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

05-02-254S

СИЛАБУС **SYLLABUS**	**Популяційна екологія** **Population ecology**	
Шифр за ОП Code in Degree Programme	ВК	
Освітній рівень Level of Education	Перший (бакалаврський); Магістерський (другий) Bachelor's (first); Master's (second)	
Галузь знань Field of Knowledge	-	Усі галузі знань НУВГП All Fields of Knowledge
Спеціальність Field of Study	-	Усі спеціальності НУВГП All Fields of Study
Освітня програма Degree Programme	Усі освітні програми All degree Programmes	

RIVNE – 2024

The syllabus of the course "Population ecology" for Bachelor's and Master's students majoring in all NUWEE degree programmes of full-time and part-time forms of education. Rivne. NUWEE. 2024. 10p.

Syllabus developer: *academic degree, academic title, and position*
Syllabus developer: Budnik Z.M., Ph.D., Associate Professor of the Department of Ecology, Technologies of Environmental Protection and Forestry;

Varzhel O. V., Doctor of Philosophy, Senior Lecturer of the Department of Land Management, Cadastre, Land Monitoring and Geoinformatics.

Syllabus was approved at the meeting of the Department of *Ecology, Technologies of Environmental Protection and Forestry*
Protocol No. 16 dated “20” may 2024

Head of the department: *Klymenko M.O., Doctor of Science, Professor, head department*

Approved by the scientific and methodical quality council of NNIAZ
Minutes No. 18 dated “21” 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

Approved by the scientific and methodical council of the NUWEE
Minutes No. 6 dated "19" June 2024
Secretary T.A. Kostyukova

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

POPULATION ECOLOGY	
ЗАГАЛЬНА ІНФОРМАЦІЯ	
Degree of higher education	*Bachelor, Master.*
Educational program	*All EP NUWEE*
Specialty	*All specialties of NUWEE*
Study year, semester	*Bachelor 2...4 year of study, 3...8 semester. Master's degree 1...2 year of study, 1...3 semester*
Number of credits	*3 ECTS credits*
Lectures:	*14 hours*
Practical /Laboratory classes:	*16 hours*

Independent work:	*60 hours*
Coursework:	-
Form of education	*full-time/part-time*
Form of final control	*credit*
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 	*Zinaida Mykolaivna Budnik, Candidate of Agricultural Sciences, Associate Professor, Associate Professor of the Department of Ecology, Environmental Protection Technologies and Forestry*
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INFORMATION ABOUT THE EDUCATIONAL COMPONENT	
Purpose and tasks	

The effect of teaching the course "Population ecology" is formation of students' knowledge and ideas about the main ones the concept of population, population relationships between individuals and the environment, population structures (gender, age, genetic, spatial, ecological), management of groups on population level.

The main tasks of studying the courses "Population ecology" is to provide students with basic knowledge on the main problems of population biology, population level of life organization, population as a biological system and its connections and relationships with the environment.

The purpose of the course are:

- to become familiar with the concept of population and population structures;
- to install and evaluate the main factors of the environment for forecasting survival, sex structure, growth and numberpopulation;
- be able to plan and conduct research with population ecology;
- to be able to characterize the main properties and characteristics of the population;
- to install internally and interpopulation connections.

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=3101

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

The educational component "Population ecology" has a logical and complete structure and can be studied in any semester specified in this syllabus

Competencies

- Ability to constant monitoring of scientific and methodical innovation information and the use of modern methods and technologies training in professional activities to ensure competence-oriented training.
- Ability establish interaction between populations and the environment environment
- The ability to independently identify a problem, set a problem and perform research for a solution specific tasks with use in the collection process, processing and generalization of information by modern means training and information and communication technologies.
- Ability to independently develop recovery measures populations
- The ability to evaluate the interaction of populations with environment.

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

PLO1. Know and understand fundamental and applied aspects of sciences about the environment.

PLO2. Demonstrate knowledge and understanding of contemporary issues population ecology (systems of the organic world as a reflection of its historical development and evolution of living from molecular-genetic to biosphere level, population level of life organization, modern ecological problems and mechanisms of adaptation of organisms to the environment existence).

