



COURSE UNIT (MODULE) DESCRIPTION

Course unit (module) title	Code
Biochemistry	

Lecturer(s)	Department(s) where the course unit (module) is delivered
<i>Coordinator: Assoc. Prof. Dovilė Karčiauskaitė</i>	Dept. of Physiology, Biochemistry, Microbiology and Laboratory medicine

Study cycle	Type of the course unit (module)
integrated studies	Compulsory

Mode of delivery	Period when the course unit (module) is delivered	Language(s) of instruction
Face-to-face Lectures, seminars and laboratory task	I semester	Lithuanian, English

Requirements for students	
Prerequisites:	Additional requirements (if any): good knowledge of organic chemistry

Course (module) volume in credits	Total student's workload	Contact hours	Self-study hours
5	134	67	67

Purpose of the course unit (module): programme competences to be developed		
The goal: to be able to understand the fundamental processes of the body's metabolism and regulation, to explain pathological conditions to assess basic biochemical tests.		
Learning outcomes of the course unit (module)	Teaching and learning methods	Assessment methods
<p>To act honestly and according to ethical obligations, follow the rules in the laboratory, think critically and self-critically, be creative, take the initiative, and communicate and work in a team with other students.</p>	<p>Lectures, seminars, laboratory work, small group discussions, process map making, discussions, case studies, and labs</p>	<ul style="list-style-type: none"> • continuous evaluation of seminars and laboratory tasks. • quiz orally or in writing (10-point scale) • written examination
<p>To know the peculiarities of the structure of the main compounds involved in the vital processes of the organism and the most important chemical transformations and their relation to biological functions.</p> <p>To know and be able to explain the main processes of metabolism and metabolism of human substances and energy, carbohydrate lipids, protein metabolism and their regulation.</p>		

Content: breakdown of the topics	Contact hours							Self-study work: time and assignments	
	Lectures	Tutorials	Seminars	Exercises	Laboratory work	Internship/work placement	Contact hours	Self-study hours	Assignments
Proteins: their structure, function, and classification. Amino acids Exp. Determination Of Protein Concentration In Serum using Biuret method.	2			2			4	4	To be prepared for discussion about proteins structure, properties and function.
Plasma proteins and peptides. Collagen. Exp. Determination Of Protein Concentration In Urine	2			2			4	4	To be prepared for discussion about plasma proteins and collagen
Enzymes: their structure, properties and mechanism of action. Regulation of enzyme activity. Exp. Measurement of alanine aminotransferase and aspartate aminotransferase activity in blood serum.	2			2			4	4	To be prepared for discussion about enzymes, their action and regulation.
Coenzymes and vitamins. Enzymopathies. Exp. Estimation Of Vitamin C In Urine	2			2			4	4	To be prepared for discussion about coenzymes and vitamins.
Bioenergetics. Energy carriers. ATP synthesis. Electron transport chain. Tricarboxylic acid cycle.	2		2				4	4	To be prepared for the discussion about bioenergetics, TCA and ETC.
Functions and classification of carbohydrates. Glycoproteins and proteoglycans Exp. Qualitative reactions of carbohydrates.	2			2			4	4	To be prepared for the discussion about carbohydrates structure and function.
Glycolysis. Glycogen metabolism Exp. Determination of glucose concentration in serum	2			2			4	4	To be prepared for the discussion about glycolysis and glycogen metabolism
Gluconeogenesis. Pentose phosphate pathway. Exp. Determination of glucose concentration in urine.	2			2			4	4	To be prepared for the discussion about glucose synthesis and pentose phosphate pathway.

Classification and characteristics of lipids. Fatty acids and eicosanoids.	2			2			4	4	To be prepared for the discussion about the structure, function and properties of lipids
Metabolism of triacylglycerols and fatty acids. Exp. Determination of triacylglycerol concentration in serum.	2			2			4	4	To be prepared for the discussion about metabolism of lipids and experiment of determination of triacylglycerols in serum.
Cholesterol structure and synthesis. Lipoprotein metabolism Exp. Determination of cholesterol and lipoproteins in blood serum.	2			2			4	4	To be prepared for the discussion about cholesterol and lipoproteins metabolism
Metabolism of phospholipids and glycolipids.	2		2				4	4	To be prepared for discussion about phospholipids and glycolipids
Metabolism of amino acid. Urea cycle Exp. Determination of urea concentration in urine. Determination of creatinine concentration in urine.	2			2			4	4	To be prepared for the discussion about metabolism of amino acids
Hemoglobin structure. Metabolism of heme. Exp. Determination Of Total Bilirubin Concentration In Serum	2			2			4	4	To be prepared for discussion about heme structure, function and metabolism
Nucleotide structure and metabolism. Nucleic acids. Exp. Determination of uric acid concentration in serum.	4			4			8	8	To be prepared for the discussion about nucleotide structure and metabolism
Colloquiums			3				3	3	To prepare for the tests
Total	32		7	28			67	67	

Assessment strategy	Weight, %	Deadline	Assessment criteria
Lab work and seminars Colloquiums	50 %	During semester	<p>The student must to be able:</p> <ul style="list-style-type: none"> - to do practical laboratory work, evaluate study data, and summarize the information received - to defend laboratory work theoretically - to use theoretical knowledge in the discussion - to be creative, take the initiative, and communicate with others <p>The tests are rated based on the logic and correctness and also the presentation of the answers to open questions.</p>
Final examination	50 %	Exam session	The exam is written form and comprises open questions. Each question is evaluated as a percentage that is recalculated to a question score.

Author	Year	Title	Issue of a	Publishing place and house
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	of public ation		periodical or volume of a publication	or web link
Compulsary reading				
Ferrier D.	2014 - 2017	Biochemistry. Lippincott Illustrated Reviews		Wolters Kluwer
Devlin T.	2008- 2011	Textbook of Biochemistry With Clinical Correlations,		Wiley-Liss, Inc.,
D.L. Nelson, M.M. Cox	2008- 2017	Lehninger Principles of Biochemistry		Worth Cummings
Garrett R.H., Grisham C.M.	2008- 2016	Biochemistry		Mary Finch
Kaminskas A., Mažeikienė A., Karčiauskaitė D.	2018	Biochemistry Laboratory manual		Vilnius, VU leidykla (www.fblm.lt)
Optional reading				
Kučinskienė Z. A.	2008	Klinikinės biochemijos ir laboratorinės diagnostikos pagrindai		Vilnius, VU leidykla
A.Praškevičius ir kt.	2002	Nukleorūgščių biochemija		Kaunas
Meisenberg G., Simmons W.H.	2011 - 2016	Principles of Medical Biochemistry		Mosby Inc., an affiliate of Elsevier, Inc.