APPROVED
In the meeting of the Council
of the Faculty of Veterinary Medicine of the LSMU
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Annex 1

PROGRAMME OF OBJECTIVE STRUCTURED PRECLINICAL EXAMINATION (OSICE) OF THE VETERINARY MEDICINE

The required animal species for the exam include horses, bovines (cattle), small ruminants (goats and sheep), domestic carnivores (dogs and cats), rodents (rabbits, guinea pigs), exotic animal.

1. Anatomy

The student must be able to independently identify anatomical structures using educational models, natural bone and joint specimens, as well as animal by-products**.**
The student must know the anatomical norms of a **healthy animal,** including the location, color, consistency, size, and anatomical parts of organs.
They must be familiar with species-specific anatomical features.
They must be able to correctly use veterinary anatomical terminology in both Lithuanian and Latin.
The student should be able to assess the limits of their competence, act honestly and with integrity, and adhere to medical ethics principles.

Topics:

1. Atlas, axis, and sacrum: their parts and species-specific differences.
2. Temporal bone, maxilla, incisive bone, and mandible.
3. Bones of the thoracic limb: scapula, humerus, forearm bones Carpal, metacarpal, digital skeleton, and sesamoid bones.
4. Bones of the pelvic limb: hip bones, femur, patella, and crural bones. Tarsal, metatarsal, digital skeleton, and sesamoid bones.
5. Atlanto-occopital, and atlanto-axial joints.
6. Joints of the remaining vertebrae, intervertebral discs, and long and short vertebral ligaments.
7. Joints of the thoracic limb: shoulder, elbow, carpal, and digital joints.
8. Joints of the pelvic limb: Sacroiliac, hip, stifle and tarsal joint.
9. Masticatory muscles, longissimus muscle, and diaphragm.
10. Muscles involved in the movement of thoracic limb joints.
11. Muscles involved in the movement of pelvic limb joints.
12. Structure of the horse hoof.
13. Structure of the cow’s udder
14. Structure of the eyeball. Eyelids.
15. Anatomy of the tongue.
16. The stomachs of the horse and ruminants.
17. Urinary organs.
18. Male and female genital organs.
19. Respiratory system: trachea and lungs.
20. Anatomical structure of the hearth.
21. Nervous system: macroscopic structure of the brain.

2. Physiology

The student must be able to ensure and monitor compliance with biological safety requirements.
Be able to distinguish the functional peculiarities of different animal species' systems and relate them to physiological processes and their regulatory mechanisms.
Be able to identify and correlate the physiological parameters of animal biological fluids (blood, urine) and other vital signs (body temperature, respiratory rate, pulse rate, blood pressure, heart rate), interpret them, and distinguish between healthy and diseased animals.
Apply classical methods for determining blood formed elements and be able to analyze the obtained results.
Be able to read abbreviations of blood parameters, interpret and analyze the results of animal blood morphological and biochemical indicators.
Be able to recognize the main electrocardiographic (ECG) parameters (P, Q, R, S, T waves; QRS complex; P-R interval; S-T segment; Q-T interval) and explain the functioning principles of the cardiac conduction system.
Be able to analyze thermographic images of different body regions.

Topics:

1. Regulatory mechanisms of physiological processes in the body (regulation of the respiratory system functions, digestive, endocrine, reproductive, excretory, and circulatory systems).
2. Analysis of the contraction mechanisms of different muscle types (skeletal striated, smooth, and cardiac muscles).
3. Interpretation of physiological parameters of various biological fluids (blood, urine).
4. Mastery of classical methods for determining blood formed elements (manual leukocyte and erythrocyte counting using a hemocytometer).
5. Analysis of main electrocardiographic (ECG) parameters in a dog's heart.
6. Assessment of the functional state of animals of different species based on physiological indicators (respiratory rate, heart rate and pulse, blood pressure, hematological and biochemical blood parameters, and physical, chemical, and microscopic parameters of urine).
7. Analysis of surface body temperature (cow, horse, rabbit, guinea pig, etc.).

3. Veterinary immunology

The student should be able to perform basic immunological reactions in immunological tests, which are an important part of the clinical practice for the identification of antigen or specific antibodies by agglutination and for the assessment of antibody-mediated immune responses.

By performing immunological testing, the student must be proficient in microdosing with variable volume dispensers, assess the immunological compatibility between the donor and the recipient, and identify immunologically incompatible donor blood and recipient serum samples by microscopy.

Moreover, the student must be able to ensure compliance with biosafety requirements in the immunology laboratory.

Topics:

1.Small volume microdosing with variable volume dispensers ranging between 10-100 microlitres (µl)
2.Determination of specific antibodies present in serum or plasma by immunoagglutination reaction
3.Determination of epitopes (antigenic determinants) on the surface of the antigen by specific antibodies.
4.Assessment of the immunological compatibility of the donor dog's blood and the recipient's serum

(plasma) by immunoagglutination
5.Assessment of the immunological compatibility of cat donor blood and recipient serum/plasma by immunoagglutination.
6.Determination of signs of agglutination.
7. Determination of signs of agglutination by microscopy.
8.Biosafety compliance in the immunology laboratory

4. **Histology**

The students must be able to identify, analyze, and evaluate histological structures of tissues and organs.
They must know the technique of histological slide staining with hematoxylin and eosin.
They must understand the histological structure of the tissues and organs that comprise a healthy animal's body and its species-specific features.
They must be able to use correct veterinary histology terminology in both Latin and English.
They must be able to assess the limits of their competence, act with honesty and integrity, and adhere to the ethical standards of veterinary medicine.

