

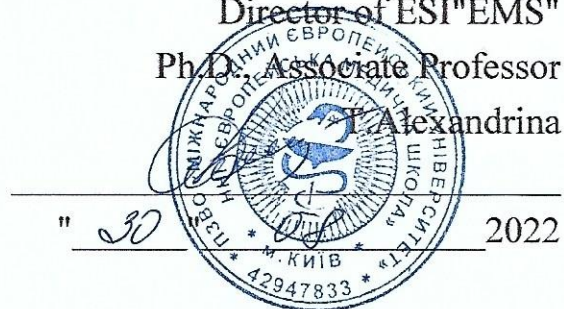
**INTERNATIONAL EUROPEAN UNIVERSITY  
EDUCATIONAL AND SCIENTIFIC INSTITUTE  
"EUROPEAN MEDICAL SCHOOL"**

APPROVED

Director of ESI"EMS"

Ph.D., Associate Professor

Alexandrina




**COURSE TRAINING PROGRAM  
on  
HISTOLOGY, CYTOLOGY, EMBRYOLOGY**

<b>Degree level</b>	Master
<b>Field of study</b>	22 "Health care"
<b>Specialty</b>	222 "Medicine"

**Kyiv - 2022**

DEVELOPED AND SUBMITTED: Educational and Scientific Institute "European Medical School", Department of Fundamental and Medical and Preventive Disciplines.

Developed by: G.B. Kostynskyi, Doctor of Medicine, Head of the Department of Fundamental and Medical and Preventive Disciplines, L.P. Bidna, Candidate of Science, Associate Professor of the Department of Fundamental and Medical and Preventive Disciplines.

Discussed and approved by the Department of Fundamental and Medical Preventive Disciplines №.1 from " 25 " 08 2022  
Head of the department Kostynskyi G.B. 

Approved at the meeting of the Scientific Council of the ESI"EMS"  
№ 1 of " 29 " 08 of 2022

## INTRODUCTION

**Program study educational disciplines** "Histology, cytology and embryology" composed in accordance to Standard higher education the second (master's) equal preparation acquirers higher education, educational degree

"Master" of the field of knowledge 22 "Health care", specialty 222 "Medicine", educational and qualification equal "Master" from with the qualification "Doctor".

**Description educational disciplines (annotation).** "Histology, cytology and embryology" lays down foundation for further assimilation students of knowledge and skill from profile theoretical and clinical professional and practical discipline - physiology, biochemistry, pathological anatomy and propaedeutics of clinical disciplines, which involves integration teaching with by these disciplines and formation skill to apply knowledge with histology in process of further education and professional activity

The discipline program is structured into four meaningful sections: section I. "Cytology",

section II. "Embryology",

section III. "General histology", section IV. "Special histology"

### **Informative description educational disciplines**

Name indicators	Branch of knowledge, specialty, level higher education	Characteristic educational disciplines	
		daytime form teaching	
Number loans – 9	Branch knowledge: 22 "Protection health"	Normative	
	Specialty: 222 "Medicine"	Year preparation	
		2nd	2nd
Total hours —270		Semester	
		III	IV
	Educational qualification level: master	Lectures	
		32 hours	32 hours
		Practical	
		48 hours	48 hours
		Independent work	
		70 hours	40 hours
Kind control			
		test	exam

**subject study educational disciplines** is microscopic and ultramicroscopic structure cells, tissues and bodies human body.

**Interdisciplinary connections:** is based on studies students medical biology, anatomy and integrates with these disciplines; lays the foundations for student learning physiology, biochemistry, pathological anatomy and pathological physiology, propaedeutics clinical disciplines, which involves the integration of teaching with these 4 disciplines and formation of skills to apply knowledge of histology, cytology and embryology in the process further education and professional activity

### **1. Goal and task educational disciplines**

**1.1. The purpose** of the educational discipline "Histology, cytology and embryology" follows from goals of the educational and professional training program for graduates of the institution of higher education and is defined content those system of knowledge and skill by which should master

doctor.

Knowledge, which students receive from educational disciplines, is basic for block disciplines that provide natural-scientific (PN block) and professional-practical (bloc PP) training.

The discipline "Histology, cytology and embryology" lays the foundation for students for their further assimilation of knowledge from specialized theoretical and clinical professional practical discipline (medical chemistry, medical genetics, clinical immunology, infectious diseases from epidemiology, internal medicine, surgery, pediatrics etc).

### 1.2. The main ones tasks study disciplines is

The main ones tasks study disciplines "Histology, cytology and embryology" is:

- study of the molecular and structural bases of cell functioning and regeneration and their derivatives;
- study basics adaptation, reactivity and maintenance homeostasis;
- determination of adaptive and regenerative capabilities of organs taking them into account fabric composition, features regulations and age changes;
- interpretation of patterns of human embryonic development, regulation of processes morphogenesis;
- definition critical periods embryogenesis, flaws and anomaly development a person

**1.3. Competences and learning outcomes**, the formation of which contributes to the discipline (relationship with normative content preparation acquirers higher education, formulated in terms results study at Standards higher education).

According to requirements Standard higher education of Ukraine (second (master's) level of higher education, field of knowledge 22 "Health care", specialty 222 "Medicine") discipline provides acquisition students of the following **competencies**:

- **integral**: the ability to integrate knowledge and solve complex specialized problems tasks in wide and multidisciplinary contexts professional activity doctor, solve practical problems in new or unfamiliar environments when available incomplete or limited information, taking into account social and ethical aspects responsibility in the industry protection health.

- **general and professionals**:

<b>general competence (ZK)</b>	
<b>ZK 1.</b>	Ability to abstract thinking, analysis and synthesis.
<b>ZK 2.</b>	Ability to learn and master modern knowledge.
<b>ZK 3.</b>	Ability to apply knowledge in practical situations.
<b>ZK 4.</b>	Knowledge and understanding of the subject area and understanding of professional activity
<b>ZK 5.</b>	Ability to adapt and act in a new situation
<b>ZK 6.</b>	Ability to make informed decisions
<b>ZK 7.</b>	Ability to work in a team
<b>ZK 8.</b>	Ability to interpersonal interaction
<b>ZK 10.</b>	Ability to use information and communication technologies
<b>ZK 11.</b>	Ability to search, process and analyze information from
<b>ZK 12</b>	Determination and persistence of delivered tasks and taken responsibilities
<b>Professionals competence (FC)</b>	
<b>FC 1 .</b>	The ability to collect medical information about the patient and analyze clinical data.
<b>FC 2.</b>	Ability to determine the necessary list laboratory and instrumental studies and their assessment results
<b>FC 11.</b>	Ability to solve medical problems in new or unfamiliar environments in the presence of incomplete or limited information, taking into account aspects of social and ethical responsibility.

