Ministry of Agriculture of the Republic of Kazakhstan
Non-profit Joint-stock Company «Kazakh Agrotechnical Research University named after S.Seifullin»

APPROVE
Chairman of the Board -Rector
of Non-profit Joint-stock Company «Kazakh Agrotechnical
Research University named after S.Seifullin»
_____ Tireuov K.M.
Protocol No.16 of "28" 06 2024.

EDUCATIONAL PROGRAM
7M05101-"Veterinary biotechnology"

Code and classification of the field of education: 7M05 Natural Sciences, mathematics and statistics
Code and classification of training areas: 7M051 "Biological and related sciences"
Code in the International Standard Classification of Education: 0510
Degree/qualification awarded: Master of Natural Sciences in the educational program "Veterinary Biotechnology"

Astana 2024

Academic Committee:

№	Full name	Academic degree, academic title	Position	Place of employment	Signature
1	Begenova Ainagul Baibolsynovna	Candidate of Veterinary Sciences, Associate Professor	Head of the Department of Microbiology and Biotechnology	Non-profit Joint-stock Company «Kazakh Agrotechnical Research University named after S.Seifullin»	
2	Suranshiev Zhanbolat Amreevich	Candidate of Veterinary Sciences, Associate Professor	Associate Professor of the Department of Microbiology and Biotechnology	Non-profit Joint-stock Company «Kazakh Agrotechnical Research University named after S.Seifullin»	
3	Sergey Borovikov	Candidate of Biological Sciences, Associate Professor	Acting Professor of the Department of Microbiology and Biotechnology	Non-profit Joint-stock Company «Kazakh Agrotechnical Research University named after S.Seifullin»	
4	Bekkuzhina Sara Sabdenovna	Candidate of Biological Sciences, Associate Professor	Acting Professor of the Department of Microbiology and Biotechnology	Non-profit Joint-stock Company «Kazakh Agrotechnical Research University named after S.Seifullin»	
5	Omarova Akkenzhe Berdikhanovna	PhD доктор	Senior Lecturer at the Department of Microbiology and Biotechnology	Non-profit Joint-stock Company «Kazakh Agrotechnical Research University named after S.Seifullin»	
6	Taldau Gulnar		Student, 2nd year	Non-profit Joint-stock Company «Kazakh Agrotechnical Research University named after S.Seifullin»	
7	Kantaeva Tomiris Ruslanovna	Students of EP 7M05102-Plant biotechnology	Student, 2nd year	Non-profit Joint-stock Company «Kazakh Agrotechnical Research University named after S.Seifullin»	
8	Suleymanova Nargiza Sunnatilla kizi	Students of EP 7M05101-Veterinary biotechnology	Student, 2nd year	Non-profit Joint-stock Company «Kazakh Agrotechnical Research University named after S.Seifullin»	

Agreed with representatives of employers:

№	Full name	Academic degree, academic title	Position	Place of employment
1	Abzhalelov Akhan Begmanovich	Researcher, Doctor of Biological Sciences, Professor	Republican Collection of Microorganisms LLP	
2	Berdikulov Maksat Amanbekovich	General Director, Candidate of Veterinary Sciences	RSE REM "National Reference Center for Veterinary Medicine" KVKN Ministry of Agriculture of the Republic of Kazakhstan	
3	Sailau Kasenovich Abeldenov	Head of the Laboratory of Molecular Biotechnology, PhD Doctor	National Center of Biotechnology LLP	
4	Kiyan Vladimir Sergeevich	Head of the Laboratory of "Biodiversity and Genetic Resources", PhD Doctor, Associate Professor	National Center of Biotechnology LLP	
5	Temirkhanov Aslan Zhanaevich	Chief Scientific Secretary of the Republican Collection of Microorganisms LLP, Candidate of Agricultural Sciences.	Republican Collection of Microorganisms LLP	

The Academic Committee was approved by the order of the Chairman of the Board-Rector of Non-profit Joint-stock Company «Kazakh Agrotechnical Research University named after S.Seifullin»

№ 374-N dated "18" 10 2023.

Educational program -7M05101 -"Veterinary biotechnology"

Reviewed:
at the meeting of the Department of Microbiology and Biotechnology
Protocol №. 14 from "24" 05 2024 y.

at the meeting of the Faculty Council on Academic Quality
Protocol №. 9 from "30" 05 2024y.

at the meeting of the Academic Council of the University
Protocol № 10 from "24" 06 2024y.

Date of update of the EP "____"_____202__ y

The content of the educational program

№	Name of the components	Pages
	Regulatory references	6
1.	Passport of the educational program	7
2.	General characteristics of the educational program	8
3.	Competence model (portrait) graduate	9
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Regulatory references

References to the following normative legal acts were used in the development of the educational program:

