НАЦІОНАЛЬНИЙ УНІВЕРСИТЕТ ВОДНОГО ГОСПОДАРСТВА ТА ПРИРОДОКОРИСТУВАННЯ

Навчально-науковий інститут агроекології та землеустрою

Co-funded by the European Union

National University of Water and Environmental Engineering

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СИЛАБУС **SYLLABUS**	**Теорія динаміки популяції риб** **Theory of fish population dynamics**	
Шифр за ОП Code in Degree Programme	ОК.10	
Освітній рівень Level of Education	Магістерський (другий) Master's (second)	
Галузь знань Field of Knowledge	20	Аграрні науки та продовольство Agricultural Sciences and Food
Спеціальність Field of Study	207	Водні біоресурси та аквакультура Aquatic Bioresources and Aquaculture
Освітня програма Degree Programme	Охорона, відтворення та раціональне використання гідробіоресурсів Protection, reproduction and rational use of hydrobioresources	

RIVNE – 2024

The syllabus of the educational component "Theory of fish population dynamics" for master's degree students of the educational program "Protection, reproduction and rational use of hydrobioresources", specialty 207 Aquatic bioresources and aquaculture. Rivne. NUWEE. 2024. 10 p.

Educational Program (EP) on the university website:
http://ep3.nuwm.edu.ua/id/eprint/28749

Syllabus developer: *academic degree, academic title, and position*
Petruk Alina Mykolaivna, Candidate of Agricultural Sciences, Associate Professor of the Department of Water Bioresources.
Syllabus was approved at the meeting of the Department of Water Bioresources Protocol No. 8 dated “24”june 2024

Head of the department: *Tatyana Poltavchenko, Ph.D., Associate Professor, Head of the Department of Water Bioresources.*

The head (guarantor) of the EP: *Vasyl Sondak, Doctor of Biology Science, Professor of the Department of Water Bioresources*

Approved by the scientific and methodical quality council of NNIAZ
Protocol No. 11 dated “_13_”_may_2024

Head of the Scientific and Methodological Council for the Quality of the Institute of Agroecology and Land Management (NNIAZ):
Alla Pryshchepa, Doctor of Agricultural Sciences, Professor, Director the Institute of Agroecology and Land Management

The previous version of the syllabus (*specify code*) -

Theory of fish population dynamics	
ЗАГАЛЬНА ІНФОРМАЦІЯ	
Degree of higher education	*Master*
Educational program	*Protection, reproduction and rational use of hydrobioresources*
Specialty	*207 Aquatic Bioresources and Aquaculture*
Study year, semester	Master's degree 1...2 year of study, 1...3 semester
Number of credits	*4 ECTS credits*
Lectures:	*20 hours*
Practical /Laboratory classes:	*20 hours*
Independent work:	*80 hours*
Coursework:	-
Form of education	*full-time/part-time*
Form of final control	*examination*
Language of teaching	*the state language or a foreign language in accordance with clause 2.4 of the Regulation on the organization of the educational process at NUWEE*

INFORMATION ABOUT THE DEVELOPER(S)	
Lecturer 	***Petruk Alina Mykolaivna, Candidate of Agricultural Sciences, Associate Professor of the Department of Water Bioresources.***
Wikisitet	*specified URL*: : https://cutt.ly/GgZrFbm
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INFORMATION ABOUT THE EDUCATIONAL COMPONENT	

Purpose and tasks

The purpose of studying the discipline "Theory of fish population dynamics" is to acquaint students with the main theoretical concepts, models and methods that allow studying changes in the number and structure of fish populations in natural ecosystems, as well as in the conditions of ichthyofauna management, conservation and rational use fish resources. Tasks of the discipline: to study the basics of population theory and the processes that determine the dynamics of fish populations. Get acquainted with various models of populations that describe their development, interaction with the environment and other species. To learn how to apply mathematical modeling methods for forecasting changes in the number of fish populations. This discipline is important for the training of specialists in the field of ichthyology, fish far.

A link to the placement of the educational component on the Moodle educational platform, on the platform of educational programs and their educational components

https://exam.nuwm.edu.ua/course/view.php?id=344

Study prerequisites*

(the place of the educational component in the structural and logical scheme)

The educational component "Theory of fish population dynamics" has a logical and complete structure and can be studied in any semester specified in this syllabus

Competencies

• Ability to use information and communication technologies.
• Ability to abstract thinking, analysis and synthesis.
• The ability to forecast the dynamics of the number and biomass of fish, their fish productivity, to make forecasts for the catch.
• The ability to determine the natural feed base, the quality of sexual products of fish, to predict the dynamics of population and biomass, to make forecasts of fish productivity.

