NATIONAL UNIVERSITY OF LIFE AND ENVIRONMENTAL SCIENCES OF UKRAINE
Department of Physiology of Vertebrates and Pharmacology

APPROVED

Veterinary Medicine Faculty
«4 » VI 2025

CURRICULUM OF ACADEMIC DISCIPLINE
«Veterinary pharmacology»

Area of knowledge 21 Veterinary Medicine

Specialty 211 – «Veterinary Medicine»

Academic programme «Veterinary Medicine»

Faculty of Veterinary Medicine

Developed by**: I. M. Derkach,** Professor of the Department of Physiology of Vertebrates and Pharmacology, Doctor of Veterinary Sciences, Professor

Kyiv – 2025

Description of the discipline «Veterinary pharmacology»

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 Physiology of Vertebrates and Pharmacology 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.

Academic degree, specialty, academic programme	
Academic degree	*Master's*
Specialty	*211 «Veterinary medicine»*
Academic programme	*«Veterinary medicine»*
Characteristics of the discipline	
Type	*Compulsory*
Total number of hours	*180*
Number of ECTS credits	*6*
Number of modules	*5*
Form of assessment	*Semester test, exam*
Indicators of the course for full-time form of study	
Year of study	3
Term	5, 6
Lectures	*60 hr.*
Laboratory classes	*75 hr.*
Self-study	*45 hr.*
Number of hours per week for full-time students	*5 hr.*

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

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.

Competences acquired:

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 11. Ability to apply knowledge of biosafety, bioethics and animal welfare in professional activities.

PC 15. Know the rules for storing various pharmaceuticals and biological products, the methods of their enteral or parenteral administration, and understand the mechanism of their action, interaction, and complex effect on the animal body.

PC 16. Ability to protect the environment from pollution by livestock waste, as well as materials and means for veterinary purposes.

PC 19. Ability to carry out educational activities among industry workers

and the public.

First day competencies

2. Understand scientific research methods, the contribution of basic and applied research to science and implementation of the 3Rs principle (Replacement, Reduction, Refinement)

9. Be able to review and evaluate literature and presentations critically

12. Use of professional capabilities to contribute to the advancement of veterinary knowledge and the One Health concept, in order to promote the health, safety and welfare of animals, people and the environment, as well as the United Nations Sustainable Development Goals

26. Access the appropriate sources of data on information and legislation relating to animal care and welfare, animal movement, notifiable and reportable diseases, use of medicines, including responsible use of antimicrobials

27. Prescribe and dispense medicines correctly and responsibly in accordance with legislation and latest guidance.

Expected learning outcomes (ELO):

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

Modules and topics	Number of hours			
	Total	including		
		Lect.	Lab.	Indep.
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 the body	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		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 module 1	**26**	**6**	**14**	**6**
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 module 2	**24**	**8**	**10**	**6**
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 module 3	**42**	**12**	**18**	**12**
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. medicines that affect blood clotting. Blood substitutes	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 module 4	**42**	**14**	**16**	**12**
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 module 5	**46**	**20**	**17**	**9**
Total hours	**180**	**60**	**75**	**45**

3. Topics of lectures

No.	Topic	Hours
1	Veterinary pharmacology and its tasks. Pharmacotherapy. Pharmacokinetics. Ways of introducing drugs into the animal's body	2
2	Physicochemical factors of drug transport across cell membranes and their distribution in animals. Biotransformation of drugs and their excretion from the body	2
3	Pharmacodynamics. Types of action of medicinal substances. Long-term effects of drugs. The mechanism of action of drugs. Factors influencing	2

