Додаток 3
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COURSE SYLLABUS
«HISTOLOGY, CYTOLOGY, EMBRYOLOGY»

Degree of higher education - Master
Specialization - 211 Veterinary Medicine

Educational program «Veterinary Medicine»
Academic year – 1, 2, semester – 2, 3
Form of study - full-time
Number of ECTS credits – 6
The language of instruction - English | Ukrainian

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Course page in eLearn	https://elearn.nubip.edu.ua/course/view.php?id=1330 https://elearn.nubip.edu.ua/course/view.php?id=1680

DESCRIPTION OF THE DISCIPLINE

The academic discipline «Cytology, Histology, Embryology» is compiled in accordance with the educational and professional training program for the ED «Master» of the specialty 211 «Veterinary Medicine» of the full term of study. It is fundamental in the training of a veterinarian. Together with anatomy, physiology and biochemistry, they form the necessary basis for students to successfully master paraclinical and clinical disciplines. The discipline «Cytology, Histology, Embryology» includes four sections: «Cytology», «Embryology», «General Histology» and «Special Histology». Each of them has its own subject of study. «Cytology» studies the structure and function of cells, «Embryology» – the development and structure of germ cells and embryo development, «General Histology» – the development, structure and function of tissues, «Special Histology» – the structure of organs of their systems and apparatus. The subject of study of this discipline is the micro- and submicroscopic structure of the structural components of the organism, and their formation in the process of embryonic development.

Competencies of the educational programme:

Integrated competence (IC):

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

General competencies (GC):

7. Ability to conduct research at the appropriate level;
11. Ability to evaluate and ensure the quality of work performed;

Professional (special) competencies (PC):

1. The ability to establish the features of the structure and functioning of cells, tissues, organs, their systems and apparatus of the animals organism of different classes and species - mammals, birds, fish and other vertebrates;
2. The ability to use tools, special devices, instruments, laboratory equipment and other technical means to carry out the necessary manipulations during professional activities;

Program learning outcomes (PLO) of the educational programme:

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

3. To determine the essence of the physicochemical and biological processes that occur in animals' organism in normal and pathological conditions.

5. Establish a link between the clinical manifestations of the disease and the results of laboratory tests.

COURSE STRUCTURE

Topic	Hours (lectures / laboratory)	Learning outcomes	Tasks	Assessment
1st year of the study, 2nd semester				
Module 1. Cytology				
Topic 1. Insight into Histology. Definitions and subject of "Histology, Cytology, Embryology" and its place in the biological and veterinary sciences	2/3	*Know* the constituent parts of the discipline, the methods of their research and the importance for the training of a veterinary medicine doctor; the stages of making histological specimens, the structure of a light microscope and the rules for working with it. *Be able to use* a light microscope to analyze cytological and histological specimens.	*Preparation for lectures* (preliminary acquaintance with the presentation and full-text lecture in eLearn). *Execution and delivery of laboratory work* (in methodical recommendations – during laboratory employment, and independently – in eLearn). *Doing independent work* (tasks in eLearn). *Preparation and writing of a modular test* (descriptive part in the form of written / oral answer – in the classroom, test – in eLearn).	*Execution and delivery of laboratory and independent* works, as well as *Modular control* in the form of *tests* (in eLearn) and *oral/written survey* – according to the evaluation log in eLearn
Topic 2. Overview of eukaryotic cells. Cell theory. The chemical composition of cells	2/3	*Know* the main modern provisions of cell theory and the foundations of the chemical composition and structure of cells. *Analyze* intracellular structures on electrograms.		
Topic 3. The structure of the eukaryotic cell	2/3	*Know* the parts of the eukaryotic cell. *Be able, using* a light microscope, to differentiate them on histological specimens and electrograms.		
Topic 4. The structure of the eukaryotic cell	2/3	*Know* the compartments of eukaryotic cells and their functional features. *Be able, using* a light microscope, to differentiate the compartments of the cell on histological specimens and electrograms.		
Topic 5. The structure of the eukaryotic cell. Cell division	2/3	*Know* the manifestations of cell life. *Be able* to differentiate, *using* a light microscope, on histological specimens methods of cell proliferation.		
Module 2. Embryology				
Topic 6. Structure of Germ Cells	2/3	*Know* the features of the structure and function of germ cells. *Be able, using* a light microscope, to differentiate the germ cells of males and females.	*Preparation for lectures* (preliminary acquaintance with the presentation and full-text lecture in eLearn). *Execution and delivery of laboratory work* (in methodical recommendations – during laboratory employment, and independently – in eLearn).	*Execution and delivery of laboratory and independent* works, as well as *Modular control* in the form of *tests* (in eLearn) and *oral/written survey* – according to the evaluation log in eLearn
Topic 7. Development of germ cells. Early embryonic development	2/3	*Know* the periods of development of the germ cells of males and females, the stages of fertilization and the main periods of embryogenesis of domestic animals. *Be able, using* a light microscope, to differentiate the varieties of blastula and gastrula on histological specimens.		

