SYLLABUS OF THE EDUCATIONAL COMPONENT

CYTOLOGY, HISTOLOGY, EMBRYOLOGY

speciality	**211 Veterinary medicine**	**mandatory discipline**	**mandatory**
educational program	**«Veterinary medicine»**	**faculty**	**veterinary medicine**
educational level	**master**	**department**	**normal and pathological morphology**

TEACHER

Byrka Olena Viktorivna

Scientific degree - Candidate of Veterinary Sciences in the specialty 16.00.02 - pathology, oncology and morphology of animals
Academic title - associate professor
Work experience - 19 years

Indicators of professional activity on the subject of the course:

- author and co-author of about 60 scientific publications;
- experience of scientific work of 19 years;
- participant of scientific and methodical conferences.

phone	**0935593888**	**e-mail**	**histology@ukr.net**	**remote support**	**Moodle**

GENERAL INFORMATION ABOUT THE EDUCATIONAL COMPONENT

Aim	providing students with the necessary theoretical knowledge on the structure, development, and functioning of the animal organism at the subcellular, cellular, tissue, and organ levels of structural organization; practical skills and abilities regarding a complex of methods for preparing histological preparations and their microscopy.
Form	lectures, laboratory classes, independent work, marking of drawings of histological preparations by students with subsequent supervision by the teacher, writing tests of content chapters, written test or oral examination, educational practice in histological technique.
Detailing of learning results and forms of their control	• the ability to understand the regularities of the structure of cells, tissues and organs from the standpoint of the unity of structure and function; microstructural features of cellular and tissue elements that participate in biological processes at the level of light and electron microscopy (GC1, GC7, SC1, SC2, PLO1, PLO3) / control in laboratory classes, consultations, test and exam; • ability to microscopically examine histological preparations; identify tissues, their cellular and non-cellular structures at the microscopic and submicroscopic levels (GC1, GC7, SC1, SC2, SC6, PLO1, PLO3) / control in laboratory classes, consultations, tests and exams; • the ability to identify organs, their tissue and cellular elements at the microscopic level; recognize the structural features of cells, tissues and organs in connection with various physiological and protective and adaptive reactions of the body (GC1, GC3, GC7, SC1, SC2, SC6, PLO1, PLO3) / control in laboratory classes, consultations, test and exam; • ability to analyze the patterns of embryonic development of farm animals, analyze tasks and achievements in solving practical issues of animal husbandry (GC1, GC3, SC1, SC2, SC6, PLO1, PLO3) / control in laboratory classes, consultations, tests and exams;
	• ability to think abstractly, analyze, synthesize, search, and process information from various sources (GC 1, GC3, GC7, SC1, SC2, PLO1, PLO3) / control in laboratory classes, consultations, tests, and exams.
Scope and forms of control	8 ECTS credits (240 hours): 32 hours of lectures, 98 hours of laboratory classes, 80 hours of independent studies, 30 hours of teaching practice, current control (4 chapters); final control in the second semester (1st year) - undifferentiated credit, in the third semester (2nd year) - exam, in the fourth semester (2nd year) - teaching practice - differentiated credit.
Requirements of the teacher	timely completion of tasks, activity, demonstration of knowledge, skills and abilities when working with a microscope.
Enrollment conditions	according to the curriculum.

COMPLIANCE WITH THE EDUCATION STANDARD AND EDUCATIONAL PROGRAM

Competencies	**GC1. Ability to think abstractly, analyze and synthesize, search, and process information from various sources.** **GC3. Knowledge and understanding of the subject area and profession.** **GC7. Ability to conduct research at the appropriate level.** **SC1. The ability to establish the features of the structure and functioning of cells, tissues, organs, their systems and apparatuses of the body of animals of different classes and species - mammals, birds, insects (bees), fish and other vertebrates.** **SC2. Ability to use tools, special devices, instruments, laboratory equipment and other technical means to perform the necessary manipulations during professional activities.** **SC6. Ability to select, package, fix and ship samples of biological material for laboratory research.**	**Program learning outcomes**	**PLO1. Know and correctly use the terminology of veterinary medicine.** **PLO3. Determine the essence of physicochemical and biological processes that occur in the body of animals in normal and pathological conditions.**

STRUCTURE OF THE EDUCATIONAL COMPONENT

Chapter 1. Basics of cytology. General embryology.

