



## 1. General information

Course: BIOCHEMISTRY

Type: BASIC

Degree: 333 - UNDERGRADUATE DEGREE PROGRAMME IN PHYSIOTHERAPY

Center: 109 - FACULTAD DE FISIOTERAPIA Y ENFERMERÍA

Year: 1

Main language: Spanish

Use of additional  
languages:

Web site:

Code: 17307

ECTS credits: 6

Academic year: 2022-23

Group(s): 40

Duration: C2

Second language: English

English Friendly: Y

Bilingual: N

Lecturer: MARIA TERESA AGULLO ORTUÑO - Group(s): 40				
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Lecturer: GORKA RUIZ DE GARIBAY PONCE - Group(s): 40				
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## 2. Pre-Requisites

Not established

## 3. Justification in the curriculum, relation to other subjects and to the profession

**Justification:** Biochemistry belongs to the basic training module of the Health Sciences branch of knowledge. It allows the physiotherapy student to acquire knowledge about the structure, organization and functions of living matter in molecular terms. It is divided into three main areas: structural chemistry of the components of living matter and the relationship of biological function to chemical structure; metabolism, all the chemical reactions that take place in living matter; and the chemistry of the processes and substances that store and transmit biological information.

**Relationship with other subjects:** Biochemistry is related to many disciplines: with organic chemistry that describes the properties of biomolecules; with biophysics that applies the properties of physics to the study of biomolecules; with research, which tries to understand pathological states in molecular terms; with nutrition that has clarified metabolism by describing dietary needs for health maintenance; with microbiology, which has shown that single-celled organisms and viruses are especially suitable for determining many metabolic pathways and regulatory mechanisms; with the physiology that investigates the vital processes at tissue and organism level; with cell biology that describes the biochemical division of work within a cell and with genetics, which describes the mechanism that gives a certain cell or organism its biochemical identity. Biochemistry is interdisciplinary, it is a basic and transversal subject. In the Physiotherapy curriculum it is related to Human Morphophysiology, Neurophysiology, General Pathology and Physiotherapy in Clinical Specialties,

**Relationship with the profession:** Allows the student to achieve fundamental professional skills for a good development of their profession, such as knowing and identifying the structure and function of the human body. Understand the molecular and physiological bases of cells and tissues, apply information and communication technologies and systems, and know the pathophysiological processes and their manifestations, as well as the risk factors that determine health and disease states.

## 4. Degree competences achieved in this course

## Course competences

Code	Description
CB1	Prove that they have acquired and understood knowledge in a subject area that derives from general secondary education and is appropriate to a level based on advanced course books, and includes updated and cutting-edge aspects of their field of knowledge.
CB2	Apply their knowledge to their job or vocation in a professional manner and show that they have the competences to construct and justify arguments and solve problems within their subject area.
CB3	Be able to gather and process relevant information (usually within their subject area) to give opinions, including reflections on relevant social, scientific or ethical issues.
CB4	Transmit information, ideas, problems and solutions for both specialist and non-specialist audiences.
CB5	Have developed the necessary learning abilities to carry on studying autonomously
E04	Students must understand the molecular bases of cells and tissues.
E05	Students must know the diverse chemical reactions in living matter.
E06	Students must understand processes and substances that store and transmit biological information.
G01	Students must show their ability to make educated decisions and solve problems based on available knowledge and information within their field of study.
G02	Students must prove their organizational, planning, and time management skills for the teaching-learning process.
G03	Students must demonstrate their skills in terms of analyzing, summarizing both verbally and in writing, as well as producing and defending arguments.
G04	Students must show their skills in terms of verbal and written communication in Spanish.
G05	Students must show their ability to manage information properly.
G06	Students must show their capabilities and management of ITCs in their field of study.

