



Sumy
National
Agrarian
University

MINISTRY OF EDUCATION AND SCIENCE OF UKRAINE
SUMY NATIONAL AGRARIAN UNIVERSITY

APPROVED

AT THE SCIENTIFIC COUNCIL OF SNAU

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CONFIRMED BY

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ACADEMIC DEGREE PROGRAM

Speciality	204, Technology of production and processing of animal products
Academic program	204, Aquaculture
Qualification	Master degree

Sumy 2023

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1. General description of the Program

Faculty	Faculty of Biology and Technology
General field	20, Agricultural sciences and food
Field	204, "Technology of production and processing of animal products"
Specialty	204, "Technology of production and processing of animal products"
Academic program	204, Aquaculture
Qualification	master degree
Form of education	full time, part time
Language of studying	Ukraine
General program entry requirements	Previous educational level of the applicant: Bachelor's degree
Total duration of study and credits	1.4 years, 72 weeks, 90 credits
Theory	41 weeks
Practice	5 weeks
Defense of thesis	5 weeks
Vacation	11 weeks
Working team members	1.Vechorka V.V., Dr., Professor, Dean of the Biotechnology Faculty 2.Kyselov O.B., PhD, Associate Professor of the Department of Technology fodder and feeding animals 3.Mykhalko O.G., teacher of the Department of technology fodder and feeding animals

2. Justification of the introduction of a new educational program (revision of the existing program)

The importance of aquaculture and fisheries development at both global and regional levels is constantly increasing. One of the fundamental factors for efficient fisheries, combining high productivity with economically viable costs and high nutritional value of fishery products, is an advanced approach to the training of professionals and the study of aquaculture at universities, which includes the exchange of experience between scientists and producers, their interaction and cooperation with the business community and international environmental organizations. This prompted Sumy National Agrarian University to develop a degree program in Aquatic Bioresources and Aquaculture, which is still offered at the bachelor's level. However, the successful management of fisheries enterprises, the needs of the industry and the modern requirements for running businesses in this field require more trained professionals at higher educational levels, so the possibility of SNAU's participation in the AFISHE project is a logical and timely opportunity for the development of this area of the world, which will ensure the creation of a new master's degree program "Aquaculture".

3. Labor market analysis

Today, both state-owned and private companies specializing in the cultivation and processing of fishery products operate in the region. These enterprises use both natural and artificial reservoirs, but the production technology and cultivation culture do not always meet modern standards. Therefore, within the framework of this project, it is planned to establish close relations with local aquaculture and fishery enterprises in order to carry out joint activities and solve current environmental problems.

4. Distinctive features and competitive advantages of the program

The educational master's program ensures the acquisition of in-depth knowledge and forms a critical approach to issues of production technology and processing of livestock and aquaculture products, making effective professional decisions and solving current tasks and problems of the industry. The developed and implemented master's degree program in aquaculture will not only provide thorough knowledge of fish

breeding and rearing in artificial and natural reservoirs, but also avoid environmental problems in the future expansion of the aquaculture industry in the country.

5. Purpose of the academic degree program

Training of a highly qualified and competitive professional adapted to production and management activities, able to comprehensively combine scientific, project and entrepreneurial components, with the aim of introducing innovative technologies in the field of production and processing of livestock and aquaculture products. The main objective of the introduction of the Master's Degree in Aquaculture is the possibility of functioning of the educational process in the Master's Degree in Aquaculture and Fisheries, which provides students with in-depth, specialized and interdisciplinary training aimed at academic, research and professional training in the field of aquaculture. Students are provided with the fundamental knowledge, skills, and abilities to develop and research aquaculture, plan, manage, and monitor inland waters, evaluate the environmental impacts of aquaculture production technology, and implement strategies for future aquaculture development. The master's degree program provides students with the fundamental knowledge, skills, and abilities that will enable them to develop and conduct research in aquaculture; design, manage, and monitor continental waters; evaluate the environmental impacts of aquaculture production technology; and implement strategies that will enable the aquaculture industry to evolve.