1 The Constitution of the Republic of Kazakhstan;
2 The Labor Code of the Republic of Kazakhstan;
3 The Law of the Republic of Kazakhstan "On Education";
4 "State mandatory standards of higher and postgraduate education", approved by Order № 2 of the Minister of Science and Higher Education of the Republic of Kazakhstan dated July 20, 2022 (hereinafter – SES);
5 "Rules for the organization of the educational process on credit technology of education in organizations of higher and postgraduate education", approved by Order № 152 of the Minister of Education and Science of the Republic of Kazakhstan dated April 20, 2011;
6 "Standard rules of the organization of higher and postgraduate education", approved by Order of the Minister of Education and Science of the Republic of Kazakhstan dated October 30, 2018 № 595;
7 "Qualification requirements for educational activities of organizations providing higher and (or) postgraduate education education, and a list of documents confirming compliance with them", approved by the order of the Minister of Science and Higher Education of the Republic Kazakhstan № 4 dated January 5, 2024;
8 Order of the Ministry of Education of the Republic of Kazakhstan dated March 20, 2015 № 137 "On approval of requirements for educational organizations to provide distance learning and rules for organizing the educational process for distance learning and in the form of online training in educational programs of higher and (or) postgraduate education";
9 Guidelines for the use of the European Credit Transfer and Accumulation System (ECTS);
10 Standards and guidelines for quality assurance of higher education in the European Higher Education Area (ESG);
11 Guidelines for the development of educational programs of higher and postgraduate education, Appendix 1 to the order of the Director of the National Center for the Development of Higher Education of the Ministry of Education and Science of the Republic of Kazakhstan dated 05/24/2023 № 601 n/a;
12 "Rules for maintaining the register of educational programs implemented by organizations of higher and (or) postgraduate education, as well as the grounds for inclusion in the register of educational programs and exclusion from it", approved by Order No. 106 of the Minister of Science and Higher Education of the Republic of Kazakhstan dated October 12, 2022;
13 Documented procedure "Documentation Management", approved by Order of the Chairman of the Board-Rector № 269-N dated 07/24/2023;
14 Documented procedure "Quality Records Management", approved by Order of the Chairman of the Board-Rector № 218-N dated 04/21/2020.

1 Passport of the educational program

1.1 The purpose of the educational program

The purpose of the program is to train highly competitive scientific and pedagogical personnel in the field of veterinary biotechnology with a clear focus on future personal and professional activities that meet the requirements of domestic and foreign employers.

The main objectives of the program are the following:

- training of highly qualified masters who are able to formulate and solve modern practical problems of veterinary biotechnology;
- instilling skills in the practical use of immunobiological, biochemical, molecular genetic, breeding, statistical and other methods of biological and related sciences in the creation of effective diagnostic, therapeutic and prophylactic agents and feed additives;
- formation of personal qualities of students as a future specialist and/or head of a scientific and production team.

1.2 Learning outcomes

LO 1- To study the psychology of management in pedagogical activity. Be proficient in a foreign language at a professional level, allowing you to conduct scientific research and be able to show your leadership qualities for the development of enterprises in the industry. To know the functional and stylistic characteristics of the scientific presentation of the material in the studied foreign language, the general scientific terminology and the terminological sublanguage of the corresponding specialty in a foreign language

LO 2- Analyze current trends in the development of scientific knowledge, current methodological and philosophical problems of science, methodology of scientific knowledge, principles and structure of the organization of scientific activity.

LO 3- To reveal the psychology of cognitive activity of undergraduates in the learning process. Possess psychological and pedagogical methods and means to improve the effectiveness of training and education, modern technologies for the use of leadership abilities to implement the educational process, taking into account the requirements of society, as well as the specifics of the professionalization of teaching staff in the field of veterinary biotechnology.

LO 4- To draw conclusions and interpret the methodology of scientific research in the implementation of scientific projects or research. To use the acquired knowledge and ideas in the context of scientific research. To introduce scientific research methods into the educational and scientific process. To formulate the moral guidelines of modern science; problem field, universal principles and moral values of bioethics, ethical problems of manipulation with stem cells. To use modern laboratory and technological equipment, knowledge of fundamental sciences in their scientific work to solve specific problems.

LO 5- Apply the methods of molecular biology and genetics in scientific research; know the hereditary information, composition, structure, functions and patterns of chromosomes, genes and genomes. To use the acquired knowledge in animal genetics and breeding, obtaining new breeds and improving the existing qualities of farm animals. To develop practical skills in the technology of recombinant DNA creation based on the methods of molecular biology and genetics.

LO 6 -Use immunological analysis methods to determine the presence of antigens (proteins and polysaccharides) or antibodies specific to them in biological objects. Have practical skills in diagnosing infectious diseases of animals. To develop traditional and modern biological products. To describe the

vital activity of the fungal cell, the characteristics of fungi, their classification and features of metabolism. To develop a modern classification and technology for the production of fungal diagnostic drugs, test systems and vaccines.

LO 7- Analyze the list of zooanthroponotic diseases, the basic principles and methods of diagnosis of particularly dangerous infectious diseases of animals and humans, technologies for obtaining components of immunological reactions and principles of formulation: serological reactions – RA, RMA, RLA, RSC, immunochemical reactions – ELISA, IHA, molecular genetic – various PCR variants. Identify and discuss current issues and problems of modern biotechnology, veterinary medicine and animal husbandry

LO 8- To determine the spread of microorganisms and their role in the transformation of substances in nature, the influence of various adverse factors on microorganisms. Classify the morphology and physiology of microorganisms, classical methods of selection of strains of microorganisms, modern methods of selection of microorganisms; methods of storage of producing strains.

