

**1. General information****Course:** FUNDAMENTALS OF BIOCHEMISTRY**Type:** BASIC**Degree:** 341 - UNDERGRADUATE DEGREE PROGRAMME IN BIOCHEMISTRY**Center:** 501 - FACULTY OF ENVIRONMENTAL SCIENCES AND BIOCHEMISTRY**Year:** 1**Main language:** Spanish**Use of additional languages:****Web site:****Code:** 13307**ECTS credits:** 6**Academic year:** 2021-22**Group(s):** 40**Duration:** C2**Second language:****English Friendly:** Y**Bilingual:** N**Lecturer:** OSCAR GOMEZ TORRES - Group(s): 40

Building/Office	Department	Phone number	Email	Office hours
Edificio ICAM. Dcho. 32	QUÍMICA INORG., ORG., Y BIOQ.	926051783	oscar.gomez@uclm.es	Monday 10-11h

Lecturer: MARIA RODRIGUEZ PEREZ - Group(s): 40

Building/Office	Department	Phone number	Email	Office hours
Edif. 6. Dcho 11	QUÍMICA INORG., ORG., Y BIOQ.	5435	maria.rodriguezperez@uclm.es	Tuesday and Wednesday 10-12h

2. Pre-Requisites

Not established

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

Not established

4. Degree competences achieved in this course**Course competences**

Code	Description
E01	Express themselves correctly in basic biological, physical, chemical, mathematical and computer terms.
E09	Be familiar with the different cell types (prokaryotes and eukaryotes) at the level of structure, physiology and biochemistry and be able to critically explain how their properties are adapted to their biological function.
E11	To have an integrated vision of the cellular functioning of both the metabolism and the gene expression, being able to relate the activity of the different cellular compartments.
E15	Experimentally determine the concentrations of metabolites, the kinetic and thermodynamic parameters and the control coefficients of the reactions of the intermediate metabolism.
E16	Know how to design and execute the different steps of a protein and nucleic acid purification protocol of a biological sample, determining the yield and the final purity.
E19	Understand the principles that determine the three-dimensional structure of biological molecules, macromolecules and supramolecular complexes and be able to explain the relationships between structure and function.
E21	Understand the chemical and thermodynamic principles of biocatalysis and the role of enzymes and other biocatalysts in the functioning of cells and organisms.
G03	Be able to collect and interpret relevant data, information and results, draw conclusions and issue reasoned reports on relevant social, scientific or ethical issues in connection with advances in Biochemistry and Molecular Biology.
T10	Ability to self-learn and to obtain and manage bibliographic information, including Internet resources

5. Objectives or Learning Outcomes**Course learning outcomes****Description**

To know the most relevant physiopathological alterations of the metabolism.

Understand the structure and function of the main types of macromolecules.

Know the fundamentals of enzymatic catalysis: enzymes and coenzymes.

To know the basic mechanisms of metabolic regulation.

Be able to describe the mechanism of ATP synthesis coupled to electronic transport.

To know the participation of the different macromolecules in the structure of the cellular organelles.

Understand the importance of the aqueous medium in biological systems.

Understand and understand the metabolic compartmentalization and its role in the regulation of metabolism.

To be able to make a general outline of the main catabolic and anabolic routes and to locate the main points of regulation.

Know how to interpret a michaelian kinetics, calculate the parameters of Vmax and Km and distinguish these kinetics from the allosteric ones.

To know the main anabolic and catabolic routes related to the metabolism of carbohydrates, lipids and proteins.

Additional outcomes**6. Units / Contents****Unit 1: Molecular components of living beings.****Unit 1.1** Introduction to Biochemistry.

- Unit 1.2** Proteins I
- Unit 1.3** Proteins II.
- Unit 1.4** Enzymes I
- Unit 1.5** Enzymes II
- Unit 1.6** Enzymes III
- Unit 1.7** Structure and function of coenzymes.
- Unit 1.8** Structure and function of carbohydrates and lipids.

Unit 2: Bioenergetics and Metabolism

- Unit 2.1** Introduction to metabolism.
- Unit 2.2** Carbohydrate metabolism.
- Unit 2.3** Oxidative metabolism.
- Unit 2.4** Gluconeogenesis and Metabolism of glycogen, glyoxylic acid cycle and glycogen metabolism.
- Unit 2.5** Lipid metabolism.
- Unit 2.6** Nitrogen metabolism.

