

SYLLABUS
Spring semester 2024-2025 academic year
Educational program "6B05103 Biotechnology"

ID and name of course	Independent work of the student (IWS)	Number of credits			General number of credits	Independent work of the student under the guidance of a teacher (IWST)
		Lectures (L)	Practical classes (PC)	Lab. classes (LC)		
87022 Biochemistry of drugs	3	3	-	3	6	6
ACADEMIC INFORMATION ABOUT THE COURSE						
Learning Format	Cycle, component	Lecture types	Types of practical classes		Form and platform final control	
Offline	BD, elective	Presentation/problem			Writing Offline	
Lecturer - (s)	Raigul Yesengeldiyevna Niyazova, PhD, professor					
e-mail :	Raygul.Niyazova@kaznu.kz					
Phone :	87273773202					
Assistant - (s)	Doktyrbay Gulina., Senior Lecturer					
e-mail :	gulina.kaznu@gmail.com					
Phone :						
ACADEMIC COURSE PRESENTATION						
Purpose of the course	Expected Learning Outcomes (LO) *			Indicators of LO achievement (ID)		
	As the result of studying the course the student will be able to:			(at least 2 per LO)		
Formation and development of general professional and professional competencies necessary for professional activity in the field of Biochemistry of Drugs to generate a complete system of knowledge	LO1 Use the ability and willingness to use the basic laws of natural sciences in professional activities			1.1 Knowledge of basic concepts, formulas and laws of natural science disciplines in professional activities;		
				1.2 Understanding of the overall structure of the course and the relations between its elements.		
	LO2 Apply knowledge about the Biochemistry of Drugs			2.1 Knowledge of the theoretical foundations of Biochemistry of Drugs aspects and its practical application;		
				2.2 The ability to apply modern ideas about the basics of Biochemistry of Drugs		
				2.3 Analyze dynamics of scientific problems in Biochemistry of Drugs		
	LO3 Demonstrate the ability to experiment in the field of Biochemistry of Drugs			3.1 Knowledge of modern achievements in technologies of Biochemistry of Drugs study;		
				3.2 Has the ability to use methods (research, calculation, analysis, etc.) inherent to the field of Biochemistry of Drugs		
	LO4 Know the principles of obtaining information, researching in the field of Biochemistry of Drugs			4.1 Knowledge of theoretical foundations of obtaining various pharmaceutical drugs;		
				4.2 Knows how to create, identify and use methods of analysis		
	LO5 Own modern approaches to the study in the field of Biochemistry of Drugs			5.1 Knowledge about innovative ways of biochemistry based on the use of data from study drugs;		
				5.2 The ability to use new methods and techniques of Biochemistry of Drugs		
Prerequisites	Bh 2209 Biochemistry					
Postrequisites						
Learning Resources	Literature: main, additional.					

