

SYLLABUS

The academic year when the cycle of instruction is commenced 2019-2025 [INT]

Module/course name:	Histology with Embryology and Cytophysiology		Module code	LK.3.A.002
Faculty:	Faculty of Medicine MUL			
Major:	Medical			
Specialty:				
Level of study:	I (Bachelor studies) <input type="checkbox"/> II (Master studies) <input type="checkbox"/> Integrated Master studies X Doctoral studies <input type="checkbox"/>			
Mode of study:	full-time X part-time (extramural) X			
Year of study:	I X II <input type="checkbox"/> III <input type="checkbox"/> IV <input type="checkbox"/> V <input type="checkbox"/> VI <input type="checkbox"/>	Semester:	1 X 2 X 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 <input type="checkbox"/> 6 <input type="checkbox"/> 7 <input type="checkbox"/> 8 <input type="checkbox"/> 9 <input type="checkbox"/> 10 <input type="checkbox"/> 11 <input type="checkbox"/> 12 <input type="checkbox"/>	
Module/course type:	obligatory X elective <input type="checkbox"/>			
Language of instruction:	Polish <input type="checkbox"/> English X			
Form of education	Hours			
Lecture	40			
Seminar				
Laboratory class	110			
E-learning				
Practical class				
Internship				
Other				
TOTAL				
Student's work input (participation in class, preparation, evaluation, etc.)	Student's hourly workload			
1. In class	150			
2. Student's own work including: 1 Preparation for class 2 Preparation for partials and finals	150			
Summary of the student's workload	300			
ECTS points for module/course	12			

Educational objectives:

After passing the course of HISTOLOGY WITH EMBRYOLOGY AND CYTOPHYSIOLOGY student shows knowledge of the structure of the cells, tissues and organs of the human body, recognizes and interprets the microscopic images of these structures. The student also has a knowledge of the basic cell functions such as: the processes of cell division, differentiation, proliferation, processes of aging, types of cells death and intercellular communication, knows the function of stem cells in the body and their importance in medical science. In addition, the student knows the origin and the stages of development of different tissues and organs of the human body, as well as the structure and function of the fetal membranes and features and types of teratogenic agents and their influence on the development of the embryo and fetus.

The matrix of learning outcomes for module/ subject with reference to verification methods of the intended educational outcomes and forms of instruction:

Learning outcome code	A student who has obtained a credit for the module/course has the knowledge/skill to:	Methods of verifying the achievement of the intended learning outcomes:	Form of instruction * provide the symbol
A.W1.	knows anatomical, histological and embryological terminology in Polish and in English;	Written exam, practical exam, MCQ, open-cloze test	Lecture/Lab class
A.W4.	knows basic cellular structures and their functional specializations	Written exam, practical exam, MCQ, open-cloze test	Lecture/Lab class
A.W5.	knows the microarchitecture of extracellular matrix and organs,	Written exam, practical exam, MCQ, open-cloze test	Lecture/Lab class
A.W6.	knows the stages of human fetus development, structure and functions of fetal membranes and placenta and the developmental stages of specific organs and the influence of harmful effects on the embryo and fetus development (teratogenic)	Written exam, practical exam, MCQ, open-cloze test	Lecture/Lab class
B.W17.	knows the methods of intercellular communication, communication between a cell and extracellular matrix and the signal transmission paths in a cell as well as examples of disturbances in these processes, leading to development of cancers and other diseases;	Written exam, practical exam, MCQ, open-cloze test	Lecture/Lab class
B.W18.	knows such processes as: cell cycle, proliferation, differentiation and aging of cells, apoptosis and necrosis and their significance for the body functions;	Written exam, practical exam, MCQ, open-cloze test	Lecture/Lab class
B.W19.	has basic knowledge on stem cells and their application in medicine;	Written exam, practical exam, MCQ, open-cloze test	Lecture/Lab class
B.W20.	knows basics of induction and transmission in the nervous system and higher nervous actions as well as physiology of striated and smooth muscles and blood functions;	Written exam, practical exam, MCQ, open-cloze test	Lecture/Lab class
B.W22.	knows the course and control of reproductive functions in males and females;	Written exam, practical exam, MCQ, open-cloze test	Lecture/Lab class
B.W23.	knows the body aging mechanisms;	Written exam, practical exam, MCQ, open-cloze test	Lecture/Lab class
A.U1.	operates an optic microscope, also in respect of utilizing immersion;	practical exam	Lab class
A.U2.	recognizes in the images obtained from optic or electronic microscope, histological structures corresponding to organs, tissues, cells and cellular structures, offers description and interpretation of their structure and interprets relations between structure and function;	practical exam	Lab class

