Syllabus
Curriculum for the discipline "Biochemistry"

Educational program - 6B10115 "Medicine"

1.	**General information about the discipline:**		
1.1	Course Code: Bio 2204	1.6	Academic year: 2025-2026
1.2	Name of the discipline: "Biochemistry"	1.7	Course: 3
1.3	**Prerequisites:** General Pathology	1.8	Semester:6
1.4	**Postrequisites:** "Internal Diseases-1", "Internal Diseases-2".	1.9	Number of credits (ECTS): 3
1.5	Cycle: BD	1.10	Component: IC

2.	**Contents of the course:**
	Developing knowledge about the functional organization of enzymes, the role of membranes in metabolism, mechanisms of substance transport, vitamins and their biological role, anaerobic energy pathways, catabolism, carbohydrate, lipid, and protein metabolism, and the concept of nitrogen balance as an indicator of protein metabolism. Principles of analysis for the diagnosis and treatment of diseases.

3.	**Summative assessment form:**		
3.1	Testing ☑	3.5	Coursework
3.2	Writing	3.6	Essay
3.3	Oral	3.7	Project
3.4	Certification of practical skills ☑	3.8	Other (specify)

4.	**Objectives of the discipline:**
	to develop in students a holistic understanding of the molecular mechanisms and regulation of basic metabolic processes, the characteristics of their occurrence in human organs and tissues, and the use of knowledge of biochemical indicators for diagnosis and monitoring the effectiveness of treatment in pathology.

5. Final learning outcomes (FLO of the discipline):	
LO 1	Demonstrates knowledge of the structure, functions, and properties of representatives of the main classes of bioorganic compounds: carbohydrates, lipids, simple and complex proteins, vitamins, etc. Understands the molecular mechanisms of metabolic processes and their regulation and the possible consequences of their disruption. Knows the basic biochemical constants of biological fluids in the human body during pathology.
LO 2	Conducts biochemical studies to determine intermediates of carbohydrate, lipid, and nitrogen metabolism in human biological fluids; determines the activity of specific enzymes in blood serum.
LO 3	Interprets the results of basic biochemical studies; uses metabolic maps and specialized reference material to predict the characteristics of biochemical process disorders and their regulation due to deficiencies of biologically active substances (vitamins, enzymes, hormones).

LO 4	Demonstrates: own knowledge and skills in conducting biochemical research; ability to conductь literary search and analysis of scientific articles in independent study of the discipline; ability to work in a team.		
5.1.	**LO discipline**	**Learning outcomes of the EP, which are associated with the discipline's LO**	
	LO 1 LO 2 LO 3 LO 4	LO1.	Assesses population health indicators and their physical, radiological, chemical, and biological-ecological determinants, using advanced technologies to identify hidden patterns and predict risks.
		LO 11	Provides patient-centered care in the fields of biomedical, clinical, and epidemiological sciences, aimed at the diagnosis, treatment, and prevention of the most common diseases.

6.	**Detailed information about the discipline**					
6.1	The location of the department is Al-Farabi-1 square, building No. 1, 4th floor, rooms 400, 404, 406, 408, 411, 413 biology_biochemistry@mail.ru , ext.: (ATS) 40-82-06. ext. 227					
6.2	**Quantity hours**	Lectures	Practical. les.	Lab.	SIWP	SIW
		6	24	-	9	42/9

7. Information about teachers:

No.	Full name	Degrees and position	Email address	Scientific direction	Achievements
1.	Kenzhebekov P.K.	PhD, professor	kenzhebekov.p @gmail.com	"Study of the chemical composition of volatile aroma-forming compounds in some meat products"	42 scientific publications, 1 textbook
2.	Asilbekova G.K.	Master of Biology, senior teacher	shahats@mail.ru	Microelementoses	16 scientific publications, 1 textbook
3.	Kanzhigitova M.Zh.	Master of Biology, senior teacher	molya_1503@mail.ru		15 scientific publications
4	Zhienbaeva A.	Master of Biology, senior teacher	alia.zhienbaeva@mail.ru		10 scientific publications
5.	Abdirova T.O.	teacher	tyul_84@mail.ru		3 scientific publications