6. Learning outcomes of the academic degree program

LO 1.	Evaluate and ensure the quality and safety of livestock and aquaculture technologies, feed and feed products, animal nutrition levels, and products of animal origin.
LO 2.	To develop, implement and modernize effective technologies and procedures in the field of production and processing of livestock and aquaculture products.
LO 3.	Conduct research and/or innovative activities to gain new knowledge and create new technologies and products in the field of animal husbandry, aquaculture and in other multidisciplinary contexts.
LO 4.	Apply modern mathematical methods, information technologies and specialised software for research and development in the field of technologies for the production and processing of livestock and aquaculture products.
LO 5.	Search for, analyse and evaluate the necessary data in scientific literature, databases and other informative sources
LO 6.	Create and explore models of technological processes of production and processing of livestock and aquaculture products, evaluate their appropriateness, determine the limits of applicability.
LO 7.	Manage complex activities in the field of production and processing of livestock and aquaculture products, define objectives, plan and distribute work, manage resources.
LO 8.	Communicate freely orally and in writing in Ukrainian and one of the foreign languages when discussing professional issues, research and innovations in the field of production and processing of livestock products, aquaculture and related problems.
LO 9.	Make effective decisions on the production and processing of livestock and aquaculture products, including in difficult and unpredictable conditions, forecast their development, determine factors influencing the achievement of set objectives, analyse and compare alternatives, assess risks and likely consequences of decisions.
LO 10.	Be responsible for developing professional knowledge and practises, evaluating the strategic development of the team, designing effective human resource policies.
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 12.	Be able to plan and organise the technological processes of rearing, keeping and propagating

	fish in different types of reservoirs and control the safety and quality of their products.
LO 13.	Be able to organise the processes of processing, storage, preservation and sale of fish and aquaculture products.
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.

7. Teaching and learning methods

The application of interactive, problem-oriented, informative and communicative principles of theoretical and practical training, information and educational environment Moodle, the result of which is the training of highly qualified specialists who meet the requirements of the labor market.

Mastering the methodology of research and scientific-practical work, the ability to present their results in native and foreign languages.

Conducting scientific work using the scientific material base of the university and its partners.

Use of tutors to supervise independent work and individual scientific supervision during the completion of the thesis. Active learning is interactive learning methods;

The principle of binary - active direct participation of the teacher and student;

away classes;

learning through practice;

self-study;

personalized training - individual consultations;

seminar;

lecture;

online lecture;

excursion;

self-reliant study activities;

seminar: practical PC room classes;

online seminar: practical PC room classes;

group work.

8. Assessment methods and approaches

Types of assessment:

Formative assessment - formative tasks and descriptive feedback to students from teachers, fellow students, and a wide range of stakeholders;

Summative assessment - determining the level of achievement of program learning outcomes by the student of higher education;

Self-assessment.

Assessment methods: practical assessment, coursework, examination assessment.

Attestation is provided in the form of a single state qualification examination and a public defense of the qualification work in the prescribed manner. Types of assessment: summative assessment - level determination achievements of a higher education student learning outcomes;

Assessment methods: practical assessment, examination assessment.

9. Field of professional activity and future career opportunities

International Standard Classification of Occupations 2008 (ISCO-08).

2213.2 Technologist-researcher in the production and processing of animal husbandry products

2213.2 Technological engineer for the production and processing of animal husbandry products

2213.2 Aquaculture production specialist

2211.2 Ichthyologist

2211.2 Fish breeder (professional)
 2211.2 Hydrobiologist
 2211.2 Research fish breeder
 2211.2 Ichthyopathologist
 2211.1 Research ichthyologist
 2213.1 Aquaculture researcher.

10. Organization of practices/internship

The Master's research practice is an integral part of the educational process and an effective form of consolidation of the knowledge acquired in the study of the basic disciplines, as well as a preparatory basis for the study of the professional disciplines. Research practice is carried out in modern companies and organisations in the field of aquaculture in order to acquire the necessary and sufficient level of practical knowledge and skills according to the qualification level of the Master. The research internship is carried out after the successful completion of the first semester, comprises 10 credits (300 hours) and lasts 5 weeks.