	<p>1. Clinical biochemistry and drug development. From Fundamentals to Output / Edited by Shashank Kumar. - Apple Academic Press, 2021</p> <p>2. Paul G. Pearson and Larry C. Wienkers. Handbook of Drug Metabolism Third Edition. - Taylor & Francis Group, 2019.</p> <p>3. Michael D. Coleman. Human Drug Metabolism Third Edition. - John Wiley & Sons, 2020.</p> <p>4. Hye Suk Lee, Kwang-Hyeon Liu. Drug Metabolism, Pharmacokinetics and Bioanalysis. – 2019.</p> <p>5. Identification and quantification of drugs, metabolites, drug metabolizing enzymes, and transporters. Concepts, Methods, and Translational Sciences / Edited by Shuguang MA, Swapan K. Chowdhury. – 2020. – Elsevier. – 684p.</p> <p>Research infrastructure</p> <p>Professional scientific databases</p> <p>1. Web of Science (WoS) http://webofscience.com/</p> <p>2. Scopus http://www.scopus.com/</p> <p>3. ScienceDirect www.sciencedirect.com</p> <p>Internet resources</p> <p>1 . http://elibrary.kaznu.kz/ru</p> <p>2. Elibrary - www.elibrary.ru</p> <p>3. Molbiol - www.molbiol.ru</p> <p>4. NIH USA - www.pubmed.com</p>
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Academic course policy	<p>The academic policy of the course is determined by <u>the Academic Policy and the Policy of Academic Integrity of Al-Farabi Kazakh National University</u> .</p> <p>Documents are available on the main page of IS Univer .</p> <p>Integration of science and education. The research work of students, undergraduates and doctoral students is a deepening of the educational process. It is organized directly at the departments, laboratories, scientific and design departments of the university, in student scientific and technical associations. Independent work of students at all levels of education is aimed at developing research skills and competencies based on obtaining new knowledge using modern research and information technologies. A research university teacher integrates the results of scientific activities into the topics of lectures and seminars (practical) classes, laboratory classes and into the tasks of the IWST, IWS, which are reflected in the syllabus and are responsible for the relevance of the topics of training sessions and assignments.</p> <p>Attendance. The deadline for each task is indicated in the calendar (schedule) for the implementation of the content of the course. Failure to meet deadlines results in loss of points.</p> <p>Academic honesty. Practical/laboratory classes, IWS develop the student's independence, critical thinking, and creativity. Plagiarism, forgery, the use of cheat sheets, cheating at all stages of completing tasks are unacceptable.</p> <p>Compliance with academic honesty during the period of theoretical training and at exams, in addition to the main policies, is regulated by <u>the "Rules for the final control" , "Instructions for the final control of the autumn / spring semester of the current academic year" , "Regulations on checking students' text documents for borrowings"</u>.</p> <p>Documents are available on the main page of IS Univer.</p> <p>Basic principles of inclusive education. The educational environment of the university is conceived as a safe place where there is always support and equal attitude from the teacher to all students and students to each other, regardless of gender, race / ethnicity, religious beliefs, socio-economic status, physical health of the student, etc. All people need the support and friendship of peers and fellow students. For all students, progress is more about what they can do than what they can't. Diversity enhances all aspects of life. All students, especially those with disabilities, can receive counseling assistance by phone / e- mail or via video link in MS Teams.</p> <p>Integration MOOC (massive open online course). In the case of integrating MOOC into the course, all students need to register for MOOC. The deadlines for passing MOOC modules must be strictly observed in accordance with the course study schedule.</p> <p>ATTENTION! The deadline for each task is indicated in the calendar (schedule) for the implementation of the content of the course, as well as in the MOOC. Failure to meet deadlines results in loss of points.</p>
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INFORMATION ABOUT TEACHING, LEARNING AND ASSESSMENT				
Score-rating letter system of assessment of accounting for educational achievements				Assessment Methods
Grade	Digital equivalent points	points, % content	Assessment according to the traditional system	<p>Criteria-based assessment is the process of correlating actual learning outcomes with expected learning outcomes based on clearly defined criteria. Based on formative and summative assessment.</p> <p>Formative assessment is a type of assessment that is carried out in the course of daily learning activities. It is the current measure of progress. Provides an operational relationship between the student and the teacher. It allows you to determine the capabilities of the student, identify difficulties, help achieve the</p>
A	4.0 _	95-100	Great	
A-	3.67	90-94		