LO 9- Apply the main technological processes, methods of bionanotechnology in biotechnology in animal husbandry, biology and veterinary medicine. Possess skills in the field of technologies for obtaining nanomaterials and using them in practice. To systematize and analyze the achievements of cell biology. Predict animal breeds, methods of comprehensive assessment of the best animals. To select queens and producers for mating, aimed at the rational use of animals;

LO 10 -Classify the technological diversity of biotechnological target products (biomass, primary and secondary metabolites), methods of their separation and purification; the principle of operation of the main biotechnological equipment, the conditions of valid separation methods for obtaining various products. To draw conclusions about the latest achievements in the field of preparation of various biotechnological products and methods of separation and purification of target products.

2 General characteristics of the educational program. Modern biotechnology occupies a leading position in the system of biological, medical, veterinary and zootechnical research and represents a progressive form of industrial technology based on biological objects – humans, animals, plants, microorganisms, cells and viruses. The modern concept of education in the field of biotechnology implies the need for the formation of knowledge and practical skills among future specialists. The general orientation and knowledge of students in the field of the use of biotechnology in pharmaceutical production, in the production of biologics, in veterinary medicine are extremely important, because according to expert estimates, the share of medicines obtained by biotechnological methods in the near future will be over 50%.

In this regard, the educational program "Veterinary Biotechnology" is one of the priorities of the master's degree programs of the group "Biological and Related Sciences", combining fundamental and applied science, as well as production.

The educational program "Veterinary Biotechnology" has been developed in accordance with the National Qualifications Framework, professional standards of the training area "7M051 – Biological and Related Sciences", coordinated with the Dublin Descriptors and the European Qualifications Framework.

The uniqueness of the program. The main direction of biotechnology is the development of various methods, methods, production schemes aimed at obtaining valuable substances based on biological objects. Biotechnology is a synthesis of fundamental science and practice. Therefore, this program for the preparation of undergraduates in the field of Veterinary Biotechnology is aimed at training biologists and biotechnologists who are capable not only of conducting fundamental biological research, but also of implementing the results obtained into production**.**

The stakeholders of the educational program are: agricultural enterprises, laboratories of the veterinary, food and processing, microbiological, pharmaceutical industries; veterinary stations, zootechnical breeding stations, research institutes and universities of biotechnological, biological, veterinary, agricultural profile; agricultural enterprises; breeding stations; biocombinants for the production of vaccines and biologics, laboratories for quality control and the safety of agricultural products. Graduates of the educational program "Veterinary Biotechnology" in the field of training "7M051 – Biological and related sciences" can work in the following positions: researcher in research institutes and universities; technician, in production laboratories for the production of vaccines and biological products of the veterinary field; master, technologist in biotechnological industries; specialist in the field of agricultural biotechnology; biotechnologist - an animal breeder; a teacher of basic and specialized disciplines in biotechnology at universities.
After receiving a master's degree in Natural Sciences, a graduate of this educational program has the opportunity to continue his studies in the doctoral program 6D051 – "Biological and Related Sciences" and receive a PhD degree.

3 Competence model (portrait) graduate

3.1 The field of professional activity of a graduate of the educational program "Veterinary Biotechnology" in the field of training "7M051 – Biological and related sciences" is the production of biotechnological products for veterinary purposes and the development of modern biotechnological processes providing for the production of diagnostic, therapeutic, preventive and feed preparations of a new generation for veterinary and animal husbandry; breeding of microorganisms and animals; scientific and scientific-pedagogical activity in the field of education and science.

3.2 Types of professional activity Areas of professional activity under the educational program "Veterinary Biotechnology" provides for the development of diagnostics, vaccines and therapeutic serums of a new generation; production of protein and vitamin complexes, feed additives, enzymes, etc.; the use of modern methods and approaches of biological and related sciences to increase the productivity of microorganisms and animals; the use of national and international standards in the assessment, quality control and certification of raw materials, intermediates and finished biotechnological products; experimental study of the properties and life processes of biological objects; design of biotechnological devices and equipment; modification of genotypes of biological objects with economically valuable characteristics, introduction into production of the results of new research and innovative developments; teaching of biotechnology disciplines in higher educational institutions, as well as teaching biology and the basics of biotechnology in secondary educational institutions and colleges of the biological field.

3.3 General education competencies have an idea of the role of science and education in public life; about current trends in the development of scientific knowledge; about current methodological and philosophical problems of natural sciences; possess the necessary knowledge in the field of pedagogy and psychology; integrate knowledge gained through the study of basic disciplines to solve research problems; apply interactive teaching methods; to think creatively and creatively approach the solution of new problems and situations; to be fluent in a foreign language at a professional level; have the skills to carry out educational and pedagogical activities on credit technology of education; methods of teaching professional disciplines; the use of modern information technologies in the educational process; public speaking, correct and logical formulation of their thoughts in oral and written form; expansion and deepening of knowledge necessary for daily professional activities and continuing education in doctoral studies. be competent in the field of research methodology, in carrying out scientific projects and research in the professional field;

3.4 Basic competencies a graduate of the Master's degree in natural Sciences should know both the general principles of biotechnological processes in various fields of the national economy, taking into account ethical and legal norms in relation to other people, animals and nature, and individual productions related to the production of drugs for various purposes. Have modern ideas about the diversity of biological objects, schemes of biotechnological production; genetic and cellular methods to increase the productivity of the producer, to be able to use cognitive and professional activities in conducting discussions on the importance of biotechnology in veterinary medicine, genetic engineering, immunobiotechnology, veterinary medicine; the industry of biologics and diagnostics.