8. Thematic plan

No.	Topic	Summary	LO discipline	Number of hours	Forms/methods/technologies of teaching	Forms/methods of assessment
1.	**Lecture:**Pathology of carbohydrate metabolism (diabetes mellitus, hypoglycemia, glycogenosis).	Pathology of carbohydrate metabolism (diabetes mellitus, hypoglycemia, glycogenosis).	LO1	1	Introductory, overview	feedback questions
	Practical lesson: Carbohydrate Metabolism Pathology (Diabetes Mellitus, Hypoglycemia, Glycogenosis). Laboratory Workshop:	Carbohydrate metabolism pathology (diabetes mellitus, hypoglycemia, glycogenosis). Regulation of blood glucose levels (the role of insulin and glucagon). Biochemical changes in diabetes mellitus. Hypoglycemic conditions. Laboratory workshop: Determining blood glucose levels.	LO1 LO2 LO3	4	seminar, situational tasks, testing	Checklist
	SIWP: Glycogenoses as hereditary diseases of carbohydrate metabolism.	Mechanisms of development of diabetes mellitus types 1 and 2. Hypoglycemia: causes, consequences, biochemical mechanisms. Glycogenosis as hereditary diseases. Diagnostic tests for carbohydrate metabolism disorders.	LO1 LO2 LO3	1/6	essay, analysis of a scientific article, presentation	Checklist
2.	**Lecture:**Lipid metabolism pathology (atherosclerosis, obesity, hyperlipoproteinemia)	Pathology of lipid metabolism (atherosclerosis, obesity, hyperlipoproteinemia).		1	overview	feedback questions
	Practical lesson: Lipid Metabolism Pathology (Atherosclerosis, Obesity, Hyperlipoproteinemia). Laboratory Workshop:	Lipid metabolism pathology (atherosclerosis, obesity, hyperlipoproteinemia). The role of lipoproteins in lipid transport. Biochemistry of atherosclerosis. Hyper- and hypolipidemia. Laboratory workshop: Determination of serum triglycerides.	LO1 LO2 LO3	3	seminar, situational tasks, testing	Checklist
	SIWP:	The role of lipoproteins in pathology (LDL, HDL).	LO1 LO2	1/6	essay, analysis of a	Checklist

	Hereditary hyperlipoproteinemias and their biochemical diagnostics.	Biochemical mechanisms of atherosclerosis. Hyper- and hypolipidemias: classification. Modern methods for diagnosing dyslipidemia.	LO4		scientific article, glossary	
3	**Lecture:** Pathology of protein and amino acid metabolism (amyloidosis, dysproteinemia, hereditary diseases).	Pathology of protein and amino acid metabolism (amyloidosis, dysproteinemia, hereditary diseases).	LO1	1	overview	feedback questions
	Practical lesson: Protein and amino acid metabolism pathology (amyloidosis, dysproteinemia, hereditary diseases). Laboratory workshop:	Protein and amino acid metabolism disorders (amyloidosis, dysproteinemia, hereditary diseases). Causes and mechanisms of dysproteinemia. Amyloidosis as a systemic disease. Hereditary disorders of amino acid metabolism (phenylketonuria, etc.). Laboratory workshop: Determination of total protein in blood serum.	LO1 LO2 LO4	3	Seminar, situational tasks, testing.	Checklist
	SIWP: Phenylketonuria and other amino aciduria: biochemical basis.	Amyloidosis: mechanisms and biochemical features. Hereditary amino acid disorders (phenylketonuria, tyrosinemia, etc.). Dysproteinemias and their clinical significance. Modern methods for diagnosing protein disorders.	LO1 LO2 LO4	2/6	essay, analysis of a scientific article, problem solving	Checklist
4.	**Lecture:**Enzyme deficiencies.	Classification of enzymopathies. Hereditary and acquired variants.	LO1	1	overview	feedback questions
	Practical lesson: Enzyme pathologies. Laboratory practical training.	Classification of enzymopathies. Hereditary and acquired variants. Examples: G6PD deficiency, Tay-Sachs disease, galactosemia. Modern diagnostic methods (enzyme diagnostics, molecular	LO1 LO2 LO3	4	Seminar, case studies, testing, laboratory work	Checklist

		diagnostics). Determination of ALT and AST activity in blood serum.				
	SIWP: Midterm exam No. 1.	**Midterm exam No. 1.**Pathology of carbohydrate, lipid, protein and amino acid metabolism. Enzyme pathologies.	LO1 LO2 LO4	1/6	Control questions, test assignments, situational tasks.	Checklist Evaluation of answers to control questions, test assignments and solutions to situational problems
5.	**Lecture:** Blood pathology (anemia, leukemia, jaundice, coagulopathy).	Blood pathology (anemia, leukemia, jaundice, coagulopathy).	LO1	1	overview	feedback questions
	Practical lesson: Blood pathology (anemia, leukemia, jaundice, coagulopathy). Laboratory practical:	Blood pathology (anemia, leukemia, jaundice, coagulopathy). Biochemical changes in anemia. Pathogenesis of jaundice (hemolytic, hepatic, mechanical). Blood clotting disorders (coagulopathy). Laboratory workshop: Determination of transaminase activity (in liver pathology).	LO1 LO2 LO4	3	seminar, situational tasks, testing, laboratory work	Checklist
	SIWP: Biochemical diagnostics of leukemia.	Biochemical changes in anemia. Bilirubin metabolism disorders in jaundice. Biochemistry of blood coagulation and coagulopathies. Leukemia: metabolic characteristics of blood cells.		1/6	essay, analysis of a scientific article, problem solving	Checklist
6.	**Lecture:**Pathology of connective and other tissues	Pathology of connective and other tissues (collagenoses,	LO1	1	overview	feedback questions