B+	3.33	85-89	Fine	best results, timely correct the educational process for the teacher. The performance of tasks, the activity of work in the classroom during lectures, seminars, practical exercises (discussions, quizzes, debates, round tables, laboratory work, etc.) are evaluated. Acquired knowledge and competencies are assessed. Summative assessment - type of assessment, which is carried out upon completion of the study of the section in accordance with the program of the course. Conducted 3-4 times per semester when performing IWS. This is the assessment of mastering the expected learning outcomes in relation to the descriptors. Allows you to determine and fix the level of mastering the course for a certain period. Learning outcomes are evaluated.																					
B	3.0	80-84																							
B-	2.67	75-79																							
C+	2.33	70-74																							
C	2.0	65-69																							
C-	1.67	60-64	Satisfactorily	<table border="1"> <thead> <tr> <th colspan="2">Formative and summative assessment</th> <th>Points % content</th> </tr> </thead> <tbody> <tr> <td>Activity at lectures</td> <td></td> <td>10</td> </tr> <tr> <td>Work in lab classes</td> <td></td> <td>25</td> </tr> <tr> <td>Independent work</td> <td></td> <td>25</td> </tr> <tr> <td>Design and creative activity</td> <td></td> <td></td> </tr> <tr> <td>Final control (exam)</td> <td></td> <td>40</td> </tr> <tr> <td>TOTAL</td> <td></td> <td>100</td> </tr> </tbody> </table>	Formative and summative assessment		Points % content	Activity at lectures		10	Work in lab classes		25	Independent work		25	Design and creative activity			Final control (exam)		40	TOTAL		100
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D+	1.33	55-59																							
D	1.0	50-54																							
FX	0,5	25-49																							
F	0	0-24	Unsatisfactory																						

Calendar (schedule) for the implementation of the content of the course

A week	Topic name	Number of hours	Max. ball
MODULE 1 Biochemistry of some drugs			
1	L 1. Biophysical and Biochemical Characteristics of Therapeutic Proteins	2	1
	LC 1. Features of conducting an experiment in a biochemical laboratory.	2	6
2	L 2. Biologically active peptides	2	1
	LC 2. Protein hydrolysis. Separation of amino acid mixture by partition chromatography on paper	2	6
3	L 3. Oligonucleotides	2	1
	LC 3. Release of deoxyribonucleotides from the liver or spleen	2	6
4	L 4. Antibiotics	2	1
	LC 4. Color reactions to antibiotics	2	6
	IWST 1. Consultations on the implementation of IWST 1		
5	L 5. Vitamins	2	1
	LC 5. Quantitative determination of rutin, vitamin C	2	6
	IWS 1. Coenzymes: Role in Medicine /miniconference		20
MODULE 2 Drug Metabolism			
6	L 6. An Introduction into Drug Metabolism	2	1
	LC 6. Determination of iron in food products	2	6
	IWST 2. Colloquium (testing on the topics covered in Module 1).		10
7	L 7. Experimental Approaches to Study Metabolism	2	1
	LC 7. Determination of chlorides, nitrates and nitrides in plants	2	6
	IWST 3. Consultations on the implementation of IWS 2		
	IWS 2. Technologies for in vitro and in vivo drug metabolism studies / individual project		21
Midterm control 1 (Cumulative)			100
8	L 8. Redox Reactions	2	1
	LC 8. Enzyme inhibitors. Inhibition of trypsin activity by trasylol	2	6
9	L 9. Reactions of Hydrolysis	2	1
	LC 9. Influence of temperature on the efficiency of enzyme catalysis. Influence of temperature on pepsin activity. Study of thermolability of invertase	2	6
10	L 10. Reactions of Conjugation	2	1
	LC 10. Influence of medium on the efficiency of enzyme catalysis. Influence of pH on trypsin activity. Influence of medium on catalase activity.	2	6
11	L 11. Metabolism and Bioactivity	2	1
	LC 11. Determination of salivary amylase enzyme activity under the influence of medicinal preparations	2	6
	IWST 4. Consultations on the implementation of IWS 3		