3.5 Professional competencies will be proficient in advanced methods and technologies of working on modern equipment. Demonstrate the ability and willingness to apply the knowledge gained from the master's program in further research and practice; be able to use immunobiological, biochemical, molecular genetic, breeding, statistical and other methods of biological and related sciences in the creation of effective diagnostic, therapeutic and preventive drugs and feed additives; to acquire skills in the development of highly effective diagnostics, vaccines, therapeutic serums, protein-vitamin complexes and other biotechnological products of a new generation and the introduction of innovative products into production;

4 The base of professional practices

Teaching practice

1. Department of Microbiology and Biotechnology of S.Seifullin KATRU

2. Universities and colleges of the biological field.

Research practice.

1. Scientific and production platform of agricultural biotechnology";
2. Accredited "Jointly Kazakh-Chinese Laboratory for Biological Safety";
3. Republican Collection of Microorganisms LLP;
4. National Center of Biotechnology LLP;
5. Scientific and Production Enterprise "Antigen" LLP;
6. Scientific Research Institute of Biological Safety Problems in Otar;
7. JSC "RCPJ" "Asyl tulik" Ministry of Agriculture of the Republic of Kazakhstan;
8. RSE REM "Kazakh Scientific Center for Quarantine and zoonotic Infections named after M.Aikimbayev, Almaty
9. RSE REM "Republican veterinary laboratory" KVKN of the Ministry of Agriculture of the Republic of Kazakhstan
10. RSE REM "National Reference Center for Veterinary Medicine" KVKN of the Ministry of Agriculture of the Republic of Kazakhstan

5 The structure of the Master's degree program in the scientific and pedagogical direction

№ п/п	The name of the cycles of disciplines and activities	Total labor intensity	
		in academic hours	in academic credits
1	2	3	4
1.	Theoretical training	**2640**	88
1.1	Cycle of basic disciplines (DB)	**1050**	**35**
1)	University component (VC):	600	20
	including:		
	History and philosophy of science	150	5
	Foreign language (professional)	150	5
	Pedagogy of higher education	90	3
	Management Psychology	150	5
	Teaching practice	60	2
2)	Elective Component (EC)	450	15
	English for Academic purposes/Academic Writing	150	5
	Biotechnology of fungi /Molecular genetic foundations of biotechnology	150	5
	Theory and methods of experiment/ Scientific processing of research materials	150	5
1.2	Cycle of core disciplines (CD)	**1590**	**53**
1)	University component (UC)	***1410***	
	Immunology	150	5
	Laboratory diagnostics of zooanthroponoses	210	7
	Selection of industrial strains of microorganisms	180	6
	Modern problems of biotechnology in veterinary medicine and animal husbandry	150	5
	Bionanotechnology	210	7
	Scientific foundations of animal breeding	150	5
	Research practice	360	12
2)	Component of choice (CCH)	**180**	**10**
	Bioethics and biosafety in biotechnology /Modern methods of separation and purification of target products	180	6
2	Research work of a graduate student	**720**	**24**
1)	Research work of a graduate student, including internship and completion of a master's thesis	720	24

	(RWGS)		
3	Additional types of training (ATT)		
4	Final attestation (FA)	**240**	**8**
1)	Preparation and defense of a master's thesis (PDMTH)	240	8
	Total	**3600**	**120**

WORKING CURRICULUM
for 2024-2026 academic year
For the modular education program "Veterinary Biotechnology"
by the speciality/group of educational programmes M082 – Biotechnology
Degree: Master's program by specialization (Scientific & pedagogical direction)
Form of education: Full-time (MS 2 years) semester
Entry year: 01-09-2024