Topic 8. Differentiation of Germ Layers and Axial Organs. Embryogenesis of Amphioxus, Fish and Amphibians	2/3	*Know* the structures of the animal organism and the germ layers and axial organs from which they develop and the main stages of embryogenesis of the lancelet, fish and amphibians. *Be able, using* a light microscope, to differentiate the germ layers and axial organs on a histological specimens.	*Doing independent work* (tasks in eLearn). *Preparation and writing of a modular test* (descriptive part in the form of written / oral answer – in the classroom, test – in eLearn).	
Topic 9. Embryogenesis of Birds and Mammals	2/3	*Know* the main stages of embryogenesis of birds and mammals, periods of their embryonic development. *Be able, using* a light microscope, to differentiate extraembryonic organs of mammals and birds on histological specimens and macroscopic preparations.		
Module 3. General Histology				
Topic 10. General characteristics of tissues. Epithelia	2/3	*Know* the modern foundations of the structure, classification of tissues and the sources of their development, as well as the classification and morphofunctional features of epithelial tissue. *Be able, using* a light microscope, to differentiate the types of epithelial tissue on histological specimens.	*Preparation for lectures* (preliminary acquaintance with the presentation and full-text lecture in eLearn). *Execution and delivery of laboratory work* (in methodical recommendations – during laboratory employment, and independently – in eLearn). *Doing independent work* (tasks in eLearn). *Preparation and writing of a modular test* (descriptive part in the form of written / oral answer – in the classroom, test – in eLearn).	*Execution and delivery of laboratory and independent* works, as well as *Modular control* in the form of *tests* (in eLearn) and *oral/written survey* – according to the evaluation log in eLearn
Topic 11. Connective tissue. Body fluids	2/3	*Know* the features of the structure and function of connective tissue and its classification; the components of the tissue of the internal environment and their functional characteristics. *Be able, using* a light microscope, to differentiate blood cells of amphibians, fish, birds and mammals in smears.		
Topic 12. Proper Connective tissue	2/3	*Know* the tissues that are part of the proper connective tissue and their structural and functional features. *Be able, using* a light microscope, on histological specimens to differentiate loose and dense fibrous connective tissues and varieties of the latter, as well as tissues with special properties.		
Topic 13. Supportive tissues	2/3	*Know* the features of the structure and function and classification of supportive tissue. *Be able, using* a light microscope, to differentiate types of bone and cartilage tissue on histological specimens.		
Topic 14. Muscle tissue	2/3	*Know* the classification, functional features and structure of the muscle tissue types. *Be able, using* a light microscope, to differentiate cardiac, skeletal and smooth muscle tissue on a histological specimens.		
Topic 15. Nervous tissue	2/3	*Know* the components of the nervous tissue, the peculiarities of their structure and function, and the classification of nerve cells and neuroglia. *Be able, using* a light microscope, to differentiate nerve cells, nerve fibers and endings and cells of neuroglia on histological specimens.		
Total for 1 semester				**70**
Test				**30**
Total				**100**

