

NAME OF THE COURSE		Medical Chemistry and Biochemistry II				
Code	MFE	Year of study	2nd			
Course teacher	Prof. Vedrana Čikeš Čulić	Credits (ECTS)	8			
Associate teachers	Prof. Irena Drmić Hofman, PhD Prof. Anita Markotić, PhD Prof. Maja Pavela-Vrančić Assoc. Prof. Nikolina Režić Mužinić, PhD Assist. Prof. Marina Degoricija, PhD Angela Mastelić, PhD Assist. Prof. Sandra Marijan, PhD	Type of instruction (number of hours)	L	S	E	F
			34	34	32	100
Status of the course	Mandatory	Percentage of application of e-learning	10%			
COURSE DESCRIPTION						
Course objectives	The aim of the course Medical Chemistry and Biochemistry II is to enable the acquisition of knowledge about the structure of biomolecules, chemical and energy changes and apply them to individual biochemical processes. Furthermore, the goal is to understand how the human body functions at the molecular level, how it uses energy, how it maintains its structures, recognizes and responds to a variety of signals, develops and grows, with special emphasis on integrating flow and connection of metabolic reactions at the level of cells, tissues and organs. Such a curriculum forms the biochemical basis for understanding human physiology and offers the student the knowledge necessary to understand the biochemical basis of many diseases and pathobiochemical processes. A thorough understanding of these principles should enable students, future physicians, to make appropriate use of the results of biochemical analyzes in diagnostic procedures aimed at improving health, preventing disease and treating disorders of any age.					
Course enrolment requirements and entry competences required for the course	Previously passed exam in Medical Chemistry and Biochemistry I, Medical Biology and Medical Physics					
Learning outcomes expected at the level of the course (4 to 10 learning outcomes)	<ol style="list-style-type: none"> List and explain the principles of biochemical and energy changes in metabolism of carbohydrates, lipids, proteins, information macromolecules and signaling molecule. Describe the mechanisms of regulation of carbohydrates, lipids, proteins, information macromolecules and signaling molecules. Integrate metabolic changes at the level of cells, tissues and the whole organism. Describe the structure and role of biological membranes and extracellular matrix. Integrate the course and connection of metabolic reactions in different tissues, distinguish similarities and differences, identify signaling molecules involved in (intercellular) signaling and recognize and discuss the (patho) biochemical basis of individuals metabolic diseases. Explain the biochemical background of disorders caused by errors in structure of molecules, biochemical reactions or biochemical processes. 					

	<p>7. Evaluate the application of biochemical methods and various biochemical laboratory tests in the diagnosis and treatment of diseases and the diagnostic significance of certain biochemical markers.</p>
<p>Course content broken down in detail by weekly class schedule (syllabus)</p>	<p>In parentheses is the number of hours referred to each topic.</p> <p><u>BIOCHEMISTRY (B1)</u></p> <p>1. PROTEIN AND ENZYME FUNCTIONS</p> <p>S1 (1) Sickle cell anemia. Scarvy. S2 (2) Enzymes in clinical diagnosis.</p> <p>2. BIOENERGETICS AND CARBOHYDRATE METABOLISM</p> <p>L1 (2) Bioenergetics and oxidative phosphorylation. SB1 (1) Regulation of respiratory chain and oxidative phosphorylation. S3 (1) Introduction to carbohydrates L2 (2) Glycolysis. SB2 (1) Regulation of glycolysis. L3 (2) Tricarboxylic acid cycle. SB3 (1) Regulation of TCA cycle. L4 (1) Gluconeogenesis. SB4 (1) Regulation of gluconeogenesis. L5 (1) Glycogen metabolism. SB5 (2) Regulation of glycogen synthesis and degradation. L6 (2) Metabolism of monosaccharides and disaccharides. SB6 (2) Pentose phosphate pathway and NADPH. L7 (1) Glycosaminoglycans, proteoglycans, and glycoproteins.</p> <p>3. LIPID METABOLISM</p> <p>S4 (1) Metabolism of dietary lipids. L8 (1) Fatty acid and triacylglycerol metabolism: structure and synthesis of fatty acids. SB8 (1) Regulation of fatty acids synthesis. L9 (2) Fatty acid and triacylglycerol metabolism: mobilization of stored fats, oxidation of fatty acids, ketone bodies. L10 (1) Complex lipid metabolism. L11 (2) Cholesterol and lipoprotein metabolism. SB11 (1) Hypercholesterolemia. S5 (2) Mechanism of hormone action depending on their structure.</p> <p><u>BIOCHEMISTRY (B2)</u></p> <p>4. NITROGEN METABOLISM</p> <p>L12 (2) Amino acids: disposal of nitrogen. L13 (2) Amino acid degradation and synthesis. SB13 (1) Metabolic defects in amino acid metabolism. L14 (2) Conversion of amino acids to specialized products: porphyrin metabolism. L15 (1) Other nitrogen-containing compounds: catecholamines; thyroid hormones. SB15 (1) Signal transduction disorders. L16 (1) Nucleotide metabolism. SB16 (1) Regulation of nucleotide metabolism.</p> <p>5. INTEGRATION OF METABOLISM</p> <p>S6 (2) Metabolic effects of insulin and glucagon. L17 (2) The feed / fast cycle. S7 (1) Diabetes mellitus. S8 (1) Obesity. L18 (2) Nutrition and vitamins. SB18 (2) Vitamins.</p>

