UNIWERSYTET MEDYCZNY
IM. PIASTÓW ŚLĄSKICH WE WROCŁAWIU

Appendix to Resolution No.2303
of Senate of Wroclaw Medical University
of 28 April 2021 r.

Syllabus for academic year: 2023/24

Description of the course			
Course	Biochemia z elementami chemii	**Group of detailed education results**	
	Biochemistry with elements of Chemistry	**Group of classes (group code):** B	**Group name:** Scientific basis of medicine
Faculty	Faculty of Dentistry		
Major	English Division - Faculty of Dentistry		
Level of studies	uniform MA studies		
Form of studies	full-time		
Year of studies	2	**Semester of studies**	zimowy,letni
Type of course	obligatory		
Language of study	English		

Number of hours													
Form of education													
	(L)	(SE)	(AC)	(MC)	(CC)	(LC)	(CSC)	(PCP)	(FLC)	(PE)	(VP)	(DSS)	(EL)
Semestr zimowy:													
Katedra Biochemii i Immunochemii:	15		10			35							
Kształcenie bezpośrednie:	0		10			35							
Kształcenie zdalne:	15		0			0							
Semestr letni:													
Katedra Biochemii i Immunochemii:	15		10			35							
Kształcenie bezpośrednie:	0		10			35							
Kształcenie zdalne:	15		0			0							
Razem w roku:													
Katedra Biochemii i Immunochemii:	30		20			70							
Kształcenie bezpośrednie:	0		20			70							
Kształcenie zdalne:	30		0			0							

Lectures (L); Seminars (SE); Auditorium classes (AC); Major Classes - not clinical (MC); Clinical Classes (CC); Laboratory Classes (LC); Classes in Simulated Conditions (CSC); Practical Classes with Patient (PCP); Foreign language Course (FLC), Physical Education (PE); Vocational Practice (VP); Directed Self-Study (DSS), E-learning (EL)

Educational objectives (max. 6 items)

C1: Acquisition of the knowledge on the current medical biochemistry, with a special focus on oral cavity biochemistry

C2: Shaping attitudes promoting scientific reliability, by stressing the importance of precision and repeatability of laboratory measurements as well as diligence in biochemical calculations.

C3: Development of efficiency and manual precision of, as aptitudes and abilities necessary during the work in students laboratory as well as in a future professional career as dentistry doctor.

C4: Implementation of habits of continuous development and expanding of knowledge by self-studies

C5: Development social competences needed to practice the medical profession, in accordance with graduate's profile.

Education result for course in relation to verification methods of the intended education result and the type of class:

Number of detailed education result	Student who completes the course knows/is able to	Methods of verification of intended education results	Form of didactic class
B.W1.	the role of major and trace elements in processes occurring in the body, including supply, absorption and transport;	Written exams in a form of MCQ, MRQ tests, a choice of yes/no answers, matching answers. Standardized oral exams focused on the evaluation of knowledge on the level of understanding, analysis, synthesis, problem solving.	WY, CA, CL
B.W2.	the role of electrolytes, buffer systems and chemical reactions in biological systems;	Written exams in a form of MCQ, MRQ tests, a choice of yes/no answers, matching answers. Standardized oral exams focused on the evaluation of knowledge on the level of understanding, analysis, synthesis, problem solving.	WY, CA, CL
B.W3.	the biochemical bases of integrity of the human body;	Written exams in a form of MCQ, MRQ tests, a choice of yes/no answers, matching answers. Standardized oral exams focused on the evaluation of knowledge on the level of understanding, analysis, synthesis, problem solving.	WY, CA, CL
B.W4.	the structure and functions of important chemical compounds found in the human body, especially the properties, functions, metabolism and reaction enthalpy of proteins, nucleic acids, carbohydrates, lipids, enzymes and hormones;	Written exams in a form of MCQ, MRQ tests, a choice of yes/no answers, matching answers. Standardized oral exams focused on the evaluation of knowledge on the level of understanding, analysis, synthesis, problem solving.	WY, CA, CL
B.W5.	the principles of calcium and phosphate metabolism;	Written exams in a form of MCQ, MRQ tests, a choice of yes/no answers, matching answers. Standardized oral exams focused on the evaluation of knowledge on the level of understanding, analysis, synthesis, problem solving.	WY, CA, CL
B.U1.	relate chemical phenomena to processes occurring in the oral cavity;	AC – presentations, essays; LC - reports	CA, CL

