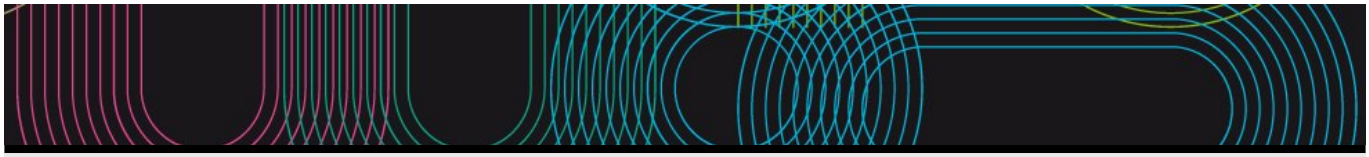

IDENTIFYING DATA				
Biological chemistry				
Subject	Biological chemistry			
Code	V11G200V01602			
Study programme	(*)Grao en Química			
Descriptors	ECTS Credits	Choose	Year	Quadmester
	9	Mandatory	3rd	2nd
Teaching language	Spanish			
Department				
Coordinator	Valverde Pérez, Diana			
Lecturers	Pérez Cid, Benita Silva López, Carlos Teijeira Bautista, Marta Valverde Pérez, Diana			
E-mail	dianaval@uvigo.es			
Web				
General description	Introductory course of Biochemistry, global and integrated knowledge of the molecular mechanisms responsible of biological processes.			

Competencies	
Code	
A1	Students have demonstrated knowledge and understanding in a field of study that builds upon their general secondary education, and is typically at a level that, whilst supported by advanced textbooks, includes some aspects that will be informed by knowledge of the forefront of their field of study
A2	Students can apply their knowledge and understanding in a manner that indicates a professional approach to their work or vocation, and have competences typically demonstrated through devising and sustaining arguments and solving problems within their field of study
A3	Students have the ability to gather and interpret relevant data (usually within their field of study) to inform judgments that include reflection on relevant social, scientific or ethical issues
A5	Students have developed those learning skills that are necessary for them to continue to undertake further study with a high degree of autonomy
C4	Demonstrate knowledge and understanding of essential facts, concepts, principles and theories: Basics and tools for solving analytical problems and characterization of chemical substances
C15	Demonstrate knowledge and understanding of essential facts, concepts, principles and theories in: chemistry of biological molecules and their processes
C19	Apply knowledge and understanding to solve basic problems of quantitative and qualitative nature
C21	Recognize and implement good scientific practices for measurement and experimentation
C23	Present oral and written scientific material and scientific arguments to a specialized audience
C25	Handle chemicals safely, considering their physical and chemical properties, including the evaluation of any specific risks associated with its use
C26	Perform common laboratory procedures and use instrumentation in synthetic and analytical work
C27	Monitor, by observation and measurement of physical and chemical properties, events or changes, and document and record them in a consistent and reliable way
C28	Interpret data derived from laboratory observations and measurements in terms of their significance and relate them to the appropriate theory
D1	Communicate orally and in writing in at least one of the official languages of the University
D3	Learn independently
D4	Search and manage information from different sources
D5	Use information and communication technologies and manage basic computer tools
D7	Apply theoretical knowledge in practice
D8	Teamwork
D9	Work independently

D12	Plan and manage time properly
D13	Make decisions
D14	Analyze and synthesize information and draw conclusions
D15	Evaluate critically and constructively the environment and oneself

Learning outcomes

Expected results from this subject	Training and Learning Results		
New			
Identify and recognise the structure of the distinct types of *biomoléculas and represent them properly, recognise his properties and his chemical reactivity.	A1 A3	C15	D1 D3 D4 D5 D7 D8 D9 D12 D13 D14 D15
Recognise the distinct biological activities of the diverse types of *biomoléculas	A1 A3	C15	D1 D3 D4 D5 D7 D8 D9 D12 D13 D14 D15
Define the kinetical enzymatic of reactions *catalizadas by enzymes as well as his general mechanisms. Recognise the distinct types of inhibition of the enzymatic activity and his quantification	A1 A3	C4 C15	D1 D3 D4 D5 D7 D8 D9 D12 D13 D14 D15
Relate the vitamins with the corresponding *coenzimas of enzymatic reactions	A1 A3	C15	D1 D3 D4 D5 D7 D8 D9 D12 D13 D14 D15
Explain he concept of *Bioenergética. Reason conceptually the importance of him attachment of the processes *endergónicos and *exergónicos in the biological systems	A1 A3	C15	D1 D3 D4 D5 D7 D8 D9 D12 D13 D14 D15