A.U5.	uses anatomical, histological and embryological terminology in speech and writing.	Written exam, practical exam, MCQ, open-cloze test	Lecture/Lab class
K01	shows responsibility for improving their skills and transfer of the knowledge to other students	- an extended observation by a supervisor/tutor - 60-degree assessment (feedback from teachers)	Lecture/Lab class
K02	recognizes its own limitations, its own deficits and educational needs, and plans educational activity and its evaluation	- an extended observation by a supervisor/tutor - 60-degree assessment (feedback from teachers)	Lecture/Lab class

EXAMPLES OF METHODS VERIFYING THE ACHIEVEMENT OF THE INTENDED LEARNING OUTCOMES:

In terms of knowledge: Oral exam (*non-standardized, standardized, traditional, problem-based*).

Written exam – the student produces/identifies answers (*essay, report; structured short-answer questions /SSQ/; multiple choice questions /MCQ/; multiple response questions /MRQ/; matching test; true/false test; open cloze test*)

In terms of skills: practical exam; Objective Structured Clinical Examination /OSCE/; Mini-CEX (mini – clinical examination); completion of a given assignment; project, presentation.

In terms of social competences:

A reflective essay; an extended observation by a supervisor/tutor; 360-degree assessment (feedback from teachers, peers, patients, other co-workers); self-assessment (portfolio included).

Course content: (use keywords referring to the content of each class following the intended learning outcomes):

Semester 1

Lectures:

1. The cell, cell organelles: nucleus, endoplasmic reticulum, mitochondria, Golgi complex, lysosomes. Chromatin and Chromosomes, Classification of chromosomes, DNA. 2h
2. Cytophysiology: Cell membranes: Biochemical components – lipids (phospholipids), proteins (integral and peripheral membrane proteins), carbohydrates (glycocalyx). Membrane organization – fluid mosaic model. Transport across membranes. Cytoskeleton: Microfilaments – structure, Intermediate filaments – structure, types, role in medical diagnostics, Microtubules. Centrioles: structure, function. 2h
3. Epithelial tissue. Characteristic features of epithelia. Function. Classification: simple squamous epithelium, simple cuboidal epithelium, simple columnar epithelium, pseudostratified epithelium, stratified squamous epithelium, stratified cuboidal epithelium, stratified columnar epithelium, transitional epithelium. Communication between cells: intercellular junctions: desmosome, hemidesmosome, gap junction. Signal receptors and signaling mediated by intracellular receptors. Specific epithelial types: microvilli, cilia, flagella, stereocilia. Basal lamina and basement membrane. Glands: Exocrine and endocrine glands. Way of secretion: merocrine, apocrine, holocrine. 2h
4. Connective tissue. Components of connective tissue: ground substance, fibers, cells: fibroblasts, fibrocytes, plasma cells, mast cells, macrophages mesenchymal cells, reticular cells. Connective tissue types: loose and dense (regular and irregular), mucous connective tissue (Wharton's jelly), reticular connective tissue, adipose tissue (white and brown). Cartilage – hyaline, elastic and fibrous. 2h
5. Blood: Composition of plasma, blood cells: erythrocytes, leukocytes, platelets. Bone marrow: red bone marrow and yellow bone marrow. Bone: bone cells (osteocytes, osteoblasts, osteoclasts), bone matrix, Organization of

- spongy bone and compact bone, Osteon. Hematopoiesis and blood function. 2h
6. Nervous tissue. Development of nervous tissue. General characteristics. Cells of nervous tissue: neurons and glial cells : astrocytes (protoplasmic and fibrous), oligodendrocytes, Schwann cells, microglia, ependymal cells. Peripheral nerve. Synapses. Nerve fibers. 2h
 7. Muscle tissue. Development of muscle tissue. General features of muscle tissue. Organization and types of muscle tissue: skeletal muscle, cardiac muscle, smooth muscle. Stem cells and their potential use in medicine, growth factors and differentiation. Progenitor and precursor cells. 2h
 8. Cardiovascular & Immune systems. Development of cardiovascular system. General organization of blood vessels. Types of blood vessels: arteries, veins, capillaries (continuous, fenestrated, sinusoidal capillaries). Lymphatic vascular system. Central and peripheral lymphoid organs: thymus, lymph nodes, spleen, MALT, GALT, BALT. Cells of immune system: lymphocytes T and B, NK cells, plasma cells. 2h
 9. Cell cycle. Mitosis. Meiosis. Spermatogenesis. Oogenesis. Ovarian cycle. 2h
 10. Fertilization, cleavage, blastocyst formation, implantation. 1h
 11. Early stages of development: bilaminar germ disc, trilaminar germ disc, the embryonic period. Gastrulation, formation of the notochord, establishment of the body axes. Derivatives of the ectodermal, endodermal, mesodermal germ layers. Uterus at time of implantation. Fetal membranes. Placenta. 2h
 12. Congenital malformations. Types of abnormalities, principles of teratology. Environmental factors: infectious agents, pharmaceutical drugs and chemical agents, hyperthermia, radiation, maternal disease. 2h
 13. Development of head and neck, pharyngeal arches, pouches, clefts, tongue, thyroid gland, face, nasal cavities, palate. Teratogens. Malformations. 2h

