INTERACTIVE SYLLABUS

Author:	Амирова А. К.		
Department of a faculty member:	Biology and Biotechnology;		
Department of a faculty member:	Molecular biology and genetics;		
Name:	Agricultural Biotechnology. Genetics (6B05105) 4 course		
Discipline:	Agricultural Biotechnology		
Objectives of Discipline:	Discipline aims to develop the ability to analyze the modern achievements of plant and animal breeding and develop and implement scientific and practical projects. It will consider the genetic bases of the evolution of living organisms, forms of selection, bases of population genetics, bases of breeding, methods of accelerated reproduction of biotechnology and the preservation of high-quality breeding animals, advanced methods of embryo transplantation, transfer and storage; biotechnological control of farm animals.		
Общее количество credits:	9.00		
Academic year	2026		
Educational Program	;		
Independent work of the student (IWS):	5		
Independent work of a student under the guidance of a teacher (IWST):	6		
Education format:	Offline		
Cycle, Cycle component:	П, ЕС		
Types of lectures:	problematic, analytical lecture		
Types of practical lessons:	Lab classes, problem solving, situational assignments		
Exam format:	офлайн		
Form and platform of the final control:	ИС UNIVER, ПИСЬМЕННЫЙ		
Lecturer-(s):	**Full name**	**Mobile phone number**	**Email**
	Aigul Amirova	87088047195	aigul_amir@mail.ru
Assistants:	**Full name**	**Mobile phone number**	**Email**
Type of control:	[RK1 + RK2 + Exam] (100)		
Contributors:			

Expected Learning Outcomes (LO)*	**Indicators of achievement of LO (IA)**
To describe the specifics of modern biotechnology processes in agriculture and the scientific principles of their implementation;	1. Compares the possibilities and disadvantages of using traditional and biotechnological methods; 2. Master the algorithm for applying technologies and specialized equipment when solving professional problems;
To develop the ability to analyze the modern achievements of plant and animal breeding and develop and implement scientific and practical projects.	1. Demonstrates the ability to select the methods necessary for research; 2. Shows the possibilities and prospects for using genetic engineering methods of biotechnology in agriculture.
To implement the genetic bases of the evolution of living organisms, forms of selection, bases of population genetics, bases of breeding, methods of accelerated reproduction of biotechnology and the preservation of high-quality breeding animals.	1. Applies to manipulate methods of accelerated reproduction of biotechnology and preservation of high-quality breeding animals. 2. Shows the application of genetic engineering techniques to solve problems in genetics and biotechnology.
To analyze the methods of embryo transplantation, transfer and storage; biotechnological control of farm animals.	1. Justifies the use of methods of embryo transplantation, transfer and storage; biotechnological control of farm animals. 2. Chooses to act rationally and independently, guided by evidence and scientifically based conclusions.
To justify advanced plant and animal breeding methods: plant cell and tissue cullture, Haploid biotehnology, animal embryo transplantation, and biotechnological control of farm animals.	1. Explains the goals of plant cell and tissue cullture, Haploid biotehnology, animal embryo transplantation and biotechnological control of farm animals.

Expected Learning Outcomes (LO)*	Indicators of achievement of LO (IA)
	2. Establishes the ablility to analyze the obtained data in the professional field and interpret its results.

Prerequisites:

Postrequisites:

Type	Educational resources
Literature:basic	1. 2.
additional	1. 2.
Research infrastructure	1. 2.
Professional scientific databases	1. 2.
Online resources	1. 2.
Software	1. 2.

Academic politics of the discipline:

The academic policy of the course is determined by the Academic Policy and the Policy of Academic Integrity of Al - Farabi Kazakh National University.

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 cannot. Diversity enhances all aspects of life. All students, especially those with disabilities, can receive counseling assistance by phone/e-mail *enter teacher's contacts* or via video link in MS Teams *enter a permanent link 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.

Evaluation methods:

Assessment Methods
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.

Formative and summative assessment The teacher introduces his own types of assessment or uses the proposed option	**Points % content** The teacher enters his score into points in accordance with the calendar(schedule). The exam does not change and the final score in the course.
Activity at lectures	5
Work in practical classes	20
Independent work	25
Design and creative activity	10
Final control (exam)	40
TOTAL	100

A point-rating letter-based assessment system
for accounting for academic achievements:

Score-rating letter system of assessment of accounting for educational achievements			
Grade	**Digital equivalent points**	**points, % 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	