2nd year of the study, 3rd semester				
Module 4. Special Histology. Cardiovascular, Lymphatic and Endocrine systems				
Topic 16. Cardiovascular system	2/3	*Know* the patterns of the structure of tubular and parenchymal organs, the composition of the cardiovascular system, development, structure and function of the heart, blood and lymphatic vessels. *Be able, using* a light microscope, to differentiate the heart, types arteries, veins and microcirculatory vessels on histological specimens.	*Preparation for lectures* (preliminary acquaintance with the presentation and full-text lecture in eLearn). *Execution and delivery of laboratory work* (in methodical recommendations – during laboratory employment, and independently – in eLearn). *Doing independent work* (tasks in eLearn). *Preparation and writing of a modular test* (descriptive part in the form of written / oral answer – in the classroom, test – in eLearn).	*Execution and delivery of laboratory and independent* works, as well as *Modular control* in the form of *tests* (in eLearn) and *oral/written survey* – according to the evaluation log in eLearn
Topic 17. Lymphatic system (Central organs of hematopoiesis and lymphopoiesis)	2/3	*Know* the composition and general characteristics of the lymphatic system, the classification of the organs of hematopoiesis and immune defense, their development, structure and function. *Be able, using* a light microscope, to differentiate the central organs of hematopoiesis and immune defense on histological specimens.		
Topic 18. Lymphatic system (Peripheral organs of hematopoiesis and lymphopoiesis)	2/3	*Know* the composition and general characteristics of the lymphatic system, the classification of the organs of hematopoiesis and immune defense, their development, structure and function. *Be able, using* a light microscope, to differentiate the peripheral organs of hematopoiesis and immune defense on histological specimens.		
Topic 19. Endocrine system	2/3	*Know* the general characteristics, classification of the organs of the endocrine system and the peculiarities of their structure and function. *Be able, using* a light microscope, to differentiate the endocrine glands on histological specimens.		
Module 5. Special Histology. Integumentary system. Digestive, respiratory and urinary systems				
Topic 20. Integumentary system	2/3	*Know* the composition of the integumentary system, functions, structure and development of the skin and its derivatives. *Be able, using* a light microscope, to differentiate the skin, its glandular and horny derivatives on histological specimens.	*Preparation for lectures* (preliminary acquaintance with the presentation and full-text lecture in eLearn). *Execution and delivery of laboratory work* (in methodical recommendations – during laboratory employment, and independently – in eLearn). *Doing independent work* (tasks in eLearn). *Preparation and writing of a modular test* (descriptive part in the form of written / oral answer – in the classroom, test – in eLearn).	*Execution and delivery of laboratory and independent* works, as well as *Modular control* in the form of *tests* (in eLearn) and *oral/written survey* – according to the evaluation log in eLearn
Topic 21. Digestive system (Oral structures. Extramural salivary gland)	2/3	*Know* the organs of the oral cavity, extramural salivary glands, their features of development, structure and function. *Be able, using* a light microscope, to differentiate the components and stages of development of teeth, mechanical and taste papillae of the tongue and types of extramural salivary glands on histological preparations.		
Topic 22. Digestive system (Esophagus. Glandular stomach. Compound stomach)	2/3	*Know* the features of the development, structure and function of the esophagus, glandular and compound stomachs. *Be able, using* a light microscope, to differentiate the esophagus, glandular and compound stomachs on histological specimens.		

Topic 23. Digestive system (Small and large intestine. Liver and pancreas)	2/3	*Know* the features of the structure, function and development of the small and large intestine, liver and pancreas. *Be able, using* a light microscope, to differentiate the small and large intestine, liver and pancreas on histological specimens.		
Topic 24. Respiratory system	2/3	*Know* the general characteristics and composition of the respiratory apparatus, their structural and developmental features. *Be able, using* a light microscope, to differentiate the components of the airways and the respiratory part of the lungs on histological specimens. Distinguish the cells of the alveolar wall on the electron micrograph.		
Topic 25. Urinary system	2/3	*Know* the functions and composition of the urinary system organs , their structure and development, the histophysiology of urine formation, the endocrine complex of the kidneys. *Be able, using* a light microscope, to differentiate the urinary system organs on histological specimens.		
Module 6. Special Histology. Reproductive, nervous systems and sense organs				
Topic 26. Female reproductive system	2/3	*Know* the composition and functions of the male reproductive system, the structure of the testes, excretory (genital) ducts, accessory glands and penis. *Be able, using* a light microscope, to differentiate the organs of the male reproductive system on histological specimens.	*Preparation for lectures* (preliminary acquaintance with the presentation and full-text lecture in eLearn). *Execution and delivery of laboratory work* (in methodical recommendations – during laboratory employment, and independently – in eLearn). *Doing independent work* (tasks in eLearn). *Preparation and writing of a modular test* (descriptive part in the form of written / oral answer – in the classroom, test – in eLearn).	*Execution and delivery of laboratory and independent* works, as well as *Modular control* in the form of *tests* (in eLearn) and *oral/written survey* – according to the evaluation log in eLearn
Topic 27. Male reproductive system	2/3	*Know* the composition, functions and structure of the female reproductive system – ovary, oviduct, uterus, vagina, and vulva. *Be able, using* a light microscope, to differentiate the organs of the female reproductive system on histological specimens.		
Topic 28. Nervous system	2/3	*Know* the general characteristics, classification, development and structure of the organs of the nervous system. *Be able, using* a light microscope, to differentiate the brain and spinal cord, nerve nodes and nerves on histological specimens.		
Topic 29. Analyzers. Eye	2/3	*Know* the general characteristics of analyzers and their composition, their classification, development and structure of the eye and ocular adnexa. *Be able, using* a light microscope, to differentiate the membranes of the eyeball and their layers on histological specimens.		
Topic 30. Analyzers. Spiral organ. Vestibular apparatus	2/3	*Know* the general characteristics of analyzers and their composition, their classification, development and structure of the spiral organ and vestibular appar. *Be able, using* a light microscope, to differentiate a spiral organ and its constituent elements on histological specimens.		

