

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

Work program (syllabus) of the educational component
Hydroecology
(mandatory/ selective)


It is implemented within the educational program Technologies in Aquaculture

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

at the second (master's) level of higher education

Sumy – 2024

Developer:  **Viktoriia VECHORKA**, Doctor of Agricultural Sciences, 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 <u>24.08.2024</u> .No <u>18</u>
	Head  Olha BORDUNOVA department

Agreed:

Guarantor of the educational program  **Viktoriia VECHORKA**

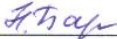
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Faculty of Biology and Technology  **Viktoriia VECHORKA**

Review of the work program (attached) provided:



Methodist of the Education Quality Department,

licensing and accreditation  (N. Baranik)

Registered in the electronic database: date: 14.08 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. ЗАГАЛЬНА ІНФОРМАЦІЯ ПРО ОСВІТНІЙ КОМПОНЕНТ

1.	Name of OK	Hydroecology						
2.	Faculty/department	Biological and technological / genetics, breeding and biotechnology of animals						
3.	The status is	Mandatory						
4.	Program/Specialty (programs), which is a component of OK for (to be filled in for mandatory OK)	204 Technology of production and processing of animal husbandry products						
5.	OK can be offered for (to be filled in to select OK)							
6.	NRK level	7						
7.	Semester and duration of study	The third, 11 weeks						
8.	Number of ECTS credits	5						
9.	The total number of hours and their distribution	Contact work (class)					Independent work	
		Lectures		Practical/seminar			Lectures	
		daytime	extramural		Daytime	extramural	daytime	extramural
		22	-		22	-	22	-
10.	Language	Ukrainian						
11.	Teacher/Coordinator of the educational component	Victoria VECHORKA						
11.	Contact Information	Professor of the Department of Animal Genetics, Breeding and Biotechnology E-mail: vvvechorka@gmail.com consultations: 316g, every tuesday 14 ⁰⁰ -15 ⁰⁰						
12.	General description of the educational component	The educational discipline «Hydroecology» occupies a fundamental place in the scheme of studying the basics during the professional activity of the educational program «Technologies in Aquaculture». The discipline will be useful for future specialists to understand the regularities and peculiarities of the functioning of water ecosystems of various types under the conditions of the action of natural and anthropogenic factors on them and the possibilities of ecological regulation of economic decisions regarding the water management of Ukraine using the ability of groups of hydrobionts to improve the ecological state and restore the quality of natural waters.						

13.	Goal	<p>The main goal of the course is for students to gain knowledge about the structure, regularities and peculiarities of the functioning of water ecosystems of various types (reservoirs, large, medium and small rivers, lakes, cooling reservoirs, canals, etc.) under the conditions of the action of natural and anthropogenic factors on them, as well as skills and practical skills of their ecological regulation by economic decisions regarding the water management of Ukraine using the ability of groups of hydrobionts to improve the ecological state and restore the quality of natural waters.</p>
14.	Prerequisites for studying OK, connection with other educational components of OP	<p>The student must have a sufficient level of general and professional competences.</p>
15.	Policy of academic integrity	<p>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</p> <p>In accordance with it, the requirements for the student to observe academic integrity during the study of the educational component are as follows:</p> <p>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.</p> <p>It is unacceptable for a student to:</p> <p>show a 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.</p> <p>For violating the rules of academic integrity, students may be held liable for the following forms of responsibility:</p> <ul style="list-style-type: none"> - repeated assessment (test, exam, credit, etc.); - repeated completion of the training course; - warning.
16.	Link to the course in the Moodle system	<p>https://cdn.snau.edu.ua/moodle/course/view.php?id=3679</p>