Module code	Module name	Discipline	Discipline	Code of subject	Subject name	Academic credits	Control in the academic period					Volume of hours							Distribution of credits per			
														including			MSI WT	MSI W	1 course		2 course	
																			1	2	3	4
																			Number of weeks in the			
							Exams	Differentiated test(practice)	Differentiated test(course paper)	Practice/ SRW	Term paper/project	Total	In-class learning	Lectures	Practice	Lab practicals			15	15	15	15
General modules																						
1	Social Sciences	B	U	IFN 5203	History and philosophy of science	5	1					150.0	45.0	15	30	0	20	85	5.0			
2		B	U	PU 5202	Psychology of management	5	2					150.0	45.0	15	30	0	20	85		5.0		
3		B	U	PVSH 5201	Pedagogics of higher school	3	2					90.0	30.0	15	15	0	12	48		3.0		
4		B	U	PP 6205	Pedagogical training	2				60		60.0		0	0	0	0	0				2.0
5	Professional foreig	B	U	IYaP 5204	Foreign language (professional).	5	1					150.0	45.0	0	45	0	20	85	5.0			
6		B	E	AYaDAC	English for Academic Purposes	5	1					150.0	45.0	0	45	0	20	85	5.0			
7		B	S	AP 5206	Academic writing		1						45.0	0	45	0	20	85				
Modules of specialty/education programm																						
8	Innovative technologies	A	U	Bio 6304	Bionanotechnology	7	3					210.0	75.0	30	45	0	28	107			7.0	
9		A	U	SPBVZh	Modern problems of biotechnology in veterinary and	5	3					150.0	45.0	15	30	0	20	85			5.0	
10		A	E	BBB 6309	Bioethics and biosafety in biotechnolog	6	3					180.0	60.0	30	30	0	24	96			6.0	
11		A	S	SMROCP	Modern methods of division and purification of target		3						60.0	30	30	0	24	96				
12	Biotechnology Research	A	U	Imm 5306	Scientific basics of animal breeding	5	1					150.0	45.0	15	0	30	20	85	5.0			
13		A	U	SPSHM	Selection of industrial stamme of microorganisms	6	2					180.0	60.0	30	0	30	24	96		6.0		
14		A	U	IP 5307	Research practice	6				180		180.0		0	0	0	0	0		6.0		
15		A	U	IP D	Research practice	6				180		180.0		0	0	0	0	0			6.0	
16		A	U	NOSZh 6305	Scientific basis of animal breeding	5	4					150.0	45.0	15	30	0	20	85				5.0
17		A	U	LDZ 6301	Laboratory diagnosis of zooanthroponosis	7	4					210.0	75.0	30	0	45	28	107				7.0
18		B	E	TME 5207	Theory and Methods experiment	5	1					150.0	45.0	15	30	0	20	85	5.0			
19		B	S	NOMI 5207	Fundamentals of scientific research		1						45.0	15	30	0	20	85				
20		B	E	BG 5208	Biotechnology of mushrooms	5	2					150.0	45.0	15	30	0	20	85		5.0		
21		B	S	MGOB 5208	Molecular genetic basics of biotechnology		2						45.0	15	30	0	20	85				
Scientifically research																						
22	Master's researc	R	C	NIRMVVM	Master student's research work, including	5				150		150.0		0	0	0	0	0	5.0			
23		R	C	NIRMVMD	Undergraduate research work, including the	5				150		150.0		0	0	0	0	0		5.0		
24		R	C	NIRMVVM	Master student's research work, including	6				180		180.0		0	0	0	0	0			6.0	
25		R	C	NIRMVVM	Master student's research work, including	8				240		240.0		0	0	0	0	0				8.0
1	**General education subjects(GER)**					**0**		**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
	Core subjects(GER/CS)					0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	University component(GER/UC)					0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Electives(GER/ES)					0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2	**Base requirements(BS)**					**35**		**0**	**0**	**60**	**0**	**1050**	**300**	**75**	**225**	**0**	**132**	**558**	**20**	**13**	**0**	**2**
	Core subjects(BS/CS)					0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	University component(BS/UC)					20		0	0	60	0	600	165	45	120	0	72	303	10	8	0	2
	Electives(BS/ES)					15		0	0	0	0	450	135	30	105	0	60	255	10	5	0	0
3	**Profession requirements(VRS)**					**53**		**0**	**0**	**360**	**0**	**1590**	**405**	**165**	**135**	**105**	**164**	**661**	**5**	**12**	**24**	**12**
	Core subjects(VRS/CS)					0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	University component(VRS/UC)					47		0	0	360	0	1410	345	135	105	105	140	565	5	12	18	12
	Electives(VRS/ES)					6		0	0	0	0	180	60	30	30	0	24	96	0	0	6	0
Total of theoretical course						112	14	0	0	1140	0	3360	705	240	360	105	296	1219	30.0	30.0	30.0	22.0
AC	**Additional courses**														0							
FA	**Final attestation**					8									240.0							
	Master dissertation defence					8				4					240							
	Total					120				1144		3600	705	240	360	105	296	1219				

Appendix 1 to the Academic Calendar
Approved by the Scientific Council of the NAO "KATRU named after S.Seifullin", Protocol No. 12 of 28.03.2024

The schedule of the educational process for the 2024-2025 academic year for the Master's degree programs of the Faculty of Veterinary Medicine and Animal Husbandry Technology