Program learning outcomes (PLO). Learning outcomes (LO)*

PLO1. Have specialized conceptual knowledge that includes modern scientific achievements in the field of aquatic bioresources and aquaculture and is the basis for original thinking and conducting research.
PLO2. Freely present and discuss orally and in writing the results of research and innovation, other issues of professional activity in national and foreign languages.
PLO3. Search for the necessary information using a variety of resources: journals, databases, open data and other resources, analyze and evaluate this information.
PLO4. Make effective decisions, take responsibility and work in critical conditions during the performance of production, technological and scientific tasks of aquatic bioresources and aquaculture, analyze and integrate alternatives, assess risks and likely consequences.
PLO5. Develop and implement scientific and applied projects on the problems of aquatic bioresources and aquaculture and related interdisciplinary projects taking into account production, legal, economic and fishery aspects.
PLO6. Apply modern modeling methods, digital technologies to solve production, technological and scientific problems in the field of bioresources and aquaculture

The structure and content of the educational component	
Lectures - 20 hours. Practical 20 - hours. Independent work – 80 hours.	
Lectures, presentations, discussions, situational problems. Multimedia equipment, computer equipment for processing practical work, search and analysis of information on the Internet	
LECTURES AND PRACTICAL LESSONS	
Topic 1. Introduction to the discipline "Theory of fish population dynamics"	
Lectures – 2 hours. Practice – 2 hours Independent work - 8 hours PLO4, PLO5, PLO6 Literature [1-6]	Content and main tasks of the course "Theory of fish population dynamics". Problems and prospects for the development of research on the dynamics of fish populations in Ukraine and the world. Basics of increasing fish productivity of water bodies and rational use of fish resources of water bodies of Ukraine
Topic 2. Fodder resources and peculiarities of food relationships of fish.	
Lectures – 2 hours. Practice – 2 hours Independent work - 8 hours PLO1, PLO4, PLO5, PLO6 Literature [1-6]	Patterns of the formation of the feed base of fish in reservoirs. Nutritional ecology and regularity of changes in fish nutrition. Food needs and energy balance of fish. The effect of metabolic rate and growth rate on the diet of fish. Nutritional relationships of fish within faunal complexes, different geographic latitudes, between individual fish species and within the same species.
Topic 3. Patterns of fertility, quality of sexual products and fish spawning	
Lectures – 2 hours. Practice – 2 hours Independent work - 8 hours PLO1, PLO4, PLO5, PLO6 Literature [1-6]	Mechanisms of regulation of fish fertility and the quality of their sexual products. Patterns of changes in fish fertility depending on their length, body weight, age, fattening, fatness and other biological characteristics. Changes and differences in fecundity within the same fish population, different populations of the same species and the ichthyofauna of water bodies as a whole. Patterns of influence of fecundity on the reproduction efficiency of the fish population.
Topic 4. Population structure and patterns of its changes in fish	

Lectures – 2 hours. Practice – 2 hours Independent work - 8 hours PLO1, PLO4, PLO5, PLO6 Literature [1-6]	Changes in the structure of the fish population, factors and mechanisms of transformation of fish communities. The adaptive value of the dynamics of the sex-age structure of the fish population. Types and dynamics of fish spawning populations. Types of industrial fish populations. Patterns of fish population formation - acclimatizers
Topic 5. Patterns of fluctuations in the number and biomass of fish.	
Lectures – 2 hours. Practice – 2 hours Independent work - 8 hours PLO1, PLO4, PLO5, PLO6 Literature [1-6]	Patterns of adaptation of fish to self-regulation of the number and biomass of their population. The relationship between the fertility of fish breeders and the number of their offspring. The influence of the number and quality of breeders on the amount of replenishment depending on the rate of maturation and growth of fish in the population. The causes of fluctuations in the number of fish, the periodicity of fluctuations in the number and biomass of the fish population.
Topic 6. General and natural mortality of fish.	
Lectures – 2 hours. Practice – 2 hours Independent work - 8 hours PLO1, PLO4, PLO5, PLO6 Literature [1-6]	Causes of general and natural mortality of fish. Influence of abiotic factors on fish mortality. Impact of predators on the population and low supply of food as an important cause of general and natural mortality of fish. Dependence of the value of fish mortality coefficients on their size, age and number.
Topic 7. Dynamics of industrial fish mortality.	
Lectures – 2 hours. Practice – 2 hours Independent work - 8 hours PLO1, PLO4, PLO5, PLO6 Literature [1-6]	Dependence of the industrial mortality rate on age. The influence of changes in fishing intensity on fish mortality, the dependence of the industrial mortality rate on fishing intensity. The influence of industrial mortality on the size of the industrial herd and the size of catches.
Topic 8. Methods of regulation of industrial and amateur fishing.	
Lectures – 2 hours. Practice – 2 hours Independent work - 8 hours PLO1, PLO4, PLO5, PLO6 Literature [1-6]	Protection of the habitat of commercial fish. Patterns of rational exploitation of living fish resources of reservoirs and industrially valuable fish populations. Methods of targeted formation of ichthyofauna, management of fish population and increase of their productivity.
Topic 9. Modeling of fish population dynamics.	