Lecture 1 (L1)	Introduction. Fundamentals of cytology. General principles of the structure of a somatic cell. Nucleus.	**Laboratory class 1 (Lc1)**	**General cytology.** Methods of histological research. Principles of the structure of a somatic cell. Structure of the cell nucleus. Somatic cells (neurons) from a section of the spinal ganglion of a cat. Somatic cells (hepatocytes) from a section of the liver of a sheep.	**Independent work**	1. Intercellular contacts. (Notebook and oral test). 2. Cellular life: metabolism, irritability, excitability, movement, differentiation,

		Lc 2	Membrane (mitochondria, Golgi complex) organelles.		growth, aging, death, apoptosis (abstract, report). 3. Features of embryogenesis of lancelet, fish, amphibians. 4. Periods of intrauterine development of mammals. 5. Periods of development of the chicken embryo. Notes in the notebook and oral control.
		Lc 3	Non-membrane (centrosome) organelles.		
L2	Cytoplasm. Membranous and non-membranous organelles. Inclusions of the cytoplasm. Non-cellular structures. Vital activity and reproduction of cells.	**Lc 4**	Cellular inclusions: glycogen inclusions, fatty inclusions, secretory and pigment inclusions.		
		Lc 5	Cell life. Mitosis of plant cells.		
		Lc 6	Amitosis of bladder epithelial cells.		
L3	Progenesis. Gametes. Development of germ cells (gametogenesis).	**Lc 7**	***Final lesson, "Basics of cytology".***		
		Lc 8	**General embryology.** Female germ cells: oligolecithal type egg, mesolecithal type egg.		
		Lc 9	Male germ cells: sperm smear from a male and a female rooster.		
L4	Embryogenesis. Fertilization. Cleavage. Gastrulation. Embryogenesis of birds and placental mammals.	**Lc 10**	Gametogenesis.		
		Lc 11	Fertilization of the egg (division of maturation of the egg).		
		Lc 12	Zygote cleavage (complete uniform cleavage of the zygote of horse roundworm, complete uneven cleavage of the frog zygote, of frog blastula). Gastrulation, its types.		

Chapter 2. General histology.

L5	Epithelial tissues.	**Lc 13**	Germ layers (total preparation of the chicken embryo, germ layers and axial organs). Germ membranes (trunk and amniotic folds, placenta).	**Independent work**	**1.** Morpho-functional features of the glandular epithelium (notebook and oral test). **2.** Embryonic and postembryonic hematopoiesis. Scheme of hematopoiesis (abstract, report).
		Lc 14	***Final lesson, "General embryology".***		
		Lc 15	**General histology.** Epithelial tissues: single-layered squamous epithelium, single-layered single-row prismatic borderline epithelium, single-layered multi-row prismatic ciliated epithelium.		
L6	Connective tissues. General characteristics. Mesenchyme, blood, hematopoiesis, lymph, adipose, pigment, mucous, endothelium, reticular, loose connective tissue.	**Lc 16**	Glandular epithelium: stratified squamous non-keratinized epithelium.		**3.** The structure of the muscle as an organ. **4.** Intrafusal muscle fibers. **5.** 5. Regeneration of epithelial, trophic, muscular and nervous tissue. Summary in the notebook and oral control.
		Lc 17	Connective tissues. Mesenchyme, the blood of mammals..		
		Lc 18	Bird blood, reticular tissue.		
L7	Connective tissues. Dense connective, cartilaginous, and bone tissues.	**Lc 19**	Loose fibrous connective tissue.		

		Lc 20	Dense connective tissue is collagenous, dense connective tissue is elastic.		
		Lc 21	Cartilage tissue: hyaline, elastic, fibrous.		
L8	Muscle tissue.	**Lc 22**	Bone tissue: lamellar bone tissue, development of bone tissue in place of hyaline cartilage tissue.		
		Lc 23	***Final lesson, "General Histology, Part 1".***		
		Lc 24	Muscle tissue: striated skeletal, striated cardiac muscle tissue, non-striated muscle tissue.		
L9	Nervous tissue.	**Lc 25**	Nervous tissue: multipolar nerve cells, myelinated and unmyelinated nerve fibers, cross-section of a nerve.		
		Lc 26	***Final lesson,"General histology, part 2".***		
		Lc 27	***Passed.***		
Chapter 3. Nervous system, sensory organs. Cardiovascular system. Organs of hematopoiesis and immunity. Endocrine system, general integument of the body.					
L10	Introduction to special histology. Nervous system. Sense organs.	**Lc 28**	Cerebral cortex, cerebellar cortex, giant pyramidal cells, spinal ganglion.		1. Features of the structure of the autonomic nervous system. 2. The structure of the inner ear. 3. The conducting system of the heart 4. The lymphoid system of the mucous membranes. Cellular interactions in immune reactions. Summary in the notebook and oral control during the chapter.
		Lc 29	Anterior wall of the eye, posterior wall of the eye, spiral organ.		
		Lc 30	***Final lesson***		
L11	Cardiovascular system. Organs of hematopoiesis and immunological defense.	**Lc 31**	Artery, vein, vessels of the microcirculatory system.		
		Lc 32	Thymus, lymph node, spleen. Cloacal sac, palatine tonsil.		
		Lc 33	***Final lesson***		
L12	Endocrine system. General body covering.	**Lc 34**	Pituitary gland, thyroid gland, adrenal gland.		
		Lc 35	Hairy skin, lactating and non-lactating mammary glands.		
		Л3 36	***Final lesson***		