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

Study results for OK: After studying the educational component, the student is expected to be able to...	Program learning outcomes, to be achieved by the OK (indicate the number according to the numbering given in the OP)			How RND is estimated
	Program learning outcomes №8	Program learning outcomes № 9	Program learning outcomes № 12	
LR 1. To know the most important problems of "Hydroecology" science, scientific institutions conducting hydroecological research in Ukraine. Analyze influencing factors in the aquatic environment and their effect on hydrobionts.			X	Individual task, final exam
LR 2. To study the relationship between aquatic organisms and salts dissolved in water, the processes of osmoregulation in hydrobionts.		X		Individual task, final exam
LR 3. Analyze the impact of hydrological, hydrochemical and hydrobiological factors on the efficiency of primary production. To identify the influence of the regulation of river flow on the biological productivity of reservoirs.	X	X		Individual task, final exam
LR 4. Carry out measures to protect the natural reproduction of industrial hydrobionts. Implement regulatory documents regarding surface water quality.	X	X		Individual task, final exam
LR 5. To characterize the species structure of hydrobiocenosis, interpopulation relations in hydrobiocenoses, components and functioning of hydrobiocenosis.	X	X	X	Individual task, final 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		Practical		Laboratory				
	d.	e.	d.	e.	d.	e.	d.	e.	
<p>Topic 1. Hydroecology as a science. The most important problems of science.</p> <p>1. Introduction. Definition of the term "hydroecology". The most important problems of science. Subject, tasks and methods of hydroecology.</p> <p>2. Scientific institutions conducting hydroecological research in Ukraine.</p> <p>3. Factors in the aquatic environment and their effect on hydrobionts.</p>	6	-	-	-	6	-	14	-	1,2,3,4,5,8,9,10
<p>Topic 2. Ecological factors of the vital activity of hydrobionts.</p> <p>1. The relationship between aquatic organisms and salts dissolved in water.</p> <p>2. Processes of osmoregulation in hydrobionts.</p> <p>3. Biogenic migration of microorganisms.</p> <p>4. Adaptation of hydrobionts.</p>	6				6		12		1,2,3,4,5,8,9,10
<p>Topic 3. Biological productivity of aquatic ecosystems.</p> <p>1. The influence of hydrological, hydrochemical and hydrobiological factors on the efficiency of primary production.</p> <p>2. The influence of river flow regulation on the biological productivity of reservoirs.</p>	4				4		14		1,2,3,4,5,7,8,9,10

3. Biological production and energy flow in aquatic ecosystems. 4. Secondary products and the rate of their production.									
Topic 4. Protection and reproduction of hydrobionts. 1. Biological resources of the hydrosphere and their development. 2. Measures to protect the natural reproduction of industrial hydrobionts. 3. Acclimatization of hydrobionts. 4. Aquaculture.	4				4		12		1,2,3,4,5,6,8,9,10
Topic 5. Types of continental water bodies and their characteristics. 1. General characteristics of rivers. Living conditions. 2. General characteristics of lakes and swamps. Living conditions. 3. General characteristics of artificial reservoirs. Living conditions. 4. General characteristics of underground waters.	2				2		10		1,2,3,4,5,8,9,10
Topic 6. General characteristics of the hydrosphere. Ocean. 1. Hydrosphere. General characteristics. 2. General characteristics of the World Ocean. 3. The structure of the Earth's crust under the World Ocean and the topography of the bottom. 4. Salinity and some physical properties of sea water. 5. Water balance of the World Ocean.	-	-	-	-	-	-	10	-	1,2,3,4,5,8,9,10

6. The main components of the biosphere in the ocean.									
Topic 7. Aquatic ecosystem as a component of the hydrobiosphere. <ol style="list-style-type: none"> 1. Number and biomass of hydrobiont populations. 2. Population size regulation. 3. Informational and functional connections in populations of hydrobionts. 4. Population density of hydrobionts. 	-	-	-	-	-	-	12	-	1,2,3,4,5,8,9,10
Topic 8. Hydrobiocenosis as a component of the aquatic ecosystem. <ol style="list-style-type: none"> 1. Components and functioning of hydrobiocenosis. 2. Species structure of hydrobiocenosis. 3. Hydrobiocenoses of transitional ecological zones (ecotopes). 4. Interpopulation relations in hydrobiocenoses. 	-	-	-	-	-	-	12	-	1,2,3,4,5,6,8,9,10
Topic 9. Organic and toxic pollution and its consequences for aquatic ecosystems. <ol style="list-style-type: none"> 1. Organic substances and their circulation in aquatic ecosystems. 2. Самозабруднення й самоочищення водою. 3. Toxic pollution and its sources 4. The structure of hydrobiocenoses as a result of toxic effects. 5. Regulation of surface water quality. 	-	-	-	-	-	-	10	-	1,2,3,4,5,6,7,8,9,10
Total	22	-	-	-	22	-	106	-	