11. Requirements for the teaching staff

Meets the licensing conditions: Availability of the department responsible for the education of higher education students; scientific and pedagogical staff involved in the implementation of the educational program, have scientific degrees and academic titles, work at Sumy NAU at their main place of work; have a high scientific and professional level of activity.

12. Material and technical resources necessary for the implementation of the program

Material and technical support of the educational and professional program is determined by the use of specialised laboratories and classrooms of the faculty and interfaculty facilities (aquaculture laboratory, electron microscopy laboratory, PCR diagnostics, software laboratory in agribusiness), technical means and equipment, provision of computer workstations and unlimited Internet access. All necessary social and housekeeping infrastructures are in place, the number of dormitory places meets the requirements.

13. Guaranteed library and other information resources

Scientific library of SNAU <http://library.snau.edu.ua> provides access to electronic catalogs and electronic library, world information resources, Ukrainian repositories and Internet libraries.

14. Brief descriptions and objectives of the program modules

Module	credit	hours
Mandatory disciplines		
1. Methodology and organization of scientific research	5	150
<p>The aim of the training component is the formation of students' knowledge, skills and abilities in the methodology of conducting professional experiments, systematisation, analysis and evaluation of research results, design of scientific papers, copyright and patent documentation. The module aims to achieve professional program competences realised through disciplinary learning outcomes, in particular the ability to plan, organise and conduct scientific experiments on feeding, breeding and rearing of animals and fish. As a result of studying the educational component, the student will be able to organise and conduct experiments on farm animals and fish, professionally evaluate the results and prepare and publish a scientific paper. The main topics to be studied: scientific and technical progress and its importance for the development of animal husbandry and aquaculture; methodological bases of scientific research; technology and organisation of scientific activity; animal and fish feeding experiments as a kind of biological experiment; methods of conducting zootechnical experiments; modern requirements for conducting experiments on animals and fish; rules for preparing a report on completed research; calculation of the economic efficiency of scientific developments; publication of the results of scientific research; qualification</p>		

work of university applicants; registration of research work; civil law means of protecting copyright and related rights.		
2. Production management, business organization and personnel management in animal husbandry	5	150
The educational component involves the acquisition of knowledge and the formation of skills in the application of methods of production management and personnel management in livestock enterprises, necessary for the formation of future specialists, enterprise managers, specialists in the field of organization and management of technological processes in livestock enterprises, entrepreneurial structures of individual branches of livestock production. In addition, the study of the discipline allows you to understand: forms of organization of economic activity, economic relations of people that objectively arise between them in the process of business organization and implementation of entrepreneurial activity; planning tasks and production optimization problems in conditions of limited resources; indicators of economic processes and reasonably make rational management decisions based on business planning and budgeting.		
3. Modern technologies of fodder and feed additives	5	150
The discipline contributes to the training of professionals who are able to solve practical problems of professional activity in the production of high quality feed and its effective use in the field of animal husbandry and aquaculture production. Main topics studied: comprehensive assessment of feed nutrition, production, use and quality control of green fodder; procurement, storage and quality control of roughage; technology and conditions for harvesting high-quality silage; technology of hay making; roots and tubers and other succulent fodder; cereals and methods of their processing; technologies of production and use of fodder of animal origin, microbiological and chemical synthesis, mixed fodder and balancing fodder additives; fodder production in processing plants; modern fodder distribution technologies. As a result of studying the educational component, the student will be able to organize and conduct experiments on farm animals and fish, professionally evaluate its results, prepare and issue a scientific paper.		
4. Innovative technologies for the production of animal husbandry products	5	150
The aim of the discipline is to enable masters to perfectly apply the results of innovations in science and technology for the production and initial processing of quality livestock products. The discipline ensures the mastery of innovative technologies as a guide to science in versatile agriculture. During the study many factors are taken into account, which allow to achieve significant results, to provide students with in-depth knowledge of the technology of production of milk and beef, pork, poultry products, aquaculture, methods of keeping farm animals, poultry, fish and their implementation in animal husbandry, pig and poultry farming, aquaculture work organization in the implementation of industrial technologies, rational use of biological and economically useful properties of animals and poultry, modern methods of their selection in industrial animal husbandry, poultry farming, aquaculture. The main method of implementing the program is lectures, conducting laboratory and practical classes on the study of advanced technologies in the field of livestock, poultry and fish farming.		
5. Breeding of farm animals	5	150
The aim of the study of this discipline is to train the theoretical knowledge and practical skills of students in the field of breeding, which will enable reliable estimation of the genotype and phenotype of farm animals using population genetic parameters. They use modern achievements in genetics, biotechnology and breeding methods and skillfully apply them in practise to effectively improve existing and newly created breeds and types of farm animals. Basic concepts and categories from the disciplines: animal genetics, breeding of farm animals, knowledge of breeds of all types of farm animals, methods of evaluating the conformation of animals, physiology and feeding, basics of biometric statistics. Calculation and reasoned application of population genetic parameters in determining the selection situation in the herd and breed, application of existing modern methods for objective and reliable evaluation of the genotype of the animal, mastery of modern methods for evaluating the genotype of the animal, including linear classification by type; to use the achievements of biotechnology to intensify selection; in modern conditions of using the principles of large-scale selection, use breeding methods in the process of improving existing breeds and types of agricultural animals.		
6. Innovative technologies for processing livestock products	5	150

