FACULTY OF MEDICINE

CURRICULUM 0912.1 MEDICINE

DEPARTMENT OF HISTOLOGY, CYTOLOGY AND EMBRYOLOGY

APPROVED

at the meeting of the Commission for Quality Assurance and Evaluation of the Curriculum faculty of Medicine, Minutes No. 1 of 16.09.21

Chairman, MD, PhD, Professor
Suman Serghei _____

APPROVED

at the Council meeting of the Faculty Medicine, Minutes No. 1 of 21.09.21

Dean of Faculty of Medicine No.2, MD, PhD, Associate Professor
Betiu Mircea _____

APPROVED

approved at the meeting of the chair histology, cytology and embryology, Minutes **No.3 of 14 september 2021**

Head of chair, MD, PhD, Professor
Saptefrati Lilian _____

SYLLABUS

DISCIPLINE **HISTOLOGY, CYTOLOGY AND EMBRYOLOGY**

Integrated studies

Type of course: **Compulsory discipline**

Curriculum developed by the team of authors:

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Fulga Veaceslav, MD, PhD, Associate Professor

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I. INTRODUCTION

- General presentation of the discipline: place and role of the discipline in the formation of the specific competences of the professional / specialty training program

Histology, Cytology and Embryology is a fundamental discipline, linked organically to anatomy. Histology - as a concept in a broad sense - includes the study of the cell (cytology), of tissues (histology in a narrow sense) and organ study (microscopic anatomy), all carried out by means of optical or electronic microscopy. The study of histology, cytology and embryology at the university level will enable the future physician to learn the principles of the structural organization, development, and vital activity of cells, tissues, organs, organ systems and the human body as a polisistem, as well forming of concepts about reproduction and cell interaction, knowing of general laws of human ontogenesis, creating of identification skills of histological specimens and microphotoelectronograms, development of critical thinking in tackling of problems of fundamental morphology.

- Mission of the curriculum (aim) in professional training:

Study of microscopic and ultramicroscopic structure of cells, tissues and organs of the healthy body; acquiring of knowledge about human embryogenesis stages; skills training of the morpho-functional analysis of vital processes in the cell, tissue and organ in normal..

- Languages of the course: **Romanian, English, Russian;**
- Beneficiaries: students of the II year, **faculty of Medicine**.

II. MANAGEMENT OF THE DISCIPLINE

Code of discipline		**F.03.O.022/ F.04.O.031**	
Name of the discipline		**Histology, cytology and embryology**	
Persons in charge of the discipline		**Globa Tatiana, Fulga Veaceslav**	
Year	**II**	Semester/Semesters	**3/4**
Total number of hours, including:			**270**
Lectures	**30/30**	Practical/laboratory hours	**20/20**
Seminars	**25/25**	Self-training	**45/75**
Form of assessment	**E/E**	Number of credits	**4/5**

III. TRAINING AIMS WITHIN THE DISCIPLINE

At the level of knowledge and understanding:

- to know the basis of cytology, histogenesis, the structure and functions of tissues and organs;
- to understand the regularities of differentiation, cell and tissue regeneration;
- to identify the role of nervous system, endocrine and immune systems in the regulation of morphogenetic processes.
- to know the features of human development;
- to identify the aged changes of cells, tissues and organs.

At the application level:

- to make the diagnosis of cells, tissues and organs using the light microscope;
- to describe the electron microphotograph;
- to solve the problems of situation, multilateral and critical working with the studied information;
- to apply the knowledge acquired in the usual clinical test appreciation;
- to be able to apply the principle of cause and effect;
- to be astute to argue their own opinion and to accept diversity in the study of cells, tissues and organs.

At the integration level:

- to appreciate the importance of histology, cytology and Embryology in the context of medicine
- to address the problems of fundamental medicine creatively
- to infer interrelations between Histology, Cytology and Embryology and other basic disciplines;
- to possess the skills of implementation and of morphological integration of obtained knowledge in clinical disciplines;
- to be able to objectively assess and evaluate the knowledge in the field;
- to be able to assimilate new achievements in the disciplines morphology.

IV. PROVISIONAL TERMS AND CONDITIONS

For good skills of discipline is required acquiring thorough knowledge in biology and chemistry, obtained in schools.

