

Ministry of Education and Science of Ukraine
Sumy National Agrarian University
Faculty of Biological and Technological
Department of Animal Genetics, Breeding and Biotechnology

Work program (syllabus) of the educational component

EK 28 Biotechnology

(basic / selective)

It is implemented within the educational program

Technology of production and processing of animal husbandry products

in specialty **204 - Technology of production and processing of animal husbandry products**

at the first **(bachelor) level of higher education**

Developer: [Signature] Oleksandr Chekh, PhD, Senior Lecturer
at the Department of Genetics, Breeding and Animal Biotechnology

Reviewed, approved and adopted at the meeting of the Department of Genetics, Breeding and Animal Biotechnology	protocol from <u>10.06.2026</u> <u>[Signature]</u>
	Head of Department <u>[Signature]</u> Mykola SHPETNYI

Agreed:

Guarantor of the Educational Program

[Signature] Тетяна Чернівецька

Dean of the Faculty where the Educational Program is implemented

[Signature] v.v. Veselova

Review of the syllabus (attached) provided by:

[Signature] Л.М. Храбрий
[Signature] Буклова Т.П.

Methodologist of the Department of Quality
Assurance, Licensing and Accreditation

[Signature] N. Baranik

Registered in the electronic database: Date: 07.07 2026

Information on viewing the work program (syllabus):

The academic year in which the changes are made	The number of the annex to the work program with a description of the changes	The changes were reviewed and approved		
		Date and number of the protocol of the meeting of the department	Head of Department	Guarantor of the educational program

1. GENERAL INFORMATION ABOUT THE EDUCATIONAL COMPONENT

1.	Name EC	Biotechnology		
2.	Faculty/department	Biological and Technological /Animal Genetics, Breeding and Biotechnology		
3.	Status EC	Basic		
4.	Program/Specialty (programs), the component of which is EC			
5.	EC can be offered for (for major ECs)	Technology of production and processing of animal husbandry products/204 – Technology of production and processing of animal husbandry products		
6.	Level NRK	6 level		
7.	Semester and duration of study	5 semester, 15 weeks		
8.	Number of ECTS credits	5		
9.	The total number of hours and their distribution	Contact work (class)		Independent work
		Lectures	Practical	
		Part-time	Part-time	Part-time
		4	6	140
10.	Language of education	English		
11.	Teacher/Coordinator of the educational component	Chekh Oleksandr Oleksandrovysh		
11.1	Contact Information	Senior Lecturer of the Department of Animal Genetics, Breeding and Biotechnology, office 316 email: olexa0701@gmail.com consultations: every Tuesday 14 ⁰⁰ -15 ⁰⁰ .		
12.	General description of the educational component	The Biotechnology discipline contributes to the training of specialists capable of solving practical problems of professional activity in the field of livestock production using theories and methods of improving existing or breeding new populations of agricultural animals using biotechnological methods. The main topics to be studied: the subject and methods of biotechnology; gene cloning; obtaining genetically modified organisms; cell engineering; biotechnology of interferon and hormone production; biotechnology of biogas production; production and use of animal and poultry mouth stimulants. As a result of studying the educational component, the student will be able to characterize biological phenomena, create aseptic conditions for conducting biotechnological research; select a nutrient medium for clonal growth and cultivation; conduct a blood test, determine the Rh factor of the blood; use hormonal drugs to increase the growth and productivity of animals; to use knowledge of biotechnology when studying issues of breeding and selection of animals, breeding, special zootechnics and their future specialty by profession.		
13.	The purpose of the educational component	Formation of students' knowledge, abilities and skills regarding the biotechnology of obtaining new breeds of animals with increased productivity, genetic engineering, industrial microbiology, as well as providing a complete understanding of the production of vaccines and medicines. The educational component is aimed at achieving professional program competencies, which is implemented through		

		Disciplinary learning outcomes about modern methods of reproduction and breeding of agricultural animals by biotechnological methods (transgenesis, cloning of animals).
14.	Prerequisites for studying EC, connection with other educational components of the Educational Program	EC 6 Morphology, physiology and biochemistry of animals; EC 27 Animal Genetic Resources of Ukraine
15.	Policy of academic integrity	The policy of academic integrity at SNAU is governed by the Code of Academic Integrity http://docs.snau.edu.ua/documents/education/quality/kodeks_akadem_dobrochesnosti.pdf In accordance with it, the requirements for the student to observe academic integrity during the study of the educational component are as follows: to be responsible for one's duties, to fulfill the tasks prescribed by the educational program on time and in good faith; to be present at all classes; perform independent work; honestly and responsibly prepare for current, modular and final control; submit for assessment only self-made work. It is unacceptable for a student to: showing disrespectful and incorrect attitude towards the teacher; being late for classes and missing them without valid reasons; during the educational process, use hints, other people's work, telephones; provide and receive assistance from third parties during current, modular and final control; receive or offer a bribe for receiving any benefits in educational activities. For violating the rules of academic integrity, students may be held liable for the following forms of responsibility: - repeated assessment (test, exam, credit, etc.); - repeated completion of the training course.
16.	Link to the course in the Moodle system	https://cdn.snau.edu.ua/moodle/course/view.php?id=1220

