interpret data gathered from observation and measurement in the laboratory and the field.
- **CE37** : Ability to find, analyse, understand and write scientific and technical texts.
- **CE38** : Use inductive and deductive methods correctly in the field of Biology.
- **CE39** : Recognise and evaluate biological processes in daily life.
- **CE40** : Relate Biology to other disciplines.

Generic UA Competences

- **CGUA2** : Express oneself correctly, both orally and in writing, in either of the official languages of the Region of Valencia.

Exclusive skill taught in this course

No data

Learning outcomes (Training objectives)

No data

Specific objectives stated by the academic staff for academic year 2018-19

LEARNING OBJECTIVES:

- To know the structure and function of the different biomolecules and to understand their function in the biological processes.
- To know the fundamentals of the replication, transcription and translation of the genetic material.
- To interpret, evaluate process and synthesise information of biochemistry and molecular biology data.
- To acquire basic skills to experiment and to interpret the information proceeding from observation and measurement in biochemistry and molecular biology, using the biological material, reagents, instruments and application devices in a safe way.
- To be able to seek, to analyse and to understand scientific texts of Biochemistry and molecular biology.
- To use correctly inductive and deductive methods in the field of biochemistry and molecular biology.
- To recognise and value the biochemical processes in the daily life.
- To relate biochemistry and molecular biology to other subjects.

SPECIFIC OBJECTIVES:

- To offer a view of the concept of biochemistry and to set up the axioms of the molecular logic of the cells.
- To describe the physical and chemical properties of water, as the most abundant compound within the cell.
- To state the laws of thermodynamic and to set up the relations among the different state functions.
- To know the role that ATP plays in the energetic metabolism.
- To solve acid - base problems involving amino acids, to estimate the isoelectric points and net charges, and to draw and to understand their pH titration curves.
- To apply the basic essentials about the determination of the primary structure of polypeptides.
- To distinguish the structural levels of proteins, and analyse the three-dimensional structure and folding of these biomolecules.
- To set up the relation structure-function of the proteins as essential molecular machines to carry out cellular and intercellular physiological functions.
- To know the characteristics of a biological catalyst.
- To describe the progress curve for an enzymatic reaction and to calculate the specific activity of an enzyme preparation.
- To state the meaning of the kinetic parameters for an enzyme.
- To identify the chiral centres of the monosaccharides and to define the concepts of enantiomer, epimer and anomer.
- To describe the composition and properties of the cellular membrane.
- To set up the nature of the different transport mechanisms through the membrane.
- To explain the phenomenon of denaturation and renaturation of nucleic acids.
- To know the characteristics of the telomeres in linear eukaryotic chromosomes.
- To describe the concept of mutation and to enumerate the mechanisms of DNA repair.
- To explain the concepts of general recombination, specific site recombination and transposition and to mention the main characteristics of their mechanisms.
- To describe the splicing process related to RNA maturation.
- To know the enzymatic activity of the reverse transcriptase and to describe its role in the viral infection process.
- To explain the characteristics of the genetic code.

- To define the concepts of a regulator gene, a repressor, a promoter and an operator (operon), and to describe the control mechanisms in the expression of the lac and trp operons.
- To explain the notion of DNA cloning and to describe the main cloning vectors.

Content and bibliography

Content for academic year 2018-19

BRIEF DESCRIPTION:

Introduction. Molecular stage of life. Structure and function of proteins. Enzymes. Catalysis and enzyme kinetics. Carbohydrates. Lipids, biomembranes and membrane transport. Structure and function of nucleic acids. DNA Replication, repair and recombination. DNA Transcription and RNA maturation. Translation. Regulation of gene expression

THEORETICAL AND PRACTICAL CONTENTS:

THEORY:

B 1. INTRODUCTION.

T 1. Introduction. The Basis of Biochemistry.

1.1. Introduction to Biochemistry. 1.2. Water as a sustaining life medium. 1.3. Bioenergetics.

B 2. BIOMOLECULES.

T 2. Structure and function of proteins.

2.1. Amino acids. 2.2. Peptides. Primary structure determination. 2.3. Three-Dimensional structure and function of proteins.

T 3. Enzymes. Catalysis and enzyme kinetics.

3.1. Characteristics of biological catalysts. 3.2. Enzyme catalysis. 3.3. Enzyme kinetics. 3.4. Enzyme regulation.

T 4. Carbohydrates.

4.1. Monosaccharides. 4.2. Oligosaccharides. 4.3. Polysaccharides. 4.4. Glycoconjugates.

T 5. Lipids.

