

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

MODULE SYLLABUS


Bioresources of the hydrosphere and their use (selective)

Implemented within the Technologies in aquaculture educational program

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

Sumy – 2024

Developer:  **Oleksandr MYKHALKO**, 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	Minutes No10 dated 06.06.2024	
	Head department	 (signature) Viktor OPARA (surname, initials)

Agreed:

Guarantor of the educational program



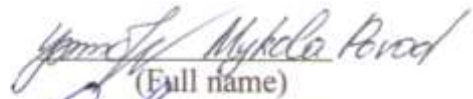
Viktoriia VECHORKA

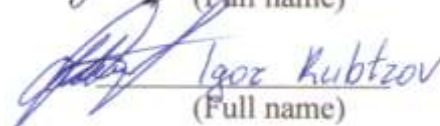
Dean
Biological and technological faculty



Viktoriia VECHORKA

A review of the work program (attached) is provided:


 (Full name)


 (Full name)

Methodist of the Education Quality Department,
licensing and accreditation


 (Full name)

Registered in the electronic database: date:18.04.2024

Syllabus review data:

The academic year in which changes are made	The Academic program attachment number with changes description	Changes revised and approved		
		Minutes No and date of the department meeting	Head of Department	Guarantor of the Academic program

1. MODULE OVERVIEW

The name of the educational component	Bioresources of the hydrosphere and their use					
Faculty/department	Biological-technological/Forage and animal feeding technologies					
Status of the educational component	Selective					
Program/Specialty (programs), the component of which is an educational component for	Technologies in aquaculture					
An educational component may be offered for	204 Technology of production and processing of animal husbandry products 207 Aquatic biological resources and aquaculture					
National Qualifications Framework level	seventh					
Semester and duration of study	the second, 11 weeks					
Number of ECTS credits	5					
The total number of hours and their distribution	Contact work (class)					
	Lectures		Practical/seminar		Independent work	
	full-time education	external form of education	full-time education	external form of education	full-time education	external form of education
	22	-	22	-	-	106
Language of education	Ukrainian					
Teacher/Coordinator of the educational component	Mykhalko Oleksandr Gryhorovych					
Contact Information	Associate Professor of the Department of Feed Technology and Animal Feeding office 322 of the main building email address: snau.cz@ukr.net consultations: every Tuesday 14 ⁰⁰ -15 ⁰⁰ .					
Module description	The educational component explores aquatic bioresources and their industrial significance. Students will gain a deep understanding of hydrobiont life forms, their interactions and the influence of both natural and anthropogenic factors on aquatic organisms. The course will cover the identification of productive zones in the formation of bioresources in marine and freshwater environments, hydrobiocenoses, and their functional role in the hydrosphere. The program examines hydrobionts in marine, oceanic, and continental water bodies as natural aquatic bioresources and as aquaculture. Students will develop skills in identifying various types of aquatic bioresources and predicting water body productivity. They will be equipped to analyze the regulatory aspects of the international industry, Ukraine's legislative support, and the protection of aquatic living					

		resources.
	The purpose of the educational component	The main task of educational component is possessing of comprehensive knowledge of aquatic bioresources and their role in resilient aquatic ecosystems and their significance as a raw material base for industries.
	Prerequisites for studying the educational component, connection with other educational components of the educational program	The educational component is based on the following: Hydroecology "
	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=5708

2. CORRELATION BETWEEN MODULE LEARNING OUTCOMES (MLOs) AND PROGRAM LEARNING OUTCOMES (PLOs)

MLOs: On successful completion of the module the learner will be able to:	PLOs				How assessed
	LO 5. Search for, analyse and evaluate the necessary data in scientific literature, databases and other informative sources	LO 11. Apply knowledge and understanding of chemical composition and classification of natural waters, temperature regime of reservoirs, oxidizability of water, pH, biogenic content, methods of influencing chemical composition and gas regime of water in natural and artificial reservoirs, use of natural waters and self-purification processes of reservoirs in the management of aquatic bioresources and aquaculture facilities.	LO 14. Make effective decisions, take responsibility and work under critical conditions in carrying out productive, technological and scientific tasks in the field of aquatic bioresources and aquaculture, analyse and integrate alternatives, assess risks and probable consequences for the environment.	LO 15. Perform professional activities guided by the principles that provide for the implementation of measures for the protection of aquatic ecosystems, the use and reproduction of aquatic biological resources.	
MLO 1. find out, analyze and evaluate the information about bioresources from different sources	+		+		Analysis of publications in a given topics
MLO 2. understand the chemical and biological processes in water and manage them while using of aquatic bioresources.	+	+			Case studies and situation analysis
MLO 3. assess risks and probable consequences for the environment due to using of natural aquatic bioresources.		+	+	+	Participation in focus groups Case studies and situation analysis
MLO 4. make effective decisions on the protection of aquatic ecosystems, rationally use and reproduction of aquatic biological resources, based on national and international legislation.	+		+	+	Group tasks with self- and mutual assessment