2024-2025 academic year

Course	August	September				October					November				December				January					February				March				April					May				June				July					August			
	26	2	9	16	23	30	7	14	21	28	4	11	18	25	2	9	16	23	30	6	13	20	27	3	10	17	24	3	10	17	24	31	7	14	21	28	5	12	19	26	2	9	16	23	30	7	14	21	28	4	11	18	25
	30	6	13	20	27	4	11	18	25	1	8	15	22	29	6	13	20	27	3	10	17	24	31	7	14	21	28	7	14	21	28	4	11	18	25	2	9	16	23	30	6	13	20	27	4	11	18	25	1	8	15	22	29
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52
M082- "Biotechnology" EP "Veterinary biotechnology"																																																						
I	PW	.	.	.	.	.	.	/ME1	.	.	/RW	/RW	/RW	/RW	/RW	/ME2	E/D	E/D	E/D	H	H	H	.	.	.	.	.	.	/ME1	/RW	/RW	/RW	/RW	/RW	/RW	.	.	/ME2	E/D	E/D	D/H	RD/H	RP/S/H	RP/S/H	RP/S/H	RP/S/H	RP/S/H	RP/S/H	H	H	H	H	H	H
II	H	RP.	RP.	RP.	RP.	RP.	RP./RW	RP./RW	RP./RW	RP./RW	RP./RW	RP./RW	RP./ME1	.	.	.	.	.	.	/ME2	E/D	E/D	H	/RW	TP./RW	TP./RW	/RW	.	.	/ME1	.	.	.	/RW	/RW	/RW	/RW	/ME2	E/D	E/D	FE	FE	FE	FE									
EP "Plant biotechnology"																																																					
I	PW	.	.	.	.	.	.	/ME1	.	.	/RW	/RW	/RW	/RW	/RW	/ME2	E/D	E/D	E/D	H	H	H	.	.	.	.	.	.	/ME1	/RW	/RW	/RW	/RW	/RW	/RW	.	.	/ME2	E/D	E/D	D/H	RD/H	RP/S/H	RP/S/H	RP/S/H	RP/S/H	RP/S/H	RP/S/H	H	H	H	H	H	H
II	H	RP.	RP.	RP.	RP.	RP.	RP./RW	RP./RW	RP./RW	RP./RW	RP./RW	RP./RW	RP./ME1	.	.	.	.	.	.	/ME2	E/D	E/D	H	/RW	TP./RW	TP./RW	/RW	.	.	/ME1	.	.	.	/RW	/RW	/RW	/RW	/ME2	E/D	E/D	FE	FE	FE	FE									
M082- "Biotechnology" EP "Veterinary biotechnology" (winter reception-2023-2025)																																																				
II	H	RP.	RP.	RP.	RP.	RP./RW	RP./RW	RP./ME2	RP./RW	/RW	.	/ME2	E/D	E/D	FC	FC	FC	FC																																				
M082- "Biotechnology" EP "Veterinary biotechnology" (winter reception-2024-2026)																																																			
I	PW	.	.	.	.	.	.	/ME1	/RW	/RW	/RW	/RW	/RW	.	.	/ME2	E/D	E/D	E/D	H	H	H																																		
II																								.	.	.	.	.	.	/ME1	.	.	.	.	TP	TP	.	/ME2	E/D	E/D	E/D	RD/H	RP/S/H	RP/S/H	RP/S/H	RP/S/H	RP/S/H	RP/S/H	H	H	H	H	H	H
M138 - Veterinary 7M09101 - "Diagnosis, treatment and prevention of animal diseases", direction: scientific and pedagogical																																																				
I	PW	.	.	.	.	.	.	/ME1	/RW	.	.	.	.	.	.	/ME2	E/P	E/P	H	H	H	H	.	.	.	.	/TP	/TP	/ME1	/RW	.	.	.	.	.	.	/ME2	E/P	E/P	D/H	RD/H	S/H	S/H	S/H	S/H	S/H	S/H	H	H	H	H	H	H
II	H	RP	RP	RP	RP/RW	RP/RW	RP/RW	RP/RW	RP/RW	/RW	/RW	/RW	/ME1/RW	/RW	/RW	/RW	/ME2	E/P	H	H	H	H	RP	RP	RP	RP/RW	RP/RW	RP/RW	RP/RW	RP/RW	RP/RW	RP/RW	RP/RW	RP/RW	RW	RW	RW	FE	FE	FE	FE	FE	FE	FE								
M138 - Veterinary 7M09101 - "Diagnosis, treatment and prevention of animal diseases", direction: scientific and pedagogical (winter reception) 2023-2025																																																				
I win	H	RP	RP	RP	RP	RP	RP/RW	RP/RW	RP/RW	RP/RW	RP/RW	RP/RW	RP/RW	RW	RW	RW	FE	FE	FE	FE	FE	FE	FE																															
M138 - Veterinary 7M09101 EP "Veterinary" diagnostics, treatment and prevention of animal diseases, direction: scientific and pedagogical (winter reception) 2024-2026																																																			
I win	H	.	.	.	.	.	.	/ME1	/BM	.	.	.	.	.	.	/ME2	E/P	E/P	H	H	H	H																																
II win																								RP/RW	RP/RW	RP/RW	RP/RW	RP/RW	RP/RW	RP/RW	RP/RW	RP/RW	/RW	/RW	/TP	/ME1/T	.	.	.	/ME2	E/P	D/H	RD/H	S/H	S/H	S/H	S/H	S/H	S/H	H	H	H	H	H	H
M138 - Veterinary 7M09102 EP "Safety and quality of food production"																																																			
I	PW	.	.	.	.	.	.	/ME1	.	.	.	.	.	/RW	/RW	/ME2	E/D	E/D	H	H	H	H	/TP/RW	/TP/RW	/TP	/TP	.	/RP	/ME1/RP	/RP	/RP	/RP	/RP	/RP	/RP	/RP/RW	/MT2/RP/RW	E/D	E/D	D/H	RD/H	S/H	S/H	S/H	S/H	S/H	S/H	H	H	H	H	H	H
II	H	.	.	.	.	.	/ME1	.	.	.	.	.	/ME2	RW	RW	RW	E/D	E/D	H	H	H	H	RP/RW	RP/RW	RP/RW	RP/RW	RP/RW	RP/RW	RP/RW	RP/RW	RP/RW	RP/RW	RW	RW	RW	RW	RW	FE	FE	FE	FE	FE	FE	FE								
M132 Animal breeding. 7M08201 - "Feed and feeding of farm animals", 7M08202 "Selection and reproduction of agricultural animals" educational programs																																																			
I	PW							/ME1								/ME2/RW	E/D	E/D	D/H	H	H	H	.	.	.	.	.	.	/ME1							/RW	/RW	/ME2/RW	E/D	E/D	D/H	RD/H	S/H	S/H	S/H	S/H	S/H	S/H	H	H	H	H	H	H
II	H	RP	RP	RP	RP	RP	RP	RP	RP/RW	RP/RW	RP/RW	/TP/RW	/TP/RW	/MT1/TP	/TP/RW	/ME2/RW	E/D	E/D	D/H	H	H	H	RP	RP	RP	RP/RW	RP/RW	RP/RW	RP/RW	RP/RW	RP/RW	RP/RW	RP/RW	RW	RW	RW	FE	FE	FE	FE	FE	FE										
M132 Animal breeding. 7M08201 - "Feed and feeding of farm animals" educational program (winter reception) 2024-2026																																																			
I win	H	.	.	.	.	.	.	/ME1	.	.	.	.	.	.	.	/ME2/RW	E/D	E/D	D/H	H	H	H																																
II win																								RP	RP	RP	RP	RP	RP	RP/RW	RP/RW	RP/RW	RP/RW	/TP/RW	/TP/RW	/TP/ME1/RW	/TP/RW	/ME2/RW	E/D	E/D	D/H	RD/H	S/H	S/H	S/H	S/H	S/H	S/H	H	H	H	H	H	H
M132 Animal breeding. 7M08201 - "Feed and feeding of farm animals" educational program (winter reception) 2023-2025																																																			
II win	H	RP/RW	RP/RW	RP/RW	RP/RW	RP/RW	RW	RW	RW	RW	RW	RW	RW	RW	FE	FE	FE	FE	FE																																	