V. THEMES AND ESTIMATE DISTRIBUTION OF HOURS

No. d/o	THEME	Number of hours			
		L	S	P/L	S/T
1.	Introduction. Histological techniques. Methods of study in the cytology, embryology and histology. Shapes of the cells.	-	2	1	4
2.	Cytology. The cell theory. Cellular membrane. System of the barrier, reception and transport. Intercellular junctions.	2	1	2	4
3.	Cytoplasm contents – hyaloplasm, organelles (system of synthesis, system of intracellular digestion, system of energy, cytoskeleton), and inclusions.	2	1	2	4
4.	Nucleus of the cell. Nuclear envelope. Chromatin. Nucleolus. Nucleoplasm. Cell cycle. Self-reproduction. Cell reaction on the action of the external environment. Cells death. Necrosis. Apoptosis. Morphology of cells and post-cellular structures. **Test on "Cytology".**	2	1	2	4
5.	Notion of the general embryology: basic stages of the embryonic development, their biological role. Sex cells. First week of the development: fertilization, cleavage. Blastocyst stage. Differentiation of trophoblast at the beginning of implantation.	2	2	1	4
6.	Human embryology. Second and third weeks of the embryonic development: first stage of gastrulation, second stage of the gastrulation. Neurulation. Extraembryonic organs: amnion, chorion, yolk sac, allantois, umbilical cord. Factors of risk in the prenatal development. Critical periods of the development. **Test on "Embryology".**	2	2	1	4
7.	Tissues studying. Epithelial tissues. Glandular epithelium. Basement membrane. Physiological and reparative regeneration of epithelial tissues.	2	1	2	4
8.	Mesenchyme. Tissues of internal environment. Classification. Blood and lymph, their main functions. Formed elements of blood: leucocytes, erythrocytes, and platelets	4	1	2	6

No. d/o	THEME	Number of hours			
		L	S	P/L	S/T
	(thrombocytes). Morphological classification of leucocytes (granulocytes and agranulocytes). The structure of formed elements of blood, their functions. Hemogram and leucocyte differential count. Age-related changes in blood cell counts. Embryonic (prenatal) and postembryonic (postnatal) hematopoiesis. Features of blood stem cells and hemistem (progenitor) cells. Adjusting of hematopoiesis and imunopoiesis.				
9.	Connective tissue. Proper connective tissue. Fibrous connective tissue. Specialized connective tissue. Morpho-functional characteristic, classification.	**2**	**1**	**2**	**4**
10.	Skeletal connective tissue. Cartilaginous and bony tissues. Chondrogenesis, intramembranous and endochondral ossifications. Age related changes.	**2**	**1**	**2**	**4**
11.	Muscle tissue. Morpho-functional characteristic of muscle tissues, sources of development, classification.	**2**	**1**	**2**	**4**
12.	Nervous tissue. Morpho-functional characteristic. Sources of development. Histogenesis. Neurons. Classification of neurons. Neuroglial cells. General features and main types. Nervous fibers. Afferent and efferent nerve endings, classification and their structure. Notion about synapses. Interneuronal synapses. Classification, structure. Neuromediators. Neuronal theory.	**2**	**1**	**2**	**4**
13.	General principles of tissues organization. Cells and tissular system. Cell population. Programmed differentiation. Molecular and genetic basis of determination. Regularities of occurrence and development of tissues. Tissue regeneration. **Midterm exam on theme***:* General histology.	**2**	**-**	**-**	**4**
14.	Nervous system. Nervous ganglia. Peripheral nerves. Spinal cord. Cerebrum. Cerebral trunk. Cerebellum. Cerebral cortex. Autonomic nervous system. Prenatal and postnatal development of organs of the nervous system. Age related changes of cortex.	**2**	**2**	**1**	**4**
15.	Circulatory system. Blood vessels. General principles of their structure. Arteries. Blood vessels of microcirculatory bed. Veins. Lymphatic vessels. Heart. Development, structure and histophysiology.	**2**	**1**	**2**	**4**
16.	Organs of lymphatic and immune system. Development, structure, histophysiology. Primary (central) organs of lymphoid (immune) system. Red bone marrow. Thymus. Secondary (peripheral) organs of lymphoid (immune) system. Lymph nodes. Spleen. Mucous associated lymphatic tissue.	**2**	**1**	**2**	**5**
17.	The immune competent cell system. Recycle of T and B-lymphocytes. T and B depending zones of peripheral lymphatic organs. Antigen-depending reactions of cells and their cooperation in the immune response to different kinds of antigenic stimulation. Cells of the cellular and humoral immunity. Natural killers. Plasma cell. Cooperation of macrophage, T and B-lymphocytes in the immune reactions. Morphological changes of lymphoid organs during immune response.	**2**	**-**	**1**	**4**
18.	Endocrine system. Central regulatory structures of endocrine system. Hypothalamus. Pituitary gland (hypophysis). Pineal body. Development, structure, histophysiology. Peripheral endocrine glands. Thyroid gland. Parathyroid glands. Adrenal (suprarenal) glands. Solitary endocrine cells.	**2**	**1**	**2**	**5**
19.	General characteristic of sense organs. Eye globe. Olfactory mucosa. Development, structure, histophysiology. Taste bud. Organ of hearing and equilibrium. Development, structure, histophysiology. **Midterm exam on themes***:* Nervous system, Cardiovascular system, Sense organs, Organs of lymphatic and immune system, Hematopoiesis, Endocrine system.	**4**	**2**	**1**	**6**
20.	Digestive system. The morpho-functional features. Development of primary digestive tube. Oral cavity. Structure and histophysiology of lips, cheeks, gingival, hard and soft	**2**	**2**	**1**	**4**