	the action and pharmacological activity of drugs. Features of pharmacological action of drugs in case of repeated use. Interaction of drugs	
4	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.	2
5	Drugs for non-inhalation anesthesia. Psychotropic substances (sedatives, neuroleptics and tranquilizers)	2
6	Analgesics. Non-narcotic analgesics. Narcotic analgesics (non-steroidal anti-inflammatory drugs NSAIDs)	2
7	Drugs that stimulate the function of the central nervous system. Psychostimulants. Analeptics. General tonics	2
8	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	2
9	Drugs that protect sensitive nerve endings from irritation. Emollients, enveloping drugs, binders and adsorbents.	2
10	Drugs that stimulate sensitive nerve endings. Irritants. Essential oils. Vomiting, ruminating and expectorants. Laxatives. Bitters	2
11	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	2
12	Drugs of cholinolytic action. Classification of cholinolytic agents. M-cholinolytic agents. H-cholinolytic agents. Muscle relaxants	2
13	Drugs of adrenomimetic and adrenolytic action. Adrenomimetic means of direct and indirect action. Adrenolytic agents. Antihistamines	2
14	Drugs acting on the cardiovascular system. Cardiac glycosides. Drugs that normalize heart rate. Antispasmodics	2
15	Drugs acting on the cardiovascular system. medicines that affect blood clotting. Blood substitutes	2
16	Diuretics (diuretics). Drugs that stimulate liver function (cholagogues). Drugs that affect the tone and contraction of the uterus	2
17	Drugs that regulate metabolic processes. Vitamins and vitamin preparations: classification, mechanism of action and characteristics of certain groups. Multivitamins	2
18	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	2
19	Tissue drugs. Enzyme and bacterial drugs	2
20	Drugs that affect the metabolism of minerals. Drugs of macro- and micronutrients. Complex drugs of mineral substances	2
21	Antimicrobials. Medicinal dyes. Sulfanilamides. Nitrofurans.	2
22	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	2
23	Characteristics of cephalosporin antibiotics, aminoglycosides, tetracyclines, macroliths and chloramphenicol. Characteristics of	4

	polymyxin antibiotics (polypeptide antibiotics), fluoroquinolones, antifungal antibiotics and avermectins. Antiviral drugs. Phytoncides. Polyphytes. Phytomines	
24	Antiseptics and disinfectants. Factors influencing their action. Requirements for antiseptics and disinfectants. Oxidizers. Halogen-containing drugs. Iodine drugs. Aliphatic drugs	2
25	Disinfectants. Detergents (soaps and detergents). Formaldehyde drugs, phenols, cresols and their derivatives. Quaternary ammonium compounds	2
26	Antiparasitic drugs. Anthelmintics. Insecticides and acaricides. Drugs for rodent control	4
27	Antiviral drugs. Antiprotozoal drugs. Eimeriostatic drugs.	2
28	Drugs of radioprotective action. Homeopathy. Antidote drugs.	2

4. Topics of laboratory classes

No.	Topic	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

5. Topics for self-study

No.	Topic	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

6. Methods of assessing expected learning outcomes:

- oral or written survey;
- interview;
- test;
- defending laboratory/practical, design/graphical works, projects;
- peer-to-peer assessment, self-assessment.

7. Teaching methods*:*

- problem-based method;
- practice oriented studying method;
- case method;
- project education method;
- flipped classroom, mixed education method;
- research based method;
- learning discussions and debates method;
- team work, brainstorm method
- gamification studying method.

8. Results assessment.

The student's knowledge is assessed by means of a 100-point scale converted into the national grades according to the "Exam and Credit Regulations at NULES of Ukraine" in force