Enumerate the main structural appearances of the ATP that determine his paper in the transfer of energy. Describe the cycle of the ATP.	A1 A3	C15	D1 D3 D4 D5 D7 D8 D9 D12 D13 D14 D15
Distinguish the metabolic roads of the *biomoléculas, as well as his interrelationships and regulation	A1 A3	C15	D1 D3 D4 D5 D7 D8 D9 D12 D13 D14 D15
Explain the foundations of the current technicians of *proteómica and molecular biology in relation with the isolation, separation, purification, determination, identification and manipulation of proteins and nucleic acids	A1 A2 A3	C4 C15	D1 D3 D4 D5 D7 D8 D9 D12 D13 D14 D15
Apply experimentally some basic technicians in Biochemistry. Justify the application of the distinct instrumental technicians in the analysis of *biomoléculas	A1 A2 A3	C4 C15 C19 C21 C23 C25 C26 C27 C28	D1 D3 D4 D5 D7 D8 D9 D12 D13 D14 D15
Distinguish the main operations involved in the commercial production of *biomoléculas, as well as his foundations. Recognise the possible practical applications of *biomoléculas, with special emphasis in the characteristic operational conditions	A1 A2 A3 A5	C15 C21 C23 C25 C26 C27 C28	D1 D3 D4 D5 D7 D8 D9 D12 D13 D14 D15
Distinguish and pose analytical protocols of application of the previously mentioned technicians to the analysis of *biomoléculas in diverse areas (clinical, pharmaceutical, *biomédica, etc.)	A1 A2 A3 A5	C4 C15 C19 C21 C23 C25 C26 C27 C28	D1 D3 D4 D5 D7 D8 D9 D12 D13 D14 D15

Contents

Topic	
1.Biomolecules	Carbohydrates: Classification and structure. Lipids: Classification and structure. Biological functions of the lipids. Proteins: Structure and configuration of the proteins. Relation structure - function. Nucleic Acids: Structure and function.
2.Biocatalisis	Nomenclature and classification of the enzymes Enzymatic Kinetics Mechanisms of the enzymatic reactions Effect of the temperature in the enzymatic reaction and inhibition Quantification of the enzimatic activity. Alosteric enzymes
3.Vitamins and coenzymes	Structure and role in metabolic reactions
4.Metabolism of glucides	Degradative Metabolism of glucides: glycolysis. Metabolic crossroad of pyruvate. Degradative Oxidation of acetil-CoA. Respiratory chain and oxidative phosphorylation. Oxidative Route of the pentoses phosphate. Gluconeogénesis. Metabolism of glycogen.
5. Metabolism of lipids	Degradation of lipids: oxidation of fatty acids . Biosynthesis of fatty acids.
6. Metabolism of proteins	Proteolisis. Degradation of amino acids. Destination of the ion ammonium. Biosynthesis of amino acids.
7.Metabolism of nucleotides	Degradation of nucleic acids and nucleotides. Biosynthesis of nucleotides.
8.Experimental methods in Biochemistry	Technics for synthesis and isolation of biomolécules Separation, determination and identification of proteins Determination and quantification of lipids Determination and quantification of glycogen Evaluation of the enzymatic activity. Effect of the temperature and inhibition Polymerase chain reaction. Utilisation of restriction enzymes

Planning			
	Class hours	Hours outside the classroom	Total hours
Seminars	13	19.5	32.5
Laboratory practises	45.5	68.25	113.75
Troubleshooting and / or exercises	3	3	6
Master Session	26	26	52
Short answer tests	6	9	15
Practical tests, real task execution and / or simulated.	2.3	3.45	5.75
*The information in the planning table is for guidance only and does not take into account the heterogeneity of the students.			