No. d/o	THEME	Number of hours			
		L	S	P/L	S/T
	palates, tongue, tonsils and salivary glands.				
21.	Teeth and supporting structures. Development and structure of teeth. Embryonic sources of development. Age related changes. Pharynx. Esophagus. Development, structure, histophysiology.	**2**	**2**	**1**	**4**
22.	Stomach. Histophysiology of secretory cells. Small intestine. Villus-crypt system as a morpho-functional unit. Histophysiology of digestion process. Large intestine. Development, structure, histophysiology.	**2**	**2**	**1**	**4**
23.	Pancreas. The structure of exocrine and endocrine portions. Liver. Hepatic lobule – the morpho-functional unit of liver. Hepatocytes, histochemical features and their functions. Gallbladder and its structure. **Midterm exam on theme:** Digestive system.	**2**	**2**	**1**	**4**
24.	Respiratory system. Development, structure, histophysiology. Pulmonary acinus – the morpho-functional unit of the lung. The blood-air barrier and its role in gases metabolism.	**2**	**2**	**1**	**4**
25.	Skin and its derivatives. Development, structure, histophysiology.	**2**	**2**	**1**	**4**
26.	Urinary system. Development, structure, histophysiology. Nephron – morpho-functional unit of kidney. Urine formation. Juxtaglomerular apparatus structure and function. Development, structure, histophysiology.	**2**	**2**	**1**	**4**
27.	Male genital system. Development, structure, histophysiology.	**2**	**2**	**1**	**4**
28.	Female genital system. Ovary. Uterine tube. Uterus. Vagina. Development, structure, histophysiology. Cyclic modifications in women. Modifications of the endometrium in pregnancy. Human placenta. Its structure and functions: fetal membranes, system "mother-fetus". **Midterm exam on themes:** Respiratory system. Skin and its derivatives. Urinary system. Genital systems.	**4**	**2**	**2**	**6**
	TOTAL	**60**	**50**	**40**	**120**
		270			

VI. PRACTICAL WORKS PURCHASED AT THE END OF THE COURSE

The essential practical tasks are:

- using the light microscope.
- diagnosis of histological preparations under the light microscope;
- diagnosis of electronograms.

