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APPROVED

First Pro-rector for scientific
and pedagogical work



WORK ACADEMIC PROGRAMME
COURSE
HISTOLOGY

training specialists second (master's) level of higher education

22 area of expertise "Healthcare"

221 specialty "Dentistry"

<p>Discussed and approved on methodological meeting of the department <u>histology</u> Protocol № <u>10</u> the "<u>18</u>" <u>may</u> 2023 Head of Department MD, PhD Assoc. Prof. Iлона Chelpanova</p>	<p>Approved profiled methodical commission of biomedical sciences Protocol number 4 from "<u>22</u>" <u>June</u> 2023 . Chairman of the methodical commission MD, DSci., Prof. Lutsyk A.D.</p>
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Programme developers:

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INTRODUCTION

Program of study discipline "Histology, cytology and embryology" composed according to the standard of higher education in Ukraine (hereinafter - the Standard) the second (master's) level of higher education

(Name of higher education)

22 area of expertise "Healthcare"

221 specialty "Dentistry".

specialization (s) ____.

(Code name and specialization)

____ educational program. (Name of the educational program)

Description of discipline (abstract)

The term "histology" (from the Greek. Histos fabric + logos word science) suggested German scientist Karl Mayer in 1819, so called science of multicellular tissues of animals and humans. However, the volume and value of histology is the subject went beyond literal translation of his name. Histology studies not only the fabric but also the cells from which they are formed, the structure of organs and body systems. According to this distinction following sections subject: cytology (the study of cells); general histology, or actually histology (tissue studies); Special histology (studying the structure of organs and systems). Closely related to the science of histology and development of the embryo - embryology, as the structure of the organism in the study of their emergence and development. Embryology as cytology, histology now separated from and is independent science, but medical training course of higher education are combined in one piece with histology. Thus, the full name of the course - histology, cytology and embryology.

The subject of study of discipline is microscopic and ultramicroscopic structure of cells, tissues and organs of the human body

Interdisciplinary connections: based on the study of medical students of biology, anatomy and integrated with these disciplines; lays the foundation study of Physiology, Biochemistry, Pathology and Pathophysiology, Clinical propaedeutics discipline that involves the integration of teaching with these disciplines and forming of abilities to apply knowledge of histology, cytology and embryology in further education and in professional activities

1. The purpose and objectives of discipline

1.1. The goal of teaching "Histology, cytology and embryology" is the study of microscopic structures and ultramicroscopic structure of the human body, its development and changes in the different conditions of life.

1.2. The main objectives of the discipline "Histology, cytology and embryology" are:

- Studying the molecular and structural bases of operation and renewal of cells and their derivatives
- Study the basics adaptation, reactivity and maintain homeostasis
- Identification of adaptation and regenerative capacity of the tissue based on their composition, characteristics and regulation of age-related changes
- Interpretation of laws embryonic development rights, regulation of morphogenesis
- Identify critical periods of embryogenesis, defects and anomalies of human development

1.3 Competencies and learning outcomes, which promotes the formation of discipline (relationship with the normative content of training seekers of higher education, formulated in terms of learning outcomes in Standard).

According to the requirements of the standard provides the discipline of students' competences:

integrated: Ability to solve common and complex specialized tasks and practical problems in learning, which provides research and / or implementation of innovation and characterized by complexity and uncertainty of the conditions and requirements

general:

The ability to apply knowledge of histology, cytology and embryology in practical situations

Knowledge and understanding of the subject area of histology, cytology and embryology

The ability to select the strategy of communication; ability to work in a team; interpersonal interaction skills

The ability to communicate in their native language both orally and in writing; ability to communicate in a second language

skills to use information and communication technologies

The capacity for abstract thinking, analysis and synthesis, capacity to learn and be trained in modern

The ability to assess and ensure the quality of work;

certainty and persistence on tasks and responsibilities taken

special (professional, substantive):

capacity for evaluation of laboratory results

Details competencies according to the NLC descriptors in the form of "Matrix of competencies."

