Attachment No. 5 to Rector's ordinance No. 22/2020

DESCRIPTION OF THE COURSE OF STUDY

Course code	**0912.4.LEK.B.Bch**	
Name of the course in	Polish	**Biochemia**
	English	**Biochemistry**

1. LOCATION OF THE COURSE OF STUDY WITHIN THE SYSTEM OF STUDIES

1.1. Field of study	Medicine
1.2. Mode of study	Full-time
1.3. Level of study	Uniform Master's studies
1.4. Profile of study*	General academic
1.5. Person preparing the course description	Prof. dr hab. inż. Przemysław Rybiński
1.6. Contact	przemyslaw.rybinski@ujk.edu.pl

2. GENERAL CHARACTERISTICS OF THE COURSE OF STUDY

2.1. Language of instruction	English
2.2. Prerequisites*	Basic knowledge of organic and inorganic chemistry.

3. DETAILED CHARACTERISTICS OF THE COURSE OF STUDY

3.1. Form of classes		Lectures: 30 h, Laboratories: 20 h
3.2. Place of classes		Classes in the teaching rooms of UJK
3.3. Form of assessment		Credit with grade:
3.4. Teaching methods		Lectures: Verbal Laboratories: Verbal, perceptual, practical
3.5. Bibliography	**Required reading**	**1.** Dinesh P. Textbook of Medical Biochemistry. Third Edition. Elsevier 2. Vasudevan DM., Sreekumari S., Vaidyanathan K. Textbook of biochemistry for Medical Students. Sixth edition. Jaypee Brothers Medical Publisher LTD.
	Further reading	1. Satyanarayana U., Chakrapani U. Biochemistry. Fourth Edition. Elsevier

4. OBJECTIVES, SYLLABUS CONTENT AND INTENDED LEARNING OUTCOMES

4.1. Course objectives *(including form of classes)*

Lectures

C1. During the lecture, students should acquire theoretical knowledge related to the structure, properties, and applications of biologically active compounds.

C2. Additionally, students should acquire the skills to apply this knowledge in everyday life, as it relates to the functioning of the human body.

Laboratories

C1. Through laboratory exercises, students should acquire theoretical knowledge and practical skills related to the structure, properties, and applications of biologically active compounds.

C2. Additionally, students should acquire the ability to apply this knowledge in everyday life, as it relates to the functioning of the human body.

4.2. Detailed syllabus *(including form of classes)*

Lectures

1. Enzymes and kinetics. Characteristic and features of enzymes. Classification of enzymes, function of enzymes. Model of action of enzymes. Enzyme kinetics. Enzyme inhibition.
2. Carbohydrates. Nomenclature, classification of carbohydrates, stereoisomers, mutarotation, diastereoisomers and epimers. Reactions of monosaccharides. Glycosides, amino sugars. Disaccharides and polysaccharides. Metabolism. Catabolism and anabolism comparison. Glycolysis. Citric acid cycle. Energy balance of Krebs Cycle. Oxidative phosphorylation. Gluconeogenesis. Reaction of gluconeogenesis.
3. Lipids. Definition and function of lipids. Types of fats. Classification of fatty acids. Properties of fatty acids. Function of triacylglycerols. Compound lipids. Phosphoglycerides. Structure of sphingomyelin. Glycolipids, steroids. Metabolism of triacylglycerol. Absorption of lipids. Beta oxidation of fatty acids. Energetics of beta oxidation. Ketone bodies. Biosynthesis of simple lipids. Biosynthesis of cholesterol. Function of cholesterol in human body. Classification of lipoproteins. Biological membranes. Transport through membranes. Amino acids and proteins. Classification amino acids on the base of their nutritional requirements. Properties of amino acids.

Peptide chemical structure. Properties of chosen peptides. Structure of proteins. Metabolism of proteins. Nitrogen balance. Oxidative deamination of glutamate. Urea cycle.

4. Nucleotides. Structure of DNA, RNA. Transcription. Replication.

Laboratories

1. Properties of amino acids and proteins.
2. Carbohydrates. Characteristically reactions and properties.
3. Soap and fats. Properties of fats.
4. Vitamins.