Lectures – 2 hours. Practice – 2 hours Independent work - 8 hours PLO1, PLO4, PLO5, PLO6 Literature [1-6]	Application of mathematical models of population dynamics to assess the status of various fish species. Construction of models for calculating optimal modes of exploitation of the industrial fish population. Analysis of reliability and truthfulness of mathematical models of fish population dynamics.
Topic 10. Methods and regularities of forecasting fish catch	
Lectures – 2 hours. Practice – 2 hours Independent work - 8 hours PLO1, PLO4, PLO5, PLO6 Literature [1-6]	Estimation of the number and biomass of industrial fish stocks. Basic principles of building forecasts of fish population dynamics. Methods of collecting and processing ichthyological information for determining the relative size of stocks and compiling annual fish catch forecasts.
Tools, equipment, software	
- technical teaching aids: multimedia equipment, laptop; - software: MS Windows, Internet access; -software: distance learning system Moodle.	
The procedure for evaluating program learning outcomes/learning outcomes	
To achieve the goals and objectives of the course, applicants need to learn theoretical material and pass modular knowledge tests, as well as timely complete and defend practical work. As a result, the following mandatory points can be obtained: - 60 points - for the timely completion and defense of practical work and other ongoing tasks (independent work), which is the current component of the assessment; – 40 points – modular controls (20+20). Total 100 points. The current evaluation and control measures within the course are carried out in accordance with the normative documents of the NUWEE: Provisions on semester current and final control of educational achievements of students of higher education (new edition) http://ep3.nuwm.edu.ua/15311/; Regulations on certification of higher education applicants and the work of the examination commission http://ep3.nuwm.edu.ua/8545// Procedure for liquidation of academic debts at NUWEE http://ep3.nuwm.edu.ua/4273// Regulations on the educational and scientific center of independent evaluation of the National University of Water Management and Nature Resources Use http://ep3.nuwm.edu.ua/4184/ Order of the rector of NUWEE dated September 16, 2019 No. 00502 "On the implementation of a new system for evaluating students' educational achievements"; The procedure for liquidation of academic debts at NUWHP http://ep3.nuwm.edu.ua/4273/	
Recommended literature	

1. Lyashenko I. M. Modeling of biological and ecological processes / I. M. Lyashenko, A. P. A mucoeater Kyiv: VOC "Kyiv University", 2002. 340 p.
2. Methods of ichthyological research: Study guide / Yu. IN. Pylypenko and others. Kherson: OLDIPLUS, 2017. 432 c.
3. Petruk V. G., Volodarskyi E. T., Mokin V. B. Basics of research work. Study guide / Ed. Ph.D., prof. Petruka V. G. Vinnytsia: VNTU, 2005. 143 p.
4. Tovstyk V. F. Pisciculture. Kyiv: Education. Kherson, 2004. 272 p.
5. Khrushch L. S. Workshop on modeling of economic, ecological and social processes: methodological recommendations for conducting practical classes / L. S. Khrushch Ivano-Frankivsk: View of Prykarp. national University named after IN. Stefanyka, 2012. 64 p.
6. Shekk P. V., Zakharova M. IN. Modeling of fish stock dynamics: Lecture notes. Odesa, "TES", 2009. 164 p.