The matrix of competencies

Number Competence Knowledge Skills Communication Authority and Responsibility

Integral competence

The ability to solve common and complex specialized tasks and practical problems in professional

of health, or in the process of learning that involves studies and / or implementation of innovation and characterized by complexity and uncertainty conditions and requirements.

General competence

1. Ability to apply knowledge of histology, cytology and embryology in practical situations have specialized conceptual knowledge acquired during the training. To be able to solve complex problems and issues that arise in professional activities. Clear and unequivocal reports of their findings, knowledge and explanations that justify them to specialists and non-specialists. To be responsible for decision making in difficult conditions

2. Knowledge and understanding of the subject area of histology, cytology and embryology have profound knowledge of the structure of the profession. To be able to carry out professional work that needs updating and integration of knowledge. The ability to form effective communication strategy in professional activities bear responsibilities for professional development, capacity

Further professional teaching with high autonomy.

3 Ability to select the strategy of communication; ability to work in a team; Know the skills of interpersonal interaction tactics and communication strategies, laws and methods of communicative behavior be able to choose methods and communication strategies for effective teamwork Use communication strategies and skills of interpersonal interaction bear responsibilities for the selection and tactics way communication

4 The ability to communicate in their native language both orally and in writing; ability to communicate in a second language have a perfect knowledge of the native language and basic knowledge of foreign languages able to apply knowledge of the native language, both oral and written, be able to communicate in a foreign language. Use at professional and business communication and preparation of documents native language. Use a foreign language in professional activities bear responsibilities for fluency native language, development professional knowledge.

5 skills to use information and communication technologies have profound knowledge in the field of information and communication technologies used in professional activity able to use information and communication technologies in the professional field that needs updating and integration of knowledge. Use information and communication technologies in professional activity bear responsibilities the development professional knowledge and skills.

6 The capacity for abstract thinking, analysis and synthesis, capacity to learn and be trained in modern. Know the methods of analysis, synthesis and further study of contemporary able to analyze information, make informed decisions, be able to acquire modern knowledge Establish appropriate communications to achieve objectives. Bear responsibilities for timely gain modern knowledge.

7 The ability to assess and ensure the quality of work. Know the methods of evaluation of performance indicators. To be able to provide quality fulfilling work. Establish relationships to ensure quality fulfilling work. Bear responsibilities for quality performance works.

8 Certainty and persistence on tasks and duties undertaken know the responsibilities and perform the tasks routes able to determine the goals and objectives to be persistent and diligent in the performance of duties establish interpersonal relationships for effective implementation of tasks and responsibilities Responsible for quality implementation assigned tasks

Special (professional, substantive) competence

1 Capacity for evaluation of laboratory results have specialized knowledge about human organs and systems, aware of the standard methods of laboratory tests able to analyze the results of laboratory tests and on their basis to assess information on the diagnosis of the patient proved to appoint and evaluate the results of laboratory tests bear responsibility for decision for evaluating laboratory results

Learning Outcomes: Evaluate information on the diagnosis in terms of health institution, his unit, using knowledge of human, his organs and systems, based on laboratory results

2. The information amount of discipline

In studying the discipline given 225 hours 7,5 ECTS credits.

If the program is structured in modules:

Module 1. Cytology, general Histology and Embryology

Module 2. Special histology and embryology

Lectures themes.

First semester.

№	Topic of the lecture
1	Introduction to Histology, Cytology and Embryology. Cytology. Organelles and Inclusions. Nucleus of the Cell. Cell division. The Basics of General Embryology. Development of Higher Mammals and Human development.
2	Concept of Tissues. Covering and Glandular Epithelium. Tissues of internal environment. Morphology of Blood.
3	Connective tissue proper. Skeletal tissues. Cells and functions of cartilage and bone.
4	Special tissues. Muscular and Nervous tissues. Histophysiology of muscle contraction.

In total: 8 hours.

Second semester.