G16	Students must show sensitivity towards environmental issues.
G19	Students must show respect, appreciation, and sensitivity towards the work of others.
G23	Students must have acquired knowledge and understanding of Health Sciences, based on advanced textbooks and cutting-edge knowledge in their field of study.
G26	Students must show respect for Human Rights, fulfilling principles of equality between genders, non-discrimination, and universal accessibility for people with disabilities.

## 5. Objectives or Learning Outcomes

### Course learning outcomes

Description

To describe and understand the main metabolic routes in cells and tissues.

To make a portfolio or laboratory notebook that includes the different practices accomplished, following the model provided by the teacher and using appropriate scientific language.

To schematize the processes for the transmission of biological information.

To explain the molecular basis of muscle contraction.

To know how to apply strategies for problem-solving and decision-making to professional practice.

## 6. Units / Contents

### Unit 1: Molecular structures of the living being

**Unit 1.1** Introduction to biochemistry

**Unit 1.2** Water structure

**Unit 1.3** Carbohydrates

**Unit 1.4** Lipids

**Unit 1.5** Amino acids

**Unit 1.6** Proteins

**Unit 1.7** Enzymes

**Unit 1.8** Biological membranes and transport

**Unit 1.9** Muscle contraction

### Unit 2: Genetic Information

**Unit 2.1** Nucleic acids

**Unit 2.2** DNA replication and transcription

**Unit 2.3** Protein translation and synthesis

### Unit 3: Metabolism

**Unit 3.1** Bioenergetic

**Unit 3.2** Digestion and absorption of nutrients

**Unit 3.3** Regulation of metabolism

**Unit 3.4** Immuneresponse

## 7. Activities, Units/Modules and Methodology

Training Activity	Methodology	Related Competences (only degrees before RD 822/2021)	ECTS	Hours	As	Com	Description
Class Attendance (practical) [ON-SITE]	Guided or supervised work	E04 E05 G01 G03 G04 G16 G26	0.16	4	Y	N	Students will carry out the corresponding practices in the laboratory. Students come to the laboratory in small groups.
Practicum and practical activities report writing or preparation [OFF-SITE]	Self-study	E04 E05 E06 G01 G02 G03 G04 G05 G06 G23	0.36	9	Y	N	Each working group will make a report on the practices carried out and answer the questions and assumptions raised in them.
Class Attendance (theory) [ON-SITE]	Lectures	E04 E05 E06 G01 G03 G04 G09 G18 G19 G23 G26	1.6	40	Y	N	The teacher explains the basic contents. Master classes will be available to students on virtual platforms.
Group tutoring sessions [ON-SITE]	Problem solving and exercises	E04 E05 E06 G01 G02 G03 G04 G05 G06 G08 G09 G13 G14 G26	0.2	5	Y	N	In the seminars, different topics are studied in depth. A forum for debate and discussion on the results and conclusions obtained is created.
Progress test [ON-SITE]	Assessment tests	CB1 CB2 CB3 CB4 CB5 E04 E05 E06 G01 G02 G03 G04 G05 G06 G16 G19 G23 G26	0.28	7	Y	N	The progress tests will be oral presentations and preparation of individual and group works that will deal with the theoretical and practical contents of the subject.
Final test [ON-SITE]	Assessment tests	CB1 CB2 CB3 CB4 CB5 E04 E05 E06 G01 G02 G03 G04 G05 G06 G16 G19 G23 G26	0.16	4	Y	Y	Students will take a final test on the theoretical contents of the subject.
Study and Exam Preparation [OFF-SITE]	Self-study	E04 E05 E06 G01 G02 G03 G04 G05 G06 G26	2.8	70	N	-	Study and preparation of tests
Writing of reports or projects [OFF-SITE]	Self-study	E04 E05 E06 G01 G02 G03 G05 G06 G23	0.44	11	Y	N	Students search for information on topics proposed in class, solve problems, discuss results and make

					oral and / or written presentations.
<b>Total:</b>			<b>6</b>	<b>150</b>	
<b>Total credits of in-class work: 2.4</b>			<b>Total class time hours: 60</b>		
<b>Total credits of out of class work: 3.6</b>			<b>Total hours of out of class work: 90</b>		

As: Assessable training activity

Com: Training activity of compulsory overcoming (It will be essential to overcome both continuous and non-continuous assessment).