<b>FC 24</b>	Adherence to ethical principles when working with patients and laboratory animals
<b>FC 25</b>	Adherence to professional and academic integrity, to be responsible for the reliability of the obtained scientific results
<b>Software the results teaching (PRN)</b>	
<b>PRN 1.</b>	Have thorough knowledge of the structure of professional activity. Be able to carry out professional activities that require updating and integration of knowledge. To be responsible for professional development, the ability for further professional training with a high level of autonomy
<b>PRN 2.</b>	Understanding and knowledge of basic and clinical biomedical sciences, on level sufficient for solving professional tasks in the field of health care
<b>PRN 3</b>	Specialized conceptual knowledge, which includes scientific achievements in the field of health care and is the basis for conducting research, critical understanding of problems in the field of medicine and related interdisciplinary problems.
<b>PRN 4</b>	Identify and identify leading clinical symptoms and syndromes (according to list 1); according to standard methods, using preliminary data of the patient's history, data of the patient's examination, knowledge about the person, his organs and systems, establish a preliminary clinical diagnosis of the disease (according to list 2). .
<b>PRN 21.</b>	to search necessary information in professional literature and databases data others sources , analyze , evaluate and apply this one information .

*Integrative final the results training* , formation whose helps educational discipline: "Histology, cytology and embryology" lays the foundation for further formation the following program learning outcomes in accordance with the Standard of Higher Education of Ukraine postgraduate preparation specialists the second (master's) equal specialty "Medicine".

**As a result of studying the discipline "Histology, cytology and embryology" the student must know:**

- organization cells on microscopic and submicroscopic levels;
  - structure and functions superficial of the complex cells, organelle and includecytoplasm;
- structure core interphase cells and regularities his reconstruction under time mitosis;
- species reproductions cells and their features;
- regularities aged changes cells (aging) and cellular death ( apoptosis and necrosis)
- regularities basic stages embryogenesis;
- regularities and features embryonic development a person;
- definition concept "cloth";
- role general fabrics in the structure different bodies;
- aged features general tissues;
- embryonic and post-embryonic development special fabrics
- role special fabrics in structural different bodies;
- aged features special tissues;
- features physiological and reparative regeneration special tissues;
- concept about bodies, morphological and functional systems;
- features microscopic structure hollow and parenchymatous bodies;
  - the structure of various human organs in the aspect of interrelationships of the tissues included in their composition in different age periods, as well as in physiological and reparative conditions regeneration

**As a result of studying the discipline "Histology, cytology and embryology" the student must be able:**

- diagnose and describe micropreparations and electronic photomicrographs ;
- interpret microscopic and submicroscopic structure cells;
- evaluate core state cells in interphase and under time mitosis;
  - interpret features embryonic development fabrics (histogenesis) and bodies(organogenesis);
- determine critical periods embryogenesis, defects development a person;
- explain the main ones principles organizations different tissues, their interaction;
- do conclusions about role general fabrics in structural different bodies;
- analyze aged features general and special tissues;
- interpret embryonic and post-embryonic development general and special fabrics;
- evaluate physiological and remedial regeneration tissues;
  - interpret structure different bodies a person in aspects relationships tissues, which are included in their composition at different age periods, as well as in conditions of physiological ha reparative regeneration

## **2. Informative amount educational disciplines**

270 hours (9 ECTS credits) are allocated to the study of the academic discipline: (64 lecture hours, 96 practical classes, 110 hours SRS).

### **SECTION AND. CYTOLOGY**

*Specific purposes:*

Interpret the concept of cell organization at the microscopic and submicroscopic level levels; Draw conclusions about the role of the surface complex cells, organelles and cytoplasmic inclusions; Assess the state of the cell nucleus in interphase and during mitosis; Analyze processes aging and death cells

### **TOPIC 1. MICROSCOPE. MICROSCOPIC INSTRUMENTS. HISTORY DEVELOPMENT OF HISTOLOGY, CYTOLOGY AND EMBRYOLOGY. METHODS HISTOLOGICAL, CYTOLOGICAL AND EMBRYOLOGY RESEARCH**

The emergence of histology, cytology and embryology as independent sciences. Value of works R. Hook , A. Levenhuk , Ya. Purkinje , R. Brown , M. Schleiden for creation cellular theories. Research by T. Schwann . Cellular theory as fundamental generalization of biology Clarification microscopic structures fabrics and bodies creationclassification fabrics

Development of histology, cytology and embryology in Ukraine. Organization independent Departments (P.I. interlude , N.L. Khrjonshevskiy ). Value of research M.K. Kulchytskoho, V.Ya. Rubashkina , V.V. Alyoshina, M.I. Zazybina , M.F. Kashchenko, B.I. Khvatova \_

Modern stage development histology, cytology and embryology Connection histology with other sciences medical and biological profile.

Basic principles of manufacturing preparations for light and electronic microscopy, obtaining material (biopsy, needle puncture biopsy, autopsy ). Fixation, dehydration, consolidation objects, production slices on micro volumes and ultramicrotome. Kinds micropreparations - cut, dab, imprint, films, polish Coloring and contrast of preparations. The concept of histological dyes. Microscopy technique using light microscopes. Special lighting method microscopy: phase -contrast , dark-field , luminescence, interference , laser scanning \_ Transmission and scanning electronic microscopy. Concept about histochemistry, radio autograph , immunocytochemistry . Living room methods research.

Quantitative methods research - morphometry, densitometry, cytophotometry ,spectro - fluorometry.

### **Topic 2. CYTOLOGY. GENERAL ORGANIZATION CELLS STRUCTURAL COMPONENTS CELLS CYTOLEMA (PLASMOLEMA)**

Concept about the cell as elementary i live system Eukaryotic cell - as basis structures, functions, playback, development, adaptation and restoration multicellular organisms. Cell derivatives as components of multicellular tissues organisms

The purpose and tasks of cytology, its significance for medicine. Basic provisions of cellular theories on modern stage development of science.

General plan of the structure of a eukaryotic cell. Relationship of shape and size cells from their functional specialization in body animals and a person

Modern idea about biological membranes Cluster-mosaic model structures biomembranes . Membrane, supramembranous and submembranous components cytolemma , their structural and chemical and functional characteristic.

Transmembrane transport of substances. Diffusion, facilitated transport. Endo is that exocytosis \_ Wall etching. Receptor functions of cytolemma . Microvilli , cilium, flagellum, basal intussusception. Intercellular contacts, their types, structure and functions, intercellular interaction.

### **Topic 3. STRUCTURE AND FUNCTIONS OF CYTOPLASM**

The main ones components cytoplasm - hyaloplasm, organelles, inclusion.

Hyaloplasm - definition, cytosol and cytomatrix , physical and chemical properties, chemical storage, value for cellular metabolism Organelles - definition, classification. Organelles general and special appointment. Membrane organelles (grainy and non-grainy endoplasmic net, complex Golgi, lysosomes , peroxisomes , mitochondria). Non-membrane organelles (ribosomes, centrioles, microtubules , microfilaments and intermediate filaments ). Synthetic processes in the cell Interaction structural components cells at synthesis proteins and non-protein substances

Inclusion - definition, classification, value.