8.1. Distribution of points by types of educational activities

Topic	Results	Assessment
Semester 1		
Module 1		
Topic 1 Veterinary pharmacology and its tasks. History of pharmacology Pharmacotherapy. Pharmacokinetics. Ways of introducing drugs into the animal's body	Know the subject and objectives of veterinary pharmacology. Understand the concepts of pharmacotherapy and pharmacokinetics. Distinguish ways of introducing drugs into the animal's body	-
Topic 2 Veterinary recipe. The structure of recipes. Pharmacopoeia. Ways to write recipes. Measures of mass and volume in the recipe. Principles of dosing of drugs. Pharmacy. Storage of veterinary drugs	Know the subject of veterinary prescription, the principles of dosing of drugs and the purpose of the pharmacopoeia and pharmacy. Understand the structure of the recipe. Write recipes in different ways	Up to 10 points
Topic 3 Physicochemical factors of drug transport across cell membranes and their distribution in animals. Biotransformation of drugs and their excretion from the body	Analyze the physicochemical factors of drug transport across cell membranes and their distribution in the body. Understand the biotransformation of drugs and their excretion from the body	-
Topic 4 Dry dosage forms: powders, dusts,	Know the features of solid dosage forms. Be able to write recipes	Up to 10 points

tablets, pills, briquettes		
Topic 5 Mild dosage forms: boluses, pills, ointments, liniments, suppositories, pastes	Know the features of mild dosage forms. Be able to write recipes	Up to 10 points
Topic 6 Pharmacodynamics. Types of action of medicinal substances. Long-term effects of drugs. The mechanism of action of drugs.	Distinguish between types of action and long-term effects in the action of drugs. Understand the basics of pharmacodynamics and mechanism of action of drugs	-
Topic 7 Liquid dosage forms: solutions, mixtures, emulsions, suspensions, mucus, syrups, infusions, decoctions, tinctures	Know the features of liquid dosage forms. Be able to write recipes	Up to 10 points
Topic 8 Writing of recipes	Know the features of different dosage forms. Be able to write recipes	Up to 20 points
Topic 9 Factors influencing the action and pharmacological activity of drugs. Features of pharmacological action of drugs in case of repeated use. Interaction of drugs	Analyze the factors influencing the action and pharmacological activity of drugs. Know the features of the drug when re-used	-
Topic 10 Pharmacy workshop	Know the features of different dosage forms. Be able to make them and write a recipe	Up to 10 points
Modular control. Colloquium 1	Use the acquired knowledge when doing tasks	Up to 30 points for the tests
General for the module 1		100
Module 2		
Topic 11 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	Know the drugs that act mainly on the central nervous system and means for inhalation and non-inhalation anesthesia. Distinguish stages, levels and types of general anesthesia	Up to 10 points for the laboratory work, up to 10 points for the independent work
Topic 12 Drugs for non-inhalation anesthesia. Psychotropic substances (sedatives, neuroleptics and tranquilizers)	Know sedatives, neuroleptics and tranquilizers. Understand the mechanism of their action. Be able to write recipes	Up to 20 points for the laboratory work
Topic 13 Analgesics. Non-narcotic analgesics. Narcotic analgesics (non-steroidal anti-inflammatory drugs - NSAIDs)	Know narcotic and non-narcotic analgesics. Understand the mechanism of their action. Be able to write recipes	Up to 20 points for the laboratory work
Topic 14 Drugs that stimulate the function of the central nervous system. Psychostimulants. Analeptics.	Know the means of stimulating the function of the central nervous system. Understand the mechanism of their action. Be able to write	Up to 10 points for the laboratory work