Total for 2 semester	**70**
Exam	**30**
Total for course	**100**

ASSESSMENT POLICY

Policy regarding deadlines and resits:	Laboratory, independent and modular works must be submitted in the planned time before the end of the study of the current module. Violation of the deadlines without a good reason entitles the teacher to lower the grade. Reassignment of modular control work occurs in the presence of valid reasons (for example, hospital) and is allowed in the term before the end of the following module.
Academic honesty policy:	Copying, use of mobile devices, and additional literature when writing modular tests, tests and exams are strictly prohibited.
Attendance policy:	Attendance at lectures and laboratory classes is mandatory for all students in the group. Late classes are not allowed. A lab coat is a must in laboratory classes. For objective reasons (for example, illness, international internship) training can take place according to an individual curriculum approved in a certain order. Missed lectures, after their processing by the applicant of higher education, are worked out in the form of an interview with the teacher. Missed laboratory classes are worked out by students in the laboratory of the department, information about the practice is entered into the departmental journal of the practice of missed classes.

SCALE OF ASSESSMENT OF STUDENT KNOWLEDGE

Student rating, points	**National grade based on exam results**	
	credits	**credits**
90-100	excellent	passed
74-89	good	
60-73	satisfactory	
0-59	unsatisfactory	not passed

RECOMMENDED SOURCES OF INFORMATION

Basic literature

1. Хомич В.Т. Лекції з цитології, ембріології та гістології свійських тварин: Навчальний посібник. К.: ТОВ “Аграр Медіа Груп”, 2012. 296 с.
2. Новак В.П., Пилипенко М.Ю., Бичков Ю.П. Цитологія, гістологія, ембріологія: підручник за заг. ред. В.П.Новака (2-е вид., змін. і доп.) К.: Дакор, 2008. 512 с.
3. Хомич В.Т., Мазуркевич Т.А., Дишлюк Н.В., Стегней Ж.Г. Практикум з цитології, гістології та ембріології свійських тварин: Навчальний посібник /За редакцією В.Т. Хомича.-К.:ЦП Компринт, 2017. 228 с.
4. Хомич В.Т., Мазуркевич Т.А., Дишлюк Н.В., Стегней Ж.Г. Цитологія, ембріологія і гістологія свійських тварин у запитаннях і відповідях. Навчальний посібник К.:, Аграр Медіа Груп, 2013. 232 с.
5. Melnyk N. Histology, cytology and embryology. K., 2020. 370 c.
6. Ulrich D. Color atlas of embryology. Thieme, 1995. 383 p.

Supporting literature

1. Хомич В.Т., Рудик С.К., Левчук В.С. Морфологія сільськогосподарських тварин. К.: Вища освіта, 2003. 527 с.
2. Луцик О.Д., Іванова А.І., Кабак К.С. Гістологія людини. Львів: Мир, 1992. 400 с.
3. Banks W.J. Applied Veterinary Histology. 1993. 527 p.

4. Dellmann H.-D., Carithers J.R. Cytology and Microscopic Anatomy. 1996. 406 p.
5. Bacha W.J., Wood L.M. Color Atlas of Veterinary Histology. 1990. 269 p.

Information Resources

1. « LUMEN Histology from Loyola. Excellent slides plus explanatory text.
*** http://www.meddean.luc.edu/lumen/MedEd/Histo/frames/histo_frames.html
2. https://elib.vsmu.by/bitstream/123/9813/1/Miadzelets-AD_Selected%20themes%20of%20histology%20cytology%20and%20embryology%20core_2005.pdf