### **Topic 4. NUCLEAR APPARATUS CELLS REPRODUCTION CELL AGING AND DEATH CELLS**

Value core in life activities eukaryotic cells, storage and transfers genetic information. Shape, size, number of nuclei and nuclear-cytoplasmic ratios in different cell types. The main components of the nucleus: nuclear envelope, chromatin, nucleolus, karyoplasm.

Nuclear shell. her structure and functions. Membranes nuclear shell, perinuclearspace, nuclear pores.

Chromatin. Building and chemical storage. Euchromatin and heterochromatin . Sexual chromatin Chromatin as a form of existence of chromosomes in interphase nuclei Storage chromosomes: dna, RNA, histone and non-histone proteins. Structure and function of chromosomes under time division cells karyotype, ploidy .

Nucleus as derivative of chromosomes. Nuclear organizers. The structure of the nucleolus and its role in formation ribosomes

karyoplasm, physical and chemical properties, chemical storage, value in

life activities core Vital and cellular cycles, their characteristic. Types cells, coming out of the cell cycle.

Mitosis. Biological value. Phases mitosis Reconstruction structural components cells under time different phases mitosis Endomitosis. Polyploidy.

Intracellular regeneration. General morphofunctional characteristic, biological value.

Reactions of cells to a damaging effect. Reversible and irreversible cell changes. Their morphological manifestations. Adaptation of cells, its significance for preserving the life of cells in changed conditions existence. Apoptosis and his biological and medical value. Aging and death cells

## **SECTION II. EMBRYOLOGY PEOPLE**

*Specific purposes:*

Interpret the regularities of the main stages of embryogenesis. Analyze the stages development Chords and vertebrates

Interpret regularities embryonic development a person Determine critical periods embryogenesis, human developmental defects.

### **Topic 5. EMBRYONIC DEVELOPMENT. STRUCTURE AND FUNCTIONS AMNION**

Subject and task embryology a person Medical embryology. Correlation onto - and phylogeny. Periodization human embryogenesis.

Sex cells. Structure and functions of male and female germ cells, basic stages of their development. Meiosis as a mechanism of germ cell formation. Its occurrence. Fertilization in human his biological value, phases conditions, necessary for normal fertilization, phenomenon capacitation , acrosomal reaction, penetration spermatozoa, the formation of a male pronucleus . Cortical reaction of the oocyte , completion meiosis, formation female pronucleus . Concept about in vitro fertilization. Its medical and social significance. Zygote as monad.

### **Theme 6. HUMAN EMBRYONIC DEVELOPMENT. STRUCTURE AND FUNCTIONS OF THE AMNION, CHORION AND ALANTOIS.**

Fragmentation embryo human his characteristic. Building and localization embryo under time fragmentation. Types blastomeres . Morula Formation blastocysts . Embryo - i trophoblast . Implantation. her mechanisms, stages, chronology, features in a person

Delamination . Structures formed as a result of delamination . Presumptive rudiments providential bodies epiblast , hypoblast . Gastrulation. Formation embryonic mesoderm Neurulation and formation axial of the complex rudiments bodies

Differentiation embryonic leaves and their derivatives

Provisional organs: chorion, amnion, yolk sac, allantois , umbilical cord. Placenta man, his development, structure and functions. Endometrial changes during pregnancy, fetal shells System "mother-fruit". Concept about critical periods of embryogenesis and ontogenesis.

## **SECTION III. GENERAL HISTOLOGY**

*Specific purposes:*

Interpret concept "cloth".

To draw conclusions about the role of common tissues in the structure of various organs. Analyze aged features general tissues.

Draw conclusions about the role of special tissues in the structure of various organs. Analyze aged features special fabrics.

Interpret embryonic and post-embryonic development of special tissues. Evaluate physiological and remedial regeneration special fabrics.

### **Topic 7. INTRODUCTION IN GENERAL HISTOLOGY. GENERAL PRINCIPLES TISSUE ORGANIZATION. EPITHELIAL FABRICS**

Concept about fabric Systemic approach at defined concept fabrics, as multicellular body

Cells and cellular derivatives as fabric elements.

Formation fabrics on basis differentiation cells embryonic rudiments Mechanisms histogenesis. Regularities occurrence and evolution tissues, theories parallelism and divergent evolution. The concept of cell populations. Trunk cells, their properties. Determination and differentiation of cells, their molecular genetic foundations. Concept about the histogenetic series ( diferon ).

Classification fabrics Types physiological regeneration Concept about remedial regeneration and metaplasia .

#### **Epithelial fabrics and glands**

General morphofunctional characteristics of the epithelium. Organization of the epithelial layer Cytokeratins as markers different species epithelial fabrics Modern idea about building origin and functions basal membranes Nutrition epithelium Histogenesis epithelial fabrics Genetic and morphofunctional classification.

Building different species covering epithelium

Glandular epithelium. Building and classification glands Secretory cycle. Types secretions Features physiological and reparative regeneration epithelial fabrics

### **Topic 8. FABRICS INTERNAL ENVIRONMENT. BLOOD AND LYMPH**



Morphofunctional characteristic. Origin. Mesenchyme. Classification connective tissues. The system of connective tissues as the internal environment of the body. Blood composition, plasma and formed elements, function. Characteristics of plasma. Building and functions erythrocytes, leukocytes, platelets. Classification leukocytes, their participation in the body's protective reactions. Hemogram and leukocyte formula, their features in newborns and children different age. Characteristic lymph. Concept about physiological blood regeneration and lymph.

### **Hematopoiesis and lymphopoiesis .**

Postnatal hematopoiesis as physiological regeneration of blood Myeloid and lymphoid tissue. Modern theory hematopoiesis. Stovburova hematopoietic cell, her properties Hemi -stem cells. The concept of colony -forming units. Unipotent cells- predecessors morphologically recognizable proliferating progenitor cells, maturing and mature cells of blood. Histogenetic rows: erythropoiesis , granular cytopoiesis , monocytopenoiesis , thrombocytopenoiesis , lymphopoiesis .

Embryonic hematopoiesis (development of blood as a tissue), its stages ( mesoblastic , hepatothymolienal and medullotymolymphoid ).

## **Topic 9. OWN CONJUNCTIONS FABRICS**

General characteristic. Classification.

Fibrous connecting fabrics. Their varieties - loose and dense.

Characteristics of loose fibrous binder fabrics. Cellular composition of loose fibrous connecting fabrics (fibroblasts, macrophages , plasma cells , fabric basophils, lipocytes , pigmented you adventitial cells). Intercellular substance loose fibrous connecting fabrics, fibrous structures (collagen, reticular, elastic fibers) and amorphous substance. Macrophagic system body. Interaction cells of blood and connecting fabrics with inflammatory.

Dense fibrous connecting fabrics, their varieties - decorated and unsigned, their localization, structure and functions. Building tendon.

Connective tissues with special properties: reticular, adipose (white and borax), pigmented, mucous, their localization, structure and functions.