№	Topic of the lecture
1	General characteristics of Digestive system. Organs of Oral Cavity. Structure of the Lip. The Tongue. Soft and Hard Palate. Tonsils.
2	Teeth. Odontogenesis. Sources, stages and the course of development of teeth. Teeth' structure. Dental tissues, their distribution by anatomical parts. Age related changes of teeth.
3	Glands, associated with digestive system. Large Salivary Glands. Liver and Pancreas. General morphofunctional characteristics.
4	Respiratory system. Air-conducting portion and respiratory part. Surfactant complex. Air-blood barrier.

Total in second semester – 8 hours.

Note: duration of every lecture - 2 hours.

In total: 16hours.

Laboratory lessons themes.

First Semester.

№	Topic of Laboratory Lesson
1	Introduction into Histology, Embryology and Cytology. Modern methods of morphological investigation. Microscope. Microscopical techniques.
2	General Structure of the Cell. Biological membranes. Cell membrane. Cytoplasm. Organelles and Inclusions.
3	Cell Nucleus. Cell division and cell differentiation. Cell aging and death. Signal systems in the cell.
4	Progenesis. Fertilization, Cleavage. Gastrulation. Histo- and organogenesis. Implantation, formation of placenta, extraembryonic organs.
5	Summary lesson 1. Cytology and Embryology.
6	General histology. Sources of development and general principles of tissues organization. Epithelial tissues. Glandular Epithelium.
7	Tissues of internal environment. Morphology of Blood and Lymph. Hematopoiesis.
8	Tissues of internal environment. Connective tissue proper. Connective tissues with special properties.
9	Skeletal connective tissues – cartilage and bone.
10	Special tissues. Muscular tissue.
11	Special tissues. Nervous tissue.
12	Summary lesson 2. General histology. Tissues.
13	Central and peripheral nervous system. Receptors.
14	Sensory organs. The Eye. Visual analyzer (eye and related structures).
15	The Ear. Statoacoustic system.
16	Summary lesson 3. Nervous system. Sensory systems of human organism.

Total in first semester – 48 hour.

Second Semester.

№	Topic of Laboratory Lesson
1	Cardio-vascular system.
2	Endocrine system.
3	Immune organs.
4	Skin and its derivatives. Morphological bases of cutaneous, deep and visceral sensitivity.
5	Summary lesson № 1. Regulatory systems of human organism.
6	Oral cavity. Structure of the lip. The tongue. Hard and soft palate. Palatine tonsils.
7	Teeth. Odontogenesis. Sources, stages of tooth development and progress. Teeth' structure. Large Salivary Glands.
8	Pharynx, Esophagus, Stomach. Glands of stomach. Histophysiology of digestion.
9	General structure of Intestine. Morphological differences in structure of intestinal wall of small and large intestine.
10	Digestive Glands. Liver, Pancreas.
11	Summary lesson № 2. Digestive system.
12	Morphofunctional characteristics of Respiratory Organs.
13	Urinary system. Histophysiology of phases of urine formation.
14	Male Reproductive system. General characteristics. Functions. Principles of regulation.
15	Female Reproductive system. General characteristics. Ovarian-menstrual cycle: phases, regulation.
16	Summary lesson № 3. Special Histology and Embryology of Respiratory, Urinary and Reproductive systems. Final lesson.

Total in 2nd semester 48 hours.

Duration of every lab lesson - 3 hours, grand total 96 hours.

Independent work.

First semester

№ п\п	Topic
1	History of Histology, Cytology and Embryology. Histology in Ukraine. Modern histological technique.
2	Microscope. Microscopic devices. Histological techniques.
3	Modern methods of histological investigations.
4	Intercellular junctions, their types, intercellular interaction.
5	Chromatin and Chromosomes. Morphology and chemical structure. Karyotype. Ploidy.
6	Life and cell cycle, their characteristics. Apoptosis, its biological and medical meaning. Cell aging and cell death.
7	Conception of extracorporal fertilization, its medical and social meaning.
8	Cloning of animals. Fertilization <i>in vitro</i> , morphological aspects of embryonic transplantation.
9	Law of rise and evolution of tissues. Differentiation, determination, regeneration.
10	Human blood picture in the norm and white blood cells count. Age-related changes of Blood. Lymph characteristics.
11	Embryonic hemopoiesis (development of blood). Peculiarities of yolk sac and hepatic hemopoiesis. Modern model of hemopoiesis.
12	Postembryonic hemopoiesis. Conception of colonies-making units.
13	Histogenesis, regeneration and age changes of cartilage.
14	Osteogenesis and regeneration of bone.
15	Molecular mechanisms of muscle fiber contraction.
16	Cytophysiology of conducting system of the heart.

