

AL-FARABI KAZAKH NATIONAL UNIVERSITY
Faculty of biology and biotechnology
Department of Molecular biology and genetics



APPROVED by
Dean of Faculty

Kurmanbaeva M.S.

"23" 05, 2025, protocol №10

EDUCATIONAL-METHODICAL COMPLEX OF DISCIPLINE

«104831 Ethics and Biosafety in Genetics»

«7M05105 - Genetics»

Course	2
Semester	3
Number of credits	5 (1,70+3,30+0)

Almaty 2025

Educational-methodical complex of the discipline «104831 Ethics and Biosafety in Genetics» is made by Associated Professor, candidate of biological science Aigul Kuzembayevna Amirova based on the educational program «7M05105 - Genetics».

Considered and recommended at the meeting of the department of Molecular Biology and Genetics from «21» 05 2025, protocol №22

Head of department



Zh.K. Zhunusbayeva

SYLLABUS
Fall semester 2025 – 2026 academic year
Educational program " 7M05105 - Genetics ", 2 course

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)		
104831 Ethics and Biosafety in Genetics	5	1,70	3,30	-	5	6.
ACADEMIC INFORMATION ABOUT THE COURSE						
Learning Format	Cycle, component	Lecture types	Types of practical classes		Form and platform final control	
Offline	P, UC	problematic, analytical lecture	problem solving, situational tasks		Traditional written exam, Univer, offline of the exam	
Lecturer - (s)	associate professor Aigul Amirova					
e-mail :	aigul_amir@mail.ru					
Phone:	+7(708)8047195					
ACADEMIC COURSE PRESENTATION						
Purpose of the course	Expected Learning Outcomes (LO) *				Indicators of LO achievement (ID)	
Discipline aims to develop the ability to apply genetic technologies and biosafety methods following national and international bioethics standards in biology, genetics and medicine. It will consider basic principles of bioethics, bioethical problems of genetics, bioethical attitudes to laboratory animals, state and international requirements for conducting preclinical and clinical studies, and GLP rules.	1. To understand the importance of the social significance of the future profession and compliance with the principles and rules of bioethics in scientific activities in genetics. Determine compliance with the principles of bioethics when conducting scientific research.				1.1 Explains the problems of bioethics and trends in the development of bioethics, observes the principles of bioethics in scientific research in the field of genetics.	
					1.2 Remembers all the rules and principles of bioethics in genetics.	
	2. To understand the problems of bioethics, approaches to their solution and the use of modern technologies in the field of genetics. Evaluate the results of scientific research from the point of view of bioethics, compliance with professional and ethical requirements.				2.1 Able to classify trends and problems in bioethics and find approaches to solving them in the field of genetics.	
					2.2 Establishes the relationship between the principles of bioethics and scientific research: from the choice of direction and methods of research to the final result of the work.	
	3. To name and observe the rules of biotics and to determine the possibilities of using new scientific developments obtained in the course of scientific research for implementation in the production process in the field of biology.				3.1 Demonstrates knowledge of trends in the development of bioethics, identifies promising areas of scientific research in genetics in compliance with bioethical standards.	
					3.2 Explains the stages of scientific research and solutions to bioethical problems for implementation in the production process.	
	4. To apply knowledge of ethics and biosafety and correctly choose the direction of scientific research in compliance with the principles of bioethics.				4.1 Implements the acquired knowledge for the correct selection of the object and direction of research in compliance with the rules and principles of ethics and biosafety.	
					4.2 Able to connect theoretical and methodological skills in practice.	
	5. To carry out projects, set up methods and provide guidance; be able to find and make decisions to solve problems in scientific research in genetics and genome editing in compliance with bioethics.				5.1 Demonstrates knowledge of genome editing and genetic engineering techniques to address problems in gene therapy and is able to provide objective, reasoned ethical assessment of biomedical ideas and concepts.	

