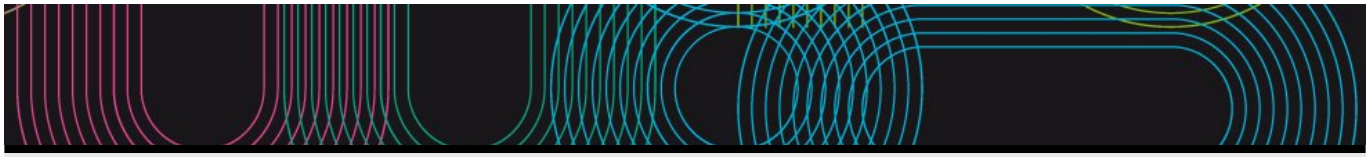
Universidade Vigo

Subject Guide 2023 / 2024



IDENTIFYING DATA				
Biochemistry II				
Subject	Biochemistry II			
Code	V02G031V01206			
Study programme	Grado en Biología			
Descriptors	ECTS Credits	Choose	Year	Quadmester
	6	Mandatory	2nd	2nd
Teaching language	Spanish			
Department				
Coordinator	Suárez Alonso, María del Pilar			
Lecturers	San Juan Serrano, María Fuencisla Suárez Alonso, María del Pilar			
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General description	English Friendly subject: International students may request from the teachers: a) resources and bibliographic references in English, b) tutoring sessions in English, c) exams and assessments in English.			

Training and Learning Results	
Code	
A1	Students should prove understanding and knowledge in this study field that starts in the Secundary Education and with a level that, even though it is suppported in advanced books, also includes some aspects that involve knowledge from the vanguard of the study field.
A2	Students should know how to apply their knowledge to their work or vocation in a professional way. They also should have the competences that are usually proved through the elaboration and defence of arguments and the resolution of problems within their study field.
B2	Manage scientific-technical information using diverse and reliable sources. Analyze data and documents and interpret them critically and rigorously, including considerations on their social relevance and in the professional field of Biology.
B3	Apply the knowledge acquired in the degree and use the scientific-technical instrumentation and CIT in contexts of Biology and/or related to the professional practice.
B6	Develop analysis and synthesis, critical reasoning and argumentation skills, applying them in Biology and other scientific-technical disciplines.
C1	Solve problems by applying the scientific method, the concepts and terminology specific to biology, mathematical models and statistical and computer tools.
C4	Isolate, identify and growth microorganisms, cells, tissues and organs, making easier their study and the assessment of their metabolic activity.
C6	Understanding and integrate the functioning of living beings (cellular, tissue, organ and individual level), explaining their homeostatic and adaptive responses.
C10	Identify biological and biotechnological processes and their potential applications, in particular in health, agri-food and environmental fields.
C11	Perform and interpret bioassays, identify chemical and biological agents, including pathogens, as well as their toxic products. Develop and apply biological control techniques.
C13	Provide training, participate in R+D+i projects, communicate results and disseminate knowledge. Contribute to the social projection of biology and to raising awareness of the environment.
D1	Understand the meaning and use of the gender perspective in the different fields of knowledge and in professional practice with the aim of achieving a fairer and more equal society.
D2	Communicate speaking and in writing in Galician.
D4	Collaborate and work in teams or multidisciplinary groups, promote negotiation skills and the ability to reach agreements.

Expected results from this subject	
Expected results from this subject	Training and Learning Results

Describe the regulation and integration of metabolism.	A1	B2	C4	D1
		B3	C6	D2
Identify metabolic specialization.	A1	B2	C4	D1
	A2	B3	C10	D2
		B6	C11	
Know and apply the molecular mechanisms of the processes responsible for the maintenance, modification and expression of genetic information.	A1	B2	C4	D1
	A2	B3	C6	D2
		B6	C10	
Know the fundamentals of molecular biology.	A1	B2	C4	D1
	A2	B3	C6	D2
		B6		
Apply the knowledge of Biochemistry to isolate, identify, handle and analyze specimens and samples of biological origin, as well as to characterize their cellular and molecular constituents.	A1	B2	C4	D1
	A2	B3	C6	D2
		B6	C10	
			C11	
Analyze and interpret the functioning of living beings and their adaptation to the environment.	A1	B2	C4	D1
	A2	B3	C6	D2
		B6	C10	
			C11	
Apply knowledge and technology related to Biochemistry in aspects related to the production, exploitation, analysis and diagnosis of biological processes and resources.	A1	B2	C1	D1
	A2	B3	C4	D2
		B6	C6	D4
			C10	
			C11	
Obtain information, develop experiments and interpret the results.	A1	B2	C1	D1
Understand the social projection of Biochemistry and its impact on professional practice, as well as know how to use its contents to teach and disseminate.	A2	B3	C4	D2
		B6	C6	D4
			C10	
			C11	
			C13	
Application and management of the concepts, terminology and scientific-technical instrumentation related to Biochemistry.	A1	B2	C1	D1
	A2	B3	C4	D2
		B6	C6	D4
			C10	
			C11	
			C13	
New	A1	B2	C1	D1
	A2	B3	C10	D2
		B6	C13	D4

