**NATIONAL UNIVERSITY OF LIFE AND ENVIRONMENTAL SCIENCES OF UKRAINE**

Department of Pharmacology, Parasitology and Tropical Veterinary Medicine

**" APPROVED "**
Dean of the Faculty of Veterinary Medicine
_____ prof. Mykola TSVILIKHOVSKY
"____" _____ 2024

**"APPROVED"**
at the meeting of the Department of Pharmacology, Parasitology and Tropical Veterinary Medicine
Minutes № 5, of «15th» May 2024
Head of Department
_____ assoc. prof. Vadym ISHCHENKO

**"REVIEWED"**
Guarantor of the AP "Veterinary Medicine"
_____prof. Nataliia GRUSHANSKA

# CURRICULUM OF ACADEMIC DISCIPLINE

## «Veterinary toxicology»

Field of knowledge Veterinary

Specialty 211 – «Veterinary Medicine»

Academic programme «Veterinary Medicine»

Faculty of Veterinary Medicine

Author: **I. M. Derkach,** Doctor of Veterinary Sciences,, Associate Professor of the Department of Pharmacology, Parasitology and Tropical Veterinary Medicine

Kyiv – 2024

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## Description of the course «Veterinary toxicology»

| Academic degree, specialty, academic programme | |
|---|---|
| Educational degree | *Master's* |
| Specialization | *211 «Veterinary medicine»* |
| Academic program | *«Veterinary medicine»* |
| **Characteristics of the discipline** | |
| Type | *Compulsory* |
| Total number of hours | *120* |
| Number of ECTS credits | *4* |
| Number of content modules | *3* |
| Form of assessment | *Semester test* |
| **Indicators of the course for full-time form of study** | |
| Course (year of study) | 4 |
| Semester | 8 |
| Lecture classes | *30 hr.* |
| Laboratory classes | *30 hr.* |
| Individual assignments | *60 hr.* |
| Number of weekly classroom hours for the full-time form of study | *4 hr.* |

## 1. Aim, objectives, competences and expected learning outcomes of the discipline

Veterinary toxicology is a science that studies poisons that cause or can cause diseases of domestic, domestic and wild animals, birds, fish and useful insects (etiology), their mechanism of action (pathogenesis), stages of chemical and biochemical transformations in the body (biotransformation), ways and terms of absorption, accumulation in organs and tissues and excretion from the body (toxicokinetics), pathoanatomical changes, development of methods of diagnosis, treatment and prevention of poisoning and rules of veterinary and sanitary examination of livestock products. Also, the toxicological characteristics of combat poisons are currently being updated.

The knowledge acquired by students for studying the discipline "Veterinary Toxicology" will be needed for mastering other disciplines at the Faculty of Veterinary Medicine and in the future for the professional activity of a veterinary medicine doctor.

Task. After completing the course, the student should have a clear idea of:

- principles of therapeutic decision-making (choice of appropriate drugs, assessment of benefits and risks from the use of drugs, monitoring of the course of therapy);

- study of the nature, action and definition of poisons, including poisonous plants, treatment of poisoning; identification and mechanisms of action of toxic elements, including toxic plants; diagnosis, treatment and prevention of toxicosis; basics of toxicity testing;

- study of policy formation and implementation at the local, national, regional and international levels through legislation, regulation and operational strategy; relevant state policy on veterinary medicine, human and animal health;

- study of clinical cases and instructions, so that the student can professionally carry out the reception of the patient and the corresponding physical examination: study the complete story of the client, based on clinical considerations, make differential and final diagnoses, establish diagnoses, develop treatment plans; communicate effectively with the client, colleagues, support staff, both verbally and in writing;

- careful use of veterinary drugs;

- sources and main properties of poisonous substances of plant, chemical, microbial and animal origin;

- general patterns of toxicokinetics (absorption, biotransformation, accumulation and excretion of poisons);

- pathogenesis (toxic dynamics) of animal poisoning;

- principles of diagnosis, treatment and prevention of poisoning;

- rules of veterinary and sanitary examination of livestock products in case of poisoning.