	(collagenoses, osteoporosis, tissue amyloidosis)	osteoporosis, tissue amyloidosis)				
	Practical lesson: Pathology of connective and other tissues (collagenoses, osteoporosis, tissue amyloidosis).	Pathology of connective and other tissues (collagenoses, osteoporosis, tissue amyloidosis).Pathology of connective and other tissues (collagenoses, osteoporosis, tissue amyloidosis). Biochemistry of collagen and elastin. Connective tissue disorders (collagenoses). Biochemical mechanisms of osteoporosis.	LO1 LO2 LO4	3	seminar, situational tasks, testing	Checklist
	SIWP: Tissue amyloidosis: biochemical mechanism and clinical significance.	Collagenoses: biochemical mechanisms.Biochemistry of osteoporosis and rickets. Elastin and its role in vascular pathology. Tissue amyloidosis.	LO1 LO2 LO4	1|6	essay, analysis of a scientific article, problem solving	Checklist
7.	**Practical lesson:** Pathology of mineral metabolism. Pathology of water-salt metabolism and acid-base balance. **Laboratory practical:**	Biochemical role of calcium, phosphorus, magnesium. Rickets, osteoporosis: causes, biochemical mechanisms. Iron disorders: sideropenia, iron overload (hemochromatosis). Regulation of water-salt balance (ADH, aldosterone). Classification of acidoses and alkaloses. Compensation mechanisms. Laboratory workshop: Determination of uric acid levels.	LO1 LO2 LO3	4	Seminar, case studies, testing, laboratory work	Checklist
	SIWP: Midterm exam No. 2.	**Midterm exam No. 2.** Blood pathology. Mineral metabolism pathology. Water-salt metabolism and acid-base balance pathology. Connective and other tissue pathology.	LO1 LO2 LO4	2/6	Control questions, test assignments , situational tasks.	Evaluation of answers to control questions, test assignments and solutions to situational problems
Preparation and conducting of midterm assessment: 9 hours						

9.	**Teaching and assessment methods**	
9.1	Lectures	Introductory, overview.

9.2	Practical classes	Completion of practical work, oral questioning (extended conversation), work in small groups, situational tasks, testing, quantitative determination of biochemical parameters and preparation of a laboratory work protocol.
9.3	SIW/SIWP	Presentation, glossary on the topic, reproduction of biochemical reaction processes, essay on the topic, analysis of scientific articles.
9.4	Midterm exam	Midterm assessment is conducted in the traditional format: oral, written, and in the form of testing, as well as solving situational problems.

10. Evaluation criteria

10.1 Criteria for assessing the learning outcomes of the discipline

No. LO	**Name of learning outcomes**	**Unsatisfactory**	**Satisfactorily**	**Fine**	**Great**
LO 1	Demonstrates knowledge of the structure, functions, and properties of representatives of the main classes of bioorganic compounds: carbohydrates, lipids, simple and complex proteins, vitamins, etc. Understands the molecular mechanisms of metabolic processes and their regulation and the possible consequences of their disruption. Knows the basic biochemical constants of biological fluids in the human body under normal and pathological conditions.	1. Does not have knowledge of the structure, functions, and properties of representatives of the main classes of bioorganic compounds: carbohydrates, lipids, simple and complex proteins, vitamins, etc. 2. Does not understand the molecular mechanisms of the course and regulation of metabolic processes and the possible consequences of their disruption. 3. Does not know the basic biochemical constants of biological fluids of the human body in normal	1. Possesses knowledge of the structure, functions, and properties of representatives of the main classes of bioorganic compounds: carbohydrates, lipids, simple and complex proteins, vitamins, etc. 2.Understood the molecular mechanisms of the course and regulation of metabolic processes and the possible consequences of their disruption. 3. Knows the basic biochemical constants of biological fluids of the human body in normal and pathological	1. Applies knowledge about the structure of the main classes of bioorganic compounds when describing biochemical processes occurring in the body. 2. Writes down biochemical reactions accurately and clearly, indicating the enzymes that catalyze these processes, while demonstrating a complete understanding of the molecular mechanisms of metabolism and regulation in the body. 3.Applies knowledge of	1. Demonstrates excellent knowledge of the structure of the main classes of bioorganic compounds when describing biochemical processes occurring in the body. Analyzes this topic and connects it to previous learning. 2. Consistently and without any difficulty writes down the reactions of biochemical processes, indicating the enzymes that catalyze these processes,