Contents

Topic	
1. Cell signalization.	Signaling systems. Intracellular receptors. Membrane receptors. Tyrosine kinase receptors . Receptors of cytokines. Receptors linked to protein G. Signaling routes.
2. Hormonal regulation.	Hormone regulation of metabolism. Main hormones involved in metabolism regulation.
3. Regulation of glycogen metabolism.	Regulation of glycogen degradation and synthesis: glycogen phosphorylase and glycogen synthase. Hormonal regulation of glycogen metabolism in muscle and liver.
4. Regulation of glucose metabolism.	Incorporation of carbohydrates from the diet to the glucidic metabolism. Uptake of glucose by tissues. Regulation of glycolysis. Regulation of gluconeogenesis. Regulation of the pentose phosphate route.
5. Regulation of lipidic metabolism.	Incorporation of lipids from the diet to lipid metabolism. Lipid transport: lipoproteins. Regulation of cholesterol synthesis and degradation. Regulation of the synthesis and degradation of triacylglycerols and fatty acids.
Integration and metabolism central route regulation	Regulation of the enzymatic complex pyruvate dehydrogenase. Regulation of the respiratory chain and oxidative phosphorylation.
Metabolic specialization of the main organs	Metabolic interrelations in various nutritional states. Metabolic specialization of the organs.
Metabolism of proteins.	Protein destinations. Degradation of proteins. Ubiquitin and proteasome. Metabolism of ammonium ion.
Practice 1	Determination of the activity of the enzyme pyruvate kinase.
Practice 2	Determination of the activity of the enzyme succinate dehydrogenase
Practice 3	Kinetics of a metabolic enzyme
Practice 4	Respiratory chain and oxidative phosphorylation. Theoretical experiments

Practice 5	Determination of the activity of the alkaline phosphatase enzyme.
Practice 6	Isolation of glycogen from liver and kidney
Practice 7	Quantification of glycogen concentration

Planning			
	Class hours	Hours outside the classroom	Total hours
Laboratory practical	15	7.5	22.5
Lecturing	29	29	58
Seminars	3	1.5	4.5
Objective questions exam	1	14	15
Essay questions exam	2	48	50
*The information in the planning table is for guidance only and does not take into account the heterogeneity of the students.			

Methodologies	
	Description
Laboratory practical	They will be carried out in the teaching laboratory of Biochemistry. The assistance to practic classes is obligatory. During the practices, the student will follow a practice script prepared by the teacher to develop the experimental protocols. The student makes a series of determinations of metabolites and enzymes and, according to his experimental results, he must identify organs and subcellular fractions with different metabolic functions. During the development of the practices, students must present the results obtained, answer a series of questions and and when they finish all the practices they will have to prepare their corresponding report.
Lecturing	The teacher will explain contents of the subject through master classes, with slide shows and videos. Students will have support copies with figures, diagrams and tables. The classes will be developed interactively with the students. The Moovi Platform will be used as a support tool.
Seminars	There will be different activities that allow the student to consolidate the knowledge of the subject. They will be done in the classroom and in the presence of the teacher. Students must answer questions raised by the teacher. Your assistance is also mandatory.

Personalized assistance	
Methodologies	**Description**
Laboratory practical	Students will be attended individually in the tutoring hours. Attention to the student can be done electronically (email, videoconference, forums in Moovi, etc.) under the modality of prior agreement.
Lecturing	Students will be attended individually in the tutoring hours. Attention to the student can be done electronically (email, videoconference, forums in Moovi, etc.) under the modality of prior agreement.
Seminars	Students will be attended individually in the tutoring hours. Attention to the student can be done electronically (email, videoconference, forums in Moovi, etc.) under the modality of prior agreement.
Tests	**Description**
Objective questions exam	Students will be attended individually in tutoring hours. Attention to the student can be done electronically (email, videoconference, forums in Moovi, etc.) under the modality of prior agreement.
Essay questions exam	Students will be attended individually in tutoring hours. Attention to the student can be done electronically (email, videoconference, forums in Moovi, etc.) under the modality of prior agreement.