VII. OBJECTIVES AND CONTENT UNITS

OBJECTIVES	CONTENT UNITS
Chapter 1. Cytology	
– To define the basic methods used in the morphology research. – To know the technique of preparation of histological slides and the main stages of hematoxylin-eosin staining. – To know the molecular structure and the functions of cell membrane. – To understand the mechanisms that allow membrane transport. – To understand the mechanisms of recognition and adhesion	1. The basic methods used in the morphology research. 2. Technique of preparation of histological slides and the main stages of hematoxylin-eosin staining. 3. Morphology of cells and post-cellular structures. 4. Cell membrane. Intercellular junctions. 5. Cytoplasmic components - hyaloplasm,

OBJECTIVES	CONTENT UNITS
(cell-cell, cell - intercellular substance). – To know the intercellular junctions (occluding junctions, tight junctions, desmosomes, gap junctions). – To define the cytoplasm and to know the ultrastructure and functions of all cytoplasmic components (hyaloplasm, organelles, inclusions). – To understand the intracellular digestion process and to differentiate between its variants: heterophagy, autophagy, crinophagy – To know the ultrastructure and chemical composition of the cell nucleus. – To define the cell cycle and to achieve the differences between interphase ($G_{1\ phase}$, $S_{\ phase}$, $G_{2\ phase}$, $G_{0\ phase}$) and mitosis (prophase, metaphase, anaphase, telophase). – To understand the cell cycle control mechanisms and cell transformation pathways; – To understand the particularities of meiosis as part of oogenesis and spermatogenesis; – To know the particularities of apoptosis and necrosis.	organelles, inclusions. 6. Cell nucleus. 7. Cell cycle. Interphase. Mitosis. Meiosis. 8. Self-reproduction. Reaction of cells to the external environment. 9. Cell deaths. Necrosis. Apoptosis.
Chapter 2. Human embryology	
– To know the male and female gametes structure. – To know the basic stages of human embryo development. – To know the main events of first week of the embryonic development: – To define the fertilization and cleavage. – To connect the notes about morula and blastocyst with the implantation. – To understand the events and mechanisms of gastrulation. – To explain the functional importance of extraembryonic organs (amnion, chorion, yolk sac, allantois). – To know the derivatives of mesoderm, ectoderm, endoderm and mesenchyme. – To define the neurulation. – To achieve the connection between risk factors and critical periods of the development.	1. The structure of male and female gametes. Fertilization. 2. First week of the embryonic development: cleavage, trophoblast differentiation and initiation of implantation. 3. Second and third weeks of the embryonic development: first stage of gastrulation, second stage of the gastrulation – formation of tri-lamellar embryo. 4. Ectodermal differentiation. Neurulation. Mesodermal differentiation. Somite. Endodermal differentiation, mesenchymal differentiation. Embryo folding. 5. Extraembryonic organs: amnion, chorion, yolk sac, allantois, umbilical cord. 6. Critical periods of the development. Risk factors of the prenatal development.
Chapter 3. General histology	
– To define the tissue and to know the classification of tissues. – To know the characteristic structural features of epithelial tissues. – To know the structure and significance of basement membrane. – To know the classification and structure of glandular epithelium. – To know the structural features of formed elements of blood. – To know the composition of blood plasma. – To interpret the hemogram and leucocyte differential count. – To achieve the comparative analysis between blood and	1. Epithelial tissues. Basement membrane. Physiological and reparative regeneration of epithelial tissues. 2. Classification of epithelial tissues. Glandular epithelium. 3. Tissues of internal environment. Classification. Mesenchyme. Blood and lymph, their main functions. 4. Formed elements of blood: leucocytes, erythrocytes, and platelets (thrombocytes). Morphological classification of leucocytes (granulocytes and agranulocytes). The structure of formed elements of blood, their