**As a result of studying the academic discipline, the student should know:**

- the main parameters of toxicometry of poisonous substances; classification of pesticides by production purpose;

- hygienic classification of pesticides according to toxicity parameters;

- physical and chemical properties of poisonous substances; ways of entry of poisonous substances into the body of animals and their toxicokinetics;

- the mechanism of the toxic effect of poisonous substances on the animal body;

- clinical signs and characteristic pathological-anatomical changes due to animal poisoning;

- rules for sampling feed and food material for chemical and toxicological studies;

- basic principles of diagnosis of animal poisoning;

- means of general and special (antidote) therapy;

- rules of veterinary and sanitary examination in case of animal poisoning.

**be able:**

- use appropriately known veterinary drugs;
- explain and apply in practice the concept of the period of elimination of

drugs from the body, to prevent the ingress of drug residues into products of animal origin intended for human consumption; know where to find relevant and relevant information on this issue;

- be able to apply medicines and biological agents appropriately to ensure the safety of the food chain and the environment;
- qualified diagnosis using modern chemical and toxicological research methods;
- treat animals in case of poisoning;
- carry out veterinary and sanitary evaluation of products obtained from animals that have suffered poisoning;
- to develop, organize and carry out animal poisoning prevention measures;

**Acquisition of competencies:**

**Integral competence (IC):**

The ability to solve complex tasks and problems in the field of veterinary medicine, which involves conducting research and/or implementing innovations and is characterized by the uncertainty of conditions and requirements.

**General competencies (GC):**

GC 2. Ability to apply knowledge in practical situations.

GC 7. Ability to conduct research at the appropriate level.

GC 9. Ability to make informed decisions.

GC 12. Efforts to preserve the environment.

**Professional (special) competencies (PC):**

PC 2. The ability to use tools, special devices, devices, laboratory equipment and other technical means to carry out the necessary manipulations during professional activities.

PC 6. Ability to select, pack, fix and send samples of biological material for laboratory research.

PC 7. Ability to organize and conduct laboratory and special diagnostic studies and analyze their results.

PC 8. Ability to plan, organize and implement measures for the treatment of animals of various classes and species suffering from non-contagious, infectious and invasive diseases.

PC 13. The ability to develop strategies for the prevention of diseases of various etiologies.

**Expected learning outcomes (ELO):**

ELO 3. To determine the essence of physico-chemical and biological processes that occur in the body of animals in normal and pathological conditions.

ELO 4. Collect anamnestic data during registration and examination of animals, make decisions regarding the choice of effective methods of diagnosis,

treatment and prevention of animal diseases.

ELO 7. Formulate conclusions regarding the effectiveness of selected methods and means of keeping, feeding and treating animals, prevention of contagious and non-contagious diseases, as well as production and technological processes at enterprises for keeping, breeding or exploiting animals of various classes and species.

ELO 15. Know the rules of storage of various pharmaceuticals and biological preparations, ways of their enteral or parenteral use, understand the mechanism of their action, interaction and complex action on the animal body.

## 2. Program and structure of the course

| Names of content modules and topics | Number of hours | | | |
|---|---|---|---|---|
| | Total | including | | |
| | | Lect. | Lab. | Indep. |
| Content **Module 1.** | | | | |
| Definition, content, tasks and objects of veterinary toxicology. The concept of poisons and poisoning. Parameters of toxicology of poisonous substances. Classification of poisonous substances. General scheme and order of chemical and toxicological research | 4 | 2 | 2 | |
| Toxicodynamics and toxicokinetics. Diagnosis and prevention of poisoning. Treatment of animals for poisoning | 2 | 2 | | |
| Toxicological characteristics of organophosphorus compounds and organochlorine compounds | 26 | 2 | 4 | 20 |
| **Modular control** | **2** | | **2** | |
| Total for content module 1 | **34** | **6** | **8** | **20** |
| **Content Module 2.** | | | | |
| Toxicological characteristics carbamic acid derivatives and phenoxy acid | 4 | 2 | 2 | |
| Toxicological characteristics of derivatives of phenol, dipyridylium, formaldehyde and cyanides | 4 | 2 | 2 | |
| Toxicological characteristics of compounds, containing mercury and lead | 4 | 2 | 2 | |
| Toxicological characteristics of compounds, containing copper and arsenic | 4 | 2 | 2 | |
| Toxicological characteristics of synthetic pyrethroids, neonicotinoids, zoocides and fluoride. Chlorine and its compounds. | 24 | 2 | 2 | 20 |

| | | | | |
|---|---|---|---|---|
| **Modular control** | **2** | | **2** | |
| Total for content module 2 | **48** | **10** | **18** | **20** |
| **Content Module 3.** | | | | |
| Toxicological characteristics feed additives. Toxicological characteristics of urea and ammonium salts. Phytotoxicoses. Classification of poisonous plants. Toxicological characteristics of plants that accumulate nitrates and nitrites | 6 | 4 | 2 | |
| Toxicological characteristics of plants, containing alkaloids | 4 | 2 | 2 | |
| Toxicological characteristics of plants, containing glycosides of various groups, coumarins, oxalates, photosensitizing substances, ether oils | 6 | 2 | 4 | |
| Mycotoxicosis of animals. Mycotoxin-producing fungi and their distribution. Influence of mushrooms and their metabolites on feed quality. Biological effect of mycotoxins on the animal body. Classification of mycotoxicosis. Characteristic aspergillus and penicillin toxicosis. Characteristics of fusariotoxicosis. Mycotoxicoses of other groups | 6 | 4 | 2 | |
| Toxicological characteristics of combat poisons substances | 22 | 2 | | 20 |
| **Modular control** | **2** | | **2** | |
| Total for content module 3 | **44** | **12** | **12** | **20** |
| **Total hours** | **120** | **30** | **30** | **60** |

## 3. Topics of laboratory classes

| № | Topic title | Hours |
|---|---|---|
| 1. | **Module 1.** General scheme and order of chemical and toxicological research | 2 |
| 2. | Toxicological characteristics of organophosphorus compounds and organochlorine compounds | 4 |
| 3. | ***Modular control (Colloquium №1)*** | 2 |
| 4. | **Module 2.** Toxicological characteristics carbamic acid derivatives and phenoxy acid | 2 |
| 5. | Toxicological characteristics of derivatives of phenol, dipyridylium, formaldehyde and cyanides | 2 |
| 6. | Toxicological characteristics of compounds, containing mercury and lead | 2 |
| 7. | Toxicological characteristics of compounds, containing copper and arsenic | 2 |
| 8. | Toxicological characteristics of synthetic pyrethroids, neonicotinoids, | 2 |

| | | |
|---|---|---|
| | zoocides and fluoride. Chlorine and its compounds. | |
| 9. | ***Modular control (Colloquium №2)*** | 2 |
| 10. | **Module 3**<br>Toxicological characteristics feed additives. Toxicological characteristics of urea and ammonium salts. Phytotoxicoses. Classification of poisonous plants. Toxicological characteristics of plants that accumulate nitrates and nitrites | 2 |
| 11. | Toxicological characteristics of plants, containing alkaloids | 2 |
| 12. | Toxicological characteristics of plants, containing glycosides of various groups, coumarins, oxalates, photosensitizing substances, ether oils | 2 |
| 13. | Mycotoxicosis of animals. Mycotoxin-producing fungi and their distribution | 2 |
| 14. | ***Modular control (Colloquium №3)*** | ***2*** |

## 4. Topics for self-study

| № | Topic title | Hours |
|---|---|---|
| 1. | Toxicological characteristics of organophosphorus compounds and organochlorine compounds | 20 |
| 2. | Toxicological characteristics of synthetic pyrethroids, neonicotinoids, zoocides and fluoride. Chlorine and its compounds. | 20 |
| 3. | Toxicological characteristics of combat poisons substances | 20 |

## 5.Tools for assessing expected learning outcomes:

- credit;
- module tests;
- abstracts;
- presentation of laboratory and practical works;

## 6.Teaching methods:

- verbal method (lecture, discussion, interview, etc.);
- practical method (laboratory, practical classes);
- visual method (illustration, demonstration);
- processing learning resources (note-taking,summarising, reviewing, writing an abstract);
- video method (remote, multimedia, web-based, etc.);
- self-study (completing assignments);
- individual research work;

## 7.Assessment methods:

- credit;
- oral or written assessment;
- module tests;
- team projects;
- essays and reports;

- presentation of laboratory and practical works;
- presentations at academic events.

## 8.Distribution of points received by students

The assessment of students' knowledge and skills is conducted by means of a 100-point scale and is converted into national grades according to Table 1 of the current *Exam and Credit Regulations at NULES of Ukraine*.

| Student's rating, points | National grading of exams and credits | |
|---|---|---|
| | exams | credits |
| 90-100 | excellent | pass |
| 74-89 | good | |
| 60-73 | satisfactorily | |
| 0-59 | unsatisfactorily | fail |

To determine a student's rating in the discipline $\mathbf{R_{DIS}}$ (up to 100 points), the received assessment rating $\mathbf{R_A}$ (up to 30 points) is added to the academic performance raiting $\mathbf{R_{AP}}$ (up to 70 points): $\mathbf{R_{DIS}} = \mathbf{R_{AP}} + \mathbf{R_A}$.

## 9. Teaching and learning aids

- e-learning course of the discipline *( https://elearn.nubip.edu.ua/course/view.php?id=4522);*
- lectures and presentations (in electronic form);
- textbooks, manuals, tutorials;
- guidelines for studying a discipline by full-time and part-time students;
- internship programmes of the discipline (if included in the curriculum).

## 10. Recommended sources of information

1. Veterinary toxicology: a course of lectures / I.M. Derkach, Dukhnytsky V.B., Boiko H.V., Ischenko V.D. – Kyiv : Comprint, 2023. 200 p.

2. Guidelines for laboratory classes of the discipline «Veterinary Toxicology» / I. M. Derkach, V. B. Dukhnytsky, G. B. Boyko, V. D. Ishchenko. – Kyiv : NULES of Ukraine, 2024. – 124 p.

3. Ветеринарна токсикологія: підручник / О.Т. Куцан [та ін.]. 2-ге видання, доповнене і перероблене, Видання присвячено 125-річчю Національного університету біоресурсів і природокористування України 100-річчю кафедри фармакології. - Київ : Видавничий центр НУБіП України, 2022. 413 с.

4. Ветеринарна мікотоксикологія : навч. посіб. / В. Б. Духницький та ін. -

Київ: Компринт, 2015. 272 с.

5. Veterinary pharmacology / Dukhnicky V., Derkach I., Vosnuk T. - Київ : Видавничий центр НУБіП України, 2019. 286 с.

6. Fundamentals of prescription writing / I.M. Derkach – Kyiv : Comprint, 2022. 128 p.

7. Ветеринарна фармакологія: підручник / Хмельницький Г.О., Духницький В.Б. – Київ : Видавничий центр НУБіП України, 2017. 571 с.

8. Аптечний практикум (навчальний посібник для лабораторних занять з дисципліни «Ветеринарна фармакологія» для студентів ОС «Бакалавр» та «Магістр» / В.Б. Духницький, І.М. Деркач – Київ: ЦП Компринт, 2017, 162 с.

9. Сучасна фармакологічна термінологія у ветеринарній медицині/ В.Б. Духницький, І.М. Деркач – К.: ЦП Компринт, 2017, 202 с.

10. Довідник з ветеринарної фармакології / В.Б. Духницький, І.М. Деркач, В.Д. Іщенко, О.К. Гальчинська – Київ : ЦП «Компринт», 2019. 232 с.