		5.2 Demonstrates knowledge of modern methods and interprets the possibilities of genome editing in the modern world while observing the rules of bioethics.
Prerequisites	"Organization and planning of scientific research", "Molecular and forensic examinations", "Genopathology"	
Postrequisites	"Preparation of the Master's Thesis"	
Learning Resources	Literature: main, additional. 1. Zhuravleva G.A. Genetic engineering in biotechnology: textbook. - SPb.: Eco-Vector, 2016. -328 p. 2. Actual problems of bioethics: collection of reviews and ref. / RAS. INION. Center for scientific-informational research on science, education and technology; ed. B.G. Yudin. Moscow, 2016. 242 p. 3. Viktoruk E.N., Mineev V.V. Bioethics. Lectures and materials for practical classes. m: textbook for students of educational program 39.03.02 Social work / Krasnoyarsk. state ped. university named after V.P. Astafiev. - Krasnoyarsk, 2017. - 140 p. 4. Mukhamedova Z.M., Rizaev Zh.A., Makhmudova A.N. Bioethics. Textbook for students of medical universities. Tashkent. Mohirbek-Ziyo, 2021. 432 p. 5. Ushakov E. Bioethics Textbook / Ushakov E.V. Bioethics: Textbook. Moscow: Yurait Publishing House, 2017. 306 p. ISBN 978-5-534-01550-8. 6. Mineev V.V. Philosophy of Death and Dying. Moscow: Direct-Media, 2014. 95 p. Internet resources 1. http://elibrary.kaznu.kz/ru 2. MOOC / video lectures, etc. 3. https://www.coursera.org/ 4. https://www.edx.org/ 5. https://www.isaaa.org/resources/publications/pocketk/16/	

Academic course policy	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>. Documents are available on the main page of IS Univer . 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. 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. 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. Compliance with academic honesty during the period of theoretical training and at exams, in addition to the main policies, is regulated by 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". Documents are available on the main page of IS Univer . 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 aigul_amir@mail.ru or via video link in ZOOM: https://us05web.zoom.us/j/88254829221?pwd=mlJuOjokfncvjeA4lZlO0kDDQ3EG3N.1 to the meeting. 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. 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.
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	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. 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 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. <table><tr><th>Formative and summative assessment</th><th>Points % content</th></tr><tr><td>Activity at lectures</td><td>5</td></tr><tr><td>Work in practical classes</td><td>20</td></tr><tr><td>Independent work</td><td>25</td></tr><tr><td>Design and creative activity</td><td>10</td></tr><tr><td>Final control (exam)</td><td>40</td></tr><tr><td>TOTAL</td><td>100</td></tr></table>	Formative and summative assessment	Points % content	Activity at lectures	5	Work in practical classes	20	Independent work	25	Design and creative activity	10	Final control (exam)	40	TOTAL	100
Formative and summative assessment	Points % content																	
Activity at lectures	5																	
Work in practical classes	20																	
Independent work	25																	
Design and creative activity	10																	
Final control (exam)	40																	
TOTAL	100																	
A	4.0	95-100	Excellent															
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																
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																

Calendar (schedule) for the implementation of the content of the course. Methods of teaching and learning.

A week	Topic name	Number of hours	Max. ball
MODULE 1. The concept of bioethics. Historical origins of bioethical thought.			
Medical ethics as an integral part of bioethics.			
1	L 1. Bioethics. History of development and directions of bioethics. Principles of bioethics. Concepts of "ethics", "morality", "morality". Seminar 1. Directions of bioethics.	1	
2	L 2. Deontological ethics and utilitarian ethics. PC 2. General ethics and special ethics. Professional ethics.	2	
	IWS P 1. Consultations on the implementation of IWS 1	1	
3	L 3. Bioethics as a field of interdisciplinary research. Bioethical issues surrounding the beginning of life and the end of life. PC 3. The concept of bioethics. Medical bioethics.	1	
		2	
4	L 4. Organ transplantation. Reproductive technologies. PC 4. Euthanasia as a medical and social institution and as medically assisted suicide. IWS 1. Ethics in the modern world. Bioethics in the context of ideas about ethics and morality. The main goal of knowledge. Types of knowledge. The main structural elements of the theory of knowledge. History of the development of science.	1	
		2	10
		2	25
5	L 5. Life as the highest value. PC 5. Medical, ethical and legal aspects of transplantology.	1	
		2	10
6	L 6. Ethical issues in stem cell manipulation. PC 6. Modern reproductive technologies and religion.	1	
		2	10
	IWS P 2. Consultations on the implementation of IWS 2	1	
7	L 7. Moral issues of human cloning. PC 7. Innovative methods of diagnostics, treatment and correction of genetic disorders, their bioethical problems. IWS 2. Bioethics and reproductive technologies. Achievements of biotechnology and principles of bioethics.	1	
		2	10
		2	25
8	L 8. Ethical aspects of the creation and use of transgenic organisms. PC 8. Risk assessment of possible adverse effects of GMOs on human health. IWS P 3. Colloquium (test) and consultation on the implementation of IWS 3	1	
		2	10
		1	
Midterm control 1			100
Module 2. Ethics and Biosafety in Genetics			
9	L 9. Ethical and legal framework for regulating biomedical research on humans and animals. PC 9. Bioethics and environmental ethics. IWS 3. Colloquium (test, project, essay). Topic: Genome editing and biomedical cell products: current status, safety and efficiency.	1	
		2	7
		2	20
10	L 10. Environmental ethics, ethical principles in relation to man to nature.	1	

