National Pirogov Memorial Medical University, Vinnytsya

"APROVED "
Vice-rector of a Higher Education Institution from Scientific-Pedagogical and Educational Affair
Prof. of HEI Oksana SEREBRENNIKOVA

"02" 09 2022 year

" AGREED "
Head of the Department
Ass. professor of HEI Yushchenko T.I.

"02" 09 2022 year

SYLLABUS
of academic discipline

Ecotoxicology

Specialty	226 Pharmacy, Industrial pharmacy
Educational level	the second (master`s) level
Educational programme	EPP Pharmacy, 2022
Academic year	2022-2023
Department	*Pharmaceutical Faculty*
Lecturer	as. Kukolevska O.S.
Contact information	pharmchem@vnmu.edu.ua Vinnytsya, Pirogov str. 56; *55-39-54*
Syllabus compiler	ass. professor of HEI Yushchenko T.I. as. Kukolevska O.S.

1. Status and structure of the discipline

Discipline status	Elective
Discipline code in EPP/ discipline place in EPP	EC 16
Course / semester	2nd year (III semester)
The amount of discipline (the total number of hours / number of credits ECTS)	*90* hours / 3 credits ECTS
Number of content modules	1 module
The structure of the discipline	Lectures - 10 hours Practical classes 30 hours Independent work 50 hours
Language of study	English
Form of study	Full - time , (*or distance education according to the order)*

2. Description of the discipline

Short abstract of the course, relevance.

Environmental toxicology (ecotoxicology) is a branch of toxicology that studies the effects of toxic substances on ecosystems and their circulation in the biosphere, especially in food chains. Environmental toxicology studies the sources of toxicants entering natural biosystems, the toxic effects of chemical substances on living organisms, as well as the stability and functioning of supraorganismal biosystems in conditions of their toxic pollution. One of the main biological objects of the study of ecotoxicology is a person. From this point of view, ecotoxicology is designed to solve one of the most important problems of human ecology - protecting people's health from damage by harmful substances in the environment. In contrast to traditional, modern ecotoxicology studies toxic effects not only at the level of the organism, but also mainly at the population and biocenotic levels. Another feature of ecotoxicology is the study of the toxic effects of the environment as an active component that affects the manifestation of toxicity. Thus, a systematic approach to solving the problems of protecting people and biota as a whole from harmful substances is carried out.

The **subject** of study of the academic discipline is:

- the effect of harmful chemicals found in the surrounding natural environment on living organisms and their populations that are part of the ecosystem;
– physico-chemical and toxic pressure characteristics of the main groups of ecotoxicants;
– assessment of the degree of danger of the effect of the ecotoxicant on living organisms;
– consequences, mechanisms of recovery of biological systems and their protection from the effects of toxic substances;
– methods of bioindication of pollution by heavy metals, pesticides, polycyclic hydrocarbons and oil;
– methods of bioindication of air, soil and water pollution;
– toxicometric parameters.

The main tasks of studying the selective discipline "Ecotoxicology" are:

- formation of students' knowledge and skills, practical skills in toxicology, which is a general theoretical discipline in the pharmacist's training system;
- consolidation and expansion of students' knowledge of toxicological and forensic chemistry, as well as obtaining basic toxicological knowledge necessary for understanding and mastering a number of medical, biological and chemical disciplines studied at the Faculty of Pharmacy.

Prerequisites

The educational elective discipline is based on knowledge of inorganic chemistry, organic chemistry, biological chemistry and lays the foundations for the study of pharmaceutical chemistry, toxicological and forensic chemistry, pharmacotherapy.

The purpose of the course and its importance for professional activity.

The purpose of teaching the optional educational discipline "Ecotoxicology" is to prepare students for mastering medical-biological and special disciplines, for which, on the basis of modern scientific ideas, to form in students the necessary knowledge, skills and abilities in the field of toxicological and forensic chemistry.

Competences, the formation of which contributes to the discipline.

Integral (IR):

- the ability to solve complex problems and critically consider and solve practical problems in professional pharmaceutical and/or research and innovation activities using the provisions of theories and methods of fundamental, chemical, technological, biomedical and socio-economic sciences; integrate knowledge and solve complex issues, formulate judgments based on insufficient or limited information; clearly and unambiguously convey one's own knowledge, conclusions and their validity to a professional and non-professional audience.

Special (professional, subject) competences (PC):

PC 1. The ability to carry out sanitary and educational work among the population for the purpose of prevention of common diseases, prevention of dangerous infectious, viral and parasitic diseases, as well as for the purpose of promoting timely detection and support of adherence to the treatment of these diseases in accordance with their medical and biological characteristics and microbiological features .

PC 3. The ability to provide pre-medical assistance to the sick and injured in extreme situations and emergencies.

PC 5. The ability to monitor the effectiveness and safety of the use of medicinal products by the population according to the data on their clinical and pharmaceutical characteristics, as well as taking into account subjective signs and objective clinical, laboratory and instrumental criteria for the examination of the patient.