12	L12. Factors Affecting Drug Metabolism	2	1
	LC 12. Influence of drugs on enzyme activity. Determination of amylase activity in cholensim tablets.	2	6
	IWS 3. Drug interactions / group project		15
13	L 13. Pharmacogenetics and Pharmacogenomics	2	1
	LC 13. Influence of drugs on enzyme activity. Study of the dynamics of triacylglycerol hydrolysis under the influence of drugs containing pancreatic lipase.	2	6
	IWST 5. Colloquium (testing on the topics covered in Module 2).		15
MODULE 3 Drug metabolism prediction			
14	L 14. Omics technologies	2	1
	LC 14. BLAST. Alignment of the six major drug metabolizing CYPs	2	6
15	L 15. Software, Web Servers and Data Resources to Study Drug Metabolism	2	
	LC 15. Structural Features of CYPs. Search for PDB structures and files. View structures using the JMol service	2	6
	IWST 6. Colloquium (testing on the topics covered in Module 3).		15
Midterm control 2			100
Final control (exam)			100
TOTAL for course			100

Dean _____ M.S. Kurmanbayeva

Chair of the Academic Committee

on the Quality of Teaching and Learning _____ L.K. Baktybayeva

Head of Department _____ A.S. Kistaubayeva

Lecturer _____ R.Ye. Niyazova

RUBRICATOR OF THE SUMMATIVE ASSESSMENT

CRITERIA EVALUATION OF LEARNING OUTCOMES

Criterion	"Excellent" Max. weight in %	"Good" Max. weight in %	"Satisfactory" Max. weight in %	"Unsatisfactory" Max. weight in %
Ball	90-100	70-89	50-69	25-49 /0-24
1. Knowledge and understanding of the theory and concept of the course	Active participation in the discussion of problems brought up on the topic of the lesson, independent analysis and judgment, fluent knowledge of the material, complete and reasoned answers to questions, participation in discussion, solid knowledge of the lecture material, mandatory and recommended additional literature / The answer contains an exhaustive disclosure of all questions (within the limits of the knowledge gained), detailed argumentation for each conclusion and statement, is constructed logically and consistently, supported by examples.	Insufficiently complete disclosure of some issues of the topic, minor inaccuracies in the formulation of categories and concepts, less activity in seminars, incomplete knowledge of the recommended mandatory and additional literature / The answer contains a complete but not exhaustive coverage of all issues, a shortened argumentation of the main provisions, allows for a violation of the logic and sequence of presentation of the material. The answer allows for stylistic errors, imprecise use of terms.	The answers reveal significant gaps in knowledge of the main provisions of the academic discipline, most of the material has not been learned, there is passivity in seminars. The answer contains incomplete coverage of the proposed questions, superficially argues the main provisions, the presentation allows for violations of logic and sequence of presentation of the material, does not provide examples. Violation of deadlines.	Incorrect coverage of the questions posed, erroneous argumentation, factual stylistic and logical errors, admission of an incorrect conclusion. Violation of deadlines / Ignorance of basic concepts, mechanisms, procedures
2. Application of the selected methodology to specific applied problems	Complete completion of the task, correctly selected test for the task, detailed, reasoned answer to the question posed when solving a practical problem.	Partial completion of the task, incomplete and sometimes reasoned answer to the question posed with an incomplete solution to the practical problem, incorrect use of terminology.	The material is presented in fragments, with a logical violation of logical sequence, factual and semantic inaccuracies are allowed, knowledge of problem solving is used superficially.	An irrational method of solving problems or an insufficiently thought-out plan for an answer, inability to solve problems, perform tasks in general, making mistakes and shortcomings that exceed the norm/ Inability to apply knowledge, algorithms to solve problems; inability to draw conclusions and generalizations. Violation of the Rules.
3. Evaluation and analysis of the applicability of the selected methodology to the	Consistent, logical and correct substantiation of scientific provisions and applications of the methodology, literacy, visualization of answers	3-4 inaccuracies in the use of conceptual material, minor errors in generalizations and conclusions that do not affect the good level of task completion are allowed	The conclusions on the applicability of substantiated scientific provisions are incorrect and unconvincing, there are stylistic and grammatical errors, and inaccuracies in the processing of results	The task was completed with gross errors, the answers to the questions were incomplete, the conceptual material and argumentation were poorly used/ The task was not completed, there

**proposed practical
task, justification
of the obtained
result**

were no answers to the questions posed, the
analysis tools were not used.