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

ОК 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

Sumy - 2024

Developer: _____ O.G. Bordunova, Doctor of Science, Professor of the Department of Animal Genetics, Breeding and Biotechnology

Considered, approved and approved at the meeting of the **Department of Animal Genetics, Breeding and Biotechnology**	protocol from 24.06.2024 р. №18 Head Department _____ O.G. Bordunova

Agreed:

Guarantor of the educational program _____ O.G. Bordunova
(signature) (FN)

Dean of the faculty where the educational program is implemented _____ V.V.Vechorka
(signature) (FN)

Dean of the faculty where the educational program is implemented: _____
(FN)
_____
(FN)

Methodist of the Education Quality Department, licensing and accreditation _____ (Hagia Bapcanick)
(signature) (FN)

Registered in the electronic database: date: 12.08. 2024.

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.	NameEC	Biotechnology							
2.	Faculty/department	Biological and Technological /Animal Genetics, Breeding and Biotechnology							
3.	StatusEC	Basic							
4.	Program/Specialty (programs), the component of which isEC								
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	3 semester, 15 weeks							
8.	Кількість кредитів ЄКТС	5							
9.	The total number of hours and their distribution	Contact work (class)						Independent work	
		Lectures		Practical		Laboratory			
		daytime	ex.	daytime	ex.	daytime	ex.	daytime	ex.
		30	-	-	-	30	-	90	-
10.	Language of education	english							
11.	Teacher/Coordinator of the educational component	Bordunova Olha Georhiyivna							
11.1	Contact Information	Professor of the Department of Animal Genetics, Breeding and Biotechnology, office 55 of the Faculty of Veterinary Medicine email:bordunova.olga59@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 24 Genetics of animals
15.	Policy of academic integrity	The policy of academic integrity at SNAU is governed by the Code of Academic Integrityhttp://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=1628

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

Study results for EC: After studying the educational component, the student is expected to be able…	As estimated РНД
ДРН 1. Apply knowledge of reproduction and breeding of agricultural animals using biotechnological methods.	Individual task,, final exam
ДРН 2. Use the legal framework for the development and use of genetically modified organisms. Apply knowledge of the biotechnology of obtaining transgenic organisms.	Individual task, report with presentation, final exam
ДРН 3. Use methods of cell engineering and cell technology to obtain organisms with valuable characteristics, diagnostics, medicines, vaccines.	Individual task, final exam
ДНР 4. Apply schemes for the use of growth	Individual task, final exam

stimulants to increase the productivity of animals and poultry.	

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.				
	daytime	ex.	daytime	ex.	daytime	ex.	daytime	ex.	
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.	6	-	-	-	4	-	20	-	1, 3, 4, 8, 12, 14, electronic resources 16, 18, 19
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.	8	-	-	-	8	-	30	-	1, 2, 3, 5, 11, 13, 15, electronic resources 20, 21, 24
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.	10	-	-	-	12	-	20	-	1, 3, 4, 10, 12, electronic resources 17, 26, 27
Topic 4. Special biotechnology	6	-	-	-	6	-	20	-	1, 6, 7, 9, 11,

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.									13,electronic resources 22, 23, 24, 25
In total	**30**	**-**	**-**	**-**	**30**	**-**	**90**	**-**	

4. TEACHING AND LEARNING METHODS

ДРН	**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**
ДРН 1	Lecture, practical work, presentation	10	Elaboration of the synopsis, literary sources, performance of an individual task.	20
ДРН 2	Lecture, presentation, practical work, simulation of production situation, work with regulatory documents	16	Elaboration of the synopsis, literary sources, preparation of a report with a presentation, performance of an individual task.	30
ДРН 3	Lecture, presentation, practical work.	16	Elaboration of the synopsis, literary sources, performance of an individual task.	20
ДРН 4	Lecture, presentation, practical work.	10	Elaboration of the synopsis, literary sources, performance of an individual task.	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.	Individual task from Topic 1.	15points / 15%	3semester, 3 week
3.	Individual calculation work on Topic 2.	15points / 15%	3semester,, 8week
4.	Presentation, report.	15 points / 15%	3semester,, 10 week
5.	Individual task from Topic 3.	15points / 15%	3semester, 12 week
6.	Individual task from Topic 4.	10 points / 10%	3semester, 14 week
7.	The exam is a multiple choice test.	30points /30%	3semester,

			examination period

5.1.2. **Evaluation criteria**

Component	Unsatisfactorily	Satisfactorily	Fine	Famously
Individual task from Topic 1.	*<8points*	*8-10points*	*10-12points*	*13-14 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
Individual task from from Topic 2	*<8points*	*8-10points*	*10-12points*	*12-14 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	*<9points*	*9-12points*	*12-14points*	*14-15 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
Individual task from Topic 3.	*<8points*	*8-10points*	*10-12points*	*12-14 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, the obtained results were clearly interpreted, proposals were made to improve

				the productivity indicators of the agricultural sector. animals using cell engineering methods
Individual task from Topic 4	*<8 points*	*9-10points*	*10-12 points*	*12-13points*
	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*	*18-22points*	*23-27 points*	*27-30points*