PLO3. Use the acquired knowledge in planning research in the field of protection and use of natural resources.

PLO4. To be able to characterize the main properties and signs population

PLO5. Identify and measure the main factors of the environment for forecast of survival rate, increase, number organisms

The structure and content of the educational component	
topics, detailed PLO/LO, tasks, forms of conducting classes, types of educational work of a higher education student, methods and technologies of learning, teaching aids, and a list of educational materials that a higher education student should master/read before class, etc.	
Lectures - 14/2 hours. Practical 16/8 hours. Independent work 60/80 hours.	
Teaching methods and technologies	Lectures, presentations, discussions, situational problems
Teaching aids	Multimedia equipment, computer equipment for processing practical work, search and analysis of information on the Internet
LECTURES AND PRACTICAL LESSONS	
Number of hours, study results, literature	Contents of topics
Topic 1. Population ecology, as a section of general ecology	
Lectures – 2/1 hour. Practice - 2/2 hours Independent work - 9/12 hours PLO1, PLO2, PLO5 Literature [1-2, 5-8]	The concept of "Population ecology". Purpose, object, subject and tasks of the course. The history of the development of population ecology. A population approach to the study of all living things. Laws, axioms, principles, rules of population ecology.
Topic 2. Population, concept, characteristics and structure	
Lectures – 2/1 hour. Practice - 2/0 h. Independent work - 9/12 hours PLO2, PLO4, PLO5 Literature [1-2, 5-8]	Type and its structure. Population as a structural and functional unit of a species. Criteria for selection of the population. Structure of populations. Organization of populations and methods of their formation.
Topic 3. Energy balance of populations	
Lectures - 2/0 hours. Practice - 2/2 hours Independent work - 9/12 hours PLO2, PLO4, PLO5 Literature [1-4, 8]	The concept of energy balance. Distribution of energy in the biosphere. Distribution of energy in organisms and populations
Topic 4. Ecology and geography of populations. Territorial patterns of populations	
Lectures - 2/0 hours. Practice - 2/2 hours Independent work - 9/11 h. PLO2, PLO3, PLO4, PLO5 Literature [1-4, 8]	The influence of the external environment on the population. Environmental amplitude and limiting factors. Ecological and complex groups of factors. Ecotop, biotope and ecological niche. Distribution of organisms in the population and range boundaries. Geographic variability of the population
Topic 5. Dynamics and evolution of populations	
Lectures - 2/0 hours. Practice - 2/0 h. Independent work - 8/11 h. PLO2, PLO4, PLO5 Literature [1-8]	Life of organisms, populations and species. Population dynamics. Population growth. Survival of populations. The speed of recovery of populations. Balanced population density. Environmental capacity and regulation of population size. The concept of self-regulation and fluctuations in the number of populations. General problems of population evolution. Elementary evolutionary system, phenomenon, material and factors. Triggers of evolution. Speciation models. Micro-, macro- and synevolution.
Topic 6. Interaction of populations	
Lectures - 2/0 hours. Practice - 2/2 hours Independent work - 8/11 h. PLO2, PLO4, PLO5 Literature [2-5, 8]	Types of interactions. Competition. Predation Detritofacies. Mutalism
Topic 7. Adaptation of populations. Biogeocenosis and ecosystem	

Lectures - 2/0 hours. Practice - 2/0 h. Independent work - 6/9 hours PLO1, PLO3, PLO4, PLO5 Literature [2-5, 8]	Concept of adaptation. General problems of adaptation. Adaptation and population. Classification and regularities of adaptations. General approaches. The place of the population in the biogeocenosis.

Forms and methods of education

Conducting lecture classes involves the demonstration of presentations on the relevant topic of the class with theoretical material and videos. Part of the lecture session is devoted to dialogue technologies, consideration of possible practical situations in the form of case packages, and discussion. Students have the opportunity to make a public speech with a presentation of the lecture material. Practical classes involve the performance of tasks based on individual initial data. In the context of practical work, Internet search systems and applied computer programs Microsoft Excel and Google Sheets are used. Students of all forms of education have access to educational materials, methodical support and instructions for self-study of course topics on the Moodle platform and the digital repository of the NUWEE. Vocational education students receive all the necessary consultations for demonstrating their knowledge and skills at scientific conferences, round tables, publications, classroom discussions, and writing a qualifying graduation thesis.