2. LEARNING RESULTS UNDER THE EDUCATIONAL COMPONENT AND THEIR RELATIONSHIP WITH PROGRAM LEARNING OUTCOMES

Learning Outcomes of the Educational Component Learning Outcomes of the Educational Component: After completing the educational component, the student is expected to be able to...	Educational Component Program Learning Outcomes targeted by the Educational Component (indicate the number according to the Educational Program)	Assessment Methods
	PLO 23: Based on the formed understanding of variability and the patterns of inheritance and expression of genetic information, predict the results of selection and direct it toward a specifically defined goal	
LO 1. Understand the subject, objectives, and methods of animal biotechnology; justify the choice of biotechnological approaches for solving production and scientific tasks.	X	Presentation report, oral questioning

LO 2. Explain the principles and stages of gene cloning; interpret the results of molecular biological research.	X	Problem-solving tasks, oral questioning
LO 3. Describe technologies for creating genetically modified organisms and evaluate their efficiency and risks in animal husbandry.	X	Presentation report, Module Test 1 (Moodle testing)
LO 4. Apply methods of cellular engineering (cell culture, cryopreservation, obtaining cell lines) in animal biotechnology practice.	X	Problem-solving tasks, essay and presentation
LO 5. Use genetic engineering methods to modify genetic material and justify their application in selection and improving animal productivity. Evaluate the mechanisms of action, efficiency, and safety of using growth stimulators for animals and poultry in modern animal husbandry.	X	Module Test 2 (Moodle testing), written exam

3. CONTENTS OF THE EDUCATIONAL COMPONENT (COURSE PROGRAM)

Topic. List of issues to be considered within the topic	Distribution within the general time budget				Recommended Books
	Auditory work			Independent work	
	Lectures	Pract.	Lab.		
	Part-time	Part-time	Part-time	Part-time	
Topic 1. Theoretical foundations of biotechnology in animal husbandry 1. Subject and methods of biotechnology. 2. History of the development of biotechnology. Contribution of domestic and foreign scientists to the development of modern biotechnology. 3. Foundation of biotechnology. 4. Use of biotechnology achievements.	2	2		30	3,5,7,9,10 Electronic resources
Topic 2. Genetic engineering in animal husbandry. 1. Gene cloning. 2. Production of genetically modified organisms. 3. Biotechnology of obtaining transgenic organisms. 4. Methods of creating transgenic animals. 5. Use of genetically modified organisms.	2	2		30	1,2,5,6,7 Electronic resources
Topic 3. Biotechnology of production of prophylactic and medicinal substances for use in animal husbandry. 1. Cellular engineering in agriculture. 2. Prospects of the cell fusion method. 3. Hybridoma technology for obtaining monoclonal antibodies. 4. Use of monoclonal antibodies in animal husbandry. 5. Biotechnological methods of production of hormonal preparations (insulin, somatotropic hormone) and their use in animal husbandry.		2		40	1,2,3,4,5,8,9 Electronic resources

Topic 4. Special biotechnology 1. Bioconversion technologies. Biotechnology of biogas production. 2. Biotechnological methods of increasing the productivity of animals and poultry. Production and use of stimulants. 3. Classification of animal and poultry growth stimulants. 4. The effect of growth stimulants on the body of animals and humans.		-		40	1,2,3,4,5,8,9 Electronic resources
In total	4	6	–	140	

4. TEACHING AND LEARNING METHODS

LO	Teaching methods (work to be carried out by the teacher during classroom classes, consultations)	Number of hours	Learning methods (what types of learning activities should be performed by the student independently)	Number of hours
LO 1	Lecture, practical work, presentation	2	Elaboration of the synopsis, literary sources, Presentation report, oral questioning.	30
LO 2	Lecture, presentation, practical work, simulation of production situation, work with regulatory documents	2	Elaboration of the synopsis, literary sources, preparation of a report with a presentation, Problem-solving tasks, oral questioning.	30
LO 3	Lecture, presentation, practical work.	2	Elaboration of the synopsis, literary sources, Presentation report, Module Test 1 (Moodle testing).	30
LO 4	Lecture, presentation, practical work.	2	Elaboration of the synopsis, literary sources, Problem-solving tasks, essay and presentation.	30
LO 5.	Lecture, presentation, practical work.	2	Elaboration of the synopsis, literary sources, Module Test 2 (Moodle testing), written exam.	20