Animal species: carnivores (dogs, cats), horses, ruminants (cattle, sheep, goats).

Topics:

1. Epithelial tissue: its types, histological structure, and location in the body.
2. Connective tissue: its types, histological structure, and location in the body.
3. Muscle tissue: its types, histological structure, and location in the body.
4. Nervous tissue: its histological structure and location in the body.
5. Digestive organs: salivary glands, forestomach, stomach, small and large intestines, liver, pancreas. Their histological structure.
6. Respiratory organs: larynx and lungs. Their histological structure.
7. Urinary organs: kidney, ureter, and urinary bladder. Their histological structure.
8. Male reproductive organs: testis, vas deferens, accessory sex glands. Their histological structure.
9. Female reproductive organs: ovary, oviduct, uterus. Their histological structure.
10.Endocrine glands: thyroid, parathyroid, adrenal gland, pancreas. Their histological structure.
11. Blood and lymph-forming organs: bone marrow, thymus, lymph node, spleen. Their histological structure.
12. Histological structure of the skin and mammary glands.
13. Histological structure of the eyeball.
14. Histological structure of the heart and blood vessels (arteries, veins, and capillaries).
15. Histological structure of the spinal cord and nerves.

5. Veterinary Pharmacology

Be able to recognize the main groups of pharmaceutical substances, their properties, mechanisms of action, indications, contraindications, and methods of administration.
Be able to apply knowledge about the structure and types of prescriptions, as well as the cascade principle, when prescribing and issuing medicines for the treatment, metaphylaxis, and prevention

of diseases in animals.
Be able to issue different types of prescriptions when prescribing medicines for animals.
Be able to complete a pharmacovigilance report form based on a given clinical case, recognizing adverse reactions of the animal's body to the administered medicine.
Be able to apply legal requirements when prescribing medicines to food-producing animals, determining the appropriate withdrawal period.
Be able to clearly and accurately explain to animal owners the rules of medication use, possible adverse reactions, and risks.

Topics:

1. Antibacterial drugs (classes and groups, mechanisms of action, indications, contraindications, side effects, methods of administration);
2. Antiseptics (classes and groups, mechanisms of action, indications, contraindications, side effects, methods of administration);
3. Antifungal drugs (classes and groups, mechanisms of action, indications, contraindications, side effects, methods of administration);
4. Anticancer drugs (classes and groups, mechanisms of action, indications, contraindications, side effects, methods of administration);
5. Drugs affecting the autonomic nervous system (classes and groups, mechanisms of action, indications, contraindications, side effects, methods of administration);
6. Central nervous system drugs (classes and groups, mechanisms of action, indications, contraindications, side effects, methods of administration);
7. Non-steroidal anti-inflammatory drugs (classes and groups, mechanisms of action, indications, contraindications, side effects, methods of administration);
8. Respiratory system drugs (classes and groups, mechanisms of action, indications, contraindications, side effects, methods of administration);
9. Cardiovascular and blood system drugs (classes and groups, mechanisms of action, indications, contraindications, side effects, methods of administration);
10. Metabolism-affecting drugs (classes and groups, mechanisms of action, indications, contraindications, side effects, methods of administration);
11. Digestive system drugs (classes and groups, mechanisms of action, indications, contraindications, side effects, methods of administration);
12. Drug residues in food products and withdrawal period.

6. Propedeutics

6.1. Small Animal Propedeutics

The student must be able to comply with biosecurity requirements, collect the anamnesis of small animals, perform ECGs on small animals, and evaluate cardiovascular system indicators.
Be able to perform general preclinical competencies: conduct clinical examinations of small animals and administer enemas to small animals.
Be able to collect urine samples using appropriate methods (cystocentesis, catheterization), store and transport them properly, and understand the basic principles of urinalysis.
Must be able to restrain and handle cats, dogs, and exotic animals.
Be able to perform subcutaneous, intramuscular, intradermal, and intravenous injections (*cephalic, saphenous, jugular veins*).

Must be able to collect blood from the *cephalic, saphenous, and jugular veins.* Prepare and select intravenous catheters according to the species and size of the animal. Insert, secure, and properly remove an intravenous catheter.
Be able to choose the appropriate needle and syringe and draw up medications.
Be able to perform dental and eye examinations, conduct necessary ophthalmological tests. Perform dermatological examinations and skin tests. Administer fluid therapy to small animals.
Must be able to recognize: the animal's physiological parameters, and manifested clinical signs and symptoms.

Topics:

1. Injections, drug administration, intravenous procedures, and restraint of small animals.
2. General and specific examinations of the skin, skin appendages, mucous membranes, and lymph nodes in small animals.
3. General and specific examinations of the respiratory and cardiovascular systems in small animals.
4. General and specific examinations of the digestive system in small animals.
5. General and specific examinations of the urinary system in small animals.
6. General and specific eye examinations in small animals.
7. General and specific examinations on exotic animals.
8. General and specific examinations of the musculoskeletal and nervous systems in small animals.
9. General and specific examinations of the endocrine system in small animals.
10. General and specific examinations of the reproductive system in small animals.

6.2. Large Animal Propedeutics

The student must be able to**:** Ensure and monitor compliance with biosafety requirements. Collect the medical history (anamnesis) of animals. Perform comprehensive and regional clinical examinations. Collect, store, and transport samples of blood, feces, and urine. Restrain and handle large animals. Administer injections subcutaneously, intramuscularly, intradermally, and intravenously. Collect blood from the jugular vein (*vena jugularis*). Prepare and select intravenous catheters. Insert an intravenous catheter. Choose appropriate needles and syringes and draw up medications. Conduct a dental examination.
The student must recognize**:** Normal physiological parameters of the animal. Clinical signs and symptoms.
The student must analyze: Data obtained from clinical examinations.
The student must apply principles of fluid therapy. Techniques for administering injections and blood sampling. Restraint methods appropriate to the species. Pharmacological knowledge (selection of needles and syringes, medication handling).
The student must be able to assess the limits of their competence, act honestly and ethically, and adhere to the professional standards of veterinary medicine.