	<p>S9 (1) Minerals.</p> <p>6. STORAGE AND EXPRESSION OF GENETIC INFORMATION</p> <p>L19 (1) DNA structure and replication. SB19 (2) DNA repair. L20 (1) RNA structure, synthesis and processing. L21 (1) Protein synthesis. SB21 (1) Protein synthesis regulation and inhibition. L22 (1) Regulation of gene expression. SB22 (1) Gene expression regulation. L23 (1) Biotechnology and human disease.</p> <p>SPECIAL TOPICS</p> <p>S10 (2) Blood clotting. S11 (1) Xenobiotic metabolism.</p> <p>Practicals (P)</p> <p>P1 (3) Amylase: determination in saliva sample. P2 (3) Determination of HbA1c by ion-exchange chromatography. P3 (3) Lipids: separation of skin lipids by thin-layer chromatography. P4 (2) Determination of LDL and HDL cholesterol. P5 (3) Determination of conjugated and total bilirubin in serum. P6 (2) Determination of creatinine and the pathological compounds in urine. P7 (3) Determination of iron and iron binding capacity in serum. P8 (4) Immunochemical analysis. ELISA. P9 (3) Determination of vitamin C. P10 (2) Hemostasis- clotting time and bleeding time tests. P11 (4) Comprehensive final exam (laboratory practicals).</p>					
Format of instruction	<input checked="" type="checkbox"/> lectures <input checked="" type="checkbox"/> seminars and workshops <input checked="" type="checkbox"/> exercises <input type="checkbox"/> <i>on line</i> in entirety <input type="checkbox"/> partial e-learning <input type="checkbox"/> field work			<input type="checkbox"/> independent assignments <input type="checkbox"/> multimedia <input type="checkbox"/> laboratory <input type="checkbox"/> work with mentor <input type="checkbox"/> (other)		
Student responsibilities	In accordance to Rules of studying and Deontological code for USSM students.					
Screening student work <i>(name the proportion of ECTS credits for each activity so that the total number of ECTS credits is equal to the ECTS value of the course)</i>	Class attendance	1	Research		Practical training	1
	Experimental work		Report		(Other)	
	Essay		Seminar essay		(Other)	
	Tests	2	Oral exam	2	(Other)	
	Written exam	2	Project		(Other)	
Grading and evaluating student work in class and at the final exam	Written exam (Biochemistry I and Biochemistry II), practical and oral exam.					

	Title	Number of copies in the library	Availability via other media
Required literature (available in the library and via other media)	1. Emine E. Abali, Susan D. Cline, David S. Franklin, Susan M. Viselli. Lippincott Illustrated Reviews: Biochemistry. 8th ed. Philadelphia, PA: Wolters Kluwer, 2021.	5	
	2. Laboratory Manual of Medical Chemistry and Biochemistry II	Print office	
Optional literature (at the time of submission of study programme proposal)	<ol style="list-style-type: none"> 1. Atkins PW, de Paula J. Physical Chemistry, 10th edition. Macmillian Education, Oxford, 2014. 2. Karen C. Timberlake. An Introduction to General, Organic and Biological Chemistry, 12th global edition, Pearson 2015. 3. Ferrier, Denise R. Lippincott Illustrated Reviews: Biochemistry. 7th ed. Philadelphia, PA: Wolters Kluwer, 2017. 		
Quality assurance methods that ensure the acquisition of exit competences	<ul style="list-style-type: none"> ▪ Analysis of the quality of teaching by students and teachers ▪ Analysis of passing exams ▪ Reports of the Teaching Control Committee ▪ Extra-institutional evaluation (visit of quality control teams of the National Agency for Quality Control, involvement in TEEP) 		
Other (as the proposer wishes to add)			