OBJECTIVES	CONTENT UNITS
lymph. - To understand the common principle of connective tissues organization. - To know the structure, ultrastructure and functions of all cells of proper connective tissues. - To know the structure and functions of cartilaginous tissue cells. - To know the structure and functions of bone tissue cells - To understand the specific features of the structure and chemical composition of the intercellular substance of connective tissues. - To understand the mechanism of ossifications processes (membranous and endochondral). - To know the structure of muscle fiber. - To understand the mechanism of muscle contraction. - To define the neuro-muscular junctions. - To know the structural particularities of contractive cardiac muscle cell. - To define the functional cardiac muscle fiber. - To know the structure of intercalated disk. - To achieve the comparative analysis between striated muscle and smooth muscle. - To know the morphological and functional classification of neurons. - To know the structure of neuron. - To know: the classification, structure and function of neuroglia. - To achieve the comparative analysis between neurons and neuroglia. - To know the structure of myelinated and non-myelinated nerve fibres. - To explain the mechanisms which drives the regeneration of the nervous tissue. - To understand the classification, structure, localization and functions of nerve endings. - To explain the structure of synapse and classification of it.	functions. 5. Hemogram and leucocyte differential count. Age-related changes in blood cell counts. 6. Connective tissue. Proper connective tissue. Fibrous connective tissue. Specialized connective tissue. Morpho-functional characteristic, classification. Cells of loose connective tissue. 7. Skeletal connective tissue. Cartilaginous and bony tissues. Chondrogenesis, intramembranous and endochondral ossifications. Age related changes. 8. Muscle tissue. Morpho-functional characteristic of muscle tissues, sources of development, classification. 9. Nervous tissue. Morpho-functional characteristic. Sources of development. Histogenesis. 10. Neurons. Classification of neurons. 11. Neuroglia. General features and the main types. 12. Nervous fibers. Afferent and efferent nerve endings, classification and their structure. 13. Notion about synapses. Interneuronal synapses. Classification, structure. Neuromediators. Neuronal theory. 14. General principles of tissues organization. Cells and tissue system. Cell population. Programmed differentiation. Molecular and genetic basis of determination. Regularities of occurrence and development of tissues. Tissue regeneration.
Chapter 4. Histology of nervous, cardiovascular, endocrine, immune systems and sense organs.	
- To explain the functions of nervous system; - To know the microscopic structure of: spinal cord; cerebellum; cerebral cortex; spinal ganglia; peripheral nerve; - To know the structural components of blood-brain barrier. - To understand the morpho-functional features of sense organs and to know the classification of them; - To know the structures of Eye globe; Olfactory mucosa; Taste buds; and Organ of hearing and equilibrium. - To know the classification and general characteristic of vessels. - To know the classification and structure of arteries, arterioles. - To explain the structure of capillaries.	1. Spinal ganglia. Peripheral nerves. Spinal cord. 2. Brain. Cerebral trunk. Cerebellum. Cerebrum. 3. Vegetative nervous system. Aged changes of the cortex. 4. Cardiovascular system. Blood vessels. The principle of their structure. Arteries. Veins. 5. The blood vessel of microcirculatory bed system. Lymphatic vessels. The heart. 6. The primary organs of hematopoiesis and imunopoiesis – bone marrow, thymus. 7. The secondary organs of hematopoiesis and imunopoiesis – lymph nodes;

OBJECTIVES	CONTENT UNITS
− To achieve the comparative analyses between capillary types. − To define the notion of microcirculatory bed. − To understand the classification and structure of arterio-venous shunts. − To know the classification and structure of veins, venules. − To achieve the comparative analyses between arteries and veins. − To know the structure of the heart. − To know the classification and structure of lymphatic vessels. − To know the classification of hematopoietic and immune organs; − To explain the functions of hematopoietic and immune organs; − To know the structure of bone marrow; − To know the structure of thymus; − To know the structural components of blood-thymus barrier; − To know the structure of spleen; − To explain the differentiations between open and closed circulation of spleen; − To know the structure of lymph node. − To know the main components of endocrine system. − To differentiate the terms as, endocrine cell, hormone, target cell. − To know the types of control system (endocrine, paracrine, autocrine and nervous). − To explain the mechanism of feedback control system. − To understand the interrelation between hypothalamus and pituitary gland. − To know the structure of adenohypophysis, hormones and their actions. − To know the structure and functions of neurohypophysis. − To know the structure of epiphysis, hormones and their actions. − To know the structure and hormones of thyroid gland, and to explain their action. − To know the structure and hormones of parathyroid gland, and to explain their action. − To know the structure and hormones of adrenal gland, and to explain their action. − To define the DES.	lymphatic nodule associated to the mucosa; spleen. 8. Embryonic (prenatal) and postembryonic (postnatal) hematopoiesis. 9. The immune competent cell system. Recycle of T and B-lymphocytes. T and B depending zones of peripheral lymphatic organs. Antigen-depending reactions of cells and their cooperation in the immune response to different kinds of antigenic stimulation. 10. Cooperation of macrophage, T and B-lymphocytes in the immune reactions. Morphological changes of lymphoid organs during immune response. 11. Central regulatory structures of endocrine system. Hypothalamus. Pituitary gland (hypophysis). Pineal body. 12. Peripheral endocrine glands. Thyroid gland. Parathyroid glands. Adrenal (suprarenal) glands. 13. Solitary endocrine cells. 14. Eye globe. Olfactory mucosa. Taste bud. Organ of hearing and equilibrium.
Chapter 5. Histology of digestive system.	
− To know the particularities of the organ structure of the oral cavity (lips, cheeks, soft palate, hard palate, tongue); − To know the principle of structural organization of the tonsils. − To know the structure of major salivary glands (parotid, submandibular, sublingual) − To achieve the differential morphological diagnosis	1. Digestive system. The morpho-functional features. Development of primary digestive tube.. 2. Oral cavity. Structure and histophysiology of lips, cheeks, gingival, hard and soft palates, tongue, tonsils and salivary glands. 3. Teeth and supporting structures.