11. Державна фармакопея України. Перше видання. – Х.: РЕРІГ, 2002. Ветеринарні препарати / О.І. Канюка, І.І. Харів, В.М. Гунчак, Д.Ф. Гуфрій. – Львів, 2006. 641 с.

12. Comparative and Veterinary Pharmacology / Cunningham F., Elliott J., Lees P. Springer Heidelberg Dordrecht London New York, 2010. 351 p.

13. Handbook of Veterinary Pharmacology / Walter H. Hsu. - Wiley-Blackwell, 2008. 564 p.

14. Pharmacology / Franklin A. Ahrens. - Williams&Wilkins, 1996. 313 p.

15. Ветеринарно-санітарна експертиза з основами технології і стандартизації продуктів тваринництва / О.М. Якубчак та ін. - Київ: Біопром, 2005. 799 с.

16. Гудков І.М., Духницький В.Б., Радченко А.М. Військова ветеринарна радіобіологія і токсикологія. Київ: Аграр Медіа Груп, 2014. 498 с.

17. Державне підприємство «Науковий центр превентивної токсикології, харчової та хімічної безпеки імені академіка Л.І. Медведя Міністерства охорони здоров'я України». URL: http://medved.kyiv.ua/

18. Дудник С.В., Євтушенко М.Ю. Водна токсикологія: основні теоретичні положення та їхнє практичне застосування: монографія. Київ: Вид-во Українського фітосоціологічного центру, 2013. 297 с.

19. Духницький В.Б., Бойко Г.В., Іщенко В.Д. Отруєння тварин Т-2 токсином: монографія. Київ: Компринт, 2018. 572 с.

20. Духницький В.Б., Іщенко В.Д., Базака Г.Я. Отруєння курейнесучок моспіланом РП (ацетаміпридом) та актарою WG (тіаметоксамом): монографія. Київ: ФОП Ямчинський О.В., 2019. 188 с.

21. Ніженковська І.В., Вельчинська О.В., Кучер М.М. Токсикологічна хімія. Київ: Медицина, 212. 372 с.

22. Система контролю якості кормів та продукції тваринництва за показниками вмісту мікотоксинів: наук.-метод. рекомен. / Хмельницький Г.О., Духницький В.Б., Бойко Г.В., Іщенко В.Д. Київ: НАУ, 2006. 28 с.

23. Blackwell's Five-Minute Veterinary Consult Clinical Companion: Small Animal Toxicology 2nd Edition. Wiley-Blackwell, 2016. 992 p.
24. Blackwell's Five-Minute Veterinary Consult Clinical Companion: Equine Toxicology 1st Edition, Kindle Edition. Wiley-Blackwell, 2021. 552 p.
25. Concepts and Applications in Veterinary Toxicology: An Interactive Guide. Springer, 2020. 367 p.
26. Gupta C. R. Biomarkers in toxicology: 2nd Edition / Academic Press, 2019. 1246 p.
27. Gupta C. R. Veterinary Toxicology: Basic and Clinical Principles: 3rd Edition / Academic Press, 2018. 1238 p.
28. Marques Patricia Veterinary Toxicology. Delve Publishing, 2019. 491 p.
29. Handbook of comparative veterinary pharmacokinetics and residues of rescities and environmental contaminants [Електронний ресурс] // Veterinary books – Режим доступу до ресурсу: https://books.google.com.ua/books?id=nNbXUFMiD4AC&printsec=frontcover&hl=ru&source=gbs_ge_summary_r&cad=0#v=onepage&q&f=fals
30. Гострі та невідкладні стани у практиці лікаря. URL: https://urgent.com.ua/en
31. Фармакологія та лікарська токсикологія. URL: https://pharmtox-j.org.ua/index.php/pharmtox-j
32. Ensley M. Toxicology, An Issue of Veterinary Clinics of North America: Food Animal Practice. Elsevier. URL: Toxicology-Issue-Veterinary-Clinics-America-ebook/dp/B08M446J7D/ref=sr_1_8?crid=1HYN868WTW31A&keywords=Veterinary+Toxicology&qid=169970