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/

A combination of teaching and research

Students have the opportunity to receive additional points for completing individual tasks of a research nature, and can also be involved in the preparation and publication of theses and scientific articles.

Recommended literature (main, secondary)

Basic literature

1. Didukh YA.P. Populyatsiyna ekolohiya. Kyyiv: Fitosotsiotsentr, 1998. 199 s.

2. Sirenko A.H. Populyatsiyna biolohiya. Lektsiyi. Ivano-Frankivsʹk: PNU, 2019. 314 s
3. Ekolohiya: pidruchnyk dlya studentiv vyshchykh navchalʹnykh zakladiv / kol. avtoriv; za zahalʹnoyu red. O. YE. Pakhomova. Kharkiv: Folio, 2014. 666s
4. Khlus L.M., Cheredaryk M. I. Populyatsiyna ekolohiya tvaryn / Navch. posib. Chernivtsi: Ruta, 2000. 96 s.
5. Tsaryk Y.V. Populyatsiyna ekolohiya. Keruvannya populyatsiyamy. Lʹviv.: Vyd-vo tsentr LNU imeni Ivana Franka, 2005. 100 s.
6. Neal D. Introduction to population biology. Cambridge: Cambridge University Press, 2004. 395 p.
7. Omelʹkovetsʹ YA. A., Stepanyuka YA. V. Populyatsiyna biolohiya. Metodychni rekomendatsiyi do laboratornykh robit. Lutsʹk: Volyn. nats. un-t. im. Lesi Ukrayinky, 2009. 44 s
8. Budnik Z.M. Metodychni vkazivky do vykonannya praktychnykh robit z navchalʹnoyi dystsypliny «Demekolohiya» dlya zdobuvachiv vyshchoyi osvity pershoho (bakalavrsʹkoho) rivnya ta druhoho (mahistersʹkoho) rivnya usikh osvitnʹo-profesiynykh prohram spetsialʹnostey NUVHP dennoyi i zaochnoyi formy navchannya [Elektronne vydannya] Rivne : NUVHP, 2021. 43 s.

Additional literature

1. Reece, J. B., Urry, L. A., Cain, M. L., Wasserman, S. A., Minorsky, P. V., and Jackson, R. B. (2011). The exponential model describes population growth in an idealized, unlimited environment. In *Campbell biology* (10th ed., pp. 1190-1192). San Francisco, CA: Pearson.
2. Z. Z. Sobko , N. M. Vozniuk , O. A. Lykho , A. M. Pryschepa , Z. M. Budnik (2020) Evolution of open air quality of urbanized territories under Covid-19 pandemic conditions. Ukrainian Journal of Ecology, 2020, 10(6), 48-53, DOI 10.15421/2020_256 (Web of Science)
3. V.P. Skyba, O.M. Kopylova, N.M. Vozniuk, O.A. Likho, A.M. Pryshchepa, Z.M. Budnik, K.Y. Gromachenko, K.P. Turchina (2021). Ecological risks in river basins: a comparative analysis of steppe and forest Ukrainian areas. Ukrainian Journal of Ecology, 2021, 11(1), 306-314, DOI 10.15421/2021_46. (Web of Science)
4. Z. Z. Sobko, N. M. Vozniuk, O. A. Likho, A. M. Pryshchepa, Z. M. Budnik, O. I. Hakalo, V. P. Skyba (2021). Development of agroecosystems under climate change in Western Polissya, Ukraine. Ukrainian Journal of Ecology, 2021, 11(3), 256-261, DOI 10.15421/2021_169. (Web of Science)
5. Budnik Z.M., Revega V.V. Analysis of change of climatic indexes on the ecological state of the small rivers (on an example r. Ikva). Materialy IKH Mizhnarodnoyi naukovoyi konferentsiyi molodykh vchenykh «Ekolohiya, neoekolohiya, okhorona navkolyshnʹoho seredovyshcha ta zbalansovane pryrodokorystuvannya» (25–26 lystopada 2021 r., m. Kharkiv). Kharkiv.:KHNU imeni V. N. Karazina, 2021. 216 s.
6. Klymenko M.O., Budnik Z.M., Kopylova O.M. Klimatychni osoblyvosti formuvannya ekolohichnoho stanu baseynu r. Ikva. Visnyk NUVHP: zb.nauk.pratsʹ Silʹsʹkohospodarsʹki nauky. Vyp. 2(90). Rivne, 2020. S. 60-71.
7. Budnik Z.M., Turchyna K.P., Yaroshyk O.M. Klimatychni osoblyvosti formuvannya ekolohichnoho stanu r. Ikva v Rivnensʹkiy oblasti. Materialy VI Mizhnarodnoyi naukovoyi konferentsiyi molodykh vchenykh «Ekolohiya, neoekolohiya, okhorona navkolyshnʹoho seredovyshcha ta zbalansovane pryrodokorystuvannya» . Kharkiv: KHNU imeni V. N. Karazina, 2018. – 276 s.