3. MODULE INDICATIVE CONTENT

Topics	Distribution of hours				Learning resources
	Directed study			Self-directed study	
	Lec	Pract	Labs		
Topic 1. Introduction. History of the study of aquatic biological resources <ol style="list-style-type: none"> Introduction History of studying hydrosphere bioresources and their consumption by humankind Methods of studying of aquatic biological resources 	2	2		8	1, 4, 6
Topic 2. Organic substances and their cycle in aquatic biocenoses. <ol style="list-style-type: none"> Types of Water Bodies. Organic Substances and Their Cycling in Aquatic Biotopes. Saprobity of water bodies Natural and anthropogenic eutrophication Measuring of water parameters 	2	2		10	1, 2, 4, 6
Topic 3. Hydrobionts. <ol style="list-style-type: none"> Classification of hydrobionts (Plankton Pleuston Neuston Nekton Benthos) Number and biomass of hydrobiont populations World Harvesting of Hydrobionts. Fishery Industry. Fishery of Non-fish Objects. 	2	2		10	1, 2, 4, 6
Topic 4. Hydrobiocenoses, their functional role in the hydrosphere. <ol style="list-style-type: none"> Species Diversity of Hydrobiocenoses Structure of Hydrobiocenoses Biological Production and Energy Flow in Aquatic Ecosystems 	2	2		10	1, 2, 3, 4, 6
Topic 5. Interpopulation relationships in the hydrosphere. <ol style="list-style-type: none"> Interactions of hydrobionts in biocenoses Competition, predation, and parasitism characterize different types of interactions between hydrobionts in ecosystems. Biotic relationships of the ichthyofauna of water bodies 	2	2		10	1, 4, 6
Topic 6. The main productive zones of the formation of biological resources of sea and fresh waters <ol style="list-style-type: none"> Autotrophic Processes in the Ocean. Primary Production of Phytoplankton. Periphyton Production Secondary Production 	2	2		10	1, 4, 6

4. Mapping of the productive zones of World Ocean					
Topic 7. Settlement of aquatic living organisms of different latitudes and depths. 1. The principles of distribution 2. Migrations (feeding, wintering, spawning) 3. Spontaneous and purposeful acclimatization of hydrobionts. 4. Biological invasions. 5. Forms of purposeful acclimatization of biological resources of sea and fresh waters 6. Methods of Acclimatization	2	2		10	1, 2, 3, 4, 6
Topic 8. Fish productivity. Environmental factors and their influence on the productivity of reservoirs. 1. Production (cultivation) of commercial fish 2. Polyculture of fish and its interaction in the water body. 3. Regulation and Ways to Increase the Productivity of Water Bodies 4. Anthropogenic Factors and Their Impact on Ichthyofauna: 5. Health management in aquatic bioresources	2	2		10	1, 2, 4, 6
Topic 9. Use of aquatic biological resources of Ukraine. Craft. Aquaculture. 1. Fishery Water Objects 2. Use of Water Bioresources 3. Industrial zones in Ukraine aquatic biological resources 4. Aquaculture. 5. Mariculture 6. Invertebrate and algae Aquaculture	2	2		10	1, 2, 3, 4, 6
Topic 10. Measures to protect the natural reproduction of industrial hydrobionts. 1. Protection against pollution 2. increasing the efficiency of natural reproduction of bioresources 3. Fisheries Legislation and Conservation of Aquatic Resources 4. Principles of fish protection 5. Responsibility for violations	2	2		10	3, 5, 6
Topic 11. Legislative support for the functioning of water management of Ukraine 1. Rules of industrial fishing in inland waters 2. The articles of Law of Ukraine on Fisheries, Industrial Fishing, and Protection of Water Bioresources	2	2		8	1, 4, 5, 6
Total	22	22		106	

4. TEACHING AND LEARNING METHODS

MLOs	Teaching methods (directed study)	Hours	Learning methods (self-directed study)	Hours
MLO 1. find out, analyze and evaluate the information about bioresources from different sources	Description of sources and approaches in big data collection and analysis	10	Doing exercises in obtaining of information and processing of data	20
MLO 2. understand the chemical and biological processes in water and manage them while using of aquatic bioresources.	Consideration of cases Explanation of possible situations	12	Making the decisions on individual tasks	40
MLO 3. assess risks and probable consequences for the environment due to using of natural aquatic bioresources.	Consideration of cases Explanation of possible situations	10	Making the decisions on individual tasks	20
MLO 4. make effective decisions on the protection of aquatic ecosystems, rationally use and reproduction of aquatic biological resources, based on national and international legislation.	Explanation of the order of investigations and actions in case of occurrence of a situations	12	Delivering an assignment by completing written tasks related to law research skills.	36