The discipline contributes to the training of future specialists who have in-depth innovative, comprehensive systematic theoretical and practical knowledge of the biochemical, physico-chemical and technological processes involved in the production of dairy and meat products of various kinds: whole milk and sour milk products, butter, hard and soft cheeses, canned milk products, ice cream, pork, beef and lamb products, cooked, semi-smoked and raw cured sausages. The main topics: modern methods of transport and purification of milk, promising methods of separation, normalisation and homogenisation of milk, modern methods of heat treatment of milk and its storage, main directions of optimisation of production of drinking milk types, dietary and medicinal properties of fermented milk products, biochemical and microbiological bases of production of fermented milk products, innovative technologies of production of various types of cheese, modern production technologies and properties of condensed dry milk products, innovative technologies for the production of ice cream, principles of complete and rational use of milk, assortment and classification of sour milk cheese, innovation directions in the production of sour milk cheese, modern methods of determining the quality of meat raw materials, functional and technological properties and nutritional value of meat and meat products.

7. Aquaculture of artificial and natural reservoirs	5	150
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The discipline provides for the study of the organisational structure of pond fish farms, their zonal location, pond stocking and the main technological processes involved in pond aquaculture, namely: the production of offspring of the main farmed subjects in artificial freshwater tanks, the rearing of juvenile fish to the viable stage, the rearing of fish planting material and its overwintering, the rearing of commercial fish, taking into account the types and systems of farms, forms and cycles of their management, and for each of them their scheme is given. Also, the use of natural reservoirs for fisheries, cultivation of aquatic organisms in controlled natural conditions, rational management of aquaculture in rivers, lakes and reservoirs, on the coasts of the seas (especially in estuaries and bays), the peculiarities of propagation and cultivation of economically valuable hydrobionts by creating optimal conditions for their intensive development and growth are studied. Mastering the knowledge of technological requirements related to the use of artificial reservoirs for fishing purposes, the general characteristics of the fishery use of reservoirs, biotechniques and technological techniques for the targeted formation of industrial ichthyofauna and the cultivation of hydrobionts under controlled conditions based on these reservoirs.

8. Hydroecology	5	150
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The aim of the study of this discipline is for students to master the regularities and peculiarities of the functioning of water ecosystems of different types (reservoirs, estuaries, large, medium and small rivers, lakes, cooling ponds, canals, etc.) under the conditions of the influence of natural and anthropogenic factors and hydrotechnical structures on them. As a result of studying this course, the student should know: structure and functions of water ecosystems of different types; methods of complex rational use of water resources; basic measures for solving ecological problems of water use; the main tasks of the industrial ecologist in the control of water protection activities. As a result of studying this course be able to: analyze the ecological condition of water bodies; determine what aquatic ecological processes occur in water bodies; develop measures to restore the ecological condition of hydroecosystems; assess anthropogenic influences on the water balance of water bodies; monitor the ecological status of water bodies under natural conditions; investigate hydrochemical, hydrobiological, and other characteristics under the conditions of a given water body using laboratory equipment; assessment of water quality in water bodies under conditions of anthropogenic pollution.