		and pathological conditions.	conditions.	basic biochemical constants to discuss the state of the body in normal and pathological conditions.	while demonstrating a complete understanding of the molecular mechanisms of the course and regulation of metabolism in the body. 3. Demonstrates excellent knowledge of the basic biochemical constants of the body's biofluids to assess the patient's condition.
LO 2	Conducts biochemical studies to determine intermediates of carbohydrate, lipid, and nitrogen metabolism in human biological fluids; determines the activity of specific enzymes in blood serum.	1. Does not conduct biochemical studies to determine intermediates of carbohydrate, lipid and nitrogen metabolism in human biological fluids in accordance with the description of the laboratory work. 2. Does not determine activity of specific enzymes in blood serum. 3. Does not understand the diagnostic value of determining enzyme activity.	1. Conducts biochemical studies to determine intermediates of carbohydrate, lipid and nitrogen metabolism in human biological fluids in accordance with the description of the laboratory work, but does not show activity and requires the assistance of the teacher. 2. Determines the activity of specific enzymes in blood serum based on descriptions, but makes mistakes and requires the	1. Independently completes all practical and laboratory work, draws appropriate conclusions and takes an active part in the discussion of the results of the work and submits completed reports. 2. Correctly and consistently determines enzyme activity in blood serum without outside	1. Freely navigates the selection of necessary reagents, equipment, and laboratory glassware for laboratory work, performs at a high level, draws appropriate conclusions, actively participates in the discussion of work results, and submits completed

			help of a teacher. 3.Understood the diagnostic value of determining enzyme activity.	assistance and makes correct conclusions. 3. Possesses knowledge of the diagnostic value of determining enzyme activity, while demonstrating a good level of knowledge of the educational material.	reports. 2. Independently and consistently determines the activity of enzymes in blood serum without outside help and makes correct conclusions based on educational material. 3. Competently uses theoretical knowledge about the diagnostic value of determining enzyme activity, draws appropriate conclusions, while demonstrating original thinking.
LO 3	Interprets the results of basic biochemical studies; uses metabolic maps and specialized reference material to predict the characteristics of biochemical process disorders and their regulation	1. Unable to interpret the results of basic biochemical tests. 2. Does not understand the metabolic maps of the body's structural and functional components. 3. Cannot use	1. Interprets the results of basic biochemical studies, allows for minor inaccuracies when discussing situational problems, and has difficulty drawing conclusions. 2. Difficulty describing	1.Applies theoretical knowledge to interpret basic biochemical studies. Draws correct conclusions based on the interpretation of data presented in situational	1. Demonstrates excellent knowledge of reference biochemical parameters when interpreting proposed biofluid analysis data. Demonstrates

	due to deficiencies of biologically active substances (vitamins, enzymes, hormones).	reference material when predicting the characteristics of disruption of biochemical processes and their regulation due to a deficiency of biologically active substances (vitamins, enzymes, hormones).	metabolic processes presented on metabolic maps of the structural and functional components of the body. 3. Poor understanding of reference material when predicting the characteristics of disruption of biochemical processes and their regulation.	problems. 2. Competently and clearly analyzes in sequence the metabolic patterns of the structural and functional components of the body, presented on the maps. 3. Effectively uses reference material when predicting the characteristics of disruption of biochemical processes and their regulation.	original thinking when analyzing situational problems, based on a deep understanding of theoretical material. 2. Demonstrates excellent knowledge of the required educational material in describing the metabolic schemes of the structural and functional components of the body, presented on the maps. 3. Effectively uses reference material when predicting the characteristics of disruption of biochemical processes and their regulation, while demonstrating critical thinking.
LO 4	Demonstrates: own knowledge and skills in conducting biochemical research; ability to conductь literary	1. Does not have the skills to independently conduct biochemical	1. Allows inaccuracies when conducting biochemical studies and does not fully complete	1. When conducting biochemical research, demonstrates good knowledge	1. Demonstrates: excellent skills in independently conducting

	search and analysis of scientific articles in independent study of the discipline; ability to work in a team	research. 2. Unable to find the necessary literary material and is unable to analyze scientific articles. 3. Does not demonstrate the ability to work in a team.	them. 2. Conducts a search for the necessary literary material, analyzes scientific articles, but expresses his thoughts without logic and arguments. 3. Knows how to work in a team, but does not show initiative.	of theoretical material, displays research skills and a desire for independent self-education. 2. Collects the necessary literary material to study a specific range of problems, analyzes scientific articles, while demonstrating critical thinking. 3. Able to work actively in a team, clearly express one's own thoughts and advise others, able to advise on a range of possible applications of biochemical research.	biochemical research; analyzes research results, demonstrating excellent knowledge of the necessary theoretical material; the ability to predict the state of the body based on the data obtained; and a desire for independent self-education. 2. Searches for necessary information in reference materials and scientific literature, and compares this data. Analyzes scientific articles, demonstrating critical thinking and is able to clearly express their own beliefs. 3. Works creatively in a team, presents his/her own beliefs in a well-reasoned

					manner, effectively exchanges information, and is able to advise others on the range of possible applications of biochemical research.