## **Topic 10. HRYACHSHOV FABRICS AND BONE FABRICS**

General plan of structure and function. Cellular elements ( chondroblasts , chondrocytes ). Isogenic groups of cells. Intercellular substance, its histochemical features . Varieties cartilaginous fabrics ( hyaline , elastic, fibrous) Ochryastia, his value in feeding, grow up and regeneration cartilage. Histogenesis cartilage fabrics.

General plan structures and functions. Varieties bone fabrics. Reticulofibrous and lamellar bone tissue. Bone tissue cells: osteocytes, osteoblasts, osteoclasts . Intercellular substance. its composition (fibers and amorphous component), physical chemical features. Direct and indirect osteogenesis . Bone as body. Periosteum, its role in the structure, nutrition, growth and regeneration of bone. Bone remodeling under time body growth. Factors affecting bone growth.

connection bones. Classification. Building joints, articular cartilage, articular capsule, her structure.

## **Topic 11. MUSCULAR FABRICS**

General morphofunctional characteristic muscular tissues, genetic and morphological classification.

Unstriated muscular cloth mesenchymal origin. histogenesis, building, morphofunctional and histochemical characteristic.

Myocyte . Organization of the contractile apparatus. Regeneration of non-striated muscle fabrics. Unstriated muscular fabrics epidermal and neural origin.

Striated skeletal muscle tissue (somatic type). Localization, histogenesis, functional features. Muscle fiber as a structural and functional unit fabrics. The structure of muscle fibers. Myosatellitocytes . Sarcoplasmic reticulum. T- system. Types of muscle fibers, the relationship between muscle excitation and contraction fibers. Muscle as an organ. Mion . Endomysium , perimysium , epimysium . Regeneration of skeletal muscular fabrics.

Cardiac muscular cloth ( coelomic type) - see section "Cardiovascular system".

### **Topic 12. NERVOUS CLOTH**

General morphofunctional characteristic. Histogenesis.

Neurocytes (neurons). Morphological and functional classification. Building perikaryon , axon, dendrites. Organelles of general and special purpose. Processes transport substances in neurons  
Concept about neurotransmitters . Secretory neurons. Neuroglia . General characteristic, the main ones varieties Centralgliaocytes . Macroglia ( ependymocytes , astrocytes, oligodendrocytes ). Microglia .

## **SECTION IV. SPECIAL HISTOLOGY**

*Specific purposes:*

Explain the concept of organs, morphological and functional systems. Interpret the peculiarities of the microscopic structure of hollow and parenchymal bodies Interpret the structure of various human organs in terms of relationshipstissues, what included in their composition in different aged periods, a also in terms

physiological and reparative regeneration

Explain the concept of organs, morphological and functional systems. Interpret the peculiarities of the microscopic structure of hollow and parenchymal bodies Interpret structure different bodies a person in aspects relationships tissues, what included in their composition in different aged periods, a also in terms

physiological and reparative regeneration

### **Topic thirteen. CARDIOVASCULAR SYSTEM**

General characteristic. Sources and course embryonic development Classification vessels  
Dependence the structure of the vessel wall from hemodynamic conditions. Age changes

General plan structures vascular walls Artery. Types arteries (elastic, muscular elastic, muscular).  
Organic features arteries

Hemomicrocircular channel. Hemocapillaries . Building endothelium. Arteriovenular \_anastomoses .

### **Topic 14. CARDIOVASCULAR SYSTEM**

veins, features structures comparatively with arteries Classification vein Building venousvalves Organic features vein

Lymphatic vessels Classification, structure lymphatic vessels different types Features structures lymphatic capillaries and postcapillaries , participation in microcirculation.

Heart. Embryogenesis. The general structure of the heart wall. Endocardium, heart valves.  
Myocardium. Features structures and functions cardiac muscular fabrics Source development,

features of histogenesis. Morpho - functional characteristic contractile, leading and secretory cardiomyocytes . Leading system hearts Opportunities regeneration cardiac muscular fabrics

Building epicardium and pericardium

Heart a newborn Reconstruction, development and age changes hearts after birth.

### **Topic 15. SYSTEM BODIES BLOOD FORMATION AND IMMUNE PROTECTION**

General morphofunctional characteristic and classification.

Red bony brain. Localization, structure and functions: stroma, parenchyma, vascularization . Yellow bone marrow. Age changes Regeneration.

Thymus ( Vylochkova gland) as central body T- lymphocytopoiesis . Chips: Kirkova and cerebral substances, thymic bodies Features vascularization . age and accidental involution, thymico -lymphatic status.

### **Topic 16. PERIPHERAL BODIES BLOOD FORMATION**

Spleen. Structure and functions: stroma and parenchyma, white and red pulp. T- and B- white pulp areas. Features of blood supply. Structure and function of venous sinuses of the spleen. Opportunities

regeneration spleen

Lymphatic nodes Building and functions: stroma and parenchyma, Kirkova and cerebral substance. T- and B-zones. Para-cortical zone. System of sinuses. Histophysiology lymphatic nodes Regeneration.

Hemolymphatic nodes Features structures and value.

the only one immune system mucous membranes shell: lymphatic nodules in the wall airborne ways, alimentary canal and others bodies

### **Topic 17. CENTRAL BODIES ENDOCRINE SYSTEMS**

General morphofunctional characteristics. The concept of hormones and their meaning for the body Target cells and hormone receptors. Mechanism of action of hormones. Principle feedback. Classification of endocrine glands. Central and peripheral endocrine links systems.

Neuroendocrine system of regulation of body functions. Hypothalamus. Great and small cell core hypothalamus as central link endocrine systems. Building and functions of neurosecretory cells. Hypothalamus-neurohypophyseal and hypothalamus - adenohipophyseal system and their neurohemal organs ( neurohypophysis and medial eminence). Liberyns and statins .

Epiphysis building, cellular storage, communication with by others endocrine glands Hormones and their action. Development, age changes

Pituitary. Embryogenesis adeno - and neurohypophysis . building, cellular storage adenohipophysis . Morphofunctional characteristics of endocrine cells , their changes in violations hormonal balance Hypothalamic-adenohipophyseal vascular system, her role in transport hormones Building and functions neurohypophysis , his role in output into the blood hormones the front hypothalamus Age changes Thyroid gland. Development, building, cellular storage. Follicles. Folliculogenesis .

### **Topic 18. PERIPHERAL BODIES ENDOCRINE SYSTEMS**

Morphofunctional characteristic follicular endocrinocytes . building, hormones and their action. Features of the secretory cycle. Reconstruction of follicles in communication with different functional activity. Parafollicular endocrinocytes , sources development, localization, hormones and their action.

Parathyroid glands Development, structure and cellular storage. Parathyrin , his role in regulations mineral exchange

Adrenal glands. Embryogenesis. Fetal and definitive cortex of the adrenal gland. Zones of the cortex, their structure, morphofunctional characteristics of their endocrinocytes . Role adrenal cortex hormones in the development of the general adaptation syndrome. Mozkova substance adrenal glands (structure, cellular storage, hormones, their action).