Topics:

1. Injections, drug administration, intravenous procedures, and restraint of large animals.
2. General and specific examinations of the skin, skin appendages, mucous membranes, and lymph nodes in large animals.

3. General and specific examinations of the respiratory and cardiovascular systems in large animals.
4. General and specific examinations of the digestive system in large animals.
5. General and specific examinations of the urinary system in large animals.
6. General and specific examinations of the reproductive system in large animals.
7. Dental examination of horses.
8. Collection, transportation, and examination of samples (blood, feces, tracheal wash, BAL (bronchoalveolar lavage), urine, skin).

7. Veterinary Diagnostic Imaging

7.1. Small Animal Diagnostic Imaging

Students should be able to select appropriate diagnostic imaging methods based on the clinical situation and anamnesis. This includes understanding the principles and indications of radiography, ultrasonography, computed tomography (CT), and magnetic resonance imaging (MRI).

Be able to properly perform basic diagnostic imaging examinations:

- **Radiography:** Ability to position the patient, set appropriate exposure parameters, and ensure high-quality images.
- **Ultrasonography:** Ability to use the ultrasound machine, select appropriate transducers, and adjust optimal image acquisition settings.

- To describe radiological findings using standard terminology and structure. This includes the identification of normal anatomical structures and the description of pathological changes (location, size, shape, density, echogenicity, etc.).
- To formulate differential diagnoses based on diagnostic imaging findings and clinical information.
- To communicate radiological findings and conclusions clearly and understandably to colleagues and/or animal owners.

Recognition:

- Recognition of normal anatomy of various animal species on radiographic, ultrasound, CT, and MRI images. This includes the visualization of different organs and systems (skeletal, internal organs, vascular, nervous systems).
- Recognition of the most common pathological changes in various organs and systems, such as inflammatory processes, tumors, trauma, degenerative changes, etc.
- Recognition of artifacts in diagnostic imaging methods and knowing how to distinguish them from real pathological findings.
- Recognition of examination quality criteria and the ability to evaluate whether the obtained images are suitable for diagnosis.

Analysis:

- Analysis of radiological findings in the context of clinical information, anamnesis, and other diagnostic tests (e.g., blood tests).
- Analysis of the dynamics of pathological changes by performing repeated diagnostic imaging examinations.
- Analysis of the advantages and disadvantages of diagnostic imaging examinations in specific clinical situations.

Application:

- Application of knowledge about diagnostic imaging methods in creating diagnostic plans for specific clinical cases.

- Application of practical skills in performing basic diagnostic imaging examinations.
- Application of standard terminology when describing radiological findings and formulating conclusions.

Ability to assess the limits of one's competencies, be honest and honorable, and adhere to veterinary medical ethics:

- Honest assessment of one's existing knowledge and practical skills in the field of diagnostic imaging.
- Recognition of the limits of one's competencies and seeking help or consultation from experienced colleagues when necessary.
- Being honest when interpreting images and formulating conclusions, avoiding subjectivity and the presentation of misleading information.
- Being honorable in one's conduct with colleagues, animal owners, and patients themselves.
- Adherence to veterinary medical ethics, ensuring animal welfare, confidentiality, and professional conduct.

Topics:

I. Basic Principles of Diagnostic Imaging:

- Radiography**:** Physical principles and X-ray generation. Principles of radiographic image formation (absorption, scattering). Factors affecting radiographic image quality (contrast, detail, density). Protection against ionizing radiation. Radiographic technique and positioning (standard projections for various body parts). Basics of reading and interpreting radiographic images.
- Ultrasonography (Sonography): Physical principles and ultrasound wave generation. Principles of ultrasound image formation (echogenicity, acoustic impedance). Ultrasound machine operation and transducer types. Ultrasound examination technique for various organs and systems. Basics of reading and interpreting ultrasound images. Common ultrasound artifacts. Color and pulsed Doppler (basics).
- Computed Tomography (CT): Physical principles and scanning principles. Image reconstruction. Use of contrast media in CT examinations. Basics of reading and interpreting CT images. Indications and contraindications of CT in veterinary medicine.
- Magnetic Resonance Imaging (MRI): Physical principles and image formation principles. Use of contrast media in MRI examinations. Basics of reading and interpreting MRI images. Indications and contraindications of MRI in veterinary medicine.
- Radionuclide Imaging (Scintigraphy) may be less detailed: Basic principles and indications in veterinary medicine.

II. Diagnostic Imaging by Organ Systems**:**

- Skeletal System**:** Normal radiographic anatomy of bones and joints of various animal species. Common skeletal trauma (fractures, dislocations). Bone and joint infections (osteomyelitis, arthritis). Metabolic bone diseases. Bone and joint tumors. Growth disorders.
- Thoracic Cavity**:** Normal radiographic and ultrasonographic anatomy of the lungs, heart, blood vessels, and mediastinum. Lung diseases (pneumonia, edema, tumors). Cardiomegaly. Pleural space pathologies (fluid, air). Diaphragmatic abnormalities.
- Abdominal Cavity**:** Normal radiographic and ultrasonographic anatomy of the liver, spleen, kidneys, gastrointestinal tract, and other organs. Organomegaly. Inflammatory processes (hepatitis, pancreatitis, enteritis). Tumors. Obstructions and foreign bodies. Fluid accumulation (ascites). Urinary tract pathologies (stones, inflammation).
- Nervous System (basics, more detailed analysis in later courses**):** Principles of diagnostic imaging of the brain and spinal cord (mainly CT and MRI). Common pathologies (trauma, tumors, herniations).