	PC 10. Bioethical aspects of human relations with animals and plants.	2	7
	IWS 4. Consultation on the implementation of IWS 4	1	
11	L 11. Universal Declaration on the Human Genome and Human Rights.	1	
	PC 11. Biosecurity and Human Rights. Human Dignity and the Human Genome.	2	7
	IWS 4. Nutritional risks from consuming GMOs and products derived from them. Emerging infections as a threat of uncontrolled spread of epidemics across the globe.	1	20
12	L12. Biosafety of human genome research using CRISPR/Cas gene knockout.	1	
	PC 12. Modifications using gene knockout to improve resistance and productivity of agricultural plants. Biosafety of scientific research.	2	7
	IWS 5. Consultation on the implementation of IWS 5	1	
13	L 13. Biosafety and mammalian genome modification using the CRISPR/Cas9 system.	1	
	PC 13. Creation of transgenic animals using CRISPR/Cas9 and the safety of living organisms' health.	2	7
14	L 14. Human gene therapy and biosafety of their use.	1	
	PC 14. The human genome and the safety of gene therapy research.	2	8
	IWS 5. Colloquium (test)	1	10
15	L 15. Prospects for the application of human gene therapy methods.	1	
	PC 15. New guidelines for human genome editing for safety and public health.	2	7
	IWS 6. Consultation on the final exam	1	
Midterm control 2			100
Final control (exam)			100
TOTAL for course			100

Dean _____ **Kurmanbaeva M.S.**

Chair of the Academic Committee
on the Quality of Teaching and Learning _____ **Baktybaeva L.K.**

Head of Department _____ **Zhunusbayeva Zh.K.**

Lecturer _____ **Amirova A.K.**

RUBRICATOR OF THE SUMMATIVE ASSESSMENT

CRITERIA EVALUATION OF LEARNING OUTCOMES

Task name IWS 2. Bioethics and reproductive technologies. Achievements of biotechnology and principles of bioethics.
(25% of 100% MC)

Criterion	"Excellent" 20-25%	"Good" 15-20%	"Satisfactory" 10-15%	"Unsatisfactory" 0-10%
Understanding Theories and concepts of professional identity and professionalism of a teacher	Deep understanding of theories, concepts of professional identity and teacher professionalism. Relevant and relevant links (citations) to key sources are provided.	Understanding theories, concepts of professional identity and teacher professionalism. Links (citations) to key sources are provided.	Limited understanding of theories, concepts of professional identity and teacher professionalism. Limited references (citations) to key sources are provided.	Superficial understanding / lack of understanding of theories, concepts of professional identity and professionalism of the teacher. Relevant references (citations) to key sources are not provided.
Awareness of key issues of professional identity and professionalism of teachers in Kazakhstan	Has a good understanding of theories, principles and methods, key concepts and the role of bioethics in improving living organisms, the relationship between bioethics and modern technologies of human genome editing and their safety. Excellent substantiation of arguments with evidence from empirical research (for example, based on interviews or statistical analysis).	Links the concepts of professional identity and teacher professionalism with the context of Kazakhstan. Supports arguments with evidence from empirical research.	Limited connection of the concepts of professional identity and professionalism of teachers with the context of Kazakhstan. Limited use of evidence from empirical research.	There is little or no connection between the concepts of a teacher's professional identity and the context of Kazakhstan. Little or no use of empirical research.
Policy proposal or practical recommendations/suggestions	Offers sound policy and/or practical recommendations, proposals for improving the professional identity and professionalism of teachers in Kazakhstan.	Offers some policy and/or practical recommendations, proposals for enhancing the professional identity and professionalism of teachers in Kazakhstan	Limited policy and practical recommendations. Recommendations are non-essential, not based on rigorous analysis, and are shallow.	Little or no policy and practice advice, or advice of very low quality.
Letter, APA style	The writing demonstrates clarity, conciseness and correctness. Strictly follows the APA style.	The letter demonstrates clarity, conciseness and correctness. Basically follows the APA style.	The letter has some key errors and clarity needs to be improved. There are mistakes in following the APA style.	The writing is unclear, it is difficult to follow the content. Lots of mistakes in following the APA style.

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Lecturer _____ **Amirova A.K.**