5.1. Chemical nature of lipids. 5.2. Types and functions of lipids

T 6. Biomembranes and transport.

6.1. Structure of cell membranes. 6.2. Solute transport across cell membranes.

B 3. MOLECULAR BIOLOGY.

T 7. Structure and function of nucleic acids.

7.1. Nucleotides. 7.2. Structure and function of DNA. 7.3. Structure and function of RNA. 7.4. Genetic information.

T 8. DNA replication, recombination and repair.

8.1. DNA replication mechanisms. 8.2. DNA damage and repair.

T 9. DNA transcription and RNA maturation.

9.1. RNA synthesis. 9.2. RNA maturation mechanisms. 9.3. Regulation of transcription.

T 10. Translation.

10.1. Genetic code. 10.2. Protein synthesis.

PRACTICAL WORK: P 1. Reagents preparation. P 2. Catalase enzymatic activity. P 3. Quantitative

estimation of proteins. P 4. Enzyme activity measurement of polyphenol oxidase. P 5. DNA isolation from halophilic Archaea. Agarose gel electrophoresis. P 6. Gel-filtration chromatography. P 7. Isolation of casein and lactose from milk.

Assessment

Assessment procedures and criteria 2018-19

Laboratory practical exercises (Practical Work) are mandatory, and attendance at a minimum of 80 % of such practical exercises laboratory for evaluation of activities related to the practical contents (with justification for non-attendance) will be required.

In case of, after the accomplishment of the proposed activities in the continuous assessment and the final test, the obtained qualification was not enough to overcome the course with 50 % of the total, a new theoretical test will be programmed in the extraordinary examinations (period) of July, adding, in this case, the marks obtained in the continuous assessment, if has passed at least 4 out of 10 the mark of final exam. In addition, the weighting will be the same that in the ordinary exams of June.

In the case to suspend the exam of laboratory practices, there will be a new opportunity in the extraordinary examination (period) of July.

As an alternative, it is allowed to obtain the final qualification giving more weight relative to the "final test". In that case, the percentage corresponding to "written theoretical-practical tests" would be added to that of the "final test".

None of the qualifications obtained in any of the activities of the continuous assessment will be kept for the next academic year, except the laboratory practical exercises, if passed.

For students applying for Extraordinary Examination to Finish Studies, the continuous assessment will be kept of the course immediately prior, and a new theoretical test will be programmed with the same characteristics as the final test, both theory and practice. The weights of continuous assessment activities and the final test will be the same as ordinary course.

According to the Curricular Adaptation Regulations of the University of Alicante, students who concur with any of the circumstances referred to therein Curricular Adaptation is entitled to request an alternative assessment system during periods of ordinary and extraordinary assessment.

Description	Criteria	Type	Weighting system
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Exam	<p>Short questions final exam. It is considered a minimum mark of 4 out of 10 to average the practice exam. In the case of not having achieved this mark, there will be a theoretical test of practical exercises in the extraordinary exam in July. On the other hand, a minimum mark of 5 out of 10 is considered so you can keep the note for the next course.</p> <p>In the ARA group the script of practical exercises will be handed in English.</p>	ACTIVITIES OF EVALUATION DURING THE SEMESTER	20
Teacher observations	Evaluation by the teacher, from the acquisition of practical skills, material and laboratory equipment handling, as well as the use of the practice sessions.	ACTIVITIES OF EVALUATION DURING THE SEMESTER	5
Written theoretical-practical tests	<p>Short and objective written tests will be done in theory class. Similarly, in the group tutorials small controls could be done. The duration of control will vary depending on the number of questions, and it will be communicated in the Campus Virtual in advance. The weighting of this section will be the arithmetic mean of all the proposed tests.</p> <p>For the ARA group, the test will be in English.</p>	ACTIVITIES OF EVALUATION DURING THE SEMESTER	25
Final test	<p>Good command of the theoretical knowledge of the course. Test will consist on questions (60%) and short response questions (arguing or numerical resolution) (40%). A minimum mark of 4 out of 10 is required to mediate the continuous assessment. Marks between 4 and 5 could be considered in the extraordinary examinations in July.</p> <p>For the ARA group, test questions will be in English.</p>	FINAL TEST	50

Official exam dates for academic year 2018-19

Exam session	Date	Time	Group - Classroom(s) allocated	Comments
(C3) Periodo ordinario para asignaturas de segundo semestre y anuales	31/05/2019			
(C4) Pruebas extraordinarias para asignaturas de grado y máster	08/07/2019			