OBJECTIVES	CONTENT UNITS
between major salivary glands and minor salivary glands. - To know the teeth structure and to understand the process of teethe development. - To know the structural particularities of hard dental tissues (enamel, dentin, cement) - To know the dental pulp structure. - To explain the structural particularities of esophagus-stomach junction. - To know the structural particularities of anterior, middle, and posterior segments of the digestive tube. - To know the structure and ulrastructure of cells of the gastric glands. - To know the structure and ulrastructure of cells of the villi and crypt epithelium. - To explain the histophysiology of digestion process. - To know the structural organization of the liver. - To define the terms: classical hepatic lobule, portal lobule and hepatic acinus. - To know the structure and ulrastructure of hepatic plates and hepatocytes. - To understand the structure of sinusoid capillary and Disse's space. - To explain the blood circulation from hepatic lobule. - To know the structure of gallbladder and bile pathways. - To know the structural organization of the pancreas. - To achieve differential morphological diagnosis between exocrine portion and endocrine portion of the pancreas.	Development and structure of teeth. 4. Pharynx. Esophagus. Stomach. Histophysiology of secretory cells. 5. Small intestine. Villus-crypt system as a morpho-functional unit. 6. Large intestine. Histophysiology of digestion process. 7. Pancreas. The structure of exocrine and endocrine portions. 8. Liver. Hepatic lobule – the morpho-functional unit of liver. Hepatocytes, histo-chemical features and their functions. Gallbladder.
Chapter 6. Histology of skin and it derivatives, respiratory system, urinar and genital systems.	
- To know the structural features of air-conducting pathways. - To define the pulmonary acinus. - To know the structural components of blood-brain barrier. - To know the structure of the pleura. - To know the skin structure: epidermis, dermis (papillary and reticular layers), subcutaneous gland. - To know the structure of skin derivatives hair, sweat glands (merocrine and apocrine), sebaceous gland, nail. - To achieve the comparative analysis between sweat glands and sebaceous gland. - To understand the development, structure and vascularization of the kidney; - To define the nephron. - To know the nephron structure; - To know the components of renal filtration barrier. - To understand the endocrine function of kidney; - To explain the urine formation process; - To know the structure of the urinary tract organs. - To know the testis structure. - To achieve the comparative analysis between Sertoli cells and spermatogenic cell line. - To explain the structure and functions of Leydig cells. - To know the structure and functions of the prostate,	1. Respiratory system. Air-conducting pathways. 2. Pulmonary acinus – the morpho-functional unit of the lung. The blood-air barrier and its role in gases metabolism. 3. Integumentary System. Sebaceous gland; sweat glands. The keratinized derivatives of skin – hair, nail. 4. Nephron – morpho-functional unit of kidney. Urine formation. Juxtaglomerular apparatus. 5. Urinary tract. Morpho-functional characteristic of the urinary tract wall: pelvis, ureter, urinary bladder and urethra. 6. Testis. Seminiferous convoluted tubule. Spermatogenesis. Blood-testicular barrier. 7. Spermatogenic pathways. Epididymis. Ductus deferent. Seminal vesicles. Ejaculatory canal. Prostate. Penis. 8. Ovary, structure and functions. Oogenesis. Ovarian cycle. 9. Uterine tube. Uterus. Menstrual cycle and it phases. Endometrium structure peculiarities during different phases of the menstrual

OBJECTIVES	CONTENT UNITS
seminal vesicles, bulbo-uretrale glands. - To know the structure and functions of the ovary; - To understand oogenesis and spermatogenesis; - To know the structure of the uterus and uterine tubes; - To understand the key elements of the mechanism of ovarian and menstrual cycles; - To know the structure of the mammary gland; - To know the structure of the human placenta.	cycle. The relationships between menstrual cycle and ovarian cycle. Vagina. 10. Mammary gland. Functional morphology of lactating and non-lactating mammary glands. 11. Human placenta. System "mother-fetus".

