

**COURSE DATA****Data Subject**

<b>Code</b>	36346
<b>Name</b>	Introduction to Biochemistry and Molecular Biology
<b>Cycle</b>	Grade
<b>ECTS Credits</b>	6.0
<b>Academic year</b>	2020 - 2021

**Study (s)**

<b>Degree</b>	<b>Center</b>	<b>Acad. year</b>	<b>Period</b>
1109 - Degree in Biochemistry and Biomedical Sciences	Faculty of Biological Sciences	1	Second term

**Subject-matter**

<b>Degree</b>	<b>Subject-matter</b>	<b>Character</b>
1109 - Degree in Biochemistry and Biomedical Sciences	4 - Biología	Basic Training

**Coordination**

<b>Name</b>	<b>Department</b>
IGUAL GARCIA, JUAN CARLOS	30 - Biochemistry and Molecular Biology
MINGARRO MUÑOZ, ISMAEL	30 - Biochemistry and Molecular Biology
TORDERA DONDERIS, VICENTE	30 - Biochemistry and Molecular Biology

**SUMMARY**

The course "Introduction to Biochemistry and Molecular Biology" is a basic course of 6 credits to be taught in the second semester of the first year of the Degree in Biochemistry and Biomedical Sciences. The subject is part of the basic "Biology" matter, which also include Biological Diversity (10 credits), Evolutionary Biology (6 credits) and Molecular Biosciences: history, experimentation and society (8 credits).

The course's main objective is to present and introduce students to the fundamental contents of Biochemistry and Molecular Biology which will be developed further in the following courses. It is intended that students acquire a solid foundation on which to build the complete training as biochemists and molecular biologists.



Also, the course aims to provide students of the first year an overview of the impact of Biochemistry and Molecular Biology at the current science and society with special emphasis in the area of Biomedicine.

## PREVIOUS KNOWLEDGE

### Relationship to other subjects of the same degree

There are no specified enrollment restrictions with other subjects of the curriculum.

### Other requirements

## OUTCOMES

### 1109 - Degree in Biochemistry and Biomedical Sciences

- Have capacity for analysis, synthesis and critical reasoning in the application of the scientific method.
- Be able to think in an integrated manner and approach problems from different perspectives.
- Be able to use new information and communication technologies.
- Know how to use the different bibliographic sources and biological databases and be able to use bioinformatic tools.
- Know the usual procedures used by scientists in the area of molecular biosciences and biomedicine to generate, transmit and disseminate scientific information.
- Know the common and differential molecular and cellular elements of the different types of living organisms with special emphasis on the human being and model organisms for their study.
- Understand experimental approaches and their limitations and interpret scientific results in molecular biosciences and biomedicine.
- Acquire skills to use the methodologies of molecular biosciences and to keep an annotated record of activities.
- Students must have acquired knowledge and understanding in a specific field of study, on the basis of general secondary education and at a level that includes mainly knowledge drawn from advanced textbooks, but also some cutting-edge knowledge in their field of study.
- Students must have developed the learning skills needed to undertake further study with a high degree of autonomy.

## LEARNING OUTCOMES

As an introductory course to the Degree, it is intended that students acquire the basic concepts related to:



- The structure and function of biomolecules.
- The mechanisms of replication, transcription and translation of genetic material.
- Biological processes for obtaining energy.
- The central metabolic pathways and their regulation.

Also, it is intended that students initiate in the following skills and processes:

- Ability to solve problems and issues through integrated application of knowledge.
- Ability to interpret experimental data.
- Ability to understand and analyze scientific texts.
- Properly use the language of biochemistry.
- Capacity for analysis, synthesis and critical thinking.
- Use of oral and written scientific language.
- Ability to disseminate scientific knowledge.
- Ability to work in teams and in multidisciplinary contexts.
- Capabilities, public presentation and defense of a job.
- Autonomous learning.
- Knowledge and application of the scientific method.

## DESCRIPTION OF CONTENTS

### 1. Introduction

Biochemistry and Molecular Biology at the Biomedical context. Biochemical interactions in aqueous solution. Biomolecules

### 2. Structure and function of proteins

Protein structural levels. Protein function: introduction to the phenomenon of cooperativity and allosterism and enzymology.



### **3. Structure and Function of Nucleic Acids**

Structure of nucleic acids. DNA metabolism. Fundamentals in the process of gene expression.

### **4. Bioenergetics**

Thermodynamics of life. ATP biochemistry. Chemiosmotic theory. Proton-motive force: introduction to electron transport chain and ATP synthase. Transport systems through membrane.

### **5. Metabolism**

A first look at the metabolism. Introduction to the central routes of metabolism and the main mechanisms of metabolic control. Metabolic alterations in biomedicine.

### **6. Methods in Biochemistry**

Introduction to basic analytical and separation techniques in biochemistry.

### **7. DNA technology**

An approach to the basic techniques of manipulation, cloning and amplification of DNA. Applications of DNA technology.

### **8. Systems biology and omics techniques**

Introduction: a holistic view of biological systems. The tools of systems biology: introduction to -omics techniques. Integrative models.