9. Aquaculture processing technology	5	150
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Mastering this discipline contributes to the training of professionals who are able to solve complex specialized problems and provide the practical principles of the technology of storage, preservation and processing of fish and other hydrobionts, the determination of quality and safety indicators for various types of products. The main topics for the study of the educational component are the characteristics of waters as raw materials, storage and transportation of hydrobionts, cold processing of products from hydrobionts, technological techniques and methods of salting, smoking, drying and curing, the technology of canned fish, the technology of fish roe, the technology of culinary products, the technology of feed, technical, medical products and biologically active substances. As a result of studying the educational component, the student will be able to determine the organoleptic indicators of fish raw materials and the mass composition of fish, calculate the thermophysical indicators of frozen fish, the duration of freezing and

thawing fish, balance the consumption of salt, Balance spices and other materials for salting, smoking, drying gyrobionts, apply methods of processing raw materials in the production of canned and preserved food, determine their quality and defects, assess the appearance and coarseness of ground feed meal, apply modern technologies in the production of fats and vitamins.		
<i>Elective disciplines</i>		
1. Philosophical problems in biology	5	150
The aim of studying this discipline is to form in the new generation of Ukrainian intellectuals a worldview appropriate to the philosophical thinking of mankind at the turn of the millennium; to connect biology with a broad socio-cultural and historical context; understand a broad range of areas of philosophy and develop an understanding of, and one's own attitude toward, the multiple paths of humanity's cultural and civilizational progress; teach to compare different, often mutually exclusive, approaches to solving complex scientific problems. Discipline Content: philosophical problems of biology; the phenomenon of life and its metaphysical dimensions; philosophical problems of ecology. The formation of a noospheric thought; philosophical problems of biology and medicine; current philosophical problems of modern natural science; development of natural science and biology in the 21st century; science and morality: social responsibility of the scientist.		
2. Civil Defence	5	150
The aim of the discipline is to train professional skills and abilities in the organization of civil protection at the level of economic objects, taking into account the specifics of the technogenic and ecological situation on the territory and in the region of the site. The task of the subject is to provide students with the latest theories, methods and technologies for predicting emergency situations, creating models of their development, determining the level of risk and justifying a set of measures to avert emergency situations, protect personnel, population, material and cultural values in emergency situations, localize and eliminate their consequences. After mastering the course program, the student knows the state and legal foundations of civil protection, its tasks and principles of construction; his duties in the field of professional activity, taking into account the tasks in civil protection; methods and tools; methods and tools for observing emergency situations, creating models (scenarios) of their development and evaluating their socio-economic consequences.		
3. The raw material base of the fish farming industry	5	150
Discipline is a subfield that is a prerequisite for the study of a complex of aquaculture disciplines in order to solve practical problems. As a result of studying the discipline, students should know: the state of biological resources (fish and other hydrobionts) in the world sea, fishing areas of Ukraine, both external and internal; the dynamics of fish populations, their main regularities, as well as learn how to apply this knowledge to calculate fish stocks, allowable catch, which is a prerequisite for rational fish farming. Training of highly qualified professionals for this area of fisheries is based on modern scientific achievements, the application of best practices for the study, development and practical application of the acquired knowledge. Purpose of the educational component: mastering the sum of knowledge of the technological requirements associated with the use of natural reservoirs for fishing purposes, the general characteristics of the fishing use of reservoirs, biotechniques and technological techniques for the targeted formation of an industrial ichthyofauna and the cultivation of hydrobionts under controlled conditions based on these reservoirs. Knowledge of the educational discipline is necessary for future specialists in aquatic bioresources to develop methods for intensification of aquaculture in natural reservoirs, application and improvement of technologies for cultivation of hydrobionts, artificial propagation of industrially valuable, rare and endangered fish species, creation of optimal conditions for natural and artificial propagation of fish stocks and conservation of biodiversity.		
4. Fishery	5	150
The discipline contributes to the training of specialists in aquatic bioresources and aquaculture, the formation of students' theoretical knowledge and practical skills on issues related to catching various types of fish in inland fresh and sea waters, modern fishing, the specifics of fish behavior in different seasons of the year, modern tools and methods fishing in modern ecological and economic conditions. The main topics to be studied: the origin and stages of the development of fishing in the historical aspect in the world and in Ukraine, the object of fishing in natural conditions and in the zone of fishing tools, the main features of the behavior of the object of fishing in the physical fields of means of intensification of fishing , Means and methods of industrial fishing, fishing with mesh nets, fishing with river floating nets and pond seines. As a		