Unit 3: Laboratory Sessions

- Unit 3.1** Purification and protein quantification
- Unit 3.2** Study of the enzymatic activity of catalase
- Unit 3.3** Purification and quantification of nucleic acids. Electrophoresis in agarose gels

7. Activities, Units/Modules and Methodology

Training Activity	Methodology	Related Competences (only degrees before RD 822/2021)	ECTS	Hours	As	Com	Description
Class Attendance (theory) [ON-SITE]	Lectures	E01 E09 E11 E15 E16 E19 E21	1.6	40	N	-	
Laboratory practice or sessions [ON-SITE]	Practical or hands-on activities	E01 E15 E16 E21 G03	0.6	15	Y	Y	
Practicum and practical activities report writing or preparation [OFF-SITE]	Self-study	G03	0.08	2	Y	Y	
Other on-site activities [ON-SITE]	Assessment tests	E15 E16 E21	0.04	1	Y	Y	
Writing of reports or projects [OFF-SITE]	Group Work	G03	0.12	3	Y	N	
Writing of reports or projects [OFF-SITE]	Group tutoring sessions	E01 E09 E11 E19 E21 T10	0.04	1	Y	N	
Study and Exam Preparation [OFF-SITE]	Self-study	E01 E09 E11 E19 E21 T10	3.36	84	N	-	
Final test [ON-SITE]	Assessment tests	E01 E09 E11 E19 E21	0.16	4	Y	Y	
Total:			6	150			
Total credits of in-class work: 2.4			Total class time hours: 60				
Total credits of out of class work: 3.6			Total hours of out of class work: 90				

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	5.00%	5.00%	evaluation of practicums. To pass the course it will be essential to obtain a minimum score of 4 points out of 10 in this test.
Test	10.00%	10.00%	practice test. To pass the course it will be essential to obtain a minimum score of 4 points out of 10 in this test.
Theoretical papers assessment	5.00%	0.00%	Assessment of reflective summaries
Final test	80.00%	85.00%	Final exam. To pass the course it will be essential to obtain a minimum score of 4 points out of 10 in this test.
Total:	100.00%	100.00%	

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:

The final mark for the course will be calculated taking into account the percentages in the table above. It will be an essential requirement to obtain a minimum of 4 in the practical exam and in the theory exam for the rest of the qualifications to be counted. The theory exam is ONLY passed with a 4. Therefore, in case of obtaining a mark lower than 4 in the practical or theory exam, the student will have to take the exam in the second retake exam. The subject will only be passed with a mark equal to or greater than 5 by adding all the assessable activities.

Non-continuous evaluation:

The final mark for the course will be calculated taking into account the percentages in the table above. The theory exam is ONLY passed with a 4. Therefore, in the case of obtaining a mark lower than 4 in the practical or theory exam, the student will have to take the exam in the second retake exam. The subject will only be passed with a mark equal to or greater than 5 by adding all the assessable activities.

Specifications for the resit/retake exam:

The final mark for the course will be calculated taking into account the percentages described in the section corresponding to the ordinary call. Again, it will be

an essential requirement to obtain a minimum of 4 in the practical exam and in the theory exam for the rest of the qualifications to be counted. The theory exam is ONLY passed with a 4. Therefore, in the event of obtaining a grade lower than 4 in the practice or theory exam, the student will fail the subject. The subject will only be passed with a mark equal to or greater than 5 by adding all the assessable activities.

Specifications for the second resit / retake exam:

To pass this exam there will only be a final test that will include concepts and learning developed both in theory and practical classes, and that will account for 100% of the grade. To take the exam, it will be essential that the laboratory practices have been carried out. In order to count the theory and practice mark, the minimum mark in both cases must be 4. The subject will only be passed with a mark equal to or greater than 5 by adding all the assessable activities.

9. Assignments, course calendar and important dates		
Not related to the syllabus/contents		
Hours	hours	
Unit 1 (de 3): Molecular components of living beings.		
Group 300:		
Initial date: 28/01/2020	End date: 8/05/2020	
Group 40:		
Initial date: 28/01/2020	End date: 8/05/2020	
Unit 2 (de 3): Bioenergetics and Metabolism		
Group 40:		
Initial date: 28/01/2020	End date: 8/05/2020	
Group 300:		
Initial date: 28/01/2020	End date: 8/05/2020	
Unit 3 (de 3): Laboratory Sessions		
Group 40:		
Initial date: 28/01/2020	End date: 8/05/2020	
Group 300:		
Initial date: 28/01/2020	End date: 8/05/2020	

10. Bibliography and Sources						
Author(s)	Title/Link	Publishing house	Citv	ISBN	Year	Description
Feduchi, Blasco, Romero & Yañez	Bioquímica, Conceptos esenciales	Panamericana		978-84-9835-357-0	2011	
Horton	Principios de Bioquímica	Pearson Educación		9789702610250	2007	
Mathews, Van Holde & Ahern	Bioquímica	Addison Wesley		9788478290536	2003	
Nelson & Cox	Lehninger: Principios de Bioquímica	Omega	Barcelona	978-84-282-1486-5	2009	
Stryer, Berg & Tymoczko,	Bioquímica	Reverte-6ª edición		9788429176001	2008	
Voet, Voet & Pratt	Fundamentos de bioquímica: la vida a nivel molecular	Panamericana		9789500623148	2007	