COURSE UNIT (MODULE) DESCRIPTION

Course unit (module) title	Code
Biochemistry	

Lecturer(s)	Department(s) where the course unit (module) is delivered
Coordinator: Assoc. Prof. Dovilė Karčiauskaitė Others:, Asist. Prof. Asta Mažeikienė	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	II 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			

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**
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.	Lectures, seminars, laboratory work, small group discussions, process map making, discussions, case studies, and labs	• continuous evaluation of seminars and laboratory tasks. • quiz orally or in writing (10-point scale) • written examination
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. 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.		

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**
1. Proteins: their structure, function, and classification. Amino acids Exp. Colour reactions of amino acids and proteins	1		1		2		**4**	**4**	To be prepared for discussion about proteins structure, properties and function.
2. Enzymes: mechanism of action and regulation. Enzymopathies. Exp. Measurement of alanine aminotransferase and aspartate aminotransferase activity in blood serum.	1		2		2		**5**	**4**	To be prepared for discussion about enzymes, their action and regulation.
3. Bioenergetics. Energy carrriers. ATP synthesis. Electron transport chain. Tricarboxylic acid cycle.	2		4				**6**	**4**	To be prepared for the discussion about bioenergetics, TCA and ETC.
4. **Functions and classification of carbohydrates.** Exp. Qualitative reactions of carbohydrates.	1		2		2		**5**	**5**	To be prepared for the discussion about carbohydrates structure and function.
5. Glycogen metabolism Exp. Determination of glucose concentration in urine	1		2		2		**5**	**5**	To be prepared for the discussion about glycogen metabolism
6. **Glycolysis and gluconeogenesis. Pentose phosphate pathway. Regulation of carbohydrate metabolism** Exp. Determination of glucose concentration in blood.	1		2		2		**5**	**5**	To be prepared for the discussion about glucose metabolism and its regulation
7. Midterm test. Bioenergetics and metabolism of carbohydrates			2				**2**	**8**	To prepare for the test
8. **Classification and characteristics of lipids. Fatty acids and eicosanoids.**	2		2		2		**6**	**5**	To be prepared for the discussion about the structure, function and

									properties of lipids
9. **Metabolism of triacylglycerols and fatty acids. Metabolism of phospholipids and glycolipids** Exp. Determination of triacylglycerol concentration in serum.	2		2		2		**6**	**5**	To be prepared for the discussion about metabolism of lipids and experiment of determination of triacylglycerols in serum.
10**. Cholesterol structure and synthesis. Lipoproteins metabolism** Exp**.** Determination of cholesterol and lipoproteins in blood serum.	1				4		**5**	**5**	To be prepared for the discussion about cholesterol and lipoproteins metabolism
11. Midterm test. Metabolism of lidpis			2				**2**	**4**	To prepare for the test
12. **Metabolism of amino acid.** Exp**.** Determination of urea concentration in urine. Determination of creatinine concentration in urine.	2		2		4		**8**	**5**	To be prepared for the discussion about metabolism of amino acids
13. Nucleotide structure and metabolism. Exp. Determination of uric acid concentration in serum.	2		2		2		**6**	**5**	To be prepared for the discussion about nucleotide metabolism
14. Midterm test. Metabolism of amino acids and nucleotides			2				**2**	**4**	To prepare for the test
Total	**16**		**26**		**24**		**67**	**67**	

Assessment strategy	**Weight,%**	**Deadline**	**Assessment criteria**
Lab work and seminars Midterm tests	50 %	During semester	**The student must to be able:** - 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 The tests are rated based on the logic and correctness and also the presentation of the answers to open questions.
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.

Score	Explanation
10 (Excelent)	The student knows very well the material of lectures, compulsory literature, practical classes, and has mastered the subject competences. Percentage rating > 95 %
9 (Very good)	The student well knows the material of lectures, compulsory literature, practical classes, and has mastered the subject competences. Percentage rating 85 – 94 %
8 (Good)	The student knows the material of lectures, compulsory literature, practical classes, but answers to some questions

				are incomplete or incomprehensive. Percentage rating 75 – 84 %
			7 (Highly satisfactory)	Answers with minor errors, however requited competencies were acquired. Percentage rating 66-74%
			6 (Satisfactory)	Student's knowledge and skills are with substantial shortcomings. Percentage rating 58-65%
			5 (Sufficient)	Student's answers contain mistakes and skills are with substantial shortcomings, meeting only minimal requirements. Percentage rating 50-57%
			4 (Insufficient)	The student has not acquired one or more subject-specific competencies, the answers contain fundamental mistakes. Percentage rating 40-49%.
			3 (Insufficient)	The answers contain fundamental errors. Less than a third of the question answered. Percentage rating 30-39%.
			2 (Insufficient)	The student has not acquired subject-specific competences and skills. Percentage rating 20-29%.
			1 (Insufficient)	The student has not acquired subject-specific competences and skills. Percentage rating <19%.

Author	**Year of publication**	**Title**	**Issue of a periodical or volume of a publication**	**Publishing place and house 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.