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Ministry of Education and Science of Ukraine
Sumy National Agrarian University
Biological and technological faculty
Department of feed technology and animal feeding

Work program (syllabus) of the educational component

Diversification of shellfish farming (selective) (selective)

It is implemented within the framework of **the Aquaculture educational program**

in specialty **204 - Technology of production and processing of animal husbandry products**
at the second (master's) level of higher education

Sums - 2024



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Developer: O.B., Kyselov associate professor of the department of feed technology and animal feeding

Considered, approved and approved at the meeting of the Department of Feed Technology and Animal Feeding	protocol from " <u>06</u> " <u>06</u> 2024 year No. <u>10</u>	
	Head department <u></u> (signature)	<u>Viktor OPARA</u> (surname, initials)

Agreed:

Guarantor of the educational program Viktoriia VECHORKA

Dean Biology and Technology Viktoriia VECHORKA

Review of the work program (attached) provided:

V. Popsuy
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Igor Rubtsov
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Methodist of the Education Quality Department, licensing and accreditation

N. Bananik
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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. GENERAL INFORMATION ABOUT THE EDUCATIONAL COMPONENT

	The name is OK	Aquaculture of artificial and natural reservoirs					
	Faculty/department	Biological-technological /Technology of fodder and animal feeding					
	The status is OK	selective					
	Program/Specialty (programs), the component of which is OK for						
	OK can be offered for	204 Technology of production and processing of animal husbandry products 207 Aquatic biological resources and aquaculture					
	NRK level	seventh					
	Semester and duration of study	second semester, 11 weeks					
	Number of ECTS credits	5					
	The total number of hours and their distribution	Contact work (class)					
		Lectures		Practical/seminar		Independent work	
		daytime	extramural	daytime	extramural	daytime	extramural
		14	-	16	-	-	120
	Language of education	Ukrainian					
	Teacher/Coordinator of the educational component	Oleksandr Kyselov					
11.1	Contact Information	Associate Professor of the Department of Feed Technology and Animal Feeding office 322 of the main building email _ address: Kyselov_SNAU@ukr.net consultations: every Tuesday 14 :00-15:00.					
	General description of the educational component	The discipline contributes to the formation of students in-depth professional knowledge about ways to diversify aquaculture as a whole and its individual components both at the global level and at the enterprise level (mollusc farming) in order to ensure the sustainable development of territories and ecologically oriented agriculture. The discipline ensures the development of students' ability to analyze and choose methods of diversification of territories and water areas, cultivated species of molluscs, production systems and production cycles of aquaculture facilities, mollusk feeding systems, fishery products and their sales markets.					
	The purpose of the educational component	Educational component: - aimed at mastering a wide range of modern methods of breeding molluscs used in aquaculture; - allows you to master the main directions of diversification of shellfish farming activities;					

		<ul style="list-style-type: none"> - studies diversification as a set of measures to optimize the rational use of natural and artificial water resources, mollusk species, technologies and production systems; - will get acquainted with various innovative methods of production technologies of aquaculture products and the organization of its functioning. <p>The educational component is aimed at achieving professional program competencies, which is implemented through disciplinary learning outcomes, in particular, the ability to determine the necessary direction of diversification and the possibilities of its implementation at each individual fish farm or in the region where aquaculture is conducted.</p>
	Prerequisites for studying OK, connection with other educational components of OP	The educational component is based on the educational components "Aquaculture production technology"
	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: 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: 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; - issuing a reprimand; - expulsion from the university (Part 5 of Article 48 of the Law of Ukraine "On Education");
	Link to the course in the Moodle system	https://cdn.snau.edu.ua/moodle/course/view.php?ID=5711

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

Learning Outcomes	Assessment method
DLO 1. Use the biological features of different types of molluscs when growing them in artificial and natural reservoirs.	Essay, multiple choice test
DLO 2. To know and use different production systems and technologies in the cultivation of shellfish in artificial and natural reservoirs.	Individual task, multiple choice test
DLO 3. To evaluate the main directions and trends of diversification of shellfish breeding in different countries of the world.	A report with a presentation, a multiple choice test
DLO 4. To organize ecological and fodder control of reproduction and cultivation of molluscs.	Individual task, multiple choice test
DLO 5. Use aquaculture diversification as a challenge to climate change and other external factors,	Individual task, multiple choice test
DLO 6. To develop promising ways of diversification and innovative technologies for growing shellfish.	A report with a presentation, a multiple choice test

3. CONTENT OF EDUCATIONAL COMPONENT (CURRICULUM DISCIPLINE)

Topic. List of issues to be considered within the topic	Distribution within the total time		Individual work	Recommended references
	Auditory work			
	Lectures	Practical		
Topic 1. Introduction: diversification of shellfish breeding as a tool for sustainable development of the aquaculture industry. 1. Modern mariculture: diversification of the industry and characteristics of the state and prospects of its development. 2. History of the development of mariculture and analysis of the current state of shellfish cultivation in the world. 3. Biology of molluscs. 4. Classification of the class of molluscs. 5. Classification of the class of bivalve molluscs. 6. Main species and classification of shrimp. 7. Main types and classification of crustaceans.	2	2	10	
Topic 2. Diversification of the production cycle in the cultivation of shellfish 1. Prospects for the development of mariculture and shellfish breeding in Ukraine; 2. Classification of production systems and technologies in shellfish cultivation; 3. Features of production systems based on the biology of the cultivated organism;	2	2	4	