Methodologies	
	Description
Seminars	They formulate , they argue and they resolve questions, related with the matter.
Laboratory practises	They will propose questions practise, to resolve in the laboratory.
Troubleshooting and / or exercises	Activity in which they formulate problems and/or exercises related with the matter. The student has to develop the suitable or correct solutions by means of the realisation of routines, the application of formulas or algorithms, the application of procedures of transformation of the available information and the interpretation of the results. It is used to employ as I complement of the magistral lesson.
Master Session	Exhibition by the professor of the contents on the matter object of study, theoretical bases and/or guidelines of a work, exercise or project to develop by the student.

Personalized attention	
Methodologies	**Description**
Seminars	The professor will resolve the doubts of the students for the good development of the activities proposed
Laboratory practises	The professor will resolve the doubts of the students for the good development of the activities proposed

Troubleshooting and / or exercises	The professor will resolve the doubts of the students for the good development of the activities proposed

Assessment

	Description	Qualification	Training and Learning Results		
Seminars	It will value the participation in the seminars and in the discussions that propose in him	15		C4 C15 C19 C23	D3 D4 D8 D12 D14 D15
Laboratory practises	It will value the assistance to practise them, the development of the same, the delivery of a memory of practise.	35	A1 A2 A3 A5	C15 C19 C21 C25 C26 C27 C28	D3 D7 D9 D12 D13 D14
Short answer tests	They will realise 2 controls with a value of 15% and 20% respectively and a final examination (15%).	50	A1 A3	C4 C15	D1 D3 D4 D9 D12 D14

Other comments on the Evaluation

The note of the controls will have eliminatory character, as long as it reach the minimum value of 5. To surpass the matter the professor has to to have in time and form of a minimum of 80% of the work requested to the student. It will be necessary to take out a 5 in the theoretical proofs of the matter to be able to take into account the rest of the elements of evaluation in the matter. In case of not reaching the necessary minimum, the final note will be the note that appears in the theoretical examination end. For the theoretical evaluation final will take into account the note obtained in the *ultimo examination, will not save the note of the previous controls if it realises the evaluation of this part in the final examination. The no realisation of any control along the course and the no assistance to the final examination will be considered how no presented. The final qualification of the students approved will be able to be normalised, so that the qualification but high will be of until 10 points. The professor will realise a follow-up of the experimental work realised by the student in the sessions of laboratory; as well as of the fascicle/ inform elaborated. The assistance to practices is compulsory, the fault of assistance even being justified will penalise the note. An inferior assistance to 75% of the practical sessions supposes the qualification of suspense in the matter. For the evaluation of Julio will realise a theoretical proof that it will be he 50% of the evaluation of the matter, will keep the qualification obtained so much in practices as in seminars. If #prpers having delivered 75% of the work of practices, has not obtained the minimum note, will be able to realise in Julio an examination of recovery of practices.

Sources of information

Basic Bibliography

Complementary Bibliography

Stryer L., Berg J. M. & Tymoczko J. L., **Bioquímica**, 7ª, Editorial Reverté, 2013

Lehninger, Nelson D. L. & Cox M. M., **Principios de Bioquímica**, 7ª, Macmillan Higher Education, cop. 2017, 2017

McKee and McKee, **Bioquímica**, 5ª, Ediciones McGraw Hill, 2014

Vollhardt, K.P.C., Schore, N.E., **Química Orgánica**, 5ª, Omega, 2007

Andreas Manz, Nicole Pamme, Dimitri Lossifidis, **Bioanalytical Chemistry**, 2ª, Imperial College Press, 2015

Victor A. Gault and Neville H. McClenaghan, **Understanding Bioanalytical Chemistry: principles and Applications**, 1ª, Wiley Blackwell, 2009

Feduchi, Blasco, Romero, Yañez, **Bioquímica**, 2ª, Panamericana, 2015

John Kuriyan, Boyana Konforti, David Wemmer, **The Molecules of Life**, 1ª, Garland Science, 2013

Schlick, Tamar, **Molecular modeling and simulation : an interdisciplinary guide**, 1ª, Springer Science+Business Media,, 2010

Recommendations

Subjects that it is recommended to have taken before

Analytical chemistry I/V11G200V01302
Organic chemistry I/V11G200V01304
Organic chemistry II/V11G200V01504