5. EVALUATION BY THE EDUCATIONAL COMPONENT

5.1. Summative assessment

5.1.1. To assess the expected learning outcomes, it is provided

№	Methods of summative assessment	Points / Weight in the overall assessment	Compilation date
1.	Presentation report, oral questioning from Topic 1.	10 points / 10%	5 semester, 3 week
2.	Problem-solving tasks, oral questioning Topic 2.	15 points / 15%	5 semester, 8 week
3.	Presentation report, Module Test 1 (Moodle testing)	10 points / 10%	5 semester,, 10 week
4.	Presentation, report.	15 points / 15%	5 semester, 10 week

5.	Problem-solving tasks, essay and presentation Topic 3-4.	10 points / 10%	5 semester, 12 week
6.	Module Test 2 (Moodle testing).	10 points / 10%	5 semester, 14 week
7.	The exam is a multiple choice test.	30 points /30%	5 semester, examination period

5.1.2. Evaluation criteria

Component	Unsatisfactorily	Satisfactorily	Fine	Famously
Presentation report, oral questioning from Topic 1.	<7 points	7-8 points	8-9 points	9-10 points
	Task requirements not met	Most of the requirements have been met, but there are no separate calculations, no analysis of the received data	All requirements of the task have been fulfilled	All the requirements of the task were fulfilled, critical thinking, thoughtfulness was demonstrated, and an own solution to the biotechnology problem was proposed
Problem-solving tasks, oral questioning Topic 2	<7 points	7-9 points	9-10 points	13-15 points
	Fewer than 6 correct answers to a test question	6-7 correct answers to the test questions	8 correct answers to the test questions	9-10 correct answers to the test questions
Individual calculation work from Topic 2	<7 points	7-8 points	8-9 points	9-10 points
	Task requirements not met	Most of the requirements have been met, but there are no separate calculations, no analysis of the received data	All requirements of the task have been fulfilled	All the requirements of the task were fulfilled, and a deep understanding of the specialized area of genetic engineering in animal husbandry was demonstrated
Presentation report, Module Test 1 (Moodle testing)	<7 points	7-9 points	9-10 points	11-15 points
	Task requirements not met	Most of the requirements have been met, but some questions are incompletely disclosed, the student does not fully master the material	All requirements of the task have been met, fluency in the material has been demonstrated	All the requirements of the task have been fulfilled, a high level of knowledge in this topic has been demonstrated, measures regarding biotechnological methods of increasing animal productivity have been substantiated
	<7 points	7-8 points	8-9 points	9-10 points

Problem-solving tasks, essay and presentation Topic 3-4.	Task requirements not met	Most of the requirements have been met, but there are no separate calculations, no analysis of the received data	All requirements of the task have been fulfilled	All the requirements of the task were fulfilled, the obtained results were clearly interpreted, proposals were made to improve the productivity indicators of the agricultural sector. animals using cell engineering methods
Module Test 2 (Moodle testing).	<7 points	7-8 points	8-10 points	9-10 points
	Task requirements not met	Most of the requirements have been met, but there are no separate calculations, no analysis of the received data	All requirements of the task have been fulfilled	All the requirements of the task were fulfilled, critical thinking was demonstrated, effective biotechnological methods of increasing the productivity of agricultural animals were determined and proposed
The exam is a multiple choice test.	<18 points	18-22 points	23-27 points	27-30 points

5.2. Formative assessment

To assess the current progress in learning and understand the directions for further improvement is provided

Nº	Elements of formative assessment	Date
1.	Oral survey after studying the topics	At the next practical session after the presentation of the material on the topic
2.	Verbal feedback from the teacher while working on the calculation task during classes	During the semester
3.	Verbal feedback from the teacher after completing the calculation task	At the next class after the student has completed the assignment
4.	Verbal feedback from the teacher and students after the task presentation	Immediately after the end of the presentation