- Cardiovascular System (basics, more detailed cardiology**):** Ultrasonographic examination of the heart and major blood vessels (echocardiography) – basic views and evaluated parameters. Radiographic signs of heart disease.
- Endocrine System (basics): Principles of diagnostic imaging of the adrenal glands, thyroid gland, and other endocrine glands (ultrasound, CT).
- Eye and Adnexa (basics): Basic principles of ultrasound examination.

III. Technical and Ethical Aspects:

- Artifact recognition and management.
- Use of contrast media and potential reactions.
- Principles of radiation safety and protective measures.
- Data archiving and management (basics of PACS systems).
- Veterinary medical ethics related to diagnostic imaging (patient welfare, confidentiality).
- Assessment of the limits of one's competencies and the importance of consultation.

7.2. Large Animal Diagnostic Imaging

The student must be able to**:** Select appropriate methods for radiography, ultrasonography, and endoscopic examination. Properly perform basic diagnostic imaging procedures.
Radiography: Position the patient, determine suitable exposure parameters, and ensure high-quality images.
Ultrasound examination: Operate the ultrasound machine, select appropriate transducers, and adjust settings to optimize image acquisition.
Endoscopic examination (bronchoscopy and gastroscopy): Use an endoscope via the nasal cavity, directing it to the larynx, trachea, and bronchi (bronchoscopy), or to the pharynx, esophagus, and stomach (gastroscopy). Describe radiological findings using standard terminology and structure.
The student must recognize**:** Normal anatomy of various animal species in radiographic and ultrasonographic images, including the visualization of different organs and systems (skeletal, internal organs). Image quality criteria and assess whether images are diagnostically adequate.
The student must analyze**:** Radiological findings in the context of clinical information, anamnesis, and other diagnostic results. The advantages and limitations of imaging modalities in specific clinical cases.
The student must apply**:** Knowledge of diagnostic imaging methods. Practical skills in performing basic diagnostic imaging procedures. Standardized terminology in describing radiological findings and formulating conclusions.

Topics:

I. Fundamental Principles of Diagnostic Imaging:

- Radiography: Physical principles and generation of X-rays. Principles of radiographic image formation. Radiation protection. Radiographic techniques and positioning (standard projections for different body parts). Basics of reading and interpreting radiographs.
- Ultrasound: Physical principles and generation of ultrasound waves. Image formation principles. Operation of ultrasound machines and types of transducers. Ultrasound techniques for various organs and systems. Basics of ultrasound image interpretation. Common ultrasound artifacts.
- Endoscopy: Basic principles and indications in large animal diagnostic imaging.
- Computed Tomography (CT): Basic principles and indications for large animals.
- Magnetic Resonance Imaging (MRI): Basic principles and indications for large animals.
- Nuclear Imaging (Scintigraphy): Basic principles and indications for large animals.

II. Imaging by Organ Systems:

- Skeletal System: Radiographic and ultrasonographic anatomy of bones and joints in large animals. Ultrasonographic imaging of equine limb joints, tendons, and ligaments.
- Thoracic Cavity: Endoscopic (bronchoscopic) examinations of equine lungs. Echocardiographic evaluation of the heart.
- Abdominal Cavity: FLASH method for rapid ultrasonographic evaluation in colicky horses. Equine endoscopic (gastroscopic) examinations. Obstetric ultrasound in cows and mares.

III. Technical Aspects of Radiation Safety and Sedation:

- Principles of radiation safety and protective measures.
- Sedative agents used during diagnostic imaging procedures.

8. Clinical Pathology

Be able to use laboratory equipment such as a refractometer and microscope.
Know the correct techniques for collecting various types of samples, be able to choose the appropriate test tubes depending on the planned analysis, know the time frame for delivering samples to the laboratory, how to properly store them (temperature conditions), and how to prepare samples for testing (centrifugation, dilution).
The student must be able to prepare smears, stain them (using quick staining methods with commercial stain kits, e.g., Diff-Quik/Hemacolor), and perform microscopy.

Recognize pathological findings:

- In blood samples (macrocytic/normocytic/microcytic anemia, hypochromia, anisochromia, anisocytosis, poikilocytosis, Cabot rings, "rouleaux" formation, cell agglutination and pseudothrombocytopenia, biochemical blood changes, and hematology analyzer results).
- In urine samples (color, clarity, specific gravity, hematuria and hemoglobinuria, sediment: crystals, blood cells, urothelial cells, and identification of artifacts).
- In cytological samples (epithelial cells, multinucleated macrophages, giant cells, erythrocytes, fungal hyphae, spores, and identification of artifacts).

Be able to perform leukocyte differential counts (100 leukocytes, and identification of lymphocytes, monocytes, neutrophils—band and segmented, basophils, and eosinophils) and explain leukogram shifts.
Be able to count and interpret cytology from tracheal washes (TW) and bronchoalveolar lavage (BAL) samples (by counting 500 cells and identifying lymphocytes, macrophages, neutrophils, mast cells, eosinophils, and epithelial cells).
Use correct terminology when describing laboratory test results.
Analyze laboratory data and be able to explain the findings to the animal's owner.