10.2 Methods and criteria for evaluation

CHECKLIST for PRACTICAL LESSON

No.	Evaluation criteria	Level			
		Great	**Fine**	**Satisfactorily**	**Unsatisfactory**
Practical classes:					
1	Oral response to the questions of this task	30	21	15	0
2	Written response to the questions of this assignment/preparation of the laboratory work protocol	30	21	15	0
3	Completing test assignments	12	8	6	0
4	Solving situational problems	28	20	14	0
	General:	**100**	**70**	**50**	

1. Oral response to the questions of this task

Approximately 3 questions of maximum 10 points:

No.	Questions	Level			
		Great	**Fine**	Satisfactorily	Unsatisfactory
1	1 question on the topic	10	7	5	0
2	2 questions on the topic	10	7	5	0
3	3 questions on the topic	10	7	5	0
	Total:	**30**	**21**	**15**	**0**

No.	Evaluation criteria	Points
1	Awarded if the student made no errors or inaccuracies during their answer. They are familiar with the theories, concepts, and approaches of the discipline being studied and critically evaluate them, and utilize the scientific advances of other disciplines.	27-30

2	It is awarded if the student did not make any serious errors in their answer, made minor inaccuracies or major errors that were corrected by the student themselves, and was able to systematize the program material with the help of the teacher.	21-26
3	This is given if the student made inaccuracies and minor mistakes during the answer, limited himself to the educational literature specified by the teacher, and experienced great difficulty in systematizing the material.	25-35
4	This is given if the student made fundamental errors during their answer, failed to cover the main literature on the topic of the lesson, is unable to use the scientific terminology of the subject, and answers with gross stylistic and logical errors.	0-24

2. Written response to the questions in this assignment

Approximately 3 questions of maximum 10 points:

No.	**Questions**	**Level**			
		Great	**Fine**	Satisfactorily	Unsatisfactory
1	1 question on the topic	10	7	5	0
2	2 questions on the topic	10	7	5	0
3	3 questions on the topic	10	7	5	0
	Total:	**30**	**21**	**15**	**0**

No.	**Evaluation criteria**	**Points**
1	The student demonstrated original thinking, demonstrated a deep knowledge of the material, and drew on scientific advances from other disciplines in his answer. He used scientific terminology.	27-30
2	The student demonstrated knowledge of the material and made minor inaccuracies, which were corrected by the student. He used scientific terminology.	21-26
3	The student made inaccuracies and minor mistakes during his answer, used scientific terminology, experienced great difficulty in systematizing the material, and needed the teacher’s help.	15-20
4	The student did not answer the teacher's questions, made fundamental mistakes and inaccuracies, and did not use scientific terminology in his answers.	0-14

Conducting laboratory work

No.	**Evaluation criteria**	**Points**
1	Completed practical and laboratory work on time and without any errors and submitted reports on them, took an active part in the discussion of the results of the work, made well-founded conclusions, and demonstrated original thinking.	27-30
2	Completed practical and laboratory work on time and submitted reports on them without any fundamental comments, took an active part in the discussion of the work results	21-26
3	Completed practical and lab assignments on time and submitted reports. Was inactive during work and required assistance from the instructor.	15-20

4	Failure to submit practical reports on time and making fundamental errors during their completion. Not completing all the practical work required by the program. Failure to participate in the discussion of the work results.	0-14

3. Completing test tasks

No.	Evaluation criteria	Points
1	90-100% correct answers	10-12
2	70-89% correct answers	8-9
3	50-69% correct answers	6-7
4	Less than 50% correct answers	0-2

4. Solving situational problems

No.	Evaluation criteria	Points
1	Demonstrates original thinking when solving a situational problem. Fully utilizes theoretical knowledge necessary for solving the problem. Demonstrates excellent knowledge of reference biochemical parameters when interpreting proposed biofluid analysis data. Demonstrates the ability to draw logical conclusions based on a situational problem, while demonstrating a thorough understanding of the required course material.	25-28
2	Possesses the necessary knowledge to solve a given situational problem. Allows for minor inaccuracies when discussing a given case. Capable of drawing correct conclusions based on the proposed situational problem.	19-24
3	Allows minor inaccuracies when discussing a given problem, has difficulty interpreting the analyses proposed in the situational problem, and draws conclusions with difficulty.	14-18
4	Makes fundamental mistakes in discussing situational problems. Passive, unable to draw appropriate conclusions.	0-13

Situational tasks –maximum 28 points (each task maximum 14 points):

No.	Questions	Level			
		Great	**Fine**	**Satisfactorily**	**Unsatisfactory**
1	1 situational task on the topic	14	10	7	0
2	2 situational tasks on the topic	14	10	7	0
	Total:	**28**	**20**	**14**	**0**

CHECKLIST for SIWP/SIW

No.	Evaluation criteria	Level			
		Great	**Fine**	**Satisfactorily**	**Unsatisfactory**
Independent work of a student					
1	Making a presentation	40	30	15	0

2	Completing essays or analyzing scientific articles	20	15	10	0
3	Completing the glossary	10	8	7	0
4	Solving situational problems/writing biochemical reactions or formulas	30	20	17	0
	General:	**100**	**73**	**46**	**0**