### **9. Seminars**

Specific topics selected by the teachers will be addressed.

**WORKLOAD**

ACTIVITY	Hours	% To be attended
Theory classes	49,00	100
Classroom practices	11,00	100
Development of individual work	20,00	0
Study and independent work	20,00	0
Preparation of evaluation activities	15,00	0
Preparing lectures	20,00	0
Preparation of practical classes and problem	15,00	0
<b>TOTAL</b>	<b>150,00</b>	

**TEACHING METHODOLOGY**

The development of the subject is divided into:

**Lectures.** Presentation and discussion of previously announced selected topics. Teaching and bibliographic resources will be available to students in multimedia. The teacher will present the basics of the subject, devoting more time to highly complex issues, and will guide the students in the integration of the contents with related issues of other subjects.

**Lectures of questions and problems.** Coordinated and parallel to the lectures program classroom, practical classes will be developed. In these classes the student participation through the resolution of issues will be stimulated. They will serve to develop activities that allow students to apply the knowledge acquired in theory classes and learn new skills in addressing scientific problems. In particular, case studies for preparation, study and discussion by students with teacher moderation will be proposed. Before any of the questions sessions, the teacher can request delivery of solved issues. These activities allow to know how students assimilate the concepts and thus help to better evaluate the student's work.

**Seminars.** Seminars that address issues in Biochemistry and Biomedical not included in the program of lectures will be scheduled in an integrated manner. Students will develop an overview of the seminars or will respond to a questionnaire about it. Attendance at seminars is mandatory.

**Review and discussion of news related to the subject.** Students will choose a science news appeared in the media related to the subjects of Molecular Biosciences and will perform a critical analysis of it, filling a form.





## EVALUATION

The evaluation of the contents of the program will be implemented by a single test that will consist of questions in various formats (multiple choice, questions, problems) to assess the knowledge and understanding acquired by the student on the subject and their ability to use the specific scientific language. The mark obtained in this exam will represent **80% of the final grade**.

The evaluation of the solved questions, seminar reviews and critical commentary on news, represent **20% of the final grade**. Active participation in class activities will be considered.

To pass the course is necessary to obtain a minimum score of 4.5 out of 10 in the examination and a final score equal to or greater than 5 out of 10.

## REFERENCES

### Basic

- Nelson, D.L. y Cox, M.M. Lehninger. Principios de Bioquímica. Ed. Omega, 6ª ed., 2014.

### Additional

- Peretó, J., Sendra, R., Pamblanco, M. y Bañó, C. Fonaments de bioquímica. Servei de Publicacions de la Universitat de València, 5ª ed., 2005 (traducción al castellano, 2007).
- Stryer, L., Berg, J.M. y Tymoczko, J.L. Bioquímica Curso básico Ed. Reverté, 2014.
- Stryer, L., Berg, J.M. y Tymoczko, J.L. Bioquímica con aplicaciones clínicas Ed. Reverté, 7ª ed., 2013.
- McKee, T. y McKee, J.R. Bioquímica. Las Bases Moleculares de la Vida. MacGraw Hill Interamericana Editores, 4ª ed., 2009.
- Mathews, C.K., Van Holde, K.E., Appling D.R. y Anthony-Cahill, S.J. Bioquímica. Ed. Pearson, 4ª ed., 2013.
- Voet, D. Voet, J.G., y Pratt, Ch.W. Fundamentos de Bioquímica: La vida a nivel molecular. Ed. Panamericana, 2ª ed., 2007.
- Alberts, B. y colaboradores. Biología Molecular de la Célula. Ediciones Omega, 5ª ed., 2010.

## ADDENDUM COVID-19

**This addendum will only be activated if the health situation requires so and with the prior agreement of the Governing Council**



### **1 y 2) Contenidos y Volumen de trabajo.**

Sin cambios.

### **3) Metodología.**

El punto de inicio dado el número de estudiantes y las aulas disponibles es de plena presencialidad en las actividades. Sin embargo, si la evolución de la situación derivada de la COVID-19 obliga a una reducción de la presencialidad, se tomarán las siguientes medidas:

1) Las actividades presenciales en aula se sustituirían en función de las herramientas tecnológicas disponibles en el aula en el momento de desarrollo del curso, por las siguientes metodologías:

- Videoconferencia síncrona
- Videos de presentaciones en mmedia.uv.es
- Presentaciones Powerpoint locutadas en Aula Virtual
- Presentaciones Powerpoint con apuntes extendidos en Aula Virtual
- Propuestas de actividades de resolución de Cuestionarios de Aula Virtual y entrega de tareas y cuestiones por Aula Virtual

2) Para tutorías y dudas se utilizarían las siguientes metodologías:

- Chats síncronos en Aula Virtual
- Foros asíncronos en Aula Virtual
- Comunicación directa profesor-estudiante a través del correo institucional

### **4) Evaluación.**

En caso de que los exámenes no pudieran ser presenciales, se realizarían 'on line' en Aula Virtual mediante las herramientas disponibles.

Los detalles concretos de la adaptación a las situaciones que se pudieran producir se supervisarán por la CAT y se comunicaran a los estudiantes a través de Aula Virtual