Topics:

1. Sample storage and transport conditions;
2. Smear preparation technique and staining with quick-staining methods;

3. Leukocyte differential count under a microscope (lymphocytes, monocytes, neutrophils—band and segmented, basophils, and eosinophils) and result interpretation;
4. Hematology (blood cell abnormalities: macrocytes, microcytes, hyperchromic, normochromic and hypochromic erythrocytes, acanthocytes, dacrocytes, schistocytes, Cabot rings, rouleaux formation, cell agglutination, interpretation of hematology analyzer results);
5. Clinical biochemistry (changes in biochemical blood parameters and interpretation of results);
6. Urinalysis (Organoleptic analysis – color and clarity. Microscopic analysis – crystals, blood cells, urothelial cells. Specific gravity determination using a refractometer. Chemical analysis using test strips);
7. Cytology (TW, BAL: lymphocytes, macrophages, neutrophils, mast cells, eosinophils, epithelial cells);
8. Presenting results to the owner / communication (understanding test results and being able to explain them).

9. General Pathology

The student must be able to:

- Explain the etiology, mechanisms of development, interrelations, classifications, forms, and consequences of general pathological processes.
- Identify general pathological processes in tissue histological samples (e.g., necrosis, degenerative changes, adaptive responses, circulatory disturbances, edema, acute and chronic inflammation, regeneration, neoplasms).
- Evaluate cytological samples, understand the evaluation process, distinguish artifacts, and differentiate between inflammatory and neoplastic processes.
- Explain terminal conditions (pre-agony, agony, death, shock), their mechanisms, classifications, and post-mortem changes.
- Select appropriate tools for cytological and histological sampling.
- Select appropriate sites for tissue and organ sampling and fix the samples correctly.
- Perform fine-needle aspiration (FNA), exfoliative cytology sampling, and prepare slides.
- Ensure and monitor compliance with biosafety requirements.
- Assess their own competence limits, act with honesty and integrity, and adhere to veterinary medical ethical standards.

Topics:

1. Terminal Conditions**:** Agony, death, shock: mechanisms and classification.
2. Sample Collection for Cytological and Histological Examination**.**Procedures and evaluation principles for cytological samples.
3. Cell Necrosis- Coagulative, liquefactive, caseous necrosis. Apoptosis.
4. Degenerative Changes - Intracellular accumulation of water, fat, glycogen, proteins. Amyloidosis. Pigments - melanin, hemosiderin, carbon dust, lipofuscin, bilirubin. Calcium deposition - dystrophic and metastatic calcification.
5. Adaptive Reactions - Atrophy, hypertrophy, hyperplasia, metaplasia.
6. Hypoxia- Types and compensatory mechanisms.

7. Circulatory Disturbances- Hyperemia, edema, hemorrhage, hematoma, thrombosis, disseminated intravascular coagulation (DIC), embolism, ischemia, infarction: causes, mechanisms, classification.
8. Acute Inflammation- Serous, fibrinous, catarrhal, hemorrhagic inflammation. Viral inflammation.
9. Systemic Inflammation: Acute phase proteins, septic shock.
10. Chronic Inflammation: Lymphocytic-plasmacytic inflammation, granulomas.
11. Regeneration: Fibrosis, scarring, granulation tissue.
12. Epithelial Tumors: Benign and malignant tumors of glandular and covering epithelium.
13. Mesenchymal Tumors: Tumors of vascular, fibrocyte, adipocyte, myocyte, lymphocyte, mast cell, and histiocyte origin.

10. Parasitology

Be able to identify the most common animal parasites based on their morphology and location within the host's body and classify them by genus.
Know the key characteristics of parasite development and epidemiological factors.
Be able to select appropriate diagnostic tests.

Topics:

1. Identify animal parasites based on their morphology and location in the host's body.
2. Classify animal parasites by class and genus.
3. Describe the key characteristics of parasite development.
4. Identify essential epidemiological factors in the spread of parasitic diseases.
5. Select appropriate diagnostic methods to confirm the diagnosis.

11. Microbiology

Be able to – identify pathogens, perform laboratory tests, and interpret results relevant to veterinary medicine.
Recognize – the morphological characteristics and arrangements of microorganisms under a microscope (cocci, bacilli, yeasts, fungi), Gram stain results (**Gram-positive** / **Gram-negative** microorganisms), and typical colony features on culture media.
Apply – basic microbiological techniques in practice: sample collection and preparation for testing, culturing appropriate nutrient media, Gram staining, and determination of bacterial antibiotic susceptibility.
Evaluate one's own competence limits, act with honesty and integrity, and follow the ethical principles of veterinary medicine – understand the importance of learning and continuous improvement, acknowledge mistakes and learn from them, ensure that testing is carried out in accordance with principles of professionalism and responsibility.

Topic:

1. Bacterial morphology
2. Structural features of prokaryotes
3. Differences between prokaryotic and eukaryotic structures
4. Principles of bacteriological examination; pure microbial cultures

5. Purpose and types of nutrient media
6. Bacterial respiration types
7. Principles of bacterial culture identification
8. In vitro determination of antimicrobial effectiveness

12. Virology

The student must understand the principles of laboratory diagnostics of animal viral diseases. Understand the differences between individual and population-level laboratory diagnostics. Be knowledgeable about direct and indirect methods for detecting viral infections. Be able to select appropriate laboratory diagnostic methods for identifying viral diseases. Be able to interpret laboratory test results for viral diseases in companion and farm animals. Acquire knowledge of key models of pathogenesis and diagnostics of important viral diseases.