Single hormone producing cells non-endocrine bodies Classification by origin ARUD cells - systems, localization, hormones and their action.

### **Topic 19 . DIGESTIVE SYSTEM**

General morphofunctional characteristics. Embryogenesis. Division into departments for development, structure and functions. General plan of the structure of the wall of the alimentary canal. Characteristic shell, their fabric storage and features in different areas May channel Innervation and vascularization May tubes Glands May channel, their localization, structure and functions. The concept of gastro-enteropancreatic endocrine the system, its value for body

Cavity mouth Features mucous shells in connection with functions. lips, cheeks gums, solid and soft palate, tonsils, tongue.

### **Topic 20 . BUILDING ZUBA TA HIS DEVELOPMENT**

Teeth Fabrics tooth their distribution according to anatomical in parts Enamel, dentin, cementum - building, chemical storage, function. Pulp tooth building, function. Periodontal . Development teeth Dairy and permanent teeth Age changes teeth

Pharynx and esophagus. Features of the structure of the mucous membrane. Esophageal glands, localization, histophysiology. Features structures walls esophagus on different levels Age changes

### **Topic 21 . BUILDING ESOPHAGUS, STOMACH**

Stomach. Building walls, her fabric storage. Features relief mucous shells and its epithelial lining, differences in different parts of the organ . Localization, structure and cellular storage glands Exo - and endocrinocytes different types Histophysiology secretory cells Regeneration epithelium stomach \_ Age changes

Small intestine. General characteristics of various anatomical departments, wall structure. Features relief mucous shells System "crypto-villus". Types of epitheliocytes , their structure and functions. Histophysiology of digestion. The role of microvilli columnar epitheliocytes in wall-mounted digestion Features structures duodenum, jejunum and ileum. Aggregated lymphatic follicles in ileum. Regeneration thin epithelium intestines Age changes

Thick gut. Building walls Features relief mucous shells Histophysiology thick intestines Vermiform process, his building, function.straight gut, departments, their morphofunctional features. Age changes. Digestive glands. Large salivary glands. Structure, histophysiology, exotic endocrine functions.

### **Topic 23. BUILDING LIVERS AND SUBGASTRIC GLANDS**

Pangastric gland. General morphofunctional characteristic. Building exocrine and endocrine parts. Acinus as a structural and functional unit exocrine clearing pancreatic glands Features morphology and functions Adenocytes . Centroacinous cells Structure of outputs ducts Types pancreatic islet cells, their morphofunctional characteristic. Acinous - islet cells Age changes

Liver. Morphofunctional characteristic. Features blood supply Building classical particles liver Intralobular hemocapillaries . Hepatic beams hepatocyte, his structure and functions. Bile capillaries Perisinusoidal space, perisinusoidal lipocytes, their structure and functions. Concept about hepatic acinus and portal a piece Biliuous bladder and biliary ways Regenerative potential bodies May systems. Age changes

### **Topic 24 . RESPIRATORY SYSTEM**

General morphofunctional characteristic. Airborne ways and respiratory department. Building shell walls airborne ways: mucous membrane shell, submucous base, fibro -cartilaginous shell, external ( adventitious )shell.

Departments airborne ways: nasal cavity, larynx, trachea, bronchi (main,big average and small caliber), terminal bronchioles, their structure and function. Concept about broncho-associated lymphoid fabric, her value for body

General plan of the structure of the lung. The concept of a lobe of the lung. Acinus as a structural functional unit of the respiratory department of the lung. Structure of alveoli, cellular storage her lining Surfactant complex. Aerogematic barrier. Pleura.

Regenerative potential bodies breath. Age changes

### **Topic 25. URINARY SYSTEM**

Urinary bodies General morphofunctional characteristic. Embryogenesis. Age changes Kidneys Cerebral and cerebral matter. Nephron as a structural and functional kidney unit. Types of nephrons. Divisions of the nephron and their histophysiology. Building renal corpuscle, renal filtration barrier. Features of kidney blood circulation -cortical and juxtamedullary blood supply systems. Endocrine apparatus kidneys Juxtglomerular complex, its structure and functions. Regenerative kidney potential. Urinary tract, structure of renal bowls, cups, ureters urinary bladder, urethra.

### **Topic 26. MALE STATEVA SYSTEM**

General characteristic. Embryogenesis. Testicle, his structure and functions. Tortuous seminal tubules, the structure of its wall. Spermatogenesis. Testicular endocrinocytes , their function. Hematotesticular barrier. Age changes

Seed-bearing ways Appendage testicles Sperm bearing strait. Family bubbles Ejaculatory duct. Prostate gland. Age changes. Penis, his structure, vascularization and innervation.

### **Topic 27. FEMALE STATEVA SYSTEM (AND)**

Ovary, development of its generative and endocrine function. Cerebral and cerebral substance. Ovogenesis, its differences from spermatogenesis. Development and structure follicles. Ovulation. Development of the corpus luteum, its types. Ovarian cycle and its regulation Atresia of follicles. Age features structures ovary  
Uterine pipes, structure and functions.

### **Topic 28. FEMALE REPRODUCTIVE SYSTEM (II)**

Uterus. Wall structure (endometrium, myometrium, perimetrium). Menstrual cycle and its phases. The structure of the endometrium in different phases of the cycle. The connection of the menstrual cycle with ovarian - Influence hormones pituitary gland and action hypothalamic centers regulations ovarian -menstrual cycle. Reconstruction of the uterus during pregnancy and after gave birth Age changes

Vagina. Wall structure, changes in structure in connection with the menstrual cycle. Milk gland. Structure and functions.

### **Topic 29. PERIPHERAL NERVOUS SYSTEMS**

Peripheral nervous system. sensitive nervous nodes (spinal and cranial). Sources of development Fabric composition. Building The position of nodes in the reflex arc. Building nervous trunks Features their reactions on damage, processes restoration. Nervous end (see section "Nervous cloth"). Somatic and vegetative (autonomous) nervous system. General morphofunctional characteristic vegetative nervous systems, distribution on sympathetic and parasympathetic systems. Concept about metasympathetic nervous system Cores central parts vegetative nervous systems. Building ganglia vegetative nervous systems. Prenodal and postnodal nervous fibers

### **Topic 30. CENTRAL NERVOUS SYSTEMS**

Nerve fibers. General characteristics, classification. Myelin and unmyelin nervous fibers Where is that? nerve regeneration fibers

Nerve endings. General morphofunctional characteristics. Receptors and effectors, their classification and structure. Concept of synapse. Interneuronal synapses (classification, building, mediators). Mechanism transfers excitation in synapse The morphological substrate of the reflex activity of the nervous system (the concept of simple and complex reflex arcs). Neuronal theory.

General morphofunctional characteristic. Embryogenesis. Classification (anatomical and functional).