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, laboratory work.	12	Elaboration of the outline of lectures, literary sources.	20
LO 2	Lecture, laboratory work.	12	Elaboration of the outline of lectures, literary sources, performance of an individual task.	20
LO 3	Lecture, laboratory work, presentation, away class	8	Elaboration of the outline of lectures, literary sources, preparation of a report with a presentation, use of a PC, performance of an individual task.	22
LO 4	Lecture, laboratory work, presentation	8	Elaboration of the outline of lectures, literary sources, performance of an individual task.	22
LO 5	Lecture, laboratory work, use of the software.	4	Elaboration of the outline of lectures, literary sources, performance of an individual task.	20

5. EVALUATION BY THE EDUCATIONAL COMPONENT

5.1. Diagnostic assessment (specified as necessary)

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

No	Methods of summative assessment	Points / Weight in the overall assessment	Completion date (indicate the number of the week on which the assessment will be conducted)
1.	Individual task on the Topic 1.	10 points /10%	3 semester, 2 week
2.	Individual task on the Topic 2.	10 points /10%	3 semester, 4 week
3.	Individual task on the Topic 3.	10 points /10%	3 semester, 5 week
4.	Individual task on the Topic 4.	10 points /10%	3 semester, 7 week
5.	Individual task on the Topic 5.	10 points /10%	3 semester, 8 week
6.	Individual task on the Topic 6.	10 points /10%	3 semester, 9 week
7.	Presentation, report.	10 points /10%	3 semester, 10 week
8.	The exam is a multiple choice test.	30 points /30%	3 semester, examination period

5.1.2. Evaluation criteria

Component	Unsatisfactorily (0-59 points)	Satisfactorily (60-74 points)	Fine (75-89 points)	Perfectly (90-100 points)
	0-6 points	6-7 points	7-9 points	9-10 points
Individual task from Topic 1.	Task requirements not met	Most of the requirements are fulfilled, but there are no	All requirements of the task have been met	All the requirements of the task were fulfilled, logical thinking,

		separate calculations, there is no analysis of the received data		thoughtfulness were demonstrated, and an own solution to the problem was proposed
Individual task from Topic 2.	0-6 points	6-7 points	7-9 points	9-10 points
	Task requirements not met	Most of the requirements are fulfilled, but there are no separate calculations, there is no analysis of the received data	All requirements of the task have been met	Completed all task requirements, demonstrated deep understanding of specialized area
Individual task from Topic 3.	0-6 points	6-7 points	7 points	8-10 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, and a high level of knowledge in this topic has been demonstrated
Individual task from Topic 4.	0-6 points	6-7 points	7-9 points	9-10 points
	Task requirements not met	Most of the requirements are fulfilled, but there are no separate calculations, there is no analysis of the received data	All requirements of the task have been met fluency in the material has been demonstrated	All the requirements of the task were fulfilled, the obtained results were clearly interpreted, suggestions were made to improve the production process
Individual task from Topic 5.	0-6 points	6-7 points	7-9 points	9-10 points
	Task requirements not met	Most of the requirements are fulfilled, but there are no	All requirements of the task have been met	All the requirements of the task have been fulfilled, the

		separate calculations, there is no analysis of the received data		obtained results have been clearly interpreted
Individual task from Topic 6.	0-6 points	6-7 points	7-8 points	8-10 points
	Task requirements not met	Most of the requirements are fulfilled, but there are no separate calculations, there is no analysis of the received data	All requirements of the task have been met	All the requirements of the task have been fulfilled, the obtained results have been clearly interpreted
Presentation, report.	0-6 points	6-7 points	7-9 points	9-10 points
	Task requirements not met	The task was completed with errors	All requirements of the task have been met	All requirements for performance with a creative approach in design have been met
Exam	0-17 points	18- 25 points	26-29 points	29-30 points

5.1.5.2. Formative assessment:

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

№	Elements of formative assessment	Date
1.	«Brainstorming» after studying the topics	At the next practical session after the presentation of the material on the topic
2.	Verbal feedback from the teacher when performing situational tasks, writing an analytical review	During the semester
3.	«Learning while learning»	In practical classes during the implementation of calculation tasks (situational cases)
4.	Verbal feedback from the teacher and students after the presentation of completed tasks	During the semester
5.	Verbal feedback from the teacher after completing the tasks	During the semester

Self-assessment can be used as an element of summative assessment and formative assessment.