5. ASSESSMENT

5.1. Diagnostic assessment

5.2. Summative assessment

5.2.1. Intended learning outcomes methods:

No	Summative assessment methods	Grades	Deadline
1	Testing the ability to demonstrate knowledge of and be able to apply them in identifying of hydrobionts.	10/10%	By the end of the 6 weeks
2	Attestation	15/15%	By the end of the 6th week
3	Debate about the risks and probable consequences for the environment due to using of natural aquatic bioresources.	20/10%	By the end of the 9th week
4	Performing the individual task to solve authentic problem encountered by professionals during the course of their work considering the protection of aquatic ecosystems, rationally use and reproduction of aquatic biological resources, based on national and international legislation	20/20%	By the end of the 11th week
5	Computer testing (multiple choice quizzes)	15/15%	By the end of 11 weeks
6	Assessment of the ability to demonstrate knowledge of and be able to find out, analyze and evaluate the information about bioresources from different sources	20/20%	By the end of the 11th week
	Total in semester	100/100%	

5.2.2. Grading criteria

Summative assessment method	Unsatisfactory	Satisfactory	Good	Excellent
Assessment of the ability to define and appropriately use the basic concepts and terminology applicable in identifying of hydrobionts	0-3	4-6	7-9	10
	Task requirements not met	Most requirements are met, but some components are missing or insufficiently met	All task requirements are met	Task requirements are met, while creativity and thoughtfulness are demonstrated
Testing the ability to demonstrate knowledge of and be able to apply them	0-7	8-12	13-17	18-20
	Few or no real	Some decent	Many good	Very strong and

in debate about the risks and probable consequences for the environment due to using of natural aquatic bioresources.	arguments given, or all arguments given had significant problems	arguments, but some significant problems	arguments given, with only minor problems	persuasive arguments given throughout
Testing the ability to demonstrate knowledge of and be able to find out, analyze and evaluate the information about bioresources from different sources	0-7	8-12	13-17	18-20
	Unclear and disorganized throughout	Clear in some parts but not overall	Mostly clear and orderly in all parts	Completely clear and orderly presentation
Performing the individual task to solve authentic problem encountered by professionals during the course of their work considering the protection of aquatic ecosystems, rationally use and reproduction of aquatic biological resources, based on national and international legislation	0-7	8-12	13-17	18-20
	Task requirements not met	Most requirements are met, but some components are missing or insufficiently met	All task requirements are met	Task requirements are met, while creativity and thoughtfulness are demonstrated
Computer testing will be calculated automatically according to the amount of correct answers				

5.3. Formative assessment

Formative exercises are designed to enable students to develop particular aspects of their learning, prior to summative assessments. Formative exercises are designed to help students use feedback and self-reflection to manage and develop their learning so that they can see how to improve their work.

No	Formative Assessment elements	Date
1.	Feedback aimed at supporting the student in understanding the correctness of their writing works	Each time you check the calculations
2.	Self-check for knowledge based on the results of the analysis of performed blitz tasks	Blitz control at the beginning of the classes
3	Evaluation of the activity and effectiveness of applicants' participation in focus groups and debates. Comments and tips.	Each time in the form of focus groups or debates

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

6. LEARNING RESOURCES

6.1. Key resources

1. FAO. 2022. The State of World Fisheries and Aquaculture 2022. Towards Blue Transformation. Rome, FAO. <https://doi.org/10.4060/cc0461en>
2. Handbook of Fish Biology and Fisheries Edited by Paul J.B. Hart and John D. Reynolds
3. The handbook for management and restoration of aquatic ecosystems in river and lake basins (2015), 100 p. URL: www.inbo-news.org
4. Євтушенко М.Ю., Глебова Ю.А. Є 27 Біологічні ресурси гідросфери [Монографія] / М.Ю. Євтушенко, Ю.А.Глебова. – К.: Вид-во Українського фітосоціологічного центру, 2013. – 179 с.
5. Закон України «Про рибне господарство, промислове рибальство та охорону водних біоресурсів» (Відомості Верховної Ради України (ВВР), 2012, № 17, ст.155) URL: <https://zakon.rada.gov.ua/laws/show/3677-17#Text>
6. Хижняк М.І., Кражан СА, Рудик-Леуська Н.Я., Кутіщев П.С. Біопродуктивність водних екосистем. Посібник, Київ: центр учбової літератури, 2020, 461 с.

6.2. Guidelines

1. Біологічні основи рибного господарства: методичні вказівки /А.М. Трофимчук, Н.Є. Гриневич, О.А. Хом'як, Н.М. Присяжнюк, А.О. Слюсаренко, В.С. Жарчинська. Біла Церква, 2022. 74 с.
2. Blue Bioeconomy URL: https://www.blue-growth.org/Fishing_Over_By_Catch/Bioeconomy_Blue_Aquatic_Biological_Resources.htm

6.3. Additional resources

Fisheries and Resources Monitoring System (FIRMS) URL: <https://firms.fao.org/firms/en>

GLOBEFISH (a multi-donor funded project within the FAO Fisheries Division) <https://www.fao.org/in-action/globefish/background/who-we-are/en/>

6.4. Computer Applications and soft

<https://kahoot.it/>

<https://www.mentimeter.com/>