Central nervous system system. Gray and white matter Nerve centers. Shells brain Spinal cord.

General morphofunctional characteristics. Gray structure substances Neuronal storage. Cores Own apparatus reflex activity Front and back the roots white substance. Conductive ways

Main brain. General characteristic, development. Stem brain Oblong brain. The most important associative cores. Reticular formation. Intermediate brain. Cores thalamus Hypothalamus, main core Functions intermediate brain

Cerebellum. Building and functions. Grey and white substance. Layers bark cerebellum, their neural storage. Interneuronal connections Afferent and efferent fibers Gliocytes of the cerebellum.

Bark large hemispheres main brain General morphofunctional characteristic. Cytoarchitectonics: neuronal composition, cortical layers of the large hemispheres. Concept about cerebral modules (barrels, columns). Interneuronal connections Myeloarchitectonics. Gliocytes.

Hematoencephalic barrier, building, value.

### **Topic 31. BODY SIGHT AND SNIFF**

General characteristics of the senses. Teaching about sensory systems. Classification sense organs according to the origin and structure of receptor cells. General characteristic. Embryogenesis. General plan of the structure of the eyeball. Shells, their departments and derivatives. The main functional devices: dioptric, accommodation, receptor Photoreceptors cells Neurons and gliocytes of the retina. Building yellow and blind stains retina Visual nerve. Hematoophthalmic barrier. Auxiliary apparatus eye Age changes

The organ of smell. General characteristics. Embryogenesis. Localization. Olfactory cells. Supporting and basal cells. Histophysiology of the organ of smell. Vomero - nasal body.  
 Body taste \_ General morphofunctional characteristic and embryogenesis Tastybuds, their localization and structure Tasty, supporting and basal cells Histophysiology organ of taste

### Topic 32. BODY LISTEN BALANCE AND TASTE

. General morphofunctional characteristics. External, middle and internal ear. Bony and webbed labyrinths Vestibular part membranous labyrinth: uterus, sac and semicircular ducts, their receptor sections: spots and ampoules combs Hairy and supporting cells Otolitova membrane and dome. Zavitkova (auditory) part membranous the labyrinth Spiral body. Hair and supporting cells. Histophysiology of vestibular and auditory device Embryogenesis of hearing organs and balance Age changes

### 3. Structure educational disciplines

Name meaningful sections and topics	Number hours			
	ll -oh	IN including		
		l	p	s.r
<b>SECTION I. "Cytology", with <i>capacious section 1</i> .</b>				
Topic 1. Microscope. Microscopic devices Histological machinery.	8	2	3	3
Topic 2. Cytology. General organization of the cell. Superficialcomplex.	9	2	3	4
Topic 3. Structure and functions cytoplasm.	8	2	3	3
Topic 4. Nuclear apparatus cells Reproduction, aging and deathcells	9	2	3	4
<b>SECTION II. "Embryology human", with <i>capacious section 2</i>.</b>				
Topic 5. Foundations of biology development General embryology. Embryonic development a person Fertilization, fragmentation	8	2	3	3
Topic 6. Embryonic development a person Structure and functions amnion , chorion, placenta and umbilical cord Gastrulation	8	2	3	3
<b>SECTION III. "General histology", with <i>capacious section 3</i>.</b>				
Topic 7. Introduction in general histology Epithelial fabrics	9	2	3	4
Topic 8. Blood . Hemogram. Erythrocytes. Platelets. Leukocytes Leukocyte formula. Lymph	8	2	3	3
Topic 9. Conjunctions actually fabrics	8	2	3	3
Topic 10. Cartilage and bone fabrics: classification, development, structure and functions.	8	2	3	3
Topic 11. Muscular fabrics: classification, development, structure and functions.	8	2	3	3
Topic 12. Nervous tissue.	9	2	3	4
<b>SECTION IV. "Special histology", <i>content section 4</i>.</b>				
Topic 13. Cardiovascular system ( AND) arteries, vessels HMCSR	9	2	3	4
Topic 14. Cardiovascular system (II) Veins Lymphatic vessels, heart	8	2	3	3
Topic 15. Central bodies hematopoiesis and immune protection	9	2	3	4
Topic 16. Peripheral bodies hematopoiesis and immune protection	8	2	3	3
Topic 17. Central bodies endocrine systems	9	2	3	4
Topic 18. Peripheral bodies endocrine system	8	2	3	3
Topic 19. Digestive system. General plan of the structure of the alimentary canal. Features structures mucous shells bodies oral cavities	9	2	3	4
Topic 20. Building tooth and his development	8	2	3	3
Topic 21. Building esophagus, stomach, thin and thick intestines	9	2	3	4
Topic 22. Building salivary glands	8	2	3	3

Topic 23. Building liver and pancreatic glands	9	2	3	4
Topic 24. Respiratory system Skin and her derivatives	8	2	3	3
Topic 25. Urinary system	9	2	3	4
Topic 26. Male reproductive system	8	2	3	3
Topic 27. Women's reproductive system (AND)	9	2	3	4
Topic 28. Women's sexual system (II)	8	2	3	3
Topic 29. Organs peripheral nervous systems	9	2	3	4
Topic 30. Organs central nervous systems	8	2	3	3
Topic 31. Organ of vision and sense of smell	9	2	3	4
Topic 32. Body hearing balance and taste	8	2	3	3
<b>EVERYTHING WITH DISCIPLINES</b>	<b>270</b>	<b>64</b>	<b>96</b>	<b>110</b>

#### 4. Topics lectures classes

No n/p	Topics lectures	Mrhours
1.	Introduction to course histology, cytology.	2
2.	Embryogenesis a person	2
3.	Introduction in general histology Covers epithelial fabrics	2
4.	Glandular epithelial fabrics	2
5	Blood and lymph.	2
6	Hemocytopoiesis	2
7.	Actually connecting fabrics	2
8.	Skeletal fabrics	2
9.	Skeletal muscular fabrics	2
10.	Smooth and cardiac muscular fabrics	2
11.	Nervous cloth: structure neuron and neuroglia	2
12.	Nervous cloth: structure nervous fibers and endings	2
thirteen	Cardiovascular system: arteries, vessels HMCSR	2
n.		
14.	Cardiovascular system: veins lymphatic vessels, heart	2
15.	Central bodies hematopoiesis and immune protection	2
16.	Peripheral bodies hematopoiesis and immune protection	2
17.	Central bodies endocrine systems	2
18.	Peripheral bodies endocrine system	2
19.	Organs oral cavities	2
20.	Drooling glands	2
21.	Building tooth	2
22.	Development teeth	2
23.	Pharynx, esophagus , stomach, thin and fat gut	2
24.	Liver and pancreatic gland.	2
25.	Respiratory system.	2
26.	Urinary system.	2
27.	Male sexual system.	2
28.	Women's sexual system AND.	2
29.	Women's sexual system II.	2
30.	Nervous system AND.	2
31.	Nervous system II.	2
32.	Organs flair.	2
<b>TOGETHER</b>		<b>64</b>