<p>result of studying the educational component, the student will be able to evaluate and analyze the types and designs of tools for sea, river, pond, amateur, sport and industrial fishing; types and characteristics of fishing materials and fishing gear equipment; methods of fishing with the main fishing tools; the basics of regulation and the principles of effective management of industrial fishing, the rules of modern amateur and sport fishing and the peculiarities of their application in different types of reservoirs.</p>		
5. Ornamental fish farming	5	150
<p>The purpose of studying the discipline is to form students' ideas and acquire knowledge about the specifics of creating natural water ecosystems in aquariums. The task of the discipline is to acquire knowledge about setting up aquariums, preparing water, caring for aquariums, breeding different types of fish, studying systematic groups of objects of decorative aquaculture, their main representatives, knowledge of the biology of different types of fish. As a result of studying the academic discipline, the student should know: types of aquariums, their arrangement, technical equipment; the main parameters of water and its hydrochemical parameters; species composition and biology of the main representatives - plants, fish and other animals; fodder and rules for their use; methods of breeding plants, fish and other objects in the aquarium; diseases and methods of their identification and treatment.</p> <p>After completing the course of the academic discipline, the student should be able to: install, prepare water and regulate hydrochemical indicators; take care of aquariums of various types; properly feed, grow, breed and treat fish and plants in the aquarium.</p>		
6. Agrarian policy	5	150
<p>The course is aimed at forming basic knowledge on the problems of forming theoretical knowledge and developing practical skills, mastering the methodological aspects of the practical application of the foundations of the formation and implementation of the state agrarian policy, evaluating and justifying its effectiveness, and acquiring skills regarding the tools of state regulation of the agrarian sector and using them in one's practical activities .</p> <p>Tasks of the discipline: mastering and revealing the economic essence, principles and main components of the development and implementation of agrarian policy, formation of skills in the analysis of socio-economic processes of the agricultural sector, evaluation of individual measures of credit-financial, budget-tax, price, social and environmental policy in the agrarian sector, and as well as sustainable development of rural areas, understanding the peculiarities of the formation of agrarian policy in countries with different levels of socio-economic development.</p>		
7. Ichthyopathology	5	150
<p>The educational discipline includes the study of fish diseases of various nature, their etiology, clinical signs and course, patho-anatomical changes in the body of sick fish, the basics of epizootology, diagnostic methods, measures for prevention and treatment, general fish breeding and improvement and veterinary and sanitary requirements for growing fish in reservoirs aimed at preventing their diseases and poisonings. It is an integral part of the professional training of ichthyologists-fish breeders.</p> <p>The purpose of the discipline is to form the theoretical and practical basis for students to successfully master the processes of fish farming and obtain high-quality fish products, to familiarize them with the basics of general pathology, parasitology and body defense mechanisms, the main diseases of fish, their nature, fish water-melioration and veterinary-sanitary measures used in everyday practical work.</p>		
8. Aquatic microbiology	5	150
<p>The goal of the educational discipline is the formation of students' scientific ideas and the acquisition of knowledge about the role of microorganisms in water bodies, which determine the specifics of the functioning of natural water ecosystems. The main tasks of studying the academic discipline: to obtain modern knowledge about the peculiarities of the ultrastructure of microorganisms and the microbiological processes associated with them, which are the basis of the circulation of substances in nature; reveal the role of microorganisms in the production of biologically active substances - antibiotics, proteins, amino acids, vitamins, enzymes; consider the influence of microorganisms on the formation of water quality, the formation of microbiocenoses of fish and other hydrobionts, their role in the occurrence of pathological processes; teach students to think, analyze and independently work on literary sources from different sections of the course; master the main approaches to optimizing the careful use of aquatic biological resources; to study the specific conditions of the water environment, water ecosystems and their changes as a result of human economic activity; to expand research skills in the field of microbiology, analyze and</p>		