Information resources on the Internet

Website of the journal "Fisheries Science of Ukraine". [Electronic resource]. – Access mode http://fsu.ua/index.php/uk/arkhiv-zhurnalu

TEACHING AND LEARNING POLICIES

List of social, "soft" skills (soft skills)

The components of the educational discipline contribute to the formation of universal, useful for any type of activity (interprofessional) skills that allow you to quickly adapt to new conditions, change the field of employment, solve non-standard tasks: - curiosity, initiative - during the assimilation of theoretical material from lectures and independent work to expand knowledge on relevant course topics; - purposefulness, perseverance - during the performance of practical work, as well as individual tasks for obtaining additional points; - adaptability, teamwork - during the discussion of the thematic issues of the course, working out practical cases; - social awareness and responsibility - as a result of taking into account the organizational requirements of the course, maintaining feedback and timely reporting on the types of activities performed; - critical thinking, leadership, creativity - understanding, analysis, search for solutions to current problems in the discipline and highlighting the results during training sessions, participation in conferences and round tables and/or scientific publications; - self-study for professional and personal growth - as a result of independent work, including with electronic educational resources and information bases.

Deadlines and rescheduling

The deadlines for passing the intermediate control modules and the final control (credit) are established in accordance with the Regulations on the Semester Current and Final Control of Educational Achievements of Higher Education Applicants (new edition) http://ep3.nuwm.edu.ua/15311/ Resubmission of test tasks to check the assimilation of theoretical material is carried out in accordance with the rules of the NNCNO and the Procedure for Liquidating Academic Debts at NUWEE http://ep3.nuwm.edu.ua/4273/
.In the case of a higher education applicant's disagreement with the evaluation results, in accordance with the Procedure for Appeals of Higher Education Applicants and Other Persons Studying at NUWHP http://ep3.nuwm.edu.ua/15467/
the applicant files an appeal, after which an appeal commission is convened. The organization of all types of educational activities within the course is carried out in accordance with the Regulations on the Organization of the Educational Process at the National University of Water Management and Nature Management http://ep3.nuwm.edu.ua/4088/
If the student disagrees with the assessment results, on the day of passing the assessment, an appeal is submitted to the NNIAZ dean's office, where the essence of the issue is explained with arguments. Attached to the complaint is a printed version of all the answers of this student during the attempt. The director of the NNI convenes an appeal commission to consider a complaint to which a student and a representative of the NNCNO are invited, in accordance with the Procedure for appeals by applicants for higher education and other persons studying at the National University of water management and nature Resources Use http://ep3.nuwm.edu.ua/15467

Non-formal and informal education (if needed)

The applicant has the possibility of recognition (re-enrollment) of the learning results obtained in non-formal and informal education in accordance with the Regulation on non-formal and informal education at the National University of Higher Education http://nuwm.edu.ua/strukturnipidrozdili/centrneformaljnoji-osviti/dokumenti. The corresponding number of hours can be credited to the applicant as a result of his successful completion of an open online course on the topic of the discipline. For this, the applicant needs to present a confirming document (certificate) about the successful completion of the online course.

Rules of academic integrity

Principles of academic integrity on the website of the NUVHP "Education Quality Department": https://nuwm.edu.ua/sp/akademichna-dobrochesnistj, in particular, the Code of Student Honor: http://ep3.nuwm.edu.ua/4917//
It is forbidden to write down and discuss issues with fellow students during all control measures, modular and final controls. In the case of detection of such violations, the student is deprived of the right to further perform the tasks and this leads to a decrease in the overall grade or failure to enroll the entire course and re-study of the educational component. Information on academic integrity, plagiarism, student honor code, etc. is provided on the website of the National Agency for Quality Assurance of Higher Education https://naqa.gov.ua/; NUWEE on the "Quality of Education" page:
http://nuwm.edu.ua/sp/akademichna-dobrochesnistj.

Attendance requirements

Lectures and practical classes are held according to the schedule in offline or online mode. Consultations are held online using Google Meet according to the consultation schedule, which is available on the website of the department of Water Bioresources. If necessary - at a time agreed with the students. Attendance is a mandatory component of the assessment. For objective reasons (illness, international internship, etc.), training can take place online (mixed form of training) upon agreement with the teacher. Applicants may use mobile phones and laptops in class, but only for educational purposes.

Author Alina Petruk

Автор
Доцент Аліна ПЕТРУК

Затверджено

Проректор з науково-педагогічної та навчальної роботи Валерій СОРОКА

документ підписаний КЕП
Номер документа СИЛ №1475
Підписувач Сорока Валерій Степанович
Підписувач (дані КЕП):
Сертифікат 3FAA9288358EC003040000009B6C3700C8C2C100