8. Evaluation criteria and Grading System			
Evaluation System	Continuous assessment	Non-continuous evaluation*	Description
Practicum and practical activities reports assessment	15.00%	15.00%	Participation in laboratory practices. Presentations of results.
Oral presentations assessment	25.00%	25.00%	Oral presentation of topics / works, which may be individual or group, or both. Participation in discussions in the classroom.
Theoretical exam	60.00%	60.00%	Written test with multiple choice.
<b>Total:</b>	<b>100.00%</b>	<b>100.00%</b>	

According to art. 4 of the UCLM Student Evaluation Regulations, it must be provided to students who cannot regularly attend face-to-face training activities the passing of the subject, having the right (art. 12.2) to be globally graded, in 2 annual calls per subject, an ordinary and an extraordinary one (evaluating 100% of the competences).

#### Evaluation criteria for the final exam:

##### Continuous assessment:

In order to pass the course, the student must pass each of the evaluation tests with a percentage not less than 40% of the value assigned to each test. The final theory exam will be of multiple choice, with five alternative answers, of which only one is the true one. Incorrectly answered questions will deduct points from the final score. Every four wrong answers will be discounted a correct one, or the corresponding percentage. The number of questions will range from 50 to 80.

The practical reports and the oral presentation of topics will be assessed according to the rubric published at the beginning of the course on the virtual campus.

##### Non-continuous evaluation:

The evaluation of the activities that replace the continuous evaluation will be carried out through a specific exam in which the competences related to the different training activities will be evaluated.

#### Specifications for the resit/retake exam:

The test will consist of a multiple choice exam, with five alternative answers, of which only one is the true one. Incorrectly answered questions will deduct points from the final grade. Every four wrong answers will be discounted a correct one, or the corresponding percentage. The number of questions will range from 50 to 80.

The qualifications corresponding to "practical reports" and "oral presentation of topics" obtained in ordinary call, will be valid, in the same percentages, for the extraordinary call. If the student does not pass the extraordinary call, these scores will only be saved until the following academic year.

The qualifications corresponding to practicum and oral presentation of assessment obtained in ordinary call, will be valid, in the same percentages, for the extraordinary call.

#### Specifications for the second resit / retake exam:

The exam will be of similar characteristics to those of the ordinary and extraordinary calls.

9. Assignments, course calendar and important dates	
Not related to the syllabus/contents	
Hours	hours
Unit 1 (de 3): Molecular structures of the living being	
Activities	Hours
Class Attendance (practical) [PRESENCIAL][Guided or supervised work]	2
Class Attendance (theory) [PRESENCIAL][Lectures]	20
Group tutoring sessions [PRESENCIAL][Problem solving and exercises]	2
Study and Exam Preparation [AUTÓNOMA][Self-study]	25
Writing of reports or projects [AUTÓNOMA][Self-study]	4
Group 40:	
<b>Initial date:</b> 30-01-2023	<b>End date:</b> 03-03-2023
<b>Comment:</b> The duration of each topic in hours is merely indicative, since it will depend on the topics of debate that arise in class and on the participation of the students.	
Unit 2 (de 3): Genetic Information	
Activities	Hours
Class Attendance (theory) [PRESENCIAL][Lectures]	8
Group tutoring sessions [PRESENCIAL][Problem solving and exercises]	1
Progress test [PRESENCIAL][Assessment tests]	3
Study and Exam Preparation [AUTÓNOMA][Self-study]	10
Writing of reports or projects [AUTÓNOMA][Self-study]	3
Group 40:	
<b>Initial date:</b> 06-03-2023	<b>End date:</b> 17-03-2023
<b>Comment:</b> The duration of each topic in hours is merely indicative, since it will depend on the topics of debate that arise in class and on the participation of the students.	
Unit 3 (de 3): Metabolism	
Activities	Hours
Class Attendance (practical) [PRESENCIAL][Guided or supervised work]	2