Topics:

1. Samples for testing
2. Enzootic bovine leukosis
3. Bovine viral diarrhea
4. Bovine herpesviruses
5. Canine parvovirosis
6. Feline leukemia
7. Feline immunodeficiency virus
8. Feline coronaviruses
9. Classical swine fever
10. African swine fever
11. Rabies
12. Influenza viruses

13. Applied Ethology and Animal Welfare

- Understand the behavioral characteristics of different animal species.
- Be able to distinguish between natural and altered animal behavior.
- Be able to identify and eliminate the causes of altered animal behavior.
- Understand the concept of animal welfare.
- Apply welfare assessment indicators for different animal species.
- Be able to assess animal adaptation to the living environment and determine the level of welfare.

Topics:

1. Characteristics of natural behavior in companion animals
2. Characteristics of natural behavior in farm animals
3. Types and causes of altered animal behavior
4. The concept of animal welfare
5. Animal welfare indicators
6. Animal welfare assessment

Practical and/or laboratory tasks:

1. In the provided X- ray or ultrasound image identify and label in Latin the anatomical parts of the X bones (bony pelvis, temporomandibular joint, form the stifle and the tarsal of the ligaments associated with the joint).
2. Be able to describe the general anatomy of the horse's hoof, including the parts of the dermis and the horny capsule.
3. Be able to identify and explain the anatomical parts of the eyeball using a model.
4. Be able to identify and explain the tongue, including its topography, attachment, shape, anatomical parts, and species-specific differences.
5. Be able to identify and explain the stomach of the horse, including its topography, type, ligaments, capacity, anatomical parts, and species-specific differences.
6. Be able to identify and explain the stomach of ruminants, including its topography, type, ligaments, capacity, anatomical parts, and species-specific differences.
7. Be able to identify and explain the kidneys, including their topography, colour, shape, type, ligaments, capsules, capacity, anatomical parts, and species-specific differences.
8. Be able to identify and explain the urinary bladder, including its topography, ligaments, and anatomical parts.
9. Be able to identify and explain the uterus, including its topography, type, ligaments, anatomical parts, and species-specific differences.
10. Be able to identify and explain the ovaries, including their topography, shape, ligaments, anatomical parts, and species-specific differences.
11. Be able to identify and explain the testicles, including anatomical parts, tunics, and species-specific differences.
12. Be able to identify and explain the penis, including its topography, anatomical parts, and species-specific differences.
13. Be able to identify and explain the trachea, including its topography, anatomical parts, ligaments, and species-specific differences.
14. Be able to identify and explain the lungs, including their topography, colour, ligaments, anatomical parts, lobes, and species-specific differences.
15. Be able to identify and explain the heart, including both external and internal structures, and be familiar with its afferent and efferent blood vessels.
16. Be able to identify and explain the brain of the horse and dog, including its macroscopic structures, ventricles, distribution of white and grey matter, and their derivatives.
17. To analyze and outline the regulatory axis of the digestive system.
18. To analyze and outline the regulatory axis of the endocrine system.
19. To analyze and outline the regulatory axis of the excretory system.
20. To analyze and outline the regulatory axis of the reproductive system.
21. To analyze and outline the regulatory axis of the circulatory system.
22. To analyze and describe the contraction sequence of different muscle types (skeletal, smooth, and cardiac muscles).
23. To assess the health status of various animal species based on biochemical and morphological blood test results.
24. To perform microscopic analysis of urine sediment and interpret the results.
25. To apply and understand the use of a hemocytometer for red and white blood cell counting in different animal species (carnivores, ruminants, horses).
26. To identify the normal (physiological) heart rhythm and evaluate the heart sounds of a dog using a stethoscope.
27. To recognize a normal electrocardiogram (ECG) of a healthy dog and explain the structure and function of the cardiac conduction system.

28. To recognize normal (physiological) respiratory sounds and determine the respiratory rate.
29. To recognize normal (physiological) gastrointestinal peristaltic sounds.
30. To determine pulse measurement sites in various animal species and assess their pulse.
31. To analyze thermograms of different animal species and identify temperature changes in various body regions.
32. To identify digestive enzymes specific to each part of the gastrointestinal tract, along with their optimal pH, substrates, and end products.
33. To test bovine serum or plasma samples for the detection of specific antibodies to *Brucella abortus, B. suis, B. melitensis* antigens by the Rose Bengal agglutination method, to be able to interpret positive and negative agglutination results, and to understand the purpose and nature of the various components and steps of the reaction.
34. Determine the immunological compatibility of donor-blood (dog or cat) and recipient sera.
35. Identify the epitopes (antigenic determinants) on the surface of the antigen using antibodies. Blood group analysis by agglutination (reserve task).
36. Identify the type of epithelial tissue in a histological slide and describe its histological structure.
37. Identify the type of connective tissue in a histological slide and describe its histological structure.
38. Identify the type of muscle tissue in a histological slide and describe its histological structure.
39. Identify nervous tissue in a histological slide and describe its histological structure.
40. Identify a digestive system organ in a histological slide and describe its histological structure.
41. Identify a respiratory system organ in a histological slide and describe its histological structure.
42. Identify a urinary system organ in a histological slide and describe its histological structure.
43. Identify a male reproductive system organ in a histological slide and describe its histological structure.
44. Identify a female reproductive system organ in a histological slide and describe its histological structure.
45. Identify an endocrine gland in a histological slide and describe its histological structure.
46. Identify a blood or lymph-forming organ in a histological slide and describe its histological structure.
47. Identify the type of skin in a histological slide and describe its histological structure.
48. Identify the type of mammary gland in a histological slide and describe its histological structure.
49. Identify a layer or part of the eyeball in a histological slide and describe its histological structure.
50. Identify the type of blood vessel in a histological slide and describe its histological structure.
51. Identify a nervous system organ in a histological slide and describe its histological structure.
52. To write a prescription for a proprietary veterinary medicinal product based on a given clinical case.
53. To write a prescription for a magistral (compounded) medicinal product based on a given clinical case.
54. To write a prescription for a proprietary human medicinal product based on a given clinical case.
55. To complete a pharmacovigilance report form based on a given clinical case.
56. To calculate the dose of a liquid medicinal product, prepare the appropriate volume of solution for subcutaneous, intramuscular, and intravenous injection, and perform the procedure.
57. To group proprietary veterinary medicinal products by indication based on provided clinical cases.
58. To determine the suitability of active substances for use in food-producing animals and assign an appropriate withdrawal period in accordance with relevant legislation.