General tonics.	recipes	
Modular control. Colloquium 2	Use the acquired knowledge when doing tasks	Up to 30 points for the tests
General for the module 2		**100**
Module 3		
Topic 15 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). Characteristics of drugs	Know the classification of drugs that act mainly on the peripheral nervous system and drugs that suppress the function of afferent nerves. Understand the requirements and mechanism of action of local anesthetics. Be able to write recipes	Up to 10 points for the laboratory work
Topic 16 Drugs that protect sensitive nerve endings from irritation. Emollients, enveloping drugs, binders and adsorbents	Know the substances that protect sensitive nerve endings, understand the mechanism of their action. Be able to write recipes	Up to 10 points for the laboratory work, up to 10 points for the independent work
Topic 17 Drugs that stimulate sensitive nerve endings. Irritants. Essential oils. Vomiting, ruminating and expectorants. Laxatives. Bitters	Know the classification of drugs that stimulate sensitive nerve endings and substances that protect sensitive nerve endings, understand the mechanism of their action.	Up to 10 points for the laboratory work
Topic 18 Drugs that affect the efferent nerves. Anatomical and physiological features of efferent nerves. M- and H-cholinomimetics of direct action. M- and H-cholinomimetics of indirect action. M-cholinomimetics. H-cholinomimetics. Drugs of cholinolytic action. M-cholinolytic agents. H-cholinolytic agents. Muscle relaxants	Know the classification and mechanism of action of drugs that act on the efferent nerves Understand the anatomical and physiological features of the efferent nerves and the structure of the synapse. know the drugs of cholinomimetic and cholinolytic action. Understand the mechanism of their action. Be able to write recipes	Up to 20 points for the laboratory work
Topic 19 Drugs of adrenomimetic and adrenolytic action. Adrenomimetic drugs of direct and indirect action. Adrenolytic agents. Antihistamines	Know the drugs of adrenomimetic and adrenolytic action, antihistamines and understand the mechanism of their action. Be able to write recipes	Up to 10 points for the laboratory work
Modular control. Colloquium 3	Use the acquired knowledge when doing tasks	Up to 30 points for tests
General for the module 3		**100**
Total in the semester 1		**70**
Test		**30**
Total for the course		**100**

Semester 2		
Module 4		
Topic 20 Drugs acting on the cardiovascular system. Cardiac glycosides. Drugs that normalize heart rate. Antispasmodics	Know the drugs acting on the cardiovascular system, the cardiac glycosides and the drugs that normalize heart rate; understand the mechanism of their action. Be able to write recipes	Up to 10 points for the laboratory work
Topic 21 Drugs acting on (hemostasis) blood clotting processes. Blood substitutes. Drugs that affect immune processes	Know the drugs acting on (hemostasis) blood clotting processes, blood substitutes and the drugs that affect immune processes; understand the mechanism of their action. Be able to write recipes	Up to 10 points for the laboratory work
Topic 22 Diuretics (diuretics). Drugs that stimulate liver function (cholagogues). Drugs that affect the tone and contraction of the uterus	Know the diuretics (diuretics), the drugs that stimulate liver function (cholagogues), the drugs that affect the tone and contraction of the uterus; understand the mechanism of their action. Be able to write recipes	Up to 10 points for the laboratory work
Topic 23 Drugs that regulate metabolic processes. Vitamins and vitamin preparations: classification, mechanism of action and characteristics of certain groups. Multivitamins	Know the drugs that regulate metabolic processes, vitamin preparations, their classification, mechanism of action and characteristics of certain groups, multivitamins; understand the mechanism of their action. Be able to write recipes	Up to 10 points for the laboratory and independent works
Topic 24 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	Know the hormonal drugs, the classification of hormonal drugs, their mechanism of action of hormonal drugs, the prostaglandins; understand the mechanism of their action. Be able to write recipes	Up to 10 points for the laboratory work
Topic 25 Tissue drugs. Enzyme and bacterial drugs. Drugs of amino acid	Know the tissue drugs, the enzyme and bacterial drugs, the drugs of amino acid; understand the mechanism of their action. Be able to write recipes	Up to 10 points for the laboratory work
Topic 26 Drugs that affect the metabolism of minerals. Drugs of macro- and micronutrients Complex drugs of mineral substances	Know the drugs of macro- and micronutrients, the complex drugs of mineral substances; understand the mechanism of their action. Be able to write recipes	Up to 10 points for the laboratory work
Modular control. Colloquium 4	Use the acquired knowledge when doing tasks	Up to 30 points for the tests
General for the module 4		100