**5. Topics seminary classes – not provided for program**

**6. Topics practical classes**

No n/p	Practical topics classes	Mr
		hours
1.	Microscope. Microscopic devices Histological machinery.	3
2.	Cytology. General organization of the cell. Superficial complex.	3
3.	Structure and functions cytoplasm.	3
4.	Nuclear apparatus cells Reproduction, aging and death cells	3
5.	Foundations of biology development General embryology. Fertilization, fragmentation.	3
6.	Embryonic development a person Structure and functions amnion , chorion, placenta and umbilical cord Gastrulation	3
7.	Introduction in general histology Epithelial fabrics	3
8.	Blood. Hemogram. Erythrocytes. Platelets. Leukocytes Leukocyte formula. Lymph	3
9.	Actually connecting fabrics	3
10.	Cartilage and bone fabrics: classification, development, structure and functions.	3
11.	Muscular fabrics: classification, development, structure and functions.	3
12.	Nervous cloth.	3
thirteen.	Cardiovascular system ( AND) arteries, vessels HMCSR	3
14.	Cardiovascular system (II) Lymphatic veins vessels, heart	3
15.	Central bodies hematopoiesis and immune protection	3
16.	Peripheral bodies hematopoiesis and immune protection	3
17.	Central bodies endocrine systems	3
18.	Peripheral bodies endocrine system	3
19.	Travna system. General plan structures May tubes Features structures mucous shells bodies oral cavities	3
20.	Building tooth and its development	3
21.	Building esophagus, stomach, thin and thick intestines	3
22.	Building salivary glands	3
23.	Building liver and pancreatic glands	3
24.	Respiratory system Skin and her derivatives	3
25.	Urinary system	3
26.	Male reproductive system	3
27.	Women's sexual system (AND)	3
28.	Women's sexual system (II)	3
29.	Organs peripheral nervous systems	3
30.	Organs central nervous systems	3
31.	Body sight and sense of smell	3
32.	Body hearing balance and taste	3
<b>TOGETHER</b>		<b>96</b>

**7. Laboratory topics classes - no provided for program**



## 8. Topics for independent classes

No	Topic occupation	K-t hours
1.	Preparation for practical classes – theoretical preparation and development of practical skills	38
2.	Microscope. Microscopic devices Histological machinery.	3
3.	Cytology. General organization cells Superficial complex.	2
4.	Cytology. Building cytoplasm	3
5.	Cytology. Nuclear apparatus cells	2
6.	Cytology. Reproduction cells Aging and death cells	2
7.	General embryology. Embryonic development chordal, lower ones and higher vertebrates	2
8.	Embryonic development a person Structure and function amnion , chorion, placenta and umbilical cord	4
9.	Epithelial fabrics	2
10.	Blood and lymph. Hematopoiesis .	2
11.	Conjunctions fabrics	4
12.	Cartilage fabrics and bone fabrics	4
13.	Muscular fabrics	2
14.	Nervous cloth	4
15.	Nervous system	2
16.	Organs flair.	4
17.	Cardiovascular system	2
18.	Organs hematopoiesis and immune protection	4
19.	Endocrine system.	2
20.	Travna system.	4
21.	Skin and derivatives	4
22.	Respiratory system.	2
23.	Sechova system.	4
24.	Male reproductive system	4
25.	Women's sexual system.	4
<b>TOGETHER</b>		<b>110</b>

## 9. Individual tasks are not foreseen by the program

## 10. Teaching methods

According to the sources of knowledge, teaching methods are used: verbal - story, explanation, lecture, instruction; visual - demonstration, illustration; practical - practical work, problem solving. According to the nature of the logic of knowledge, methods are used: analytical, synthetic, analytical-

synthetic, inductive, deductive. According to the level of independent mental activity, the following methods are used: problem-based, searching, research.

1. Verbal methods: lecture, conversation;
2. Visual methods: illustration, demonstration
3. Practical methods: performing practical work and solving situational tasks to develop skills and abilities;
4. Students' independent work on understanding and assimilation of new material
5. Use of control and educational computer programs
6. Innovative teaching methods: business game, case method.

The types of training according to the curriculum are: lectures; practical training; independent work of students.

## 11. Control methods

**Current control** is carried out on the basis of control theoretical knowledge, practical skills and abilities.

**Forms of current control** are: *in the* dream survey (frontal, individual, combined), interview; practical verification of professional skills (conducted based on the results of practical work at the end of the class); test control ("open" and "closed" test tasks).

Current control is mandatory. During the evaluation of mastering of each topic from all disciplines of the curriculum for the current educational activity, the student is given grades on a 4-point (traditional scale) taking into account the approved evaluation criteria for the discipline. All types of work provided by the curriculum are taken into account. The student must receive a grade in each topic. The teacher conducts a survey of each student in the group at each lesson and assigns a grade in the journal of attendance and student performance according to the traditional scale ("5", "4", "3", "2").

When evaluating the student's current educational activity, 20% of the grade is the student's independent work, which takes into account the knowledge of the topic of independent study and the performance of work in the notebook.

The final (summary) control of the sections is carried out at the end of the section in the form of a written test, which includes test tasks from the "Step-1" bank, theoretical questions and control of practical skills (solving situational problems, defining and describing macro- and micropreparations, etc.) .

Such methods of control as oral, written and test are used, which should contribute to increasing the motivation of students-future specialists for educational and cognitive activities. According to the specifics of professional training, preference is given to test and written control. In the case of final control, preference is given to written or test control.

## 12. Form of final control of study success .

The final control of the discipline is carried out on the basis of theoretical control knowledge, practical skills and abilities.

**Assessment** is a form of final control, which consists in assessing the student's learning of the learning material based solely on the results of his performance of certain types of work in practical, seminar or laboratory classes. Semester assessment of subjects is carried out after the end of its study, before the beginning of the examination session.

**An exam (differential assessment)** is a form of final control of a student's assimilation of theoretical and practical material from an educational discipline.

## 13. Scheme of accrual and distribution of points received by students.

The maximum number of points for a discipline is 200 points. The ratio between the results of the evaluation of the current educational activity and the final control of knowledge is 60% and 40%.

**The first semester of studying the discipline ends with a test.**

*The maximum number of points* that a student can score for the current educational activity while studying the discipline is 200 points, *the minimum number of points* - the minimum number of points - is 120 points.

*The calculation of the number of points* is carried out on the basis of the grades received by the student on a 4-point (national) scale during the study of the discipline, by calculating the arithmetic mean, rounded to two decimal places.

The student receives a credit in the last lesson of the discipline based on the results of the current assessment.

Only those students who do not have academic debt and whose average score for the current academic activity in the academic discipline is at least 3.00 are admitted to the credit.

The average grade for the current activity is converted into points on a 200-point scale, according to the conversion table (Table 1).