Topic. List of issues to be considered within the topic	Distribution within the total time			Recommended references
	Auditory work		Individual work	
	Lectures	Practical		
4. Selection of a place for breeding molluscs, permission and rules of national legislation; 5. Changes in water quality; 6. Peculiarities of management of shellfish breeding farms (biological safety). 7. Use and cultivation of wild shellfish.				
Topic 3. Diversification of mariculture facilities for growing shellfish: 1. Main directions and trends of diversification of mollusk breeding in different countries of the world; 2. Prospects for the development of mariculture and shellfish breeding in Ukraine; 3. Modern methods and principles of diversification of shellfish cultivation; 4. Biology and economically beneficial characteristics of mussels; 5. Ecological and biological characteristics and methods of growing mussels; 1. 6. Biology and economically beneficial characteristics of oysters; 2. 7. Ecological and biological characteristics and methods of growing oysters; 3. 8. Biology and economically useful features of the comb; 4. 9. Ecological and biological characteristics and methods of scallop cultivation; 5. 10. Biology and economically beneficial characteristics of shrimp; 6. 11. Ecological and biological characteristics and methods of shrimp cultivation.	4	4	6	
Topic 4. Environmental and feed control of reproduction and cultivation of molluscs: 1. Technological and environmental requirements for mollusk cultivation facilities; 2. System of shellfish nurseries (elevators and various technologies); 3. Risks when growing shellfish (predators and pests); 4. Diversification of different types of shellfish farming enterprises; 5. Protocols of incubators, rearing of larvae, evaluations, troubleshooting in hatcheries; 6. Water quality management; 7. Record-keeping, packaging and transportation of roe, use of anesthetics during transportation of mollusk roe. 8. Quarantine and hatchery protocols, principles of biosecurity, sanitary and phytosanitary (SPH) measures.	4	2	10	1, 2, 3, 4, 5, 6, 7, 8, 9, 10
Topic 5. Diversification of aquaculture as a challenge to climate change and other external factors:	-	2	20	

Topic. List of issues to be considered within the topic	Distribution within the total time			Recommended references
	Auditory work		Individual work	
	Lectures	Practical		
1. Diversification in aquaculture: species, types grown on farms, peculiarities of theology; 2. Diversification of aquaculture in Europe: Kingdom of Spain and Kingdom of Norway; 3. Diversification of aquaculture in South America: overview, facts and case studies of the Republic of Chile and the Federative Republic of Brazil; 3. Diversification of aquaculture in North America; 4. Diversification of aquaculture in Asia; 5. Adaptation of aquaculture to the climate and features of the external environment in Africa; 6. Promising ways of diversification of aquaculture.				
Topic 6. Diversification of aquaculture and shellfish farming on the Caribbean coast. 1. Status of shellfish aquaculture on the Caribbean coast of Colombia as a potential site for a regional hatchery; 2. State of fishing and shellfish farming in Panama; 3. Diversification of shellfish farming in the Caribbean.	-	2	30	
Topic 7. Promising ways of diversification and innovative technologies of shellfish cultivation 1. Diversification and redesign of the hatchery for breeding bivalve molluscs; 2. Creation of operational protocols for diversification of aquaculture enterprises; 3. Encouraging the development of related industries for sustainable use of innovative management methods to ensure resource and ecological preservation of aquaculture; 4. Cultivation of bivalve molluscs in Venezuela: diversity, potential and infrastructure for cultivation; 5. Honduras as a potential place for the creation of a small-scale hatchery for the breeding of bivalve molluscs.	2	2	40	
Total	14	16	120	

4. TEACHING AND LEARNING METHODS

	Teaching methods (work to be carried out by the teacher during classroom classes, consultations)	Number of hours	Study methods (what types of educational activities the student should perform independently)	Number of hours
Learning outcomes 1	Educational lecture (narration, explanation, demonstration, illustration) Practical lesson (explanation, demonstration)	10	Working with lecture notes, working with the book, summarizing, systematizing, deepening the material, making calculations	10

Learning outcomes 2	Educational lecture (narration, explanation, demonstration, illustration) Practical lesson (explanation, demonstration)	15	Working with lecture notes, working with the book, summarizing, systematizing, deepening the material, making calculations	10
Learning outcomes 3	Educational lecture (narration, explanation, demonstration, illustration) Practical lesson (explanation, demonstration) away class	15	Working with lecture notes, working with the book, summarizing, systematizing, deepening the material, making calculations	10
Learning outcomes 4	Educational lecture (narration, explanation, demonstration, illustration) Practical lesson (explanation, demonstration)	5	Working with lecture notes, working with the book, summarizing, systematizing, deepening the material, making calculations	10
Learning outcomes 5	Educational lecture (narration, explanation, demonstration, illustration) Practical lesson (explanation, demonstration)	5	Working with lecture notes, working with the book, summarizing, systematizing, deepening the material, making calculations	10
Learning outcomes 6	Educational lecture (narration, explanation, demonstration, illustration) Practical lesson (explanation, demonstration)	10	Working with lecture notes, working with the book, summarizing, systematizing, deepening the material, making calculations	10