Module 5		
Topic 30 Antimicrobials. Medicinal dyes. Sulfanilamides. Nitrofurans.	Know medicinal dyes, sulfonamides and nitrofuran drugs. Understand their mechanism of action. Write recipes	Up to 20 points for the laboratory work
Topic 31 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 antibiotics of different groups	Know the classification, understand the mechanism of action of antibiotics of different groups, the rules of their rational use. Be able to write recipes for them	Up to 30 points for the laboratory and independent works
Topic 32 Antiseptics and disinfectants. Factors influencing their action. Requirements for antiseptics and disinfectants. Oxidizers. Halogen-containing drugs. Iodine drugs. Aliphatic drugs. Disinfectants. Detergents. Formaldehyde drugs, phenols, cresols and their derivatives. Quaternary ammonium compounds	Know the classification and understand the mechanism of action of antiseptics and disinfectants. Analyze the requirements for them and the factors influencing their action. Be able to write recipes	Up to 20 points for the laboratory work
Topic 33 Antiparasitic drugs. Anthelmintics. Insecticides and acaricides. Drugs for rodent control	Know antiparasitic drugs, understand the mechanism of their action. Be able to write recipes	Up to 20 points for the laboratory work
Topic 34 Antiviral drugs. Antiprotozoal drugs. Eimeriostatic drugs	Know the classification and mechanism of action of antiviral, antiprotozoal and eimeriostatic agents. Write recipes	Up to 10 points for the laboratory work
Modular control. Colloquium 5	Use the acquired knowledge when doing tasks	Up to 30 points for the tests
General for the module 5		100
Total for the semester 2		**70**
Exam		**30**
All together		**100**

8.2 Scale for assessing student's knowledge

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

8.3 Assessment policy

Deadlines and exam retaking rules	works that are submitted late without valid reasons will be assessed with a lower grade. Module tests may be retaken with the permission of the lecturer if there are valid reasons (e.g. a sick leave).
Academic integrity rules	cheating during tests and exams is prohibited (including using mobile devices). Term papers and essays must have correct references to the literature used
Attendance rules	Attendance is compulsory. For good reasons (e.g. illness, international internship), training can take place individually (online by the faculty dean's consent)

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.

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

21. Zaritskyi, R., Zhuk, Y., Dreval, D., Kovpak, V., Masalovych, Y., Cheverda, I., **Derkach, I.,** & Savchuk, T. (2024). Prevalence and sensitivity of contagious and environmental cow mastitis-causing pathogens to antibiotics in Ukrainian farms. *Potravinarstvo Slovak Journal of Food Sciences*, *18*, 547–569.

https://doi.org/10.5219/1963

22. **Derkach, I.,** Derkach, S., Zhuk, Y., Solomon, V., Chepurnyj, D., & Bosa, Y. (2024). Analysis of some trends of the pharmaceutical market of rodenticides in Ukraine and the peculiarities of their use for deratization. *Scientific Messenger of LNU of Veterinary Medicine and Biotechnologies. Series: Veterinary Sciences*, *26*(113), 189-201. https://doi.org/10.32718/nvlvet11329

23. **Derkach I,** Derkach S, Dukhnytskyi V, Valchuk O, Zhuk Y, Slobodyanyuk N, Kondratiuk V, Gryshchenko S, Gudzenko M, Rozbytska T, Gruntovskyi M (2023). An investigation on availability and efficacy of anti-anemic drugs for pigs in the Ukrainian pharmaceuticals. Online J. Anim. Feed Res., 13(4): 269-273. DOI: https://dx.doi.org/10.51227/ojafr.2023.40

24. **Derkach, I.**, & Klymenko, S. (2023). Current state of scientific research and prospects for using basidiomycetes in veterinary medicine: A literature review. Ukrainian Journal of Veterinary Sciences, 14(2), 57-75. doi: 10.31548/veterinary2.2023.57

25. **Derkach I**, Dukhnitsky V, Derkach S, Lozoviy V, Kostrub V, Losa Y, Fritsky I, and Plutenko M (2021). Dynamics of Morphological Indicators of Blood of Piglets under the Influence of Iron Clathrochelate Complex and Cyanocobalamin. World Vet. J., 11 (4): 663-669. DOI: https://dx.doi.org/10.54203/scil.2021.wvj83