Symbols:
PW - Presentation week
. - theoretical training
RW - research work of a master student
E - examination session
S - summer semester

RP - research practice
TP- teching practice
R – research work
RD - registration for disciplines
D - delivery of FX

H - holidays
FE - final examination
ME1 -the first midterm exam
ME2 -the second midterm exam

Holiday days:

August 30 - Constitution Day
September 1-Knowledge Day
October 25-Republic Day
December 16 - Independence Day
January 1, 2, 3 - New Year
January 7-Christmas

March 8 - International Women's Day
March 21-23 - Nauryz
May 1 is the Holiday of Unity of the people of Kazakhstan
May 7 - Defender of the Fatherland Day
May 9 - Victory Day
July 6 - Capital Day

Dean of the Faculty _____ Akibekov O.S.
"____"_____2024

The relationship between the achievability of the formed achievability of the formed learning outcomes according to the educational program with the help of academic disciplines

№	Name of the discipline	A brief description of the discipline (30-50 words)	Number of credits	Generated learning outcomes (codes)									
				LO 1	LO 2	LO 3	LO 4	LO 5	LO 6	LO 7	LO 8	LO 9	LO 10
The cycle of basic disciplines The university component													
1	History and philosophy of science	Forms the skills of a methodological and dialectical approach to research, generalizes philosophical knowledge, studies the issues of historical development, its structure, analyzes the patterns and trends of scientific knowledge, systematizes the effectiveness of research work.	5		V								
2	Foreign language (professional)	It forms foreign language communicative competence as an important component of professional competence and the culture of scientific writing among students, which allows them to integrate into international scientific activities, allows them to freely operate the scientific and conceptual apparatus in their specialty, expand the scientific and information base, acquire broad scientific knowledge, identify promising areas of professional and scientific activity.	5	V									
3	Higher school pedagogy	It allows undergraduates studying in the scientific and pedagogical field to understand common problems, methodological and theoretical foundations of higher school pedagogy, skills in the analysis of teaching and upbringing, elements of modern planning and organization technologies.	3			V							
4	Management Psychology	Forms the skills of managing organized activities of people through the study of psychological laws and patterns of management and quality of work, forms the ability to make scientifically sound decisions, structure the actions of other people, manage the organization.	5	V									
The cycle of basic disciplines Component of choice													
6	English for academic purposes	***English for academic purposes:*** Comprehensive theoretical and linguistic, practical and information-analytical training in order to perform functions related to the use of a foreign language in professional and scientific activities: proficiency	5	V									