5. EVALUATION BY THE EDUCATIONAL COMPONENT

5.1. Diagnostic assessment (specified as necessary)

5.2. Summative assessment

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

№	Methods of summative assessment	Points / Weight in the overall assessment	Compilation date
1.	Individual work, Essay on Topic 1.	15 points / 15%	5 semester, 1-2 week
2.	Presentation, report. Topics 2	15 points / 15%	5 semester, 2-3 week
3.	Multiple choice test	15 points / 15%	5 semester, 4-5 week
4.	Individual calculation work on the topic 3	10 points / 10%	5 semester, 5-6 week
5.	Individual calculation work on the topic 4.	15 points / 15%	5 semester, 7-8 week
6.	Individual work on topic 5.	15 points / 15%	5 semester, 8-10 week
7.	Individual work on topic 6-7.	15 points / 15%	5 semester, 10-15 week

5.1.2. Evaluation criteria

Component	Unsatisfactorily	Satisfactorily	Fine	Perfectly
Abstract, Topic 1	<i>< 9 points</i>	<i>9-11 points</i>	<i>12-13 points</i>	<i>14-15 points</i>
	Task requirements not met	Most of the requirements are fulfilled, but some parts are missing, there is no analysis of the data obtained	All task requirements fulfilled	All the requirements of the task were fulfilled, the results obtained were clearly interpreted, proposals were made to improve the mariculture to increase the sustainable development of the industry
Written test, Topic 1-2	<i><5 points</i>	<i>5-6 points</i>	<i>7-8 points</i>	<i>9-10 points</i>
	Fewer than 6 correct answers to a test question	6-9 correct answers to the test questions	10-12 correct answers to the test questions	13-15 correct answers to the test questions
Intermediate certification, Topic 1-2	<i><9 points</i>	<i>9-11 points</i>	<i>12-13 points</i>	<i>14-15 points</i>
	Fewer than 6 correct answers to a test question	6-9 correct answers to the test questions	10-12 correct answers to the test questions	13-15 correct answers to the test questions
Essay, Topic 4	<i><9 points</i>	<i>9-11 points</i>	<i>12-13 points</i>	<i>14-15 points</i>
	Task requirements not met	Most of the requirements are fulfilled, but some parts are missing, there is no analysis of the data obtained	All task requirements fulfilled	All the requirements of the task were fulfilled, the results obtained were clearly interpreted, proposals were made to improve the mariculture to increase the sustainable development of the industry
Written Testing, Topic 3-5	<i><10</i>	<i>11-12</i>	<i>12-14</i>	<i>14-15</i>
	Fewer than 6 correct answers to a test question	6-9 correct answers to the test questions	10-12 correct answers to the test questions	13-15 correct answers to the test questions
Publication of abstracts, Topic 5	<i><13</i>	<i>14</i>	<i>15-19</i>	<i>20-25</i>
	Requirements for the assignment are not met	Content does not align with the topic and requirements	The abstract is superficial, with inconsistent components	The abstract is innovative in nature, substantial, and has thoroughly coordinated components

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
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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. Basic literature

1. Intensive technologies in aquaculture: teaching. manual / [R. V. Kononenko, P. G. Shevchenko, V. M. Kondratyuk, I. S. Kononenko]. - K.: "Center for Educational Literature", 2016. - 410 Sherman I.M., Yevtushenko M.Yu. Theoretical foundations of fish farming: textbook - K.: , 2011. - p

2. Sherman I.M., Yevtushenko M.Yu. Theoretical foundations of fish farming: textbook - K.: , 2011. – p

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2. FAO. 2016. Planning for aquaculture diversification: the importance of climate change and other drivers. Technical Workshop. 166 p.

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Other sources

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2. David L. VanderZwaag, Gloria Chao. 2006. Aquaculture Law and Policy : Towards Principled Access and Operations. 577 p.

3. Doebeli M., 2011. Adaptive Diversification. Monographs in Population Biology. 360 p.

4. Bart Holterman, 2011. The Fish Lands. German trade with Iceland, Shetland and the Faroe Islands in the late 15th and 16th Century. 531 p.

5. Odd-Ivar Lekang. 2020. Aquaculture Engineering. John Wiley & Sons, Incorporated, 526 p.

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Additional sources

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3. FAO Regional Office for Asia and the Pacific, Bangkok, Thailand. RAP Publication 2009/01, 50 pp. Beckenstein, A.R. 1975. Scale economies in the multiplant firm: theory and empirical evidence. *The Bell Journal of Economics*, 6 (2), 644–657.
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Software

1. Zoom software is a platform for organizing video conferences.
2. Moodle distance learning system software.

3. Internet service for online testing and creation of quizzes Quizizz.com
4. Word text editor.
5. Microsoft Office Power Point.