1. Presentation of the topic:

No.	Evaluation criteria	Points
1	The presentation was completed independently, within the assigned timeframe, and contained at least 25 slides. At least 7 literary sources were used. The slides were informative and concise. During the presentation, the author demonstrated a thorough knowledge of the topic and was accurate in answering questions during the discussion.	31-40
2	The presentation was completed independently, within the assigned timeframe, and contained at least 23 slides. At least six literary sources were used. The slides were informative and concise. During the presentation, the author demonstrated a good knowledge of the topic. The author made minor errors in answering questions, which he or she corrected.	4:30 PM
3	The presentation was completed independently, within the specified deadline, with at least 20 slides. At least 5 literary sources were used. The slides lack substance. During the defense, the author made fundamental errors in answering questions.	10-15
4	The presentation was not submitted by the deadline; it had at least 20 slides. Fewer than 5 references were used. The slides lacked substance. During the defense, the author made serious errors in answering questions. He was unsure of his own material.	0-9

2. Analysis of scientific articles:

No.	Evaluation criteria	Points
1	The work was completed neatly and submitted on time. It was independently written on at least three pages of printed text. The author's thoughts on the problem were clearly and convincingly presented. Authors' references were provided throughout the text. During the defense, the author narrated the text rather than read it. He confidently and accurately answered all questions. Articles used for the work were no more than five years old.	16-20
2	The work was completed neatly and submitted on time. It was independently written on at least three pages of typed text. The author's thoughts on the problem were clearly expressed, but without arguments. Authors were referenced throughout the text. During the defense, the author narrated the text rather than read it. When answering questions, the author made minor errors. Articles used for the work were no more than five years old.	10-15
3	The work was completed neatly and submitted on time. It was independently written on at least two pages of typed text. The author's thoughts on the problem were presented in a scattered manner, lacking arguments. Authors were not referenced throughout the text. During the defense, the author read the text. Hesitantly answers questions and makes fundamental errors. The work was based on articles more than five years old.	6-9

4	The work is written in less than two printed pages. The ideas are presented scatteredly, without supporting arguments. The text contains no citations to the authors. During the defense, the author reads the text. When answering questions, he makes serious errors and is unsure of the material. The work uses articles more than five years old.	0-5

3. Preparation of written creative work (essay)

No.	Evaluation criteria	Points
1	The content of the paper is fully consistent with the topic; the theme is explored in depth and with argumentation. The presentation of ideas is well-structured, logical, and consistent. The essay's problem is clearly articulated. There are no factual errors. The conclusion contains inferences that logically follow from the content of the main body.	16-20
2	The topic is explored fairly fully and convincingly, with only minor deviations. The thesis is clearly formulated and consistent with the essay's topic. The main body of the essay is logical and coherent, but not fully substantiated, and contains a few factual inaccuracies.	11-15
3	The answer to the topic is correct, but one-sided or incomplete. There are deviations from the topic or individual errors in the presentation of factual material. The material is presented fairly logically, but there are some irregularities in the flow of thought. The conclusions do not fully correspond to the content of the main body.	5-10
4	The topic is not fully explored, indicating a superficial knowledge. It is characterized by a haphazard arrangement of material and a lack of connection between sections. It is distinguished by the presence of serious speech errors.	0-4

4. Solving situational problems

No.	Evaluation criteria	Points
1	Demonstrates original thinking when solving a situational problem. Fully utilizes theoretical knowledge necessary for solving the problem. Demonstrates excellent knowledge of reference biochemical parameters when interpreting proposed biofluid analysis data. Demonstrates the ability to draw logical conclusions based on a situational problem, while demonstrating a thorough understanding of the required course material.	9:30 PM
2	Possesses the necessary knowledge to solve a given situational problem. Allows for minor inaccuracies when discussing a given case. Capable of drawing correct conclusions based on the proposed situational problem.	18-20
3	Allows minor inaccuracies when discussing a given problem, has difficulty interpreting the analyses proposed in the situational problem, and draws conclusions with difficulty.	10-17
4	Makes fundamental mistakes in discussing situational problems. Passive, unable to draw appropriate conclusions.	0-9

5.Preparing a glossary

No.	Evaluation criteria	Points
1	Awarded if the student has compiled a glossary independently; it contains at least 20 terms. The terms are relevant to the topic being defended; the wording is correct, consistent with the biological meaning, and complete. The terms are arranged alphabetically, and a full definition is provided.	9-10

2	Awarded if the student has compiled a glossary independently; it contains at least 20 terms. The terms are relevant to the topic being defended; the term is correctly formulated and corresponds to its biological meaning. There is no alphabetical order. There are some inaccuracies.	7-8
3	This is given if the student has compiled the glossary independently; its size is at least 20 terms. The wording of the term corresponds to the biological meaning, but is not complete. There is no alphabetical order;	5-6
4	This is given if the student has compiled a glossary independently; its size is at least 10 terms. The terms are not relevant to the topic; serious biological errors are allowed. There is no alphabetical order;	0-4

Checklist for midterm assessment

No.	**Evaluation criteria**	**Level**			
		Great	**Fine**	**Satisfactorily**	**Unsatisfactory**
Midterm exam					
1	Written response to questions	30	20	15	0
2	Completing test assignments	30	20	15	0
3	Solving situational problems	40	30	20	0
	General:	**100**	**70**	**50**	**0**