6. EDUCATIONAL RESOURCES (LITERATURE)

Recommended reading

1. Andryushchenko A.I. Pisciculture. Volume 1. Textbook. Kyiv: LLC «CP «COMPRINT». 2019. 410 p.
2. Andryushchenko A.I. Pisciculture. Volume 2. Textbook Kyiv: LLC "CPU "COMPRINT". 2019. 612 p.
3. Horbachova L. O. Modern priorities and directions of hydroecological research of river basins. Hydrology, hydrochemistry and hydroecology. Kyiv. 2006. Vol. 11. P.338–342.
4. Grokhovska Yu. R. Analysis of hydroecological processes in a small river. Taurian Scientific Bulletin. Kherson. 2007. Issue 48. P. 121–129.
5. Zakharova M. V. Hydro-ecological foundations of water management: workshop. Ministry of Education and Science of Ukraine. Odesa State Environmental University. Odesa: Ecology. 2010. 110 p.
6. Levkivskiy S. S. Rational use and protection of water resources. Textbook. Kyiv: Lybid. 2006. 278 p.
7. . Methodology for establishing and using ecological standards for the quality of surface waters of land and estuaries of Ukraine. Romanenko V. D., Oksiyuk O. P., Yatsyk A. V. Kyiv: VIPOL. 2001. 47 p.
8. Monitoring and protection of water resources, reproduction of their hydroecological functions. Rivne State Technical University. Herald. Even 2000. Issue 4 (6): "Water Management: Economics, Ecology, Management." WITH. 3–110.
9. Obodovsky O. G. Hydroecological features of the formation of riverbeds of Ukraine. Kyiv University named after T. G. Shevchenko. Herald. Series: Geography. Kyiv. 2009. Issue 45. P.58–61.
10. Romanenko V. D. Fundamentals of hydroecology. Textbook. Kyiv: Obereg. 2001. 728 p.

Review of the work program (syllabus)

The parameter by which the work program (syllabus) of the educational component is evaluated by the guarantor or a member of the project group	Yeas	No	Comment
Learning outcomes for the educational component (DRN) correspond to the NRC	+		
The results of the study by the educational component (DRN) correspond to the prescribed PRN (for mandatory OKs)	+		
Learning outcomes by educational component provide an opportunity to measure and evaluate the level of their achievement	+		

Member of the OP project group

Rubtsov Igor
(Name)

The parameter by which the work program (syllabus) of the educational component is evaluated by the teacher of the corresponding department	Yeas	No	Comment
General information about the educational component is sufficient	+		
Learning outcomes for the educational component (DRN) correspond to the NRC	+		
The results of training according to the educational component (DRN) provide an opportunity to measure and evaluate the level of their achievement	+		
Learning outcomes (LRE) refer to students' competencies, not the content of the discipline (contain knowledge, skills, abilities, and not the topics of the discipline's curriculum)	+		
The content of the OK is formed in accordance with the structural and logical scheme	+		
Educational activity (teaching and learning methods) enables students to achieve the expected learning outcomes (LEIs)	+		
The educational component involves learning through research that is appropriate and sufficient for the relevant level of higher education	+		
The assessment strategy within the educational component is in accordance with University/faculty policy	+		
The provided assessment methods make it possible to assess the degree of achievement of learning outcomes by educational component	+		
The workload of students is adequate to the volume of the educational component	+		
The recommended learning resources are sufficient to achieve the learning outcomes (LEOs)	+		
The literature is relevant	+		
The list of educational resources contains the software products necessary to achieve the DRN	+		

Reviewer (teacher of the department)

Kyselov O.
(Name)