Practicum and practical activities report writing or preparation [AUTÓNOMA][Self-study]	9
Class Attendance (theory) [PRESENCIAL][Lectures]	12
Group tutoring sessions [PRESENCIAL][Problem solving and exercises]	2
Progress test [PRESENCIAL][Assessment tests]	4
Final test [PRESENCIAL][Assessment tests]	4
Study and Exam Preparation [AUTÓNOMA][Self-study]	35
Writing of reports or projects [AUTÓNOMA][Self-study]	4
Group 40:	
<b>Initial date:</b> 20-03-2023	<b>End date:</b> 12-05-2023
<b>Comment:</b> The duration of each topic in hours is merely indicative, since it will depend on the topics of debate that arise in class and on the participation of the students.	
<b>Global activity</b>	
<b>Activities</b>	<b>hours</b>
Practicum and practical activities report writing or preparation [AUTÓNOMA][Self-study]	9
Class Attendance (theory) [PRESENCIAL][Lectures]	40
Group tutoring sessions [PRESENCIAL][Problem solving and exercises]	5
Progress test [PRESENCIAL][Assessment tests]	7
Final test [PRESENCIAL][Assessment tests]	4
Class Attendance (practical) [PRESENCIAL][Guided or supervised work]	4
Study and Exam Preparation [AUTÓNOMA][Self-study]	70
Writing of reports or projects [AUTÓNOMA][Self-study]	11
<b>Total horas: 150</b>	

10. Bibliography and Sources						
Author(s)	Title/Link	Publishing house	Citv	ISBN	Year	Description
Baynes, J.W., Dominiczak, M.	Bioquímica	Elsevier	Madrid	9788480867306	2014	
Campbell, M.	Bioquímica	Paraninfo	Madrid	9789706863355	2006	
Devlin, Thomas M.	Bioquímica: libro de texto con aplicaciones clínicas	Reverté	Barcelona	9788429172089	2004	
Feduchi E., Blasco I., Romero C.S., Yañez, E.	Bioquímica. Conceptos Esenciales	Médica Panamericana Lippincott	Madrid	978-84-9835-357-0	2014	
Harvey, R. and Ferrier, D.	Bioquímica	Williams and Wilkins	Madrid	9788496921832	2011	
Koolman, J.; Rohm, K.	Bioquímica	Médica Panamericana	Madrid	9788479037246	2005	
Lehninger, Albert L.	Bioquímica : las bases moleculares de la vida	Omega	Barcelona	84-282-0211-7	1985	
Lewin B.	Genes IX	Jones and Barlett Publishers		978-0131439818	2011	
Lozano Teruel, J.; et al	<a href="http://biology.jbpub.com/book/genes">http://biology.jbpub.com/book/genes</a> Bioquímica y biología molecular para ciencias de la salud	McGraw-Hill Interamericana	Madrid	9788448606428	2005	
Mathews, C., Van Holde, K. and Ahern, K.	Bioquímica	Addison Wesley	Madrid	9788478290536	2002	
Mathews, C.K.	Bioquímica	Pearson		9788490353929	2014	
Murray, Bender y Botham	Bioquímica Ilustrada de Harper	Mc Graw-Hill	Madrid	9786071509147	2013	
Nelson, D. and Cox, M.M.	Lehninger principios de bioquímica	Ediciones Omega	Barcelona	9788428216036	2014	
Segel, I.H.	Calculos de Bioquímica	Acirbia	Zaragoza	84-200-0504-5		
Stryer, Lubert	Bioquímica	Reverté	Barcelona	9788429176025	2013	
	Biomodelos					
	<a href="http://biomodel.uah.es/biomodel_misc/anim/memb/atpasa.html">http://biomodel.uah.es/biomodel_misc/anim/memb/atpasa.html</a>					