summarize the results of field and experimental studies and draw appropriate conclusions; evaluate water quality according to bacteriological indicators, distinguish the effect of anthropogenic factors from natural changes; to have the basic methods of assessing the consequences of anthropogenic action on reservoir ecosystems; to use the acquired knowledge to solve practical tasks, as well as during scientific research in this field.		
9. Standardization of aquaculture products	5	150
<p>The study of the discipline is the basis for the formation of future specialists in the technological discipline, responsibility for the production and processing of high-quality aquaculture products and their implementation with maximum economic benefit.</p> <p>The purpose of studying the discipline is to train highly qualified specialists capable of solving complex specialized tasks and practical problems in the field of aquaculture, rational use, protection and reproduction of aquatic biological resources using theories and methods of biology and applied sciences.</p> <p>Also the formation of a specialist - engineer - technologist in the production and processing of animal husbandry products in-depth knowledge about the meaning, essence, functions, purpose and methodical basis of the National System of Standardization, to know the structure of standards and technical conditions, to possess methods of control and management of the quality of animal husbandry products.</p>		
10. Basics of fish protection and fisheries legislation	5	150
<p>The discipline contributes to the training of specialists in aquatic bioresources and aquaculture, the formation of students' theoretical knowledge and practical skills on the protection of living water resources of reservoirs of Ukraine, provision of the field of protection of living water resources of reservoirs of Ukraine by state and international legislative and regulatory acts, structural organization and types of activities of state bodies fish protection, their rights, duties and material and technical support. The main topics to be studied: ensuring the protection of water resources by the state authorities and the legal regulation of fishing in the reservoirs of Ukraine, the rules of industrial, recreational and sport fishing, places and means of fishing in fishing water bodies of Ukraine, the legal basis of the organization of the protection of fish resources determined by the legislation of Ukraine , legal bases of responsibility for violations of fish protection legislation and legal water protection. As a result of studying the educational component, the student will be able to apply in practice the system of protection of fish and other living water resources, apply in practice the current legislation regarding violators of the system of protection of fish and other living water resources, conduct accounting for losses caused to the fishery as a result of violations of the environmental protection legislation, to draw up the necessary documents in compliance with the requirements of the current legislation of Ukraine.</p>		
11. Fish genetics	5	150
<p>In this course, cytogenetic and molecular bases of heredity, patterns of inheritance of quantitative and qualitative characteristics of fish are taught. The goal is to provide students with theoretical and practical knowledge for future effective production and research activities to improve fish productivity. Tasks: carrying out hybridological and genealogical analysis; carrying out cytogenetic analysis of fish in order to identify carriers of cytogenetic abnormalities; carrying out molecular genetic analysis of fish to determine their genotypes by genes of quantitative traits; identification of carriers of economically valuable genes to obtain offspring with expected performance parameters or with new qualitative characteristics; detection of carriers of hereditary anomalies.</p>		
12. Bioresources of the hydrosphere and their use	5	150
<p>The educational discipline is a logical continuation of the professional training of ichthyologists-fishermen from the cycle of natural and scientific disciplines and combines the knowledge acquired by students, first of all, during the study of previous professional educational components, the assimilation of which will contribute to the qualified solution of tasks related to the rational use of the biological resource potential of various types of water bodies . A significant place in the discipline is devoted to familiarization with the structure and components of biological resources of the hydrosphere, the laws of their formation, use and current state, as well as the possibilities of protection and reproduction of biological water resources. The main goal of the course: students study the hydrology of rivers, lakes, reservoirs, swamps, glaciers, underground, sea and ocean waters, the conditions of runoff formation, especially in small catchments, and their calculations.</p>		