In total

54 hours.

Second semester

№ п\п	Topic
1	Development of the sense organs. Histophysiology of accommodation, dioptric and photosensory apparatuses of the eyeball. Cytological structures of statokinetic and acoustic systems.
2	Cytological features of receptor structures of the skin, their role in the peripheral nervous system.
3	Development of the oral cavity and organs of digestive system. Embryonic sources and mechanisms of formation of the dental-maxillary apparatus.
4	Structural bases of digestion. Neurohumoral regulation of digestion.
5	Gut-associated lymphoid tissue.
6	Development of digestive glands. Regulation of secretory activity and regeneration of digestive glands.
7	Endocrine apparatus of digestive glands. Morphological peculiarities of different types of islet cells of pancreas.
8	Preparation for Summary lesson 2. Digestive system.
9	Development of respiratory system. Neurohumoral regulation of mucociliary apparatus and bronchial tone.
10	Development of urinary system. Structural bases of urine concentration.
11	Development of organs of male reproductive system. Structural and molecular criteria of the diagnostics of male infertility.
12	Development of organs of female reproductive system. Regulation of ovarian-menstrual cycle. Cervix of uterus.
13	Endometrial receptivity and mechanisms of implantation. Mechanisms of placental development. Regularities of organogenesis.

In total 59 hours.

Total duration of independent work – 113 hours.

9. Individual tasks: writing papers, preparing presentations, making visual training aids (tables, posters, histological preparations)

10. Tasks for independent work:

preparation of reports or presentations on themes from Table 8 "independent work"

11. Teaching methods: survey students with an explanation of the key issues of the subject, answer questions students master the practical skills

12. Methods of control: control test, oral examination, a written response to questions teacher

13. The form of the final control of the success of training, control of practical skills (working with a microscope, histological diagnosis drugs, electronic micrographs), test control, a written response to questions from the ticket

14. Shema calculation and distribution points that get students:

For subjects which form the final control test is:

The maximum number of points that a student can collect for current educational activity at the study course is 200 points.

The minimum number of points that a student must collect for current educational activity for enrollment course is 120 points.

Calculating the number of points is based on student assessments received by 4-point scale (national) scale in the study subjects, by calculating the arithmetic mean (CA), rounded to two decimal places. The resulting value is converted into points by multi-scale as follows:

For convenience, a table converted 200-point scale:

Recalculation of the average score for current activity in multimark scale for courses that are completed by test

For subjects which form the final control is examination (differentiated test):

The maximum number of points that a student can collect for current educational activity for admission to the examination (differentiated test) is 120 points.

The minimum number of points that a student must collect for current educational activity for admission to the examination (differentiated test) is 72 points.

Calculating the number of points is based on student assessments received by 4-point scale (national) scale in the study subjects, by calculating the arithmetic mean (CA), rounded to two decimal places. The resulting value is converted into points by multi-scale as follows:

For convenience, a table converted 200-point scale:

$$x = \frac{CA \times 120}{5}$$

Recalculation of the average score for current activity in multimark scale for subjects that completed exam.

For subjects which form the final control is examination (differentiated test):

The maximum number of points that a student can collect for current educational activity for admission to the examination (differentiated test) is 120 points.

The minimum number of points that a student must collect for current educational activity for admission to the examination (differentiated test) is 72 points.