Week	Type of lesson	Subject	The maximum score
Module 1. Genetic foundations of agricultural biotechnology. Prospects for the development of biotechnology.			
1	**lecture:** lecture 1	Introduction to agricultural biotechnology. The subject of biotechnology: objectives, methods, and development prospects.Animal and plant biotechnology.	0
	laboratory lesson: laboratory lesson 1	Laboratory safety techniques.	7
2	**lecture:** lecture 2	Application of plant cell and organ culture, genetic engineering methods and DNA technologies in agriculture.	0
	laboratory lesson: laboratory lesson 2	Laboratory safety signs and warnings.	7
3	**lecture:** lecture 3	Cell engineering. Methods of in vitro organ and tissue culture for breeding and genetic purposes.	0
	laboratory lesson: laboratory lesson 3	Types of nutrient media for plant tissue culture.	7
	IWS/IWST: IWS/IWST 3 **Criteria assessment rubricator** [show]	IWST 1 Consultation on the implementation of IWS1	0
4	**lecture:** lecture 4	Method of preparation of Murashige and Skoog nutrient medium.	0
	laboratory lesson: laboratory lesson 4	Correct use of dispensers.	7
	IWS/IWST: IWS/IWST 4 **Criteria assessment rubricator** [show]	IWS 1 Advances and prospects in plant and animal biotechnology.	20
5	**lecture:** lecture 5	Tissue and organ culture of plants. Suspension culture of plant cells.	0
	laboratory lesson: laboratory lesson 5	Technique for obtaining plant cell and tissue culture in vitro.	8
	IWS/IWST: IWS/IWST 5 **Criteria assessment rubricator** [show]	IWST 2 Consultation on the implementation of IWS 2	0

Week	Type of lesson	Subject	The maximum score
Module 2. Haploid plant biotechnology: production of haploids and doubled haploids. Cryobanks. Recombinant DNA technology.			
6	**lecture:** lecture 6	Biotechnology for producing haploids and doubled haploidsıo	0
	laboratory lesson: laboratory lesson 6	Haploid plant biotechnology methods	8
	IWS/IWST: IWS/IWST 6 **Criteria assessment rubricator** [show]	IWS 2 Haploid plant biotechnology. Plant cell selection techniques.	20
7	**lecture:** lecture 7	Collections and cryobanks of cell cultures.	0
	laboratory lesson: laboratory lesson 7	Cryopreservation of gametes and embryos. Cryopreservation rules. Freezing medium. Cryopreservation medium.	8
	IWS/IWST: IWS/IWST 7 **Criteria assessment rubricator** [show]	IWST 3 Consultation on the implementation of IWS 3	0
8	**lecture:** lecture 8	Molecular markers	0
	laboratory lesson: laboratory lesson 8	Types of molecular markers. Characterization of type I and II restriction enzymes. Construction of DNA restriction maps. Southern blot hybridization method.	8
8	**Midterm Control 1 (100)**	The maximum score: 100	Overall score: 100
9	**lecture:** lecture 9	Biotechnology and biosafety. Biotechnology in ending hunger, ensuring food security and improving nutrition, and promoting sustainable agricultural development.	0
	IWS/IWST: IWS/IWST 9 **Criteria assessment rubricator** [show]	IWS 3. Cartagena Protocol on Biosafety. Stages of risk assessment for potential adverse effects of GMOs.	20
	IWS/IWST: IWS/IWST 9 **Criteria assessment rubricator** [show]	IWST 4 Consultation on the implementation of IWS 4	0
10	**lecture:** lecture 10	The use of transgenic animals to study human diseases and gene function.	0
	laboratory lesson: laboratory lesson 10	Bioethics legislation. The "3 Rs" principle. Handling animals, using basic techniques, and euthanasia. Acceptable methods of animal euthanasia.	8
	IWS/IWST: IWS/IWST 10 **Criteria assessment rubricator** [show]	IWS 4. Ethical and legal framework for regulating biomedical research on humans and animals.	20
11	**lecture:** lecture 11	Setting up a biotechnology laboratory. Creating aseptic conditions.	0

Week	Type of lesson	Subject	The maximum score
	laboratory lesson: laboratory lesson 11	Working in a laminar flow hood.	8
	IWS/IWST: IWS/IWST 11 **Criteria assessment rubricator** [show]	IWST 5 Consultation on the implementation of IWS 5	0
12	**lecture:** lecture 12	Micropropagation of Plants.	0
	laboratory lesson: laboratory lesson 12	Obtaining Virus-Free Planting Material	7
	IWS/IWST: IWS/IWST 12 **Criteria assessment rubricator** [show]	IWS 5. Obtaining and culturing callus from parenchymatous tissue of carrot root crops	20
13	**lecture:** lecture 13	Micropropagation of Plants.	0
	laboratory lesson: laboratory lesson 13	Techniques of obtaining Virus-Free Planting Material	6
14	**lecture:** lecture 14	Objects of Animal biotechnology. Biotechnology in Animal Agriculture: status and current issues. Regulation of the release of genetic modified organisms.	0
	laboratory lesson: laboratory lesson 14	Basic methods of animal biotechnology. Animal Breeding and Biotechnology.	5
15	**lecture:** lecture 15	Animal cell technologies. Aseptic Techniques.	0
	laboratory lesson: laboratory lesson 15	Animal biotechnology. Regulation of the reproduction of farm animals. Biotechnology economic implications.	6
	IWS/IWST: IWS/IWST 15 **Criteria assessment rubricator** [show]	IWST 6. Consultation on the final exam	0
15	**Midterm Control 2 (100)**	The maximum score: 100	Overall score: 100

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