Lab classes:

1. Orientation to Course. Syllabus Review. Introduction to Histology and Cytophysiology. The cell structure: the cell nucleus: nuclear envelope - structure: the outer and inner nuclear membranes, perinuclear cisterna, nuclear pores. Chromatin, organization of chromatin, Chromosomes, Classification of chromosomes, DNA. Nucleolus - structure and function. Nuclear lamina and nuclear matrix. Endoplasmic Reticulum rough and smooth – structure and function. Mitochondria: structure, function, location. Golgi Complex: structure – cis face and trans face, function, location, flow of materials through the Golgi complex. Lysosomes: structure, function, primary and secondary lysosomes. Cytoskeleton: Microfilaments – structure, Intermediate filaments – structure, types, role in medical diagnostics, Microtubules. Centrioles: structure, function. 5h
2. Histochemistry, cytochemistry General features of histology and its method. Cytochemistry: detection of DNA (Feulgen's reaction), detection of RNA (Brachet's reaction), detection of glycogen (PAS reaction), detection of acid phosphatase (Gomori reaction, detection of dehydrogenases. Immunohistochemistry. Cytophysiology: Types of cell death. Apoptosis, Necrosis, Autophagy. Morphological figures. Aging of body. 5h
3. Epithelial tissue: Communication between cells (Intercellular junctions: types, structure and function: desmosome, hemidesmosome, gap junction), Signal receptors and signaling mediated by intracellular receptors. Embryology: Development of epithelial tissues. Characteristic features of epithelia. Function. Classification. Specific epithelial types: Simple squamous epithelium, Simple cuboidal epithelium, Simple columnar epithelium, Pseudostratified epithelium, Stratified squamous epithelium, Stratified cuboidal epithelium, Stratified columnar epithelium, Transitional epithelium. Microvilli, Cilia, Flagella, Stereocilia – structure and function. Basal lamina and basement membrane – structure and function. Glands: Exocrine and endocrine glands – definition. Structure of exocrine glands. Classification of exocrine glands. Way of secretion: merocrine, apocrine, holocrine. 5h
4. Connective tissue. Embryology: Development of connective tissue. Components of connective tissue: Ground substance – glycosaminoglycans (GAGs), proteoglycans, glycoproteins. Fibers – collagen fibers (structure, mechanical properties, collagen synthesis, collagen types); elastic fibers (structure, mechanical properties); reticular fibers (structure, mechanical properties). Cells – fibroblasts, fibrocytes, plasma cells, mast cells, macrophages mesenchymal cells, reticular cells. Connective tissue types: Connective tissue proper: loose and dense (regular and irregular), mucous connective tissue (Wharton's jelly), reticular connective tissue, adipose tissue (white and brown).Cartilage – hyaline, elastic and fibrous – structure and location. Cytophysiology of connective tissue: collagen fibers: structure, function, and synthesis, storage and relies of fat by adipose cells, cytophysiology of mast cells (development and distribution, activation and degranulation), sequence of events in the inflammatory response. 5h
5. Blood, bone marrow, bone. Blood: Composition of plasma. Formed elements – blood cells (size, number, lifespan of mature cells, cell morphology. Erythrocytes - morphological structure and function, abnormalities, reticulocytes, hemoglobin, blood types – AB, A, B, O. Leukocytes - granulocytes: neutrophils, eosinophils and basophils; agranulocytes: lymphocytes and monocytes. Platelets – number, morphological structure, role in clotting.Bone marrow. Bone: Bone cells, Bone matrix, Organization of spongy bone and compact bone,