59. To indicate the possible side effects of veterinary medicinal products.
60. Take a small animal's anamnesis (medical history) and communicate effectively with the client.
61. Perform and evaluate an electrocardiogram (ECG) in small animals.
62. Evaluate the cardiovascular system.
63. Perform a clinical examination of a small animal according the Protocol X.
64. Understand and apply general principles of enema administration in small animals.
65. Collect, store, and transport urine samples from small animals.
66. Administer fluid therapy to a small animal.
67. Perform a dental examination in small animals.
68. Perform an eye examination and necessary diagnostic tests in small animals.
69. Restrain and handle a cat safely.
70. Restrain and handle a dog safely.
71. Restrain and handle an exotic animal safely.
72. Administer a subcutaneous injection to a small animal.
73. Administer an intramuscular injection to a small animal.
74. Administer an intradermal injection to a small animal.
75. Administer an intravenous injection to a small animal.
76. Collect blood from the *cephalic* vein of a small animal.
77. Collect blood from the *saphenous* vein of a small animal.
78. Collect blood from the *jugular* vein of a small animal.
79. Prepare and choose the appropriate intravenous catheter for a small animal.
80. Insert and secure an intravenous catheter in a small animal.
81. Identify and select appropriate needles and syringes.
82. Properly draw up medications into a syringe.
83. Conduct a dermatological examination of a small animal and exotic patient.
84. Follow biosafety requirements in a small animal clinic.
85. Perform urinalysis for small animals.
86. Collect and analyze skin samples from small animals.
87. Collect and analyze eye samples from small animals.
88. Take the medical history of a large animal, communicating with the owner or farm manager.
89. Conduct and evaluate a general clinical examination of a large animal.
90. Follow biosafety requirements when working with large animals.
91. Follow biosafety requirements in a practical training/testing center.
92. Inpatient care of large animal patients.
93. Assessment of the cardiovascular system in the horse and the bovine.
94. Capillary refill time (CRT) assessment in large animals.
95. Body condition score (BCS) assessment in horses and cattle.
96. Performing a primary clinical examination of the horse (including BCS, mucous membrane color, CRT, temperature, heart rate, respiratory rate, digital pulse, and evaluation of peristalsis).
97. Performing a primary clinical examination of the bovine (including BCS, mucous membrane color, CRT, temperature, heart rate, respiratory rate, and evaluation of peristalsis**).**
98. To analyze a fecal sample from a large animal.
99. To analyze a urine sample from a large animal.
100. Collect blood samples from large animal blood vessels.
101. Perform and evaluate diagnostic imaging tests for a large animal.
102. Complete documentation, including extended clinical examination protocols.
103. Administer fluid therapy to a large animal.
104. Restrain and handle a cow safely.
105. Restrain and handle a horse safely.

106. Performing subcutaneous injections in large animals.
107. Performing intramuscular injections in large animals.
108. Performing intravenous injections in large animals.
109. Preparation and proper selection of intravenous catheters for horses.
110. Placement and fixation of an intravenous catheter in a large animal.
111. Selection and identification of needles and syringes.
112. Assessment of abomasal displacement in cattle.
113. Assessment of the rumen in cattle.
114. Radiography: Patient positioning, setting exposure parameters, radiation safety practice, radiographic image review and description.
115. Ultrasonography: Machine operation and transducer use, adjusting optimal image acquisition settings, ultrasound image review and description, artifact recognition.
116. Computed Tomography (CT) and Magnetic Resonance Imaging (MRI) (more demonstrative, depending on equipment availability): Examination planning and parameter setting, image review and manipulation, recognition of common pathologies (e.g., spinal cord herniation, brain tumors).
117. Biosafety – working with proper lab clothing and gloves, waste disposal, and cleaning the workstation after use.
118. Select appropriate test tubes for specific analyses (e.g., morphology, biochemistry, etc.).
119. Preparation and staining of a blood smear.
120. Determining the leukocyte formula under a microscope.
121. Anemia – recognizing it in preparations and describing changes using hematological terminology.
122. Urinalysis – physical, chemical, and microscopic sediment examination.
123. Preparation and evaluation of cytological smears.
124. Interpretation of laboratory results and explaining them to the animal owner in simple language.
125. Explain the etiology and mechanisms of general pathological processes, their interrelations and consequences.
126. Identify the type of tissue in a histological slide and recognize pathological changes caused by general pathological processes.
127. Select tools and properly collect samples for cytological examination.
128. In a histological slide, identify the tissue type and detect histopathological changes due to general pathological processes.
129. Evaluate the clinical and/or laboratory findings provided in a task and identify the general pathological processes they reflect, explaining the mechanisms of manifestation.
130. Identify *Moniezia* (family Anoplocephalidae) helminth.
131. Identify *Taenia* (family Taeniidae) helminth.
132. Identify *Dipylidium* (family Dipilididiidae) helminth.
133. Identify *Fasciola* (class Digenea) helminth.
134. Identify *Paramphistomum* (class Digenea) helminth.
135. Identify Parascaris (order *Ascaridida)* helminth.
136. Identify Toxocara (order *Ascaridida*) helminth.
137. Identify *Oxyuris* (family Oxyuridae) helminth.
138. Recognize microfilariae of *Dirofilaria* (family Filariidae) in a blood smear.
139. Identify flea Ctenocephalides (order Hemiptera).
140. Identify lice Bovicola (Damalinia) – chewing lice (suborder Mallophaga, order Phthiraptera).
141. Identify louse Haematopinus – sucking lice (suborder Anoplura, order Phthiraptera).
142. Identify Psoroptes mites (order Acari) – mange mites.
143. Identify Cheiletiella mites (order Acari) – walking dandruff mites.