6. EDUCATIONAL RESOURCES (LITERATURE)

6.1. Main sources

Textbooks, manuals

1. Біотехнології та біоінженерія. Вступ до фаху : навчальний посібник /О. І. Юлевич С. І. Луговий, О. І. Каратєєва, Є. В. Баркаръ. Миколаїв :МНАУ, 2022. 285 с.ISBN 978-617-7149-62-9. <https://dspace.mnau.edu.ua/jspui/bitstream/123456789/11705/1/biotechnol-navch-posib-yulevich-2022.pdf>
2. Лобова О.В., Левішко А.С., Гуменюк І.І. Біотехнології: Навч. посібник. – К.: Видавництво НУБіП України 2021. с.548. https://www.agroeco.org.ua/wp-content/uploads/pdf/cafedra/np_biotechnology.pdf
3. Боярчук О.Д., Грановський О.Е., Грищук А.В. Генетика з основами селекції: навчальний посібник. Полтава. ДЗ «Луганський національний університет імені Тараса Шевченка : Миргород, 2023. 188 с. <https://lnk.ua/dbsgoV2b3>
4. Основні напрямки сучасних біотехнологій: посібник / А.С. Юет, Д.М.Гребіник, К.О. Дворщенко, О.М. Савчук, Л.І. Остапченко. – К.: Електронне видання, 2023. – 390 с. <https://lnk.ua/oxhHFMmgD>
5. Промислові, аграрні та біотехнологічні кластери: монографія / Т.В. Сахно, Г. О. Бірта, Ю. Г. Бургу, А. М. Шостя, А.О. Семенов. Полтава. 2025. – 260 с. <https://lnk.ua/YxwikjZI9>
6. Вирішення проблем з відтворення сільськогосподарських тварин із застосуванням біотехнологічних методів: Монографія /, М. В. Себа М. О.Хоменко, І.І. Головецький, О. С. Пилипчук, В.В. Бондаренко. К.: - ТОВ ЦПКомпринт , 2021. – с. 197.
7. Yata, V. K., Mohanty, A. K., Lichtfouse, E. (eds.). (2024). Animal Biotechnology for Livestock Production 4. Springer Nature. <https://link.springer.com/book/10.1007/978-3-031-54372-2>
8. Mukhopadhyay C. S., Choudhary R. K., Panwar H., Malik Y. S. Biotechnological interventions augmenting livestock health and production. Singapore : Springer Nature Singapore, 2023. 451 p. DOI: <https://doi.org/10.1007/978-981-99-2209-3>

Methodical support

9. Петренко Г.О., Чех О.О. Біотехнологія. Конспект лекцій.для здобувачів 2 курсу спеціальності Н2 "Тваринництво" ОП "Технологія виробництва та переробки продукції тваринництва" денної та заочної форми навчання ступеня вищої освіти "бакалавр" – Суми, 2024. С. 32.
10. Biotechnology (Біотехнологія). Генетична інженерія в: методичні вказівки для лабораторно-практичних занять для здобувачів 3 курсу спеціальності Н2 "Тваринництво" ОП "Технологія виробництва та переробки продукції тваринництва" денної та заочної форми навчання ступеня вищої освіти "бакалавр" / уклад.: Г. О. Петренко, О. О. Чех. 2025. С. 30. <https://lnk.ua/JrfKfslX6>

Electronic resources

11. <https://www.genome.gov/genetics-glossary>
12. <https://www.ncbi.nlm.nih.gov/>
13. <https://www.imbg.org.ua/uk/journals/bpc/>
14. <https://www.journals.elsevier.com/journal-of-molecular-biology> Additional sources

Рецензія на робочу програму (силабус)

Параметр, за яким оцінюється робоча програма (силабус) освітнього компонента гарантом або членом проєктної групи	Так	Ні	Коментар
Результати навчання за освітнім компонентом (ДРН) відповідають НРК			
Результати навчання за освітнім компонентом (ДРН) відповідають передбаченим ДРН (для обов'язкових ОК)			
Результати навчання за освітнім компонентом дають можливість виміряти та оцінити рівень їх досягнення			

Член проєктної групи ОП _____
 (назва) (ПІБ) (підпис)

Параметр, за яким оцінюється робоча програма (силабус) освітнього компонента викладачем відповідної кафедри	Так	Ні	Коментар
Загальна інформація про освітній компонент є достатньою			
Результати навчання за освітнім компонентом (ДРН) відповідають НРК			
Результати навчання за освітнім компонентом (ДРН) дають можливість виміряти та оцінити рівень їх досягнення			
Результати навчання (ДРН) стосуються компетентностей студентів, а не змісту дисципліни (містять знання, уміння, навички, а не теми навчальної програми дисципліни)			
Зміст ОК сформовано відповідно до структурно-логічної схеми			
Навчальна активність (методи викладання та навчання) дає змогу студентам досягти очікуваних результатів навчання (ДРН)			
Освітній компонент передбачає навчання через дослідження, що є доцільним та достатнім для відповідного рівня вищої освіти			
Стратегія оцінювання в межах освітнього компонента відповідає політиці Університету/факультету			
Передбачені методи оцінювання дозволяють оцінити ступінь досягнення результатів навчання за освітнім компонентом			
Навантаження студентів є адекватним обсягу освітнього компонента			
Рекомендовані навчальні ресурси є достатніми для досягнення результатів навчання (ДРН)			
Література є актуальною			
Перелік навчальних ресурсів містить необхідні для досягнення ДРН програмні продукти			

Рецензент (викладач кафедри) _____
 (назва) (посада, ПІБ) (підпис)