- Osteon. Hematopoiesis and blood function. Stem cells and their potential use in medicine, growth factors and differentiation. Progenitor and Precursor cells. 5h
6. Partial test. 5h
 7. Muscle tissue. Development of muscle tissue. General features of muscle tissue. Organization and types of muscle tissue. Skeletal muscle: Cells – morphology, Myofilaments – thin and thick filaments, organization of myofilaments, Sarcomere, Sarcoplasmic reticulum ; triads, Types of skeletal muscle fibers – red, white and intermediate. Cardiac muscles: Cells – morphology, Intercalated discs, Organization of myofilaments, Sarcoplasmic reticulum and T tubule system – dyads, Smooth muscle: Cells – morphology, Organization of myofilaments, Organization of smooth muscle, Sarcoplasmic reticulum. Cytophysiology: Physiology of smooth and skeletal muscle. Mechanism of contraction. 5h
 8. Nervous tissue. Development of nervous tissue. General characteristics. Cells of nervous tissue: Neurons – cell body; dendrites; axon; tigroid. Morphologic classification of neurons – unipolar, bipolar, multipolar pseudounipolar. Neuroglial cells – types: astrocytes (protoplasmic and fibrous)-morphology, location and function; Oligodendrocytes- morphology, location and function; Schwann cells- morphology, location and function; Microglia- morphology, location and functions; Ependymal cells. Peripheral nerve: structure. Synapses: classification, synaptic morphology. Nerve fibers: myelinated and unmyelinated fibers, myelin sheath, nodes of Ranvier, internodes. 5h
 9. Cardiovascular & Immune system. Development of cardiovascular system. Blood vascular system: General organization of blood vessels: tunica intima – endothelium, subendothelial layer, tunica media, tunica adventitia. Types of blood vessels: arteries (elastic arteries, muscular arteries and arterioles)- morphological structure and function, veins (large, medium-sized and small veins, venules), capillaries – morphological structure (endothelium, basal lamina, pericytes). Classification of capillaries (continuous, fenestrated, sinusoidal capillaries), their structure and location. Lymphatic vascular system: lymphatic vessels – structure. General organization – central and peripheral lymphoid organs. Cells of immune system: lymphocytes T and B, NK cells, plasma cells, antigen presenting cells - morphology, origin, function. Immune response: humoral and cellular. Lymphoid organs: Lymph node – morphologic structure (cortex-lymphoid nodules, medulla), function, lymph flow through the lymph node. Thymus – morphologic structure (cortex, medulla; thymocytes, epithelial reticular cells, Hassal's corpuscles), function, thymic hormones. Spleen -- morphologic structure (white pulp and red pulp), function, blood flow through the spleen. 5h
 10. Partial test. 5h
 11. Embryology part I . Cell cycle, mitosis, meiosis. Spermatogenesis, spermiogenesis. .Oogenesis. Male and female gametes: differentiation, structure. Conduct and regulation of female and male reproductive function. 5h
 12. Embryology part II. Fertilization, cleavage, implantation. Differentiation of the germ layers (mesoderm, ectoderm, endoderm). Fetal membranes, placenta. Organogenesis. 5h
 13. Partial test. 5h
 14. Slides review. 5h
 15. Retake. 5h

Semester 2

Lectures:

1. Digestive system: Oral cavity: lips, tongue, papillae: filiform, fungiform, foliate, circumvallate. Salivary glands: parotid gland, submandibular glands, sublingual gland. Types of glands. Teeth: tooth structure-enamel, cementum, dentin, pulp cavity, pulp. 2h
2. Digestive system: esophagus: wall layers, stomach: wall layers; regional differences-cardia, fundus and body, pylorus; gastric pits; cardiac glands; gastric glands (cell types: parietal cells, chief cells, enteroendocrine cells, mucous neck cells, undifferentiated cells, their functions); pyloric glands. Small intestine: histological structure, regional differences: duodenum, jejunum and ileum. Large intestine: histological structure. Appendix-histological structure, function. 2h
3. Digestive system: liver: general structure and functions, blood supply, liver lobules (classic liver lobule, portal lobule, hepatic acinus of Rappaport), portal triad, cell types (hepatocytes, Kupffer's cells, Ito cells), biliary system. Pancreas: general structure and function, exocrine part (pancreatic acinar cells, centroacinar cells), endocrine part (islets of Langerhans). Gallbladder: histological structure. Endocrine system. Hypophysis (Pituitary gland): adenohypophysis, neurohypophysis, neurohypophyseal hormones and their effects; control of pars nervosa); Neuroendocrine Hypