NATIONAL UNIVERSITY OF LIFE AND ENVIRONMENTAL SCIENCES OF UKRAINE

Department of Physiology and Pharmacology

" APPROVED "

Dean of the Faculty of Veterinary Medicine

prof. Mykola TSVILIKHOVSKY

"____" _____ 2024

"APPROVED"

at the meeting of the Department of Physiology and Pharmacology

Minutes № 1, of «1th» July 2024

Head of Department

prof. Olena ZHURENKO

"REVIEWED"

Guarantor of the AP "Veterinary Medicine"

prof. Nataliia GRUSHANSKA

CURRICULUM OF FROM EDUCATIONAL PRACTICE OF ACADEMIC DISCIPLINE

«Veterinary pharmacology»

The amount of practice is 30 hours

Field of knowledge Veterinary

Specialty 211 – «Veterinary Medicine»

Academic programme «Veterinary Medicine»

Faculty of Veterinary Medicine

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Kyiv – 2024

Description of the course «Veterinary pharmacology»

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	*180*
Number of ECTS credits	*6*
Number of content modules	*5*
Form of assessment	*Semester test, exam*
Indicators of the course for full-time form of study	
Course (year of study)	3
Semester	6, 7
Lecture classes	*60 hr.*
Laboratory classes	*75 hr.*
Individual assignments	*45 hr.*
Number of weekly classroom hours for the full-time form of study	*5 hr.*

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

Pharmacology is an experimental science that studies changes in the living organism under the influence of drugs for their use in the practice of veterinary medicine and the search for new effective drugs.

The uniqueness of the discipline lies in the combination of modern domestic and foreign knowledge of veterinary pharmacology. The basis of training is a comprehensive approach that combines theoretical, practical and innovative training. To study the educational discipline, educational and methodological materials are used, the authors of which are scientific and pedagogical workers of the Department of Pharmacology, Parasitology and Tropical Veterinary Medicine of the Faculty of Veterinary Medicine of the NULES of Ukraine. A certified electronic training course https://elearn.nubip.edu.ua/course/view.php?id=2710 is used.

The purpose of the course is to study the basics of prescribing and the requirements for issuing them, the technology of manufacturing dosage forms,

pharmacodynamics (mechanism of action, pharmacological effects) and pharmacokinetics (absorption, distribution, biotransformation, excretion) of drugs of various pharmacological groups.

Knowledge of pharmacotherapy, pharmacoprophylaxis and pharmacostimulation provided by the work program in the discipline "Veterinary pharmacology" is necessary in the general system of training a doctor (master's degree) in veterinary medicine. In turn, this will enable the future specialist to skillfully choose (and combine) the most appropriate drugs for effective treatment of sick animals, disease prevention or stimulation of physiological functions.

Objectives. Based on the qualifications of the doctor (master) of veterinary medicine, student must have the following knowledge about the main groups of drugs (substances, drugs):

1. name of the drug (Ukrainian, Latin, synonyms);
2. chemical structure;
3. chemical and physical properties;
4. patterns of absorption, distribution of metabolism and excretion from the body;
5. mechanism of local and resorptive action, the essence of action on pathogens;
6. indications and contraindications to their use;
7. therapeutic doses for different species of animals, routes of administration and the most rational dosage forms;
8. side effects of drugs and toxicity, emergency measures in case of overdose.

As a result of studying the discipline the student **must know**:

- name in Ukrainian and Latin, the most commonly used synonyms, origin, chemical structure and composition of dosage forms, physical and chemical properties relevant to storage and use;
- ways of introduction into the body and features of absorption, biotransformation, excretion from the body;
- mechanism of local, reflex and resorptive action on the body of animals, pathogens of parasitic and infectious diseases;
- indications and contraindications to use;
- targeted therapeutic doses for animals of different species;
- the most rational dosage forms;
- methods of prescribing, toxicity and adverse side effects;
- methods of treatment of poisoning in case of overdose;
- where to find and how to interpret relevant and reliable information on the relationship between the use of antimicrobials for the treatment of animals and the development of antibiotic resistance in humans;
- the procedure for their registration and storage requirements;
- access to relevant sources of information about the licensed veterinary drugs;

must be able to:

- use appropriately known veterinary preparations, including their registration and storage;
- explain and apply in practice the concept of the period of excretion (withdrawal) of drugs from the body of animals in order to prevent residual amounts of drugs in products of animal origin intended for human consumption; know where to find modern and relevant information about this issue;
- understand the known mechanisms of antibiotic resistance of the known pathogens;
- explain convincingly the relationship between the use of antimicrobials for animal treatment, livestock products used for human consumption, and the development of adverse side effects in humans (sensitization, allergic reactions, toxic effects, antibiotic resistance, etc.);
- apply appropriate medicines and biological agents to ensure safety of the food chain and environmental protection (eg: proper disposal of biological waste);
- prescribe official and main dosage forms;
- choose the right dose and determine the frequency of medication;
- use medicines for different species of animals;
- determine the therapeutic efficacy of drugs;
- prescribe antidote therapy in case of drug poisoning;
- make simple and complex dosage forms.

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. The ability to conduct research at the appropriate level.
GC 9. The ability to make reasonable decisions.
GC 12. The desire 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 8. The ability to plan, organize and implement measures for the treatment of animals of different classes and species that are sick with non-communicable, infectious and invasive diseases.

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

PC 18. The ability to use specialized software to perform professional tasks.

PC 20. The ability to organize, implement and control the flow of documents during professional activities.

Expected learning outcomes (ELO):

ELO 1. Know and correctly use the terminology of veterinary medicine.

ELO 2. Use information from domestic and foreign sources to develop diagnostic, treatment and business strategies.

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 6. To develop quarantine and health measures, methods of therapy, prevention, diagnosis and treatment of diseases of various etiologies.

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 8. Monitor the causes of the spread of diseases of various etiologies and biological pollution of the environment with livestock waste, as well as veterinary materials and means.

ELO 9. Develop measures aimed at protecting the population from diseases common to animals and humans.

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.

ELO 19. To carry out educational activities among industry workers and the population.

2. Program and structure of the course

Names of content modules and topics	Number of hours			
	Total	including		
		Lect.	Lab.	Indep.
Content **Module 1. General pharmacology and basics of recipes**				
Veterinary pharmacology and its tasks. Pharmacotherapy. Pharmacokinetics. Ways of introducing drugs into the animal's body	2	2		
General characteristics of the veterinary formulation. Prescription, its meaning, structure, prescription requirements and dispensing procedure. Pharmacopoeia	2		2	
Physicochemical factors of drug transport across cell membranes and their distribution in animals. Biotransformation of drugs and their excretion from	2	2		

the body				
Schemes and methods of writing prescriptions. Measurement of mass and volume of medicinal substances. Dose, dosage principles. Pharmacy. Storage of medicinal substances	2		2	
Pharmacodynamics. Types of action of medicinal substances. Long-term effects of drugs. The mechanism of action of drugs. Factors influencing the action and pharmacological activity of drugs. Features of pharmacological action of drugs in case of repeated use. Interaction of drugs	2	2		
Concept of dosage form, classification of dosage forms. Specific veterinary dosage forms. Solid dosage forms	2		2	
Mild dosage forms	2		2	
Liquid dosage forms. Aerosol dosage forms	2		2	
Prescribing	6			6
Pharmacy workshop	2		2	
Modular control	**2**		**2**	
Total for content module 1	**26**	**6**	**14**	**6**
Content Module 2. Drugs that act on the central nervous system				
Drugs that act mainly on the central nervous system. Drugs for anesthesia. The mechanism of action of anesthetics. Stages, levels and types of anesthesia. Drugs for inhalation anesthesia. Prescribing	10	2	2	6
Drugs for non-inhalation anesthesia. Psychotropic substances (sedatives, neuroleptics and tranquilizers)	4	2	2	
Analgesics. Non-narcotic analgesics. Narcotic analgesics (non-steroidal anti-inflammatory drugs NSAIDs)	4	2	2	
Drugs that stimulate the function of the central nervous system. Psychostimulants. Analeptics. General tonics	4	2	2	
Modular control	**2**		**2**	
Total for content module 2	**24**	**8**	**10**	**6**
Content Module 3. Drugs acting on the peripheral nervous system				
Drugs that act mainly on the peripheral nervous system. Classification. Drugs that suppress the function of afferent nerves. Local anesthetics (requirements, classification, mechanism of action). Types of local anesthesia. Characteristics of drugs	4	2	2	
Drugs that protect sensitive nerve endings from irritation. Emollients, enveloping drugs, binders and adsorbents. Prescribing	16	2	2	12
Drugs that stimulate sensitive nerve endings. Irritants. Essential oils. Vomiting, ruminating and expectorants. Laxatives. Bitters	6	2	4	

Drugs that affect the efferent nerves. Anatomical and physiological features of efferent nerves. Synapse structure. M- and H-cholinomimetics of direct action. M- and H-cholinomimetics of indirect action. M-cholinomimetics. H-cholinomimetics	6	2	4	
Drugs of cholinolytic action. Classification of cholinolytic agents. M-cholinolytic agents. H-cholinolytic agents. Muscle relaxants	4	2	2	
Drugs of adrenomimetic and adrenolytic action. Adrenomimetic means of direct and indirect action. Adrenolytic agents. Antihistamines	4	2	2	
Modular control	**2**		**2**	
Total for content module 3	**42**	**12**	**18**	**12**
Content Module 4. Drugs that regulate the functions of systems and organs				
Drugs acting on the cardiovascular system. Cardiac glycosides. Drugs that normalize heart rate. Antispasmodics	4	2	2	
Drugs acting on the cardiovascular system. Cardiac glycosides. Drugs that normalize heart rate. Antispasmodics	4	2	2	
Diuretics (diuretics). Drugs that stimulate liver function (cholagogues). Drugs that affect the tone and contraction of the uterus	4	2	2	
Drugs that regulate metabolic processes. Vitamins and vitamin preparations: classification, mechanism of action and characteristics of certain groups. Multivitamins. Prescribing	16	2	2	12
Hormonal drugs. Classification of hormones and hormonal drugs. The mechanism of action of hormonal drugs. Estrogens, progestogens and androgens. Drugs of pituitary hormones and adrenal cortex. Prostaglandins	4	2	2	
Tissue drugs. Enzyme and bacterial drugs. Drugs of amino acid	4	2	2	
Drugs that affect the metabolism of minerals. Drugs of macro- and micronutrients. Complex drugs of mineral substances	4	2	2	
Modular control	**2**		**2**	
Total for content module 4	**42**	**14**	**16**	**12**
Content Module 5. Antimicrobial and antiparasitic drugs				
Antimicrobials. Medicinal dyes. Sulfanilamides. Nitrofurans.	4	2	2	9
Antibiotics: classification by origin, structure, strength and spectrum of antimicrobial action. Rules of rational use of antibiotics and their pharmacokinetics. Negative consequences of irrational use of antibiotics. Characteristics of penicillin antibiotics	9	2	2	

Characteristics of cephalosporin antibiotics, aminoglycosides, tetracyclines, macroliths and chloramphenicol. Characteristics of polymyxin antibiotics (polypeptide antibiotics), fluoroquinolones, antifungal antibiotics and avermectins. Antiviral drugs. Phytoncides. Polyphytes. Phytomines. Prescribing	12	4	4	
Antiseptics and disinfectants. Factors influencing their action. Requirements for antiseptics and disinfectants. Oxidizers. Halogen-containing drugs. Iodine drugs. Aliphatic drugs	4	2	2	
Disinfectants. Detergents (soaps and detergents). Formaldehyde drugs, phenols, cresols and their derivatives. Quaternary ammonium compounds	4	2	2	
Antiparasitic drugs. Anthelmintics. Insecticides and acaricides. Drugs for rodent control	6	4	2	
Antiviral drugs. Antiprotozoal drugs. Eimeriostatic drugs	3	2	1	
Drugs of radioprotective action. Homeopathy. Antidote drugs.	2	2		
Modular control	**2**		**2**	
Total for content module 5	**46**	**20**	**17**	**9**
Total hours	**180**	**60**	**75**	**45**

3. Topics of laboratory (practical, seminar) classes

№	Topic title	Hours
1.	**Module 1. GENERAL PHARMACOLOGY AND FUNDAMENTALS OF RECIPES** General characteristics of the veterinary formulation. Prescription, its meaning, structure, prescription requirements and dispensing procedure. Pharmacopoeia	2
2.	Schemes and methods of writing prescriptions. Measurement of mass and volume of medicinal substances. Dose, dosage principles. Pharmacy. Storage of medicinal substances	2
3.	Concept of dosage form, classification of dosage forms. Specific veterinary dosage forms. Solid dosage forms	2
4.	Soft dosage forms	2
5.	Liquid dosage forms. Aerosol dosage forms	2
6.	Pharmacy workshop	2
7.	***Modular control (Colloquium №1)***	2
8.	**Module 2. DRUGS ACTING ON THE CENTRAL NERVOUS SYSTEM** Drugs for anesthesia. Inhaled drugs. Non-inhalation drugs. Barbiturates. Alcohols	2
9.	Psychotropic substances (sedatives, neuroleptics and tranquilizers)	2
10.	Non-narcotic analgesics. Salicylic acid and its derivatives, aniline and pyrazolone derivatives. Analgesics of other groups	2
11.	Psychostimulants. General tonics. Analeptics	2
12.	***Modular control (Colloquium №2)***	2

13.	**Module 3. DRUGS ACTING ON THE PERIPHERAL NERVOUS SYSTEM** Local anesthetics. Synthetic compounds of nitrogen. Substituted amides of acetanilide and choline carboxylic acid	**2**
14.	Substances that stimulate sensitive nerve endings. Irritants, means, essential oils. Expectorants, ruminators, emetics	2
15.	Bitterness and laxatives. Drugs that stimulate liver function (cholagogues).	2
16.	Substances that protect sensitive nerve endings	2
17.	Drugs that affect the efferent nerves. Means of cholinomimetic action. M and H cholinomimetics of direct and indirect action	2
18.	M-cholinomimetics. M-cholinolytics.	2
19.	Ganglionic drugs. H-cholinomimetics H-cholinolytics	2
20.	Adrenergic drugs. Antihistamines.	2
21.	***Modular control (Colloquium №3)***	***2***
22.	**Module 4. MEANS REGULATING THE FUNCTIONS OF SYSTEMS AND ORGANS** Drugs that affect the cardiovascular system. Cardiac glycosides. Means that normalize heart rate. Antispasmodics	2
23.	Agents acting on blood clotting processes. Blood substitutes	2
24.	Diuretics (diuretics). Cholagogues. Uterine drugs	2
25.	Vitamin drugs. General characteristics, classification, drugs	2
26.	General characteristics of hormones and hormonal drugs. Drugs of female sex hormones. Yellow body drugs. Drugs of male sex hormones. Drugs of pituitary hormones. preparations of the adrenal cortex. Drugs of hormones of the pancreas and thyroid glands. Prostaglandins	2
27.	Tissue drugs. Enzyme drugs, bacterial drugs. Drugs of amino acids.	2
28.	Drugs that affect the metabolism of minerals. Drugs of macro- and microelements	2
29.	***Modular control (Colloquium №4)***	2
30.	**Module 5. ANTIMICROBIAL AND ANTI-PARASITIC DRUGS** Medicinal dyes with predominant antimicrobial action. Medicinal dyes with predominant antiprotozoal action. Sulfanilamide drugs. Complex drugs of sulfanilamides with trimethoprim. Nitrofurans	2
31.	Antibiotics. Mechanism of antimicrobial action. Penicillins. Cephalosporins.	2
32.	Aminoglycosides. Tetracyclines. Chloramphenicol. Macrolides and azalides. Polymyxins (polypeptide antibiotics)	2
33.	Fluoroquinolones. Avermectins. Antibiotics of different groups. Fungicidal antibiotics. feed antibiotics. Phytoncides. Polyphytes. Phytomines	2
34.	Antiseptic drugs. Oxidizers. Halogens and halogen-containing agents. Aliphatic drugs. Detergents	2
35.	Disinfectants. Formaldehyde group preparations. Chlorine preparations. Chlorine drugs. Acids and alkalis. Phenols, cresols and their derivatives. Quaternary ammonium compounds	2
36.	Antiparasitic drugs. Anthelmintic drugs. Insecticides and acaricides	2
37.	Antiviral drugs. Antiprotozoal agents. Eimeriostatic agents	2
38.	***Modular control (Colloquium №5)***	2

4. Topics for self-study

№	Topic title	Hours
1.	Writing prescriptions for solid, soft and liquid dosage forms	4
2.	Comparative characteristics of means for inhalation and non-inhalation anesthesia, advantages and disadvantages of their use.	2
3.	Comparative characteristics of medicinal substances that protect sensitive nerve endings from irritation. Prescribing emollient, enveloping, astringent and adsorbing medicinal products	5
4.	Comparative characteristics of drugs that regulate metabolic processes. Prescribing vitamin preparations: individual groups and multivitamins	12
5.	Procedure for using antimicrobial drugs in veterinary medicine. Prescribing antimicrobial drugs	7

5.Tools for assessing expected learning outcomes:

- exam;
- 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:**

- exam;
- 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): $\mathbf{R_{DIS} = R_{AP} + R_A}$.

9. Teaching and learning aids

- e-learning course of the discipline *(https://elearn.nubip.edu.ua/course/view.php?id=2710);*
- 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 pharmacology / Dukhnicky V., Derkach I., Vosnuk T. – K., 2019.
2. Fundamentals of prescription writing / I.M. Derkach – Kyiv : Comprint, 2022. 128 p.
3. Guidelines for laboratory classes of the discipline «Veterinary pharmacology» Module 2. Drugs affecting the central nervous system) / [I. M. Derkach, V.B. Duhnytsky, V. D. Ischenko, et al.] // К.: Видавничий центр «Компринт». – 2022. – С. 32.
4. Guidelines for laboratory classes of the discipline «Veterinary pharmacology» Module 3. Drugs affecting the peripheral nervous system / [I. M. Derkach, V.B. Duhnytsky, V. D. Ischenko, et al.] // К.: Видавничий центр «Компринт». – 2022. – С. 32.
5. Guidelines for laboratory classes of the discipline «Veterinary pharmacology» Module 4. Drugs regulating the functions of organs and system / [I. M. Derkach, V.B. Duhnytsky, V. D. Ischenko, et al.] // К.: Видавничий центр «Компринт». – 2022. – С. 32.
6. Guidelines for laboratory classes of the discipline «Veterinary

pharmacology» Module 5. Antimicrobial and antiparasitic drugs / [I. M. Derkach, V.B. Duhnytsky, V. D. Ischenko, et al.] // К.: Видавничий центр «Компринт». – 2022. – С. 32.

7. Fundamentals of prescription writing “Guideline for practical training in “Veterinary pharmacology” course for students of Faculty of Veterinary Medicine / V.B. Duhnytsky, I. M. Derkach, V. D. Ischenko, et al. // К.: Видавничий центр «Компринт». – 2017. – С. 45.

8. Guidance for educational practice for the students of degree "Bachelor" taught cours "Veterinary Pharmacology" / V. B. Duhnytsky, I. M. Derkach // К.: Видавничий центр «Компринт». – 2017. – С. 38.

9. Ветеринарна фармакологія: підручник / Хмельницький Г.О., Духницький В.Б. – К., 2017. – 571 с.

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

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

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

13. 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.

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

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

16. Pharmacology / Franklin A. Ahrens // Williams&Wilkins, 1996. – 313 p.

17. 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

18. Pharmacology and therapeutics for dentistyhttps [Електронний ресурс] // Veterinary books – Режим доступу до ресурсу: https:/books.google.com.ua/books?id=utVOHYuhxioC&printsec=frontcover&hl=ru&source=gbs_ge_summary_r&cad=0#v=onepage&q&f=false

19. Veterinary anaestesia and pain managment secrets [Електронний ресурс] // Veterinary books – Режим доступу до ресурсу: https://books.google.com.ua/books?id=12tfG6xnIwYC&printsec=frontcover&hl=ru&source=gbs_ge_summary_r&cad=0#v=onepage&q&f=false

20. Small animal clinical pharmacology and terapeutic [Електронний

ресурс] // Veterinary books – Режим доступу до ресурсу: https://books.google.com.ua/books?id=yDjDr_MLGSsC&printsec=frontcover&hl=ru&source=gbs_ge_summary_r&cad=0#v=onepage&q&f=false