PC 6. The ability to identify medicinal products, xenobiotics, toxins and their metabolites in biological fluids and tissues of the body, to conduct chemical and toxicological studies for the purpose of diagnosing acute poisoning, drug and alcohol intoxication.

PC 12. Ability to use knowledge of regulatory and legislative acts of Ukraine and recommendations of proper pharmaceutical practices in professional activity.

PC 13. The ability to demonstrate and apply in practical activities communicative communication skills, fundamental principles of pharmaceutical ethics and deontology, based on moral obligations and values, ethical standards of professional behavior and responsibility in accordance with the Code of Ethics of Pharmaceutical Workers of Ukraine and WHO guidelines.

PC 20. Ability to develop methods of quality control of medicinal products, including active pharmaceutical ingredients, medicinal plant raw materials and auxiliary substances using physical, chemical, physico-chemical, biological, microbiological, pharmacotechnological and pharmaco-organoleptic control methods.

Post-requisites

The educational elective discipline is integrated with pharmaceutical chemistry, toxicological and forensic chemistry, pharmacology and provides for the formation of skills in the application of acquired knowledge for the study of special disciplines and in professional activities.

3. Study results:

Integrative final program study results, the formation of which is facilitated by the educational discipline:

PSR 2. Apply knowledge from general and specialized disciplines in professional activity.

PSR 3. To comply with the norms of the sanitary and hygienic regime and the requirements of safety equipment when carrying out professional activities.

PSR 6. Argue information for decision-making, bear responsibility for them in standard and non-standard professional situations; adhere to the principles of deontology and ethics in professional activity.

PSR 7. Perform professional activities using creative methods and approaches.

PSR 9. To carry out professional activities using information technologies, "Information databases", navigation systems, Internet resources, software and other information and communication technologies.

PSR 11. Use methods of evaluating indicators of the quality of activity; identify reserves for increasing labor efficiency.

PSR 12. Analyze information obtained as a result of scientific research, summarize, systematize and use it in professional activities.

PSR 13. To carry out sanitary and educational work in professional activities in the event of outbreaks of infectious, viral and parasitic diseases.

PSR 15. Provide pre-medical assistance to patients in emergency situations and victims in extreme situations.

PSR 16. Determine the influence of factors that affect the processes of absorption, distribution, deposition, metabolism and excretion of the medicinal product and are determined by the condition, features of the human body and the physico-chemical properties of medicinal products.

PSR 18. Choose biological objects of analysis, determine xenobiotics and their metabolites in biological environments and evaluate the results obtained taking into account their distribution in the body.

4. Content and logistic of the discipline

Module 1 (Ecotoxicology)	III semester 90 hours / 3 credits	Lectures № 5 Practical classes №№ 15 Topics for self- study №№ 15

The course includes 15 topics, which are divided into 1 thematic modules.

Content module 1. Basics of ecotoxicology

Topic 1. Ecotoxicology as a science.
Topic 2. The modern state of the environment.
Topic 3. Toxic substances in various environments.
Topic 4. Principles of classification of poisonous substances.
Topic 5. Characteristics of pollutants.
Topic 6. Parameters for assessing the toxicity of pollutants.
Topic 7. Mechanism of action of xenobiotics in the body.
Topic 8. Patterns of formation of toxicity of poisons.
Topic 9. Ecotoxicokinetics.
Topic 10. Ecotoxicodynamics.
Topic 11. The main toxicants in agricultural products.
Topic 12. Contamination of food products.
Topic 13. Anthropogenic pollution of the natural environment.
Topic 14. Consequences of water ecosystems pollution. Population ecological toxicology.
Topic 15. Modern ideas about chemical carcinogenesis.

The topics of the lecture course reveal the problematic issues of the relevant sections of the discipline.

Practical classes involve theoretical substantiation of the main issues of the topic.

The student's independent work involves preparation for practical classes, studying topics for independent extracurricular work, writing abstracts, preparing presentations, tables. Control of learning the topics of independent extracurricular work is carried out at the final control of the discipline.

Individual work for full-time students is not provided.

Calendar plans of lectures, calendar plans of practical classes, thematic plan of independent extracurricular work are published on the website of the department.

The route of obtaining materials: Department of Pharmaceutical Chemistry /Students/Full-time study/ (specialty "Pharmacy, Industrial Pharmacy") /2nd year/Educational and methodological materials/ or via the link https://www.vnmu.edu.ua/ Department of Pharmaceutical Chemistry#. Access to the materials is carried out from the student's corporate account s000XXX@vnmu.edu.ua.

5. Forms and methods of monitoring academic performance

Current control in practical classes	Methods: oral or written survey, testing, solving situational problems
Control of assimilation of the thematic section of the discipline at intermediate control classes	Methods: oral or written survey, electronic testing, solving situational problems
Final semester control (credit) at the end of the III semester	According to the regulations on the organization of the educational process at National Pirogov Memorial Medical University, Vinnytsya (link https://www.vnmu.edu.ua/en/general-regulations).
Means of diagnostics of learning success	Theoretical questions, tests

6. Assessment criteria

Knowledge assessment is carried out in accordance with the Regulations of the Academic at National Pirogov Memorial Medical University, Vinnytsya (link https://www.vnmu.edu.ua/en/general-regulations).