4.3 Intended learning outcome

Code	A student, who passed the course	Relation to learning outcomes
within the scope of **KNOWLEDGE:**		
W01	Knows and understands the structure of lipids and polysaccharides and their functions in the cellular and extracellular structures;	B.W9.
W02	Knows and understandshe protein primary, secondary, tertiary and quaternary structures as well as the post-translational and functional protein modifications and their significance;	B.W10.
W03	Knows and understands the functions of nucleotides in the cell, RNA and DNA primary and secondary structure as well as chromatin structure;	B.W11.
W05	Knows and understands basic catabolic and anabolic pathways, methods of their regulation and the influence of genetic and environmental factors;	B.W13.
W06	Knows and understands basic methods used in laboratory diagnostics, including electrophoresis of proteins and nucleic acids;	B.W14.
W07	Knows and understands metabolic changes taking place in organs as well as metabolic, biochemical and molecular basis of diseases and therapies;	B.W15.
W08	Knows and understands the principles of conducting scientific research aimed at the development of medicine.	B.W26.
within the scope of **ABILITIES:**		
U01	Can determine molar and percentage concentration of compounds and the concentration of substances in isoosmotic solutions, both mono- and multi-component;	B.U3.
U02	Can determine the solubility of inorganic compounds, chemical substrate for the solubility of organic compounds, or lack thereof, and practical significance for nutrition and therapy;	B.U4.
U03	Can determine the pH of the solution and the effect of changes in the pH on the inorganic and organic compounds;	B.U5.
U04	Can envisage the development of biochemical processes depending on the state of the cells' energy;	B.U6.
U05	Can use medical databases and properly interpret the information contained therein necessary to solve problems in the field of basic and clinical sciences;	B.U8.
U06	Can plan and perform basic scientific research, interpret the results and draw conclusions.	B.U11.
U07	Can use basic laboratory and molecular techniques.	B.U12.
within the scope of **SOCIAL COMPETENCE:**		
K01	Is able to recognize his/her own limitations and self-evaluate educational deficiencies and needs;	K.S5
K02	Is able to use reliable information sources;	K.S7
K03	Is able to conclude on the basis of own surveys and observations;	K.S8
K04	Is able to introduce rules of social conduct and teamwork to the group of specialists, including specialists form other medical professions also in the multicultural and multinational environment;	K.S9
K05	Is able to give opinions concerning various aspects of professional activity;	K.S10
K06	Is able to take responsibility for own decisions made during professional activities including own safety and safety of other people;	K.S11

4.4. Methods of assessment of the intended learning outcomes																					
Teaching outcomes *(code)*	**Method of assessment (+/-)**																				
	Exam ~~oral~~/written*			**Test***			**Project***			**Effort in class***			**Self-study***			**Group work***			**Others* e.g. standardized test used in e-learning**		
	Form of classes			***Form of classes***			***Form of classes***			***Form of classes***			***Form of classes***			***Form of classes***			***Form of classes***		
	L	*L*	*...*	*L*	*L*	*...*	*L*	*L*	*...*	*L*	*L*	*...*	*L*	*L*	*...*	*L*	*L*	*...*	*L*	*L*	*...*
W01 – W08	***X***			***X***	***X***								***X***				***X***				
U01 – U07	***X***			***X***	***X***								***X***				***X***				
K01-K06	***X***			***X***	***X***								***X***				***X***				

****delete as appropriate***

4.5. Criteria of assessment of the intended learning outcomes		
Form of classes	**Grade**	**Criterion of assessment**
lecture (L)	**3**	51 – 62% of the total number of points that can be obtained
	3,5	63 – 72% of the total number of points that can be obtained
	4	73 – 82% of the total number of points that can be obtained
	4,5	83 – 92% of the total number of points that can be obtained
	5	93 – 100% of the total number of points that can be obtained
laboratories (L)	**3**	51 – 62% of the total number of points that can be obtained
	3,5	63 – 72% of the total number of points that can be obtained
	4	73 – 82% of the total number of points that can be obtained
	4,5	83 – 92% of the total number of points that can be obtained
	5	93 – 100% of the total number of points that can be obtained

5. BALANCE OF ECTS CREDITS – STUDENT'S WORK INPUT

Category	**Student's workload**
	Full-time studies
NUMBER OF HOURS WITH THE DIRECT PARTICIPATION OF THE TEACHER /CONTACT HOURS/	***50***
*Participation in lectures**	***30***
*Participation in classes, seminars, laboratories**	***20***
*Preparation in the exam/ final test**	
*Others**	
INDEPENDENT WORK OF THE STUDENT/NON-CONTACT HOURS/	***25***
*Preparation for the lecture**	***20***
*Preparation for the classes, seminars, laboratories**	***5***
*Preparation for the exam/test**	
*Gathering materials for the project/Internet query**	
Preparation of multimedia presentation	
*Others**	
TOTAL NUMBER OF HOURS	
ECTS credits for the course of study	***75***
	3

****delete as appropriate***

Accepted for execution *(date and legible signatures of the teachers running the course in the given academic year)*

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