VIII. PROFESSIONAL (SPECIFIC (SC)) AND TRANSVERSAL (TC) COMPETENCES AND STUDY FINDINGS

Professional (specific) (SC) competences

PC1. Responsible execution of professional tasks with the application of the values and norms of professional ethics, as well as the provisions of the legislation in force; Thorough knowledge of the particularities of structure, development and functioning of human body tissues in various states and pathology; Knowledge, understanding and use of specific histological language; Application of basic knowledge, concepts and methods in clinical practice.

PC2. Adequate knowledge of the sciences about the structure of the body, physiological functions and behavior of the human body in various physiological and pathological conditions, as well as the relationships between health, physical and social environment.

PC5. Interdisciplinary integration of the doctor's activity in a team with efficient use of all resources; Good knowledge and practical application of the algorithm of histological investigations in medical activities based on the fundamental knowledge.

PC7. Promoting and ensuring the prestige of the medical profession and raising the professional level. Analysis of various cellular or normal tissues elements and processes, and pathways leading to pathological conditions.

PC8. Carrying out the pedagogical and methodical-didactic activity within the technical and professional higher education institutions in the field of health.

Transversal competences (TC)

TC1. Autonomy and responsibility in the activity. Promoting logical reasoning, practical applicability, assessment and self-assessment in decision-making;

TC3. Achieving interaction skills and social responsibility.

TC4. Personal and professional development. Selection of digital materials, critical analysis and drawing conclusions.

Study findings

Upon completion of the course the student will be able to:

- to know the bases of cytology, histogenesis, structure and functions of tissues;
- to understand the legalities of diferentiation, cell and tissue regeneration;
- to know the structure and functions of the organs, the particularities of embryogenesis for each organ;
- to identify the aged changes of organs;
- to perform the diagnosis of cells, tissues and organs under the optical microscope;

- to understand the electron microphotograph;
- to deduce interrelations between Histology, Cytology and Embryology and other fundamental disciplines;
- to acquire the skills for the implementation and integration of the morphological knowledge obtained in the specialized disciplines;
- to be able to assimilate new achievements in morphological disciplines.

IX. STUDENT'S SELF-TRAINING

No.	Expected product	Implementation strategies	Assessment criteria	Implementation terms
1.	Working with the notebook of practical lessons	- Solving tasks related to topic (completing diagrams, tables, deciphering the indications for exposed images). - Solving the tests exposed at the end of each practical work. - Select extra information, using electronic addresses and additional bibliography.	The volume of topics solved during disscusion of theme	Along the semester
2.	Working with online teaching material	- Studying of histological images and presentations (pdf, ppt) on-line on Moodle software. - Studying of actual electronic sources regarding of topic	- number and duration of entries on SITE; - the results of the evaluations.	Along the semester

X. METHODOLOGICAL SUGGESTIONS FOR TEACHING-LEARNING-ASSESSMENT

- ***Teaching and learning methods used***

At the department of Histology, cytology and embryology is used classical manner of teaching: courses and practical lessons. The courses include theoretical material read by the lecturer. At the practical lessons students will study histological slides using light microscope, will study electron micrograph, and will fill the writing-books for practical lessons. The Chair assume the right to spend some interactive control tests.

- ***Applied*** *(specific to the discipline)* ***teaching strategies / technologies***

Exposing, interactive lecture, demonstration, solving of case-problem, group work, individual study, work with books and scientific texts, teaching through video and audiovisual recordings, debating, performing of laboratory tasks. In other words, the best way to learn is to use a variety of methods for each learning experience; no matter of learning style, can benefit from different types of stimuli and input.