	Academic Writing	in public speaking, conducting discussions, the ability to work with information from various sources, edit texts of professionally significant content in a foreign language. ***Academic writing.*** The course is aimed at developing and improving academic skills in the field of written English, necessary for successful written communication in an academic, professional and work environment. Students get acquainted with the peculiarities of academic writing, using library catalogs and websites. The practice of writing a discursive essay: outline, main idea, paragraphs and conclusion. Methods of paraphrasing. APA format: links and citations. Students study the types of abbreviations, academic vocabulary, and the use of articles.										
7	Biotechnology of mushrooms Molecular genetic foundations of biotechnology	***Biotechnology of fungi.*** Microscopic lower and higher fungi. Morphological features of the structure and methods of reproduction of fungi, yeast. Primary and secondary metabolites of fungi, their significance and biotechnologies. Methodology for the search and production of mushroom producing strains, storage of mushroom cultures. Principles of industrial cultivation of molds, yeasts, basidiomycetes. Biosynthesis of antibiotics by mold fungi. Feed antibiotics. Biosynthesis of vitamins, organic acids and solvents, enzymes. ***Molecular genetic foundations of biotechnology .*** Application of knowledge and methods of molecular biology and genetics in scientific research; Hereditary information, composition, structure, functions and patterns of chromosomes, genes and genomes. Obtaining new varieties and improving the existing qualities of agricultural plants. Recombinant DNA based on methods of molecular biology and genetics. Biological systems used in biotechnology, their features. Chimeric proteins and protein stabilization. DNA synthesis and sequencing methods	5					V	V				

	Theory and methods of experiment Scientific processing of research materials	***Theory and methods of experiment.*** Develops the skills of organizing and conducting a scientific experiment, studies the problems of monitoring and methodological approach to substantiating the choice of research methods. Integrates theoretical and practical knowledge in the formulation of scientific experience, with the justification of the obtained results of research work and interpret them. Scientific processing of research materials. ***When studying the discipline, students master the stages of conducting research, including choosing the direction of research,*** setting a scientific and technical problem, conducting theoretical and experimental research in animal husbandry. Undergraduates acquire the skills to search, accumulate and process scientific information, as well as learn how to conduct, process and formalize the results of experimental research. They master the methodological foundations of scientific research.	5				V						V
The cycle of core disciplines The university component													
8	Immunology	The structure, mechanisms of functioning and regulation of the body's immune system; the main methods of immunology used in biotechnology, medicine and veterinary medicine. Immunological reactions, their components (antigens, antibodies), goals of the formulation. The concept of diagnostics and diagnostic serums. Methods for obtaining diagnostic serums. Agglutination reaction, precipitation reaction: principles, components, conditions, features of formulation and accounting.	5						V				
9	Laboratory diagnostics of zooanthroponoses	Objects, areas, levels, principles, functions of diagnostic research methods. Serological reactions used in laboratory diagnostics of particularly dangerous infectious diseases of animals and humans. Reactions of hemagglutination, diffuse precipitation, complement binding, immunofluorescence, virus neutralization, enzyme immunoassay, etc. Principles and methods of manufacturing diagnostic antigens, serums, immunoglobulins and other diagnostic drugs. Development of	7							V			

		express methods for the diagnosis of diseases.											
10	Selection of industrial strains of microorganisms	The influence of various adverse factors on microorganisms. morphology, physiology and genetics of microorganisms. The possibilities of using mutagens to produce superproducts. Classical and modern methods of microbial breeding, methods of storing producer strains in a production laboratory and a collection of microorganisms. Identification of microorganisms by cultural-morphological, biochemical, molecular-genetic methods. Production of production cultures of microorganisms.	6								V		
11	Modern problems of biotechnology in veterinary medicine and animal husbandry	Knowledge of the latest achievements of world science in improving methods of diagnosis and prevention of widespread infectious and invasive diseases; the ability to use ELISA and IHA and other modern immunological methods in the diagnosis of animal diseases and the detection of antibiotics and / or anthelmintics in food; acquisition of skills and knowledge necessary for the preparation of scientific reviews on topical issues of biotechnology.	5							V			
	Bionanotechnology	Introduction to nanotechnology, the use of nanotechnology to study living objects, biocompatible nanomaterials, principles of nanobiotechnology, targeted delivery of medicines and physiologically active substances, principles of creating tissue implants based on materials with high biocompatibility. The use of modern computer technology for the analysis and systematization of the results obtained.	7									V	
	Scientific foundations of animal breeding	The basics of animal breeding include the study of the individual development of animals; exterior and interior; productivity of farm animals and methods of accounting; assessment of breeding animals by origin and quality and selection of offspring; the concept of a breed and its structure; methods of breeding farm animals;	5									V	
The cycle of core disciplines Component of choice													
12	Bioethics and biosafety in biotechnology	***Bioethics and biosafety in biotechnology***. The place and role of bioethics in the system of applied ethical knowledge. The impact of different types of GMOs on ecological systems..	6				V						V

		Assessment of the environmental risk of using GMOs. Assessment of the aggressiveness of weed plants. Assessment of the probability of the occurrence of direct or indirect effects of transgene products on organisms. The appearance of living organisms resistant or tolerant to transgenic products. International organizations and legal regulation of bioethical problems in connection with the development of biotechnologies										
	Modern methods of separation and purification of target products	***Modern methods of separation and purification of target products.*** The concept of a target product in biotechnology. Equipment, consumables and reagents for the isolation and purification of biomass of microorganisms, cells and tissues of plants and animals, cellular macromolecules in the production of biotechnological products by various methods. General principles of separation of substances using: centrifugation, membrane filtration, separation, settling, extraction, coagulation, crystallization, flotation, chromatography, electrophoresis, immunoblotting and other methods..										

Director of the IPE _____ Khusainova J.S.
Head of the Department _____ Begenova A.B.
Chairman of CFAC _____ Yeseneeva S.S.
Dean of the VM and AHT Faculty _____ Akimbekov O.S.