**Table 1.**

**Recalculation of the average grade for the current activity into a multi-point scale (for disciplines ending with credit)**

4-point scale	200-point scale	4-point scale	200-point scale	4-point scale	200-point scale	4-point scale	200-point scale
5	200	4.47	179	3.94	158	3.42	137
4.97	199	4.44	178	3.92	157	3.39	136
4.94	198	4.42	177	3.89	156	3.37	135
4.92	197	4.39	176	3.87	155	3.34	134
4.89	196	4.37	175	3.84	154	3.32	133
4.87	195	4.34	174	3.82	153	3.29	132
4.84	194	4.32	173	3.79	152	3.27	131
4.82	193	4.29	172	3.77	151	3.24	130
4.79	192	4.27	171	3.74	150	3.22	129
4.77	191	4.24	170	3.72	149	3.19	128
4.74	190	4.22	169	3.69	148	3.17	127
4.72	189	4.19	168	3.67	147	3.14	126
4.69	188	4.17	167	3.64	146	3.12	125
4.67	187	4.14	166	3.62	145	3.09	124
4.64	186	4.12	165	3.59	144	3.07	123
4.62	185	4.09	164	3.57	143	3.04	122
4.59	184	4.07	163	3.54	142	3.02	121
4.57	183	4.04	162	3.52	141	3	120
4.54	182	4.02	161	3.49	140	< 3	70-119 (refolding)
4.52	181	4.00	160	3.47	139		
4.49	180	3.97	159	3.44	138		

The learning result is also evaluated on a two-point scale (passed/failed).

Table 2

**The scale of transferring points to the national system**

According to the national system	On a 200-point scale
counted	from 120 to 200 points
not counted	less than 119 points

Students' independent work, which is provided for by the topic of the lesson along with classroom work, is evaluated during the current control of the topic in the corresponding lesson.

**The second semester (the last semester of studying the discipline)** ends with a final control in the form of an exam.

Only those students who do not have academic debt (all missed classes have been completed) and whose average score for the current educational activity in the academic discipline is at least "3" are admitted to the exam.

*The maximum number of points* that a student can score for the current educational activity for admission to the exam is 120 points and is defined as the sum of the arithmetic average of all grades received in the semester.

*The minimum number of points* that a student must score for the current educational activity for admission to the exam is 72 points. Recalculation of the average grade for the current academic performance (on a 120-point scale) in the table. 3.

Table 3.

**Recalculation of the average grade for the current academic performance in a multi-point scale for disciplines ending with an exam**

4-point scale	200-point scale	4-point scale	200-point scale	4-point scale	200-point scale
5	120	4.29	103	3.58	86
4.96	119	4.25	102	3.54	85
4.92	118	4.21	101	3.50	84
4.87	117	4.17	100	3.46	83
4.83	116	4.12	99	3.42	82
4.79	115	4.08	98	3.37	81
4.75	114	4.04	97	3.33	80
4.71	113	4.00	96	3.29	79
4.67	112	3.96	95	3.25	78
4.62	111	3.92	94	3.21	77
4.58	110	3.87	93	3.17	76
4.54	109	3.83	92	3.12	75
4.50	108	3.79	91	3.08	74
4.46	107	3.75	90	3.04	73
4.42	106	3.71	89	3	72
4.37	105	3.67	88	Less than 3	Not enough
4.33	104	3.62	87		

The maximum number of points that a student can score when taking the exam is 80 (the minimum number is at least 50).

Discipline assessment is defined comprehensively as the sum of points for the current educational activity and points for the exam.

From the allocated 120 points for the current educational activity, 4 to 12 additional points are allocated for the assessment of individual independent work of higher education applicants, according to the work curriculum. Encouragement points are added to the final grade for the discipline at the end of its study.

Points with disciplines for students, which successfully completed the program are converted into the national scale and **ECTS system** (Table 4, 5).

Table 4.

Discipline points	Evaluation on a 4-point scale
From 180 to 200 points	5
From 150 to 179 points	4
From 149 points to the minimum number of points that the student must score	3
Below the minimum number of points that the student must score	2

Table 5

**Scale assessment: national and ECTS**

Total points for all types educational activity	Rating ECTS	Rating by national scale	
		for exam, difzalik	for offset
180-200	A	perfectly	counted
160-179	B	okay	
150-159	C	satisfactorily	
130-149	D		
120-129	E		
50-119	FX	unsatisfactorily with the possibility of refolding	not counted with possibility rearrangement
0 -49	F	unsatisfactorily with mandatory repeated studying the discipline	not counted with mandatory repeated study disciplines

**14. Methodological support**

1. Working curriculum of the discipline;
2. Plans of lectures, practical classes and independent work of students;
3. Abstracts of lectures on the discipline;
4. Methodical instructions for practical classes for students;
5. Methodical materials that ensure independent work of students;
6. Test and control tasks for practical classes;
7. List of exam questions

**15. Recommended literature**

The main one literature

1. Histology. Cytology. Embryology : textbook / by ed.: O.D. Lutsika, Yu.B.Tchaikovsky. – Vinnytsia: New Book, 2018. – 592 with.
2. Histology, cytology and embryology (Atlas for independent workstudents) / Yu.B. Tchaikovsky, L.M. Sokurenko , G.B. Kostinsky , O.E., Majeovsky; by ed. L.M. Sokurenko . – Kyiv, 2020. – 152 with.

Additional literature

1. Human histology / [Lutsik O.D., Ivanova A.Y., Kabak K.S., Tchaikovsky Yu.B.]. - Kyiv : Book plus, 2010. - 584 c.

2. Histology a person / [Lutsyk AT. D., Ivanova AND. AND., Tavern K. WITH., Tchaikovsky Yu. B.]. - Kyiv : Book plus, 2003. - c 592.
3. Volkov K. S. Ultrastructure of cells and tissues: study guide-atlas / K.WITH. Volkov, N. V. Pasechko . – Ternopil: Ukrmedknyga , 1997. - 95 c.
4. Lecture presentations on histology , cytology and embryology ( University website ). 5. Histology, cytology and embryology / [ Afanasyev Yu. I., Yurina N. AND., KotovskyIS. F. and etc. ] ; under ed. Yu. I. Afanasyeva , N. AND. Yurina . – [5th ed ., processing \_ and addn .]. – M.: Medicine. - 2001. - 560c.
6. Histology : [ study book ] / under the editorship. E. G. Ulumbekova , Yu. A. Chelysheva . – [2nd ed ., processing \_ and addn .]. - M.: GEOTAR-MED, 2001. - 580c.
7. Danilov R. K. Histology . Embryology . Cytology . : [ textbook for students medical university ] / R.K. Danilov – M.: OOO " Medicinskoe ". informative agency ", 2006. - 454 c.
8. Bulletin of Taras Shevchenko Kyiv National University. Series: Biology  
<http://biovestnik.com/index.php/biology>
9. Bulletin of the Kharkiv National University, Biology series".<http://ibhb.chnu.edu.ua/biosystem>
10. Herald problems of biology and medicine: <https://vpbm.com.ua/ua/>