K.5	notice and recognise one's own limits and to self evaluate and identify educational deficits and needs	Direct observation of the student's research activity during practical laboratory determinations and his social communication skills, including in a multicultural group.	CA, CL
K.7	use objective sources of information	Direct observation of the student's research activity during practical laboratory determinations and his social communication skills, including in a multicultural group.	CL, CA
K.8	formulate conclusions based on own measurements or observations	Direct observation of the student's research activity during practical laboratory determinations and his social communication skills, including in a multicultural group.	CL
Lectures (L); Seminars (SE); Auditorium classes (AC); Major Classes - not clinical (MC); Clinical Classes (CC); Laboratory Classes (LC); Classes in Simulated Conditions (CSC); Practical Classes with Patient (PCP); Foreign language Course (FLC), Physical Education (PE); Vocational Practice (VP); Directed Self-Study (DSS), E-learning (EL)			

Student's amount of work **(balance of ECTS points):**	
Student's workload (class participation, activity, preparation, etc.)	**Student Workload**
1. Number of hours of direct contact:	90
2. Number of hours of distance learning:	30
3. Number of hours of student's own work:	180
4. Number of hours of directed self-study	0
Total student's workload:	300
ECTS points for course:	12

Content of classes: (please enter topic words of specific classes divided into their didactic form and remember how it is translated to intended educational effects

Lectures:

I. ENZYMES 1. Structure, properties and nomenclature of enzymes. 2. Enzymes – mechanisms of biocatalysis. 3. Kinetics of enzymatic reactions. 4. Regulation of enzymatic activity. 5. Isoenzymes. Diagnostic significance of enzymes. II. METABOLISM OF NITROGEN COMPOUNDS 6. Protein motifs and domains. 7. Digestion and absorption of dietary proteins. Degradation of intracellular proteins. 8. Amino acids metabolism. Urea cycle. 9. Biologically active amines. 10. Catabolism of nucleic acids. III. LIPID METABOLISM 11. Digestion and absorption of dietary lipids. 12. Transport of lipids in blood plasma. 13. Cell lipolysis and lipogenesis. 14. Ketone bodies metabolism. 15. Steroid compounds metabolism: cholesterol, steroid hormones, calciferols. IV. CARBOHYDRATE METABOLISM 16. Digestion, absorption and transport of carbohydrates. 17. Glucose metabolism. 18. Fructose and galactose metabolism. 19. Glycogen metabolism. 20. Hormonal regulation of carbohydrates metabolism. V. OXIDATIVE PROCESSES 21. Pyruvate dehydrogenase complex. 22. Tricarboxylic acid cycle. 23. Respiratory chain. 24. Oxidative stress of the organism. 25. Structure and function of cytochrome P450. Biotransformation of xenobiotics. VI. FUNCTIONAL TISSUE METABOLISM 26. Buffering systems of the organism. Integration and regulation of metabolism. 27. Collagen metabolism. 28. Heme metabolism. Diagnosis of jaundices. 29. Blood biochemistry. Structure and function of hemoglobin. 30. Renin-angiotensin system. SARS-CoV-2 infection mechanism.

Seminars:
1. Introduction to enzymatic catalysis. 2. Factors influencing enzyme activity. Kinetics of the enzyme action. Types of inhibition. 3. Modes of enzymes' action and their regulation. 4. Peptides and proteins - structure and function. 5. Amino acids metabolism I. 6. Amino acids metabolism II. Nitrogen disposal – the role of glutamine; urea cycle. 7. Dietary lipids digestion and absorption. 8. Plasma lipoproteins and their biomedical significance. Cholesterol metabolism. 9. Metabolism of ketone bodies. Hormonal regulation of lipid metabolism. 10. Adipose tissue. Credits for winter semester. 11. Carbohydrates – main energy source - glycolysis, the fates of pyruvate, gluconeogenesis 12. Glycogen synthesis and degradation. 13. The control of blood glucose concentration, and its disturbances leading to diabetes. Metabolism of glucose isomers. 14. Oxidative decarboxylation. The role of tricarboxylic acid cycle and respiratory chain in energy production I. 15. The role of tricarboxylic acid cycle and respiratory chain in energy production II. Types of transport. Transport of hydrogen atoms across biological membranes. 16. Reactive forms generation and antioxidant mechanisms of the organism. 17. Hormonal regulation of metabolic processes. 18. Eicosanoids. Connective tissue; collagen metabolism and its disturbances. 19. Biomedical significance of vitamin D in the aspects of dentistry. Metabolic profiles of the selected tissues and organs – part 1. 20. Metabolic profiles of the selected tissues and organs – part 2. Credits for summer semester.