15. CURRICULUM

Module	Distribution by semesters			Number of credits ECTS	Number of hours					Distribution of ECTS credits per week by courses and semesters					
	Exams	Credits	Projects		Courses	Work	The total amount	Auditory		Independent work	1 course	2 course			
								including:	Semester			1	2	3	
	Lectures	Practical	Laboratory		Number of weeks in the semester										
					In total	30	30	30	30	30	30	30	90	4	15
Mandatory educational components															
MC 1. Methodology and organization of scientific research	1					5	150	60	30	30	30	90	4		
MC 2. Production management, business organization and personnel management in animal husbandry	1					5	150	60	30	30	30	90	4		
MC 3. Modern technologies of fodder and feed additives	1					5	150	60	30	30	30	90	4		
MC 4. Innovative technologies for the production of animal husbandry products	1					5	150	60	30	30	30	90	4		
MC 5. Breeding of farm animals	1					5	150	74	30	30	44	76	5		
MC 6. Innovative technologies for processing livestock products	1					5	150	60	30	30	30	90	4		
MC 7. Aquaculture of artificial and natural reservoirs	1					5	150	120	60	60	60	30	4	4	
MC 8. Hydroecology	2					5	150	54	22	22	32	96			5
MC 9. Aquaculture processing technology	1		1			5	150	60	30	30	30	90	4		
MC 11. <i>Research practice</i>						10	300								
MC 12. <i>Final certification</i>	3					10	300								
Total mandatory components						65	1950	608	292	30	286	742	21	20	5
Elective educational components*															
EC 1. Philosophical problems in biology		2				5	150	44	22	22		106			4
EC 2. Civil Defence		2				5	150	44	22	22		106			4

Module	Distribution by semesters				Number of credits ECTS	Number of hours					Distribution of ECTS credits per week by courses and semesters			
	Exams	Credits	Courses			The total amount	In total	Auditory			Independent work	1 course	2 course	
			Projects	Work				Lectures	including:				1	2
			Practical	Laboratory		Number of weeks in the semester								
								15	15	11	15	15	11	
EC 3. The raw material base of the fish farming industry		2			5	150	30	14		16	120		2	
EC 4. Fishery		2			5	150	44	22		22	106			4
EC 5. Ornamental fish farming		2			5	150	44	22		22	106			4
EC 6. Agrarian policy		2			5	150	44	22	22		106			4
EC 7. Ichthyopathology		2			5	150	44	22	22		106			4
EC 8. Aquatic microbiology		2			5	150	44	22	22		106			4
EC 9. Standardization of aquaculture products		2			5	150	44	22	22		106			4
EC 10. Basics of fish protection and fisheries legislation		2			5	150	44	22	22		106			4
EC 11. Fish genetics		2			5	150	44	22	22		106			4
EC 12. Bioresources of the hydrosphere and their use		2			5	150	44	22	22		106			4
Total elective components					25	750	206	102	22	82	544	0	2	16
In total					90	2700	814	394	52	368	1286	21	22	21

* The student chooses only 5 elective components out of 12

16. Correspondence matrix of modules and educational program outcomes

Module	Learning outcomes														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Module 1			+	+	+			+							
Module 2							+		+						
Module 3	+			+											
Module 4		+		+		+									
Module 5			+	+											
Module 6		+				+									
Module 7											+				
Module 8											+		+		+
Module 9												+			
Research practice	+	+	+	+		+	+	+	+	+	+	+	+	+	+
Final certification	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+

Head of the project group (program guarantor):

Doctor of Agricultural Sciences, Professor of the Department of Animal Genetics, Student of the 2 masters course, group ZTVPPPT2201 OP "Technology of Breeding and Biotechnology"



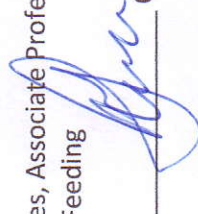
Viktoriia VECHORKA



Serhiy HAVRYKOV

Members of the project team:

Candidate of Agricultural Sciences, Associate Professor of the Department of Fodder Technology and Animal Feeding



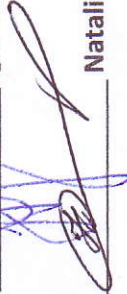
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Senior lecturer of the Department of Feed Technology and Animal Feeding



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