8. Dynamika poshyrennya varoozu bdzhil na terytoriyi Ukrayiny za 2021 rik / T. V. Poltavchenko, Z. M. Budnik, O. M. Chechet [ta in.] // Visnyk NUVHP. Sil′s′kohospodars′ki nauky : zb. nauk. prats′. Rivne : NUVHP, 2022. Vyp. 3(99). S. 105-115.
9. Kolesnyk A. V. Populyatsiyna biolohiya. Metodychni vkazivky dlya samostiynoyi roboty studentiv. Uzhhorod, 2014. 39 s.
10. Otsinka pryrodno-zapovidnoho fondu Dubens′koho rayonu Rivnens′koyi oblasti / I. M. Borshchevs′ka, O. A. Likho, K. P. Turchyna, Z. M. Budnik // Visnyk NUVHP. Sil′s′kohospodars′ki nauky : zb. nauk. prats′. - Rivne : NUVHP, 2021. Vyp. 4(96). S. 14-27.
11. Budnik Z. M. Rol′ lisovykh ekosystem u formuvanni ekomerezhi v baseyni r. Ikva / Z. M. Budnik // Visnyk NUVHP. Sil′s′kohospodars′ki nauky : zb. nauk. prats′. Rivne : NUVHP, 2019. Vyp. 1(85). S. 44-52.
12. Laboratornyy praktykum iz zahal′noyi ekolohiyi (ta neoekolohiyi) : navch. posib. / M. O. Klymenko, A. M. Pryshchepa, I. M. Borshchevs′ka [ta in.]. Rivne : NUVHP, 2017. 273 s.
13. Malenko YA.V., Voroshylova N.V., Kobryushko O.O., Pererva V.V. Zahal′na ekolohiya: navchal′nyy posibnyk. Kryvyy Rih: KDPU, 2023. 231
14. Metody vymiryuvannya parametriv navkolyshn′oho seredovyshcha: pidruch. / H.I. Hryn′, V. I. Mokhon′ko, O.V. Suvorin ta in. Syevyerodonets′k: vyd-vo SNU im. V. Dalya, 2019. 420 s.

Information resources on the Internet

1. Official page of the Ministry of Ecology and Natural Resources of Ukraine https://mepr.gov.ua/
2. On environmental protection: Law of Ukraine dated June 25, 1991 No. 1264-XI. URL: http://zakon.rada.gov.ua/laws/main/1264-12
3. Wikipedia Population ecology https://uk.wikipedia.org/wiki/
4. https://en.wikipedia.org/wiki/Population_biology

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/centr-neformaljnoji-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. In particular, the open online course on the Prometheus platform " Our Earth's Future" is dedicated to the basics of food quality systems and can be included as part of the educational component (in case of obtaining a certificate). Link https://www.coursera.org/programs/natsional-nii-univiersitiet-vodnogho-
ghospodarstva-ta-prirodokoristuvannia/learn/
earth-climate-change?source=browse

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 ecology, of technology protection and forestry: http://nuwm.edu.ua/nni-az/kaf-ecology. 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.

Автор
Доцент Зінаїда БУДНІК

Затверджено

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