- ***Methods of assessment****(including the method of final mark calculation)*

Current:

Throughout of academic year at the discipline of Histology, Cytology and Embryology takes place two written test and four midterm exams (formative evaluation), as follow:

- **Written test Nr1**: Cytology (computerized test);
- **Written test Nr.2**: Human embryology (computerized test);
- **Midterm exam Nr1**: General histology (computerized test + slide diagnostics);
- **Midterm exam Nr.2**: The nervous system, cardiovascular system, sense organs, lymphatic organs and immune protection, hematopoiesis, endocrine system (computerized test + slide diagnostics);
- **Midterm exam Nr.3**: Digestive system (computerized test + slide diagnostics);
- **Midterm exam Nr.4:** Respiratory system. The skin and its derivatives. Urinary system. Reproductive system (computerized test + slide diagnostics).

Thus, formative assessment is represented of 10 total samples, six of which are computerized tests, and four are histological diagnoses of slides. Each sample is marked separately with marks from 10 to 0. Each sample can be supported by three times, plus once in the last week of the semester (week of attestation). The annual average is formed of amount of accumulated points during the academic year divided at 10. The computerized test exam consist of variants of 20 questions each (single-choice and multiple-choice), supported in SIMU. At least eight questions will contain histological pictures or diagrams (schemes). Tests, histological pictures and diagrams are contained in the writing books for practical lessons in Histology, Cytology and Embryology and Moodle software. The student has to solve the computerized test 20 minutes. Histological diagnostic test is performed by providing of 4 histological slides for each student. Students have to recognize the slide, appoint indications and answer at the questions provided by the teacher. All histological slides used in the diagnosis are discussed and drawn by students during practical lessons.

***Final**:*

The final concluding test consists of variants of 100 computerized tests each, from all the themes of the Histology, Cytology and Embryology. The student has 100 minutes to answer the tests. The test is scored with grades from 10 to 0.

The final mark consists of 2 components: the annual average score - coefficient 0,5, the computerized test - coefficient 0,5. Assessment of knowledge is appreciated with marks from 10 to 1, as follows:

Method of mark rounding at different assessment stages

Intermediate marks scale (annual average, marks from the examination stages)	National Assessment System	ECTS Equivalent
1,00-3,00	**2**	**F**
3,01-4,99	**4**	**FX**
5,00	**5**	**E**
5,01-5,50	**5,5**	
5,51-6,0	**6**	

6,01-6,50	**6,5**	**D**
6,51-7,00	**7**	
7,01-7,50	**7,5**	**C**
7,51-8,00	**8**	
8,01-8,50	**8,5**	**B**
8,51-9,00	**9**	
9,01-9,50	**9,5**	**A**
9,51-10,0	**10**	

The average annual mark and the marks of all stages of final examination (computer assisted, test, oral) - are expressed in numbers according to the mark scale (according to the table), and the final mark obtained is expressed in number with two decimals, which is transferred to student's record-book.

Absence on examination without good reason is recorded as "absent" and is equivalent to 0 (zero). The student has the right to have two re-examinations.

XI. RECOMMENDED LITERATURE:

A. Compulsory:

1. Cytology, Embryology and Histology (courses for medical students). T. Globa, Chisinau, 2009.
2. Histology. A text and atlas with correlated cell and molecular biology. Michael H. Ross; Wojciech Pawlina. Lippincott Williams&Wilkins, 2006.
3. Wheater's functional histology. A text and colour atlas. B. Young, J. W. Heath. International student edition, 2000.
4. Histology and cell biology. An introduction to pathology. Abraham L. Kierszenbaum. Mosby 2002.
5. Langman's medical embryology. T. W. Sadler. Lippincott Williams&Wilkins, 2004.
6. Histology, colour atlas. Leslie P. Gartner, Games L. Hiatt. Willaims&Wilkins, 1994.

B. Additional

1. Histology. Ronald A. Bergman, Adel K. Afifi, Paul M. Heidger. W. B. Saunders company, 1996.
2. Histology. Leslie P. Gartner, Games L. Hiatt, Judy M. Strum. Williams & Wilkins, Mass publishing, 1992.
3. Human anatomy & physiology. Elaine N. Marieb. Addition Wesley Longman, Inc., 2001.
4. Cell biology and histology. Leslie P. Gartner, Games L. Hiatt, Judy M. Strum. Lippincott Williams&Wilkins, 2003.
5. The developing human. Clinically oriented embryology. Moore Persaud. Saunders, 2003.