5.2. Formative assessment

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

№	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

6.1.1. Textbooks, manuals

1. В. Г. Герасименко, М. О. Герасименко, М. І.Цвіліховський. Біотехнологія. (Підручник) - К. : «Фірма «Інкос», 2006. – 647 с.
2. Т. П. Пирог. Загальна біотехнологія. (Підручник). - К. : НУХТ, 2009. – 336 с.
3. Т. П. Пирог. Харчова біотехнологія. Підручник. - К. : Ліра-К, 2017. - 408 с.
4. Н.М.Іншина. Біотехнологія. (Навчальний посібник). - Суми : СумДПУім. А.С. Макаренка, 2009. - 172 с.
5. Ю.О.Сазикін, С.Н., Орехов,І.І.Чакальова. Біотехнологія. - 3-е изд., стереотип. –К. : ІЦ "Академія", 2018. - 256 с.
6. А.І.Нетрусов. Введення в біотехнологію. (Підручник). К. : "Академія", 2014. - 288 с.
7. І. В. Тіхонов. Біотехнологія (Підручник). К. : Ліра-К, 2018. - 704 с.
8. Герасименко В.Г. Біотехнологія: Навчальний посібник. - К.: Вища школа, 2021.
9. Коваленко В.П., Горбатенко І.Ю. Біотехнологія у тваринництві й генетиці. - К.: Урожай, 2012

6.1.2. Methodical support

10. Методичні рекомендації для практичних занять з дисципліни «Біотехнологія» за розділом «Генна інженерія» для студентів денної та заочної форми навчання напряму підготовки 204 «Технологія виробництва та переробки продукції тваринництва». Суми, РВВ, СНАУ, 2017. 30 с
11. Методичні рекомендації для практичних занять з дисципліни «Ембріоінженерна біотехнологія» для студентів денної та заочної форми навчання напряму підготовки 204 «Технологія виробництва та переробки продукції тваринництва». Суми, РВВ, СНАУ, 2017. 21 с.
12.«Біотехнологія: Конспект лекцій для студентів денної та заочної форми навчання» напряму підготовки 204 «Технологія виробництва та переробки продукції тваринництва». Суми, РВВ, СНАУ, 2017. 32 с.
13. Ембріоінженерна біотехнологія: Конспект лекцій для студентів денної та заочної форми навчання напряму підготовки 204 «Технологія виробництва та переробки продукції тваринництва». Суми, РВВ, СНАУ, 2017. 33 с.
14. Методичні рекомендації щодо проведення самостійної роботи з дисципліни Біотехнологія для студентів денної та заочної форми навчання напряму підготовки 204 «Технологія виробництва та переробки продукції тваринництва». Суми, РВВ, СНАУ, 2017. 22 с.
15.Методичні рекомендації щодо проведення самостійної роботи з дисципліни Ембріоінженерна біотехнологія для студентів денної та заочної форми навчання напряму підготовки 204 «Технологія виробництва та переробки продукції тваринництва». Суми, РВВ, СНАУ, 2017. 20 с

6.1.3. Electronic resources

16. Biotechnology of animals.http://mikrobiki.ru/biotehnologii/biotehnologii/biotehnologiya-zhivotnyh.html
17. Obtaining transgenic animals. http://www.biotechnolog.ru/ge/ge11_4.htm - назва з контейнеру
18. https://studfile.net/preview/5152450/page:47
19. https://ppt-online.org/138682
20. https://vseosvita.ua/library/prezentacia-do-uroku-embriotehnologii-klonuvanna-15974.html
21. https://uk.wikipedia.org/wiki/Штучне_запліднення
22. http://pplt.poltava.ua › category › 10-biolohiia/Ембріотехнології. Клонування
23. t=Перші%20спроби%20клонування%20тварин,30-х%20роках%2020%20століття.
24. http://sites.icgbio.ru/lectures/wp-content/uploads/sites/6/2014/12/lect3-11.pdf
25. http://www.den-za-dnem.ru/page.php?article=796
26. efault/files/u104/Методичні%20вказівки%20Біотехнологія%20у%20тваринництві.pdf
27. https://vseosvita.ua/library/osnovni-napramki-sucasnoi-biotehnologii-3402.htm

6.2. Additional sources

1.Дж.Уотсон, Дж. Туз, Д.Курц. Рекомбинантные ДНК. Краткий курс: Пер. с англ. - К.,1986

2. Scientific and scientific and industrial journals:

- Herald of Agrarian Science
- Animal husbandry of Ukraine
- Offer

6.3. Software

1. Excel.
2. Text Editor Word.
3. MicrosoftOfficePowerPoint.
3. Electronic database with the "Biometrics" program for statistical calculations.