1. Written response to questions

Approximately 3 questions of maximum 10 points:

No.	**Questions**	**Level**			
		Great	**Fine**	Satisfactorily	Unsatisfactory
1	1 question on the topic	10	6	5	0
2	2 questions on the topic	10	6	5	0
3	3 questions on the topic	10	8	5	0
	Total:	**30**	**20**	**15**	**0**

No.	**Evaluation criteria**	**Points**
1	The student demonstrated original thinking, demonstrated a deep knowledge of the material, and drew on scientific advances from other disciplines in his answer. He used scientific terminology.	27-30
2	The student demonstrated knowledge of the material and made minor inaccuracies, which were corrected by the student. He used scientific terminology.	21-26
3	The student made inaccuracies and minor mistakes during his answer, used scientific terminology, experienced great difficulty in systematizing the material, and needed the teacher’s help.	15-20
4	The student did not answer the teacher's questions, made fundamental mistakes and inaccuracies, and did not use scientific terminology in his answers.	0-14

2. Completing test tasks

No.	Evaluation criteria	Points
1	90-100% correct answers	9:30 PM
2	70-89% correct answers	16-20
3	50-69% correct answers	11-15
4	Less than 50% correct answers	0-10

3. Solving situational problems

Situational tasks –maximum 28 points (each task maximum 14 points):

No.	Questions	Level			
		Great	**Fine**	**Satisfactorily**	**Unsatisfactory**
1	situational task	40	30	15	0
	Total:	**40**	**30**	**15**	**0**

No.	Evaluation criteria	Points
1	Demonstrates original thinking when solving a situational problem. Fully utilizes theoretical knowledge necessary for solving the problem. Demonstrates excellent knowledge of reference biochemical parameters when interpreting proposed biofluid analysis data. Demonstrates the ability to draw logical conclusions based on a situational problem, while demonstrating a thorough understanding of the required course material.	30-40
2	Possesses the necessary knowledge to solve a given situational problem. Allows for minor inaccuracies when discussing a given case. Capable of drawing correct conclusions based on the proposed situational problem.	21-29
3	Allows minor inaccuracies when discussing a given problem, has difficulty interpreting the analyses proposed in the situational problem, and draws conclusions with difficulty.	10-20
4	Makes fundamental mistakes in discussing situational problems. Passive, unable to draw appropriate conclusions.	0-9

Multi-point system of knowledge assessment			
Grading in a letter system	Digital equivalent of points	Percentage content	Assessment according to the traditional system
A	4.0	95-100	Great
A -	3.67	90-94	
B +	3.33	85-89	Fine
B	3.0	80-84	
B -	2.67	75-79	
C +	2.33	70-74	
C	2.0	65-69	Satisfactorily
C -	1.67	60-64	
D+	1.33	55-59	
D-	1.0	50-54	
FX	0.5	25-49	Unsatisfactory

F	0	0-24	

11. Educational resources

	No	Name	Link
Electronic resources	1	Electronic library of the South Kazakhstan Medical Academy	-https://e-lib.skma.edu.kz/genres
	2	Republican Interuniversity Electronic Library (RIEL) –	http://rmebrk.kz/
	3	Digital library "Aknurpress"	-https://www.aknurpress.kz/
	4	Electronic library "Epigraph"	-http://www.elib.kz/
	5	Epigraph - a portal for multimedia textbooks	https://mbook.kz/ru/index/
	6	EBS IPR SMART	https://www.iprbookshop.ru/auth
	7	information and legal system "Zan" -	https://zan.kz/ru
	8	Medline Ultimate EVSCO	https://research.ebsco.com/
	9	eBook Medical Collection EBSCO	https://research.ebsco.com/
	10	Scopus -	https://www.scopus.com/