Calculating the number of points is based on student assessments received by 4-point scale (national) scale in the study subjects, by calculating the arithmetic mean (CA), rounded to two decimal places. The resulting value is converted into points by multi-scale as follows:

For convenience, a table converted 200-point scale:

Recalculation of the average score for current activity in multimark scale for subjects that completed exam/

Independent work of students is assessed during the current control of theme on the proper lesson. The acquisition of the topics to be considered only on independent work is controlled at the final control.

The maximum number of points that a student can collect in the preparation of the exam is 80.

The minimum score in the preparation of the exam - at least 50.

Assessment of discipline, culminating exam is defined as the sum of scores for current educational activity (at least 72) and points on the exam (at least 50).

Assessment of discipline, which ends Differentiated test is defined as the sum of scores for current educational activity (at least 72) and individual performance scores for tests at the last lesson (at least 50).

Points are converted regardless of discipline both in scale ECTS, and 4-point (national) scale. Score scale ECTS 4-point scale not converted and vice versa.

Scores of students are enrolled in one specialty, taking into account the number of points gained in the discipline ranked on a scale ECTS as follows:

Assessment ECTS statistic

A best 10% of students

In the next 25% of students

C Next 30% of students

D Next 25% of students

E Last 10% of students

Ranking of assigning ratings of "A", "B", "C", "D", "E" is held for the students of this course, studying at one of the specialty and successfully completed the study subjects. Students who have received assessment FX, F («2») is not made to the list of students who ranked. Students from assessment after retaking FX are automatically mark "E".

Scores of discipline for students who successfully completed the program, converted into traditional 4-point scale by absolute criteria listed in the table below:

Scores of discipline Score 4-point scale

From 170 to 200 points 5

From 140 to 169 points 4

From 139 points for the minimum number of points that a student must score 3

Below the minimum number of points that a student must collect 2

Assessment ECTS in traditional scale is not converted because the scale of ECTS and independent four-point scale.

Objectivity evaluation of educational activities of students tested statistical methods (correlation coefficient between the assessment and evaluation of ECTS national scale).

15. Supportive (learning content), or extended outline plan of lectures, practical training plans, tasks for independent work, issues, tasks, objectives for current and final control of knowledge and skills of students

16. Suggested Reading

Basic:

1. Lutsyk A, Nakonechna O, Sogomonian A, Smolkova O, Dzhura O, Dudok O. Histology lab guide Cytology, embryology, general histology microscopical anatomy (training manual). Lviv, 2019.
2. Mescher AL. Junqueira's basic histology: text and atlas. 14th ed. Lange, 2016;
3. Gartner LP. Textbook of histology. 4th ed. Elsevier, 2017.
4. Pawlina W, Ross MH. Histology: a text and atlas with correlated cell and molecular biology. 8th ed. Wolters Kluwer, 2020.
5. Sadler NW. Langman's medical embryology. 12th ed. Wolters KluwerLippincot Williams Wilkins, 2012.
6. Gartner L.P., Hiatt J.L. Color textbook of histology. 3rd ed. – Philadelphia, Saunders Elsevier, 2007.

Additional:

1. Moore K.L. Persaud T.V.N. The developing human: Clinically oriented embryology. 8 th ed. – Philadelphia, Saunders Elsevier, 2008.
2. Ovalle W.K., Nahirney P.C. Netters essential histology. – Philadelphia, Saunders Elsevier, 2008.
3. Kierszenbaum AL, Tres LL. Histology and cell biology: an introduction to pathology. 4th ed. Saunders Elsevier, 2016.
4. Young B, O'Dowd G, Woodford P. Wheater's functional histology: a text and colour atlas. 6th ed. Churchill Livingstone, 2014.

11. Equipment, hardware and software resources of the discipline/ course

- Working program of the discipline;
- Multimedia support of lectures;
- Lecture thesis from the discipline;
- Methodical recommendations for teachers;
- Educational platform Misa;
- Methodical recommendations for practical classes for students;
- Test and control tasks for practical classes;
- Questions and tasks for final control (exam)