144. Identify *Demodex* mites (order Acari) – mange mites.
145. Identify *Babesia spp*. (order Piroplasmida) in a blood smear.
146. Identify Cryptosporidium sp. (phylum Apicomplexa) in a fecal smear.
147. Determine bacterial morphology (cocci, bacilli, spiral forms) and arrangement under the microscope in prepared smears from bacterial cultures.
148. Determine bacterial morphology (cocci, bacilli, spiral forms) and arrangement under the microscope in prepared smears from test material.
149. Evaluate Gram-stained smears from bacterial cultures. Determine whether the bacteria are **Gram-positive** (blue/purple) or **Gram-negative** (red/pink). Know examples of Gram-positive and Gram-negative bacteria.
150. Evaluate bacterial morphology and Gram-staining characteristics in smears from mixed cultures.
151. Evaluate bacterial morphology and Gram-staining characteristics in smears prepared from test material.
152. Identify bacterial spores in simply stained smears. Know which bacteria produce spores.
153. Identify bacterial spores in stained smears using complex staining techniques. Know which bacteria produce spores.
154. Identify bacterial capsules in stained smears using simple and complex staining techniques. Know which bacteria produce capsules.
155. Recognize yeast and mold (mycelial) forms of fungi and their spores in microscopic fungal smears.
156. Determine the morphology of eukaryotic and prokaryotic cells under the microscope in stained smears.
157. Select appropriate selective, differential, and diagnostic media for the cultivation of staphylococci.
158. Select appropriate selective, differential, and diagnostic media for the cultivation of *Escherichia* and *Salmonella* genera.
159. Select appropriate selective, differential, and diagnostic media specifically for the cultivation of *Salmonella* genus.
160. Select selective media suitable for the cultivation of mycoplasmas.
161. Select appropriate selective, differential, and diagnostic media for the cultivation of yeasts and fungi.
162. Select cultivation methods for anaerobic bacteria. Know which bacteria are anaerobes.
163. Design a laboratory testing scheme for the isolation of staphylococci. Identify staphylococci based on coagulase, lecithin's, protein A, and mannitol salt fermentation.
164. Design a laboratory testing scheme for the isolation of *Escherichia coli*. Choose automated biochemical activity identification systems for Enterobacteriaceae.
165. Evaluate antimicrobial susceptibility of microorganisms using the *in vitro* disk diffusion (antibiotic sensitivity testing) method.
166. Evaluate the minimum inhibitory concentration (MIC) of antibiotics using the serial dilution method.
167. Radiography in Large Animals**:** Patient positioning Determination of exposure parameters. Implementation of radiation safety practices. Review and interpretation of radiographic images.
168. Specifics of Equine Limb Radiography**:** Techniques tailored for imaging horse limbs. Proper positioning for joint and bone visualization. Common views and diagnostic goals
169. Ultrasound Examination**:** Operation of ultrasound equipment. Use of different probes (transducers). Adjusting settings to obtain optimal image quality. Viewing and interpreting ultrasound images.
170. Specifics of Orthopedic Ultrasound in Horses**:** Soft tissue imaging (tendons, ligaments, joints). Probe selection and positioning. Image optimization for musculoskeletal structures.

171. Abdominal Ultrasound in Horses Using FLASH Method.
172. Obstetric Ultrasound in Horses and Ruminants.
173. Endoscopic Examinations in Horses: Bronchoscopy: Evaluating the upper respiratory tract and airways. Gastroscopy: Inspection of the stomach and esophagus – Equipment handling, restraint techniques, and sedation protocols.
174. Selection and submission of samples for virological testing.
175. Routine laboratory tests for enzootic bovine leukosis and their interpretation.
176. Routine laboratory tests for bovine viral diarrhea and their interpretation.
177. Bovine herpesviruses: routine laboratory tests and their interpretation.
178. Routine laboratory tests for canine parvovirus and their interpretation.
179. Laboratory tests for feline leukemia and their interpretation.
180. Feline immunodeficiency virus: routine laboratory tests and their interpretation.
181. Feline coronaviruses: routine laboratory tests and their interpretation.
182. Routine laboratory tests for classical swine fever and their interpretation.
183. Routine laboratory tests for African swine fever and their interpretation.
184. Rabies: routine laboratory tests and their interpretation.
185. Influenza viruses: routine laboratory tests and their interpretation.

Documents to know how to fill out:

1. Veterinary medicine prescription form
2. Veterinary medicines application form
3. Veterinary pharmacovigilance form
4. Completion of clinic documents/referral forms
5. Diagnostic Imaging Examination Request Form.
6. Diagnostic Imaging Examination Protocol / Report.
7. Leukocyte (differential) count table
8. Referral form for specialized laboratory tests (bacteriology, mycology, etc.)
9. Consent form