1. Biochemistry [Electronic resource]: textbook for universities / ed. E. S. Severina. - 5th ed. , rev. and additional - Electron. text data (66.5 MB). - M.: GEOTAR - Media, 2013. - 768 p. email wholesale disk (CD-ROM).
2. Biochemistry [Electronic resource]: textbook / edited by E. S. Severin. - 5th ed. - Electronic text data. (66.4 MB). - M.: Publishing group "GEOTAR-Media", 2011. - 768 p. electronic optical disc (CD-ROM)
3. Tapbergenov S.O. Medical and clinical biochemistry / Tapbergenov S.O. 2020.-512 p. https://www.elib.kz/ru/search/read_book/429/
4. Medical biochemistry. Medicine zhogary oku oryndaryna arnalgan "Medical biochemistry" okulygynyn memlekettik tildegi algashky basylymy. Evero, 2020.-608 b https://www.elib.kz/ru/search/read_book/427/
5. Tapbergenov S.O. Medical biochemistry. Volume II: medical science zhogary oku oryndaryna arnalgan "Medical biochemistry" okulygynyn memlekettik tildegi algashky basylymy. ҚР ДСМ zhone ҚР ОӘБ оқулықты жоғары [illegible] үшін зәне рулік мамандик [illegible] Usynady. – Almaty: ESPI, 2024. – 252 b https://www.elib.kz/ru/search/read_book/13609/
6. Tapbergenov S.O. Medical biochemistry. I-volume: medical science zhogary oku oryndaryna arnalgan "Medical biochemistry" okulygynyn memlekettik tildegi algashky basylymy. ҚР ДСМ zhone ҚР ОӘБ оқулықты жоғары [illegible] үшін зәне рулік мамандик [illegible] Usynady. – Almaty: ESPI, 2024. – 304 b. https://www.elib.kz/ru/search/read_book/13610/
7. Tapbergenov S.O. Medical and Clinical Biochemistry. Third revised and supplemented edition. Recommended by the Educational and Methodological Association of the Republic of Kazakhstan as a textbook for training specialists in higher medical education and for postgraduate training of physicians of all specialties. Almaty. Evero Publishing House, 2020. 516 pages. https://www.elib.kz/ru/search/read_book/429/
8. Modern experimental biochemistry: [Electronic resource]: scientific publication. - B. m.: B. i., 2000. - 1 electronic optical disc (CD-ROM)
9. Zurabyan, SE Fundamentals of bioorganic chemistry[Electronic resource]:textdook for medical students / SE Zurabyan. - Electron. 45.0MB) -

1. while on the department's premises, comply with the disciplinary requirements specified upon entering the department;
2. mandatory attendance of lectures, practical and laboratory classes according to the schedule;
3. don't be late for classes;
4. During classes, wear special clothing (robes, caps);
5. do not miss classes; in case of illness, provide a leave certificate issued by the dean's office based on a certificate of illness;
6. missed classes shou[illegible]ing work-offs;
7. actively participate i[illegible]ess;
8. comply with the Ac[illegible]gulations and [illegible]
9. complete homework and SIW assignments in a timely and accurate manner according to the SIW schedule;
10. In case of failure to complete assignments and missing a lecture, the final grade is reduced;
11. be patient, open and friendly towards fellow students and teachers;
12. take good care of the department's property;
13. In connection with the absence of lectures for an unjustified reason, 1 point is deducted from the overall admission rating for each absence.
14. In connection with the absence of classes under the SIWPS for an unjustified reason, 2 points are deducted from the overall admission rating for each absence.
15. If a student receives an unsatisfactory grade (0-49 points) during the midterm assessment, he/she will not be allowed to take the final assessment.
16. If a student receives an unsatisfactory grade in the practical skills assessment, he/she will not be allowed to take the final assessment.
17. If a student is absent from a lecture, practical lesson, or SIW (independent work of the student) lesson according to the schedule without a valid reason, an absence mark ("0") is entered in the AIS Platonus electronic educational journal.

13. Academic policy based on the moral and ethical values of the academy

Understanding the importance of the principles and culture of academic integrity, which express students' honesty in practical and laboratory work, as well as in SIW classes, exams, and expressing their position in interactions with faculty and administration.

Course grading policy: The student's final grade upon completion of the course is [illegible] of the sum of the admission ra[illegible]nt (FCA) and is assigned according to a point-rating letter system.

ME = ARA + FCA

Admission Rating Assessment (ARA) equals 60 points or 60% and includes: assessment of current control (ACC) and assessment of midterm exam (ME).

Evaluation of current control (ECC) consists of the average grade for practical classes + the average grade for independent work.

Assessment of [illegible]

Admission Rati[illegible]

Final control (F[illegible] [illegible] or 40% of the overall grade.

During testing, the trainer is offered 50 questions.
The final assessment is calculated as follows: if the student answered 45 questions out of 50 correctly, this will be 90%.

90 x 0.4 = 36 points.

Final assessmentis calculated if the student has positive grades both for the admission rating (AR) = 30 points or 30% or more, and for the final control (FC) = 20% or more.
Final score (100 points) = MEavg x 0.2 + ACCavg x 0.4 + FC x 0.4 a student who received an unsatisfactory grade for one of the types of control (ME1, ME2, CCavg) is not allowed to take the exam.
Penalty points are subtracted from the average score of the current control.

14.	Approval and revision		
Date of approval	**Protocol No.**	**Full name of the manager**	**Signature**
Date of agreement with the library and information center	Protocol No. 7 25.06.25.	Head of the BIC Darbicheva R.I.	
Date of approval at the department	Protocol No. 11.1 26.06.25.	Head of the Department of Chemical Disciplines, Biology and Biochemistry, Acting Professor K.N. Daurenbekov	
Date of approval for AK EP	Protocol No. 6 27.06.25.	Chairman of the JSC "Medicine" Auezhankyzy D.	
Date of review at the department	Protocol No. ___	Head of the Department of Chemical Disciplines, Biology and Biochemistry, Acting Professor K.N. Daurenbekov	
Date of revision at AK EP	Protocol No. ___	Chairman of the JSC "Medicine" Auezhankyzy D.	