Current control	On a four point system of traditional assessments: 5 «excellent», 4 «good»,3 «satisfactory», 2 «unsatisfactory»
Credit	On a 200-point scale (the arithmetic average grade for the semester is converted into points) Credited: 122 to 200 points Not credited: less than 122 points (See Grading Scale)

Discipline Score Scale: National and ECTS

The sum of grades for all types of educational activities	Score ECTS	Score on a national scale	
		For exam, course project (work), practice	for credit test
180-200	**A**	excellent	Credited
170-179,99	**B**	good	
160-169,99	**C**		
141-159,99	**D**	satisfactory	
122-140,99	**E**	satisfactory	
0-121,99	**FX**	unsatisfactory with the possibility of reassembly	is not credited with the possibility of reassembling
	F	unsatisfactory with a mandatory reexamination of discipline	is not credited with mandatory reexamination of discipline

7. Policy of discipline / course

The student has the right to receive high-quality educational services, access to contemporary scientific and educational information, qualified advisory assistance during the study of discipline and mastering practical skills. The policy of the department during the providing of educational services is a student-centered, based on normative documents of the Ministry of Education and the Ministry of Health of Ukraine, the Statute of the University and the Procedure for the Providing of Educational Services regulated by the main principles of the organization of the educational process in National Pirogov Memorial Medical University, Vinnytsya and the principles of academic integrity (link https://www.vnmu.edu.ua/en/general-regulations).

Adherence to the rules of VNMU, safety techniques in practical classes.

Requirements for preparation for practical classes. Student should be present at the practical lesson on time, theoretically prepared according to the topic.

Usage of mobile phones and other electronic devices. allowed for the purpose of performing test tasks on the Microsoft Teams platform.

Academic integrity. When studying the discipline, the student must be guided by the Code of Academic Integrity and Corporate Ethics of National Pirogov Memorial Medical University, Vinnytsya (link: https://www.vnmu.edu.ua/en/general-regulations)/ Code of Academic Integrity). In case of violation of the norms of academic integrity during the current and final controls student receives a grade of "2" and must work it out to his teacher in the prescribed manner within two weeks after receiving an unsatisfactory assessment.

Missed classes. Missed classes are working out in the manner prescribed by Regulations of the Academic process in National Pirogov Memorial Medical University, Vinnytsya (link https://www.vnmu.edu.ua/en/general-regulations) at the time of work out schedule (published on the website of the department https://www.vnmu.edu.ua/ department of Pharmaceutical Chemistry #) to the teacher on duty. To work out missed lesson the student must have completed the homework according to the methodical instructions and be ready for an oral or written survey.

The procedure for admission to the discipline final control is given in the Regulations of the Academic process in National Pirogov Memorial Medical University, Vinnytsya (link https://www.vnmu.edu.ua/en/general-regulations). To the final control allowed students who do not have missed practical classes and lectures and received an average traditional grade of at least "3".

Conflict resolution. In case of misunderstandings and complaints to the teacher because of the quality of educational services, knowledge assessment and other conflict situations, student should submit his / her claims to the teacher. If the issue is not resolved, the student has the right to apply to the head of the department according to Complaints Consideration Procedure in VNMU named after M.I. Pirogov (link https://www.vnmu.edu.ua/en/general-regulations)

Politics in terms of remote learning. Distance learning regulated by the Regulations of the elements of remote learning in National Pirogov Memorial Medical University, Vinnytsya (https://www.vnmu.edu.ua/ General information). The main training platforms for studying are Microsoft Team and Google Meets. Practical classes and lectures, exercises and consultations during distance learning is published on the website of the department (https://www.vnmu.edu.ua/ en/ Department of Pharmaceutical Chemistry / to Students or https://www.vnmu.edu.ua/en/Department of Pharmaceutical Chemistry / News).

Feedback from teachers is via messengers (Viber, Telegram, WhatsApp) or e-mail (at the teacher's choice) during working hours.

8. **Educational resources.**

   Educational and methodological support of the discipline is published on the website of the department (https://www.vnmu.edu.ua/ en/ department of Pharmaceutical Chemistry / for students). Consultations are held twice a week according to the schedule.

9. **The timetable and distribution of groups** with assigned teachers are published on the web page of the department ((https://www.vnmu.edu.ua /en/ department of Pharmaceutical Chemistry / for students).

10. Questions to the intermediate and final semester control (credit) of the discipline are published on the web page of the department (https://www.vnmu.edu.ua / en/ department of Pharmaceutical Chemistry / for students).

The syllabus of the discipline "Ecotoxicology" was discussed and approved at the meeting of the Pharmaceutical department (record № 1, dated 01.09.2022)

Responsible for the academic discipline _____ as. Kukolevska O.S.

(signature)

Head of the department _____ PhD, as. professor of HEI Yushchenko T.I.

(signature)