Assessment							
	Description	Qualification	Training and Learning Results				
Laboratory practical	Mandatory attendance. The teacher will evaluate the ability and behavior in the laboratory (5% of the final mark) as well as the realization of a practical report (15% of the final mark), in which the students must show the results obtained including a brief discussion. It is essential to obtain a minimum score of 5 out of 10 to be able to weigh with the rest of the sections. This activity is not recoverable if the required minimum is not reached.	20	A1 A2	B2 B3 B6	C1 C4 C6 C10 C11 C13	D1 D2 D4	

Seminars	Knowledge of the topics covered will be assessed by solving exercises, which will be handed in on the date set by the teacher. Attendance and delivery of the exercises is mandatory. It is necessary to obtain a minimum grade of 5 out of 10 to be able to weigh the final grade with the rest of the sections. This activity is not recoverable if the required minimum is not reached.	20	A1 A2	B2 B3 B6	C1 C4 C6 C10 C11 C13	D1 D2 D4
Objective questions exam	A first written test corresponding to topics 1-3 will be carried out on the date approved by the Faculty Board (see the center's website). This test will consist of multiple choice questions. It is essential to obtain a minimum score of 5.0 out of 10 to be able to weigh with the rest of the sections. This grade will account for 25% of the final grade.	25	A1 A2	B2 B3 B6	C1 C4 C6 C10 C11 C13	D1 D2
Essay questions exam	A second written test corresponding to topics 4-7 will be carried out on the date approved by the Faculty Board (see the center's website). This test will consist of multiple choice questions and a question on the integration of metabolism regulation. It is essential to obtain a minimum score of 5.0 out of 10 to be able to weigh with the rest of the sections. This grade will account for 35% of the final grade.	35	A1 A2	B2 B3 B6	C1 C4 C6 C10 C11 C13	D1 D2

Other comments on the Evaluation

The **evaluation** of the **Biochemistry II** subject is **continuou**s throughout the academic year. To be evaluated in this way, the student must carry out all the proposed activities (laboratory exercises, seminars and two written tests).
The particular situations that prevent participation in the usual activities (laboratory practices and seminars) (example: employment contract, illness, etc.) must be communicated as soon as possible to the teacher to find a solution.
Attendance is mandatory in the case of **seminars** and **laboratory practices**, admitting a single lack of attendance, which must be duly justified.
To pass the course of Biochemistry II (final grade as the sum of the weighted grades) it is essential to have obtained a grade equal to or higher than the minimum grade required in each of the activities that can be evaluated separately. Otherwise, the grades will not be added, and the grade that will appear in the Biochemistry II report will be the highest of the sections passed.
The activities approved in the first opportunity (May) of an academic year are maintained for the second opportunity (July). In the second opportunity (July) it will not be possible to recover laboratory practices and seminars, only partial exams not passed in the first opportunity can be taken.
In the event that the student does not attend any of the evaluable activities, it will appear as NOT PRESENTED in the Biochemistry II report on both occasions (May and July). Carrying out some of the proposed evaluable activities, but not all, automatically implies a fail in the Biochemistry II report (both opportunities).
These criteria will be applied identically on both occasions.
Likewise, students who prefer a global assessment of the Biochemistry II subject must notify them as soon as possible. The global exam will include questions from the laboratory practices, exercises from the seminars and all the theoretical part.
Students who do not pass the Biochemistry II subject on either of the two occasions, will keep the grade for the activities (practices and seminar) for the following two academic years, provided they have reached the minimum grade required. Only activities not passed will be repeated. Activities that have already been approved cannot be re-evaluated.
The academic calendar can be consulted at the following link: http://bioloxia.uvigo.es/gl/docencia/horariosThe exam schedule can be consulted at the following link: http://bioloxia.uvigo.es/gl/docencia/exames

Sources of information

Basic Bibliography

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

Voet, D;Voet, J.G.; Pratt, C.W., **Fundamentos de Bioquímica. la vida a nivel molecular**, 4ª Edición, Editorial Médica Panamericana, 2016

Nelson, D. L. y Cox, M. M., **Lehninger Principios de Bioquímica**, 7ª Edición, Omega, 2019

Lodish, H; Beck, A; Kaiser, C.A.; Krieger, M; Bretscher,A; Ploegh, H; Amon, A; Scott, M.P., **Biología Celular y Molecular**, 7ª Edición., Editorial Médica Panamericana, 2016

José María Teijón Rivera y Mª Dolores Blanco Gaitáncol., **Fundamentos de la Bioquímica metabólica**, 4ª edición, Tebar, 2016

Complementary Bibliography

Recommendations