Chapter 4. Organs of the digestive system. Organs of respiration and urination. Organs of the reproductive system of males and females.					
L13	Digestive organs: oral cavity, esophagus, stomach.	**Lc 37**	Oral organs: filiform and leaf-shaped papillae. Submandibular salivary gland.		
		Lc 38	Development of the tooth in the pig embryo. Early stage: laying of the epithelial tooth organ. Esophagus.		
		Lc 39	Single-chamber stomach. Multi-chamber stomach of small cattle: rumen, mesh, book.		
L14	Digestive organs: intestines, liver, pancreas.	**Lc 3 40**	Small intestine: duodenum, jejunum. Large intestine: rectum.		1. Microscopic structure and functional significance of short-crown and long-crown teeth.
					2. Microscopic structure and functional significance of the peritoneum (abstract, report). 3. Embryonic development of the reproductive system. 4. Morpho-functional features of the structure of the skin, endocrine organs, digestive, respiratory, excretory, and reproductive systems in birds. Notes in a notebook and oral examination during the chapter.
		Lc 41	Liver. Pancreas.		
		Lc 42	***Final lesson***		
L15	Respiratory and excretory organs.	**Lc 43**	Trachea, lungs.		
		Lc 44	Kidney, bladder.		
		Lc 45	***Final lesson***		
L16	The reproductive system of the male and female.	**Lc 46**	Testicle, epididymis, prostate gland.		
		Lc 47	Ovary, corpus luteum, uterus.		
		Lc 48	***Final lesson***		
		Lc 49	***Consultation before the exam.***		

BASIC LITERATURE AND METHODOLOGICAL MATERIALS

1. **Albanese Francesco. Canine and Feline Skin Cytology. Springer International Publishing Switzerland, 2017. 535 p.**
2. **Burton AG Clinical atlas of small animal cytology. 2018. 380**

1. **Byrka O., Kushch M., Zhigalova O. Album of histology for students of the faculty of veterinary medicine on specialty 211: Veterinary Medicine, 212: Veterinary hygiene, sanitation and expertise. Part I. Kharkiv. 2022. 56 p. (Україна).**
2. **Byrka O., Kushch M., Zhigalova O. Album of histology for students of the faculty of veterinary medicine on specialty 211: Veterinary Medicine, 212: Veterinary hygiene, sanitation and expertise. Part II. Kharkiv. 2022. 58 p. (Україна).**

Main literature	3. Dellmann's Textbook of Veterinary Histology (6th Edition), Blackwell Publishing, Iowa, USA, 2006. 4. Francesco C., Freeman KP Veterinary Cytology: Dog, Cat, Horse, and Cow. Taylor & Francis Group, LLC, 2017. 240 p. 5. Hans-Georg Liebig. Veterinary Histology of Domestic Mammals and Birds 5th Edition, 5M Books, 2019. 6. Lorenzo R., Wiley J. Normal cell morphology in canine and feline cytology: an identification guide. Ressel & Sons Ltd, 2018. 7. Pawlina, Wojciech, and Ross, Michael H.. Histology: A Text and Atlas: With Correlated Cell and Molecular Biology. USA, Wolters Kluwer Health, 2018. 8. Raskin RE, Meyer DJ, Atlas of Canine and Feline Cytology . Saunders , Elsevier , St. Louis . 2016. 240. 9. Ross, Michael H, et al. Atlas of Descriptive Histology. GB, Sinauer, 2009. 10. Wolfgang Kuehnel. Color Atlas of Cytology, Histology, and Microscopic Anatomy, Thieme Stuttgart · New York, 2003.	**Methodological support**	3. Kushch M., Byrka O., Zhigalova O. Cytology, histology, embryology: Manual for students of the Faculty of Veterinary Medicine. Part I. Basics of cytology. Kharkiv. 2021. 64 p.(Україна). 4. Byrka O., Kushch M., Zhigalova O. Cytology, histology, embryology. Part I. Textbook for students on specialty 211: Veterinary Medicine, 212: Veterinary hygiene, sanitation and expertise. Kharkiv. 2021. 240 p. **ELECTRONIC RESOURCES** Veterynary cytology https://veterinarycytology.org/ https://www.youtube.com/@francescocian226/videos Electronic course of the discipline "Cytology, Histology, Embryology" for students in the specialty "Veterinary Medicine" http://moodle.btu.kharkiv.ua/course/view.php?id=1681

GRADING SYSTEM

SYSTEM		POINTS	ACTIVITY THAT IS ASSESSED
Final evaluation	100 ECTS points (standard)	up to 50	50% of the average grade for chapters
		up to 50	final testing
Rating of section	100-point total	up to 60	answers to test questions
		up to 20	the result of performing tasks on cytological diagnostics during laboratory classes
		up to 10	oral answers in laboratory classes
		up to 10	result of mastering the independent work block

NORMS OF ACADEMIC ETHICS AND INTEGRITY

All participants in the educational process (including students) must adhere to the code of academic integrity and the requirements set forth in the regulation " On Academic Integrity of Participants in the Educational Process of DBTU ": to show tolerance, discipline, politeness, respect each other's dignity, show kindness, honesty, and responsibility.