Classes::
I laboratory section - ENZYMES 1. Introductory classes. Determination of pyruvate concentration. Standard curve for pyruvate. 2. Determination of aspartate aminotransferase activity. 3. Studies on kinetics of acid phosphatase reaction. 4. Determination of horseradish peroxidase activity. Test. Credit for I laboratory section. II laboratory section - NITROGEN METABOLISM 1. Quantitative determination of proteins using Biuret method. 2. Determination of isoelectric point of protein. 3. Quantitative determination of creatinine. Test. Credit for II laboratory section. III laboratory section - LIPID METABOLISM 1. Hydrolysis of lipids and determination of lipase activity. 2. Determination of LDL concentration. Test. Credit for III laboratory section.. 3. Determination of GGT activity. Credit for winter semester. IV laboratory section - CARBOHYDRATE METABOLISM 1. Determination of salivary amylase activity. 2. Quantitative determination of reducing sugars with Nelson method. 3. Determination of optimal pH of saccharase activity. 4. Examination of proteins glycation. Test. Credit for IV laboratory section. V laboratory section - OXIDATIVE PROCESSES 1. Examination of enzymatic reaction catalyzed by succinate dehydrogenase. 2. Determination of catalase activity. 3. Quantitative determination of vitamin C. Test. Credit for V laboratory section. VI laboratory section - TISSUE BIOCHEMISTRY 1. Determination of calcium and phosphate concentration. 2. Determination of hemoglobin and its derivatives. Test. Credit for VI laboratory section. 3. Determination of bilirubin concentration. Credit for summer semester.

Other:
Consultations

Basic literature
1. Richard A. Harvey et al. "Lippincot's Illustrated Reviews: Biochemistry" VIII Edition, 2021; ISBN-13: 978-1975155063 ; ISBN-10: 1975155068

Additional literature and other materials:
Robert K. Murray et al. "Harper's Biochemistry"31st edition; 2018; ISBN10 1259837939l; ISBN13 9781259837937.
,Thomas M. Devlin „Biochemistry with Clinical Correlations", 7th edition; Willey-Liss, New York; ISBN: 978-0-470-28173-4.
,L. Baynes., M. Dominiczak, „Medical Biochemistry", Mosby Elsevier, 5th Edition, 2018; ISBN: 9780702072994 ; eBook ISBN: 9780702073007

Preliminary conditions:
Knowledge of the selected issues from molecular biology and biophysics.

Rules for granting partial grades in the subject during the semester:

There are three written or oral assessment tests performed during each semester.

Conditions to receive credit for the course:

1. Proper execution of laboratory classes and preparation of reports summarizing the obtained data, correct calculations and conclusions 2. Active participation in auditorium classes – analysis and solving scientific problems and active participation in discussion. 3. Obtaining positive grades from tests covering material concerning the whole material covered in a course of biochemistry .

Grade	Criteria for courses ending with a grade
Very Good (5.0)	≥93% of correct answers

Good Above (4.5)	≥85% of correct answers
Good (4.0)	≥77% of correct answers
Satisfactory Plus (3.5)	≥69% of correct answers
Satisfactory (3.0)	≥60% of correct answers
Criteria for courses ending with a credit (without a grade)	
Credit	
Grade	**Criteria for exam**
Very Good (5.0)	≥93% of correct answers
Good Above (4.5)	≥85% of correct answers
Good (4.0)	≥77% of correct answers
Satisfactory Plus (3.5)	≥69% of correct answers
Satisfactory (3.0)	≥60% of correct answers

Department in charge of the course:	Katedra Biochemii i Immunochemii
Head of Department in charge of the course:	Prof. dr hab. Małgorzata Krzystek-Korpacka
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CONSULTATION: Detailed information pertaining to the dates and places for consultation of academic staff are provided on the university websites of the departments in which the given subjects are being conducted. Additionally the information is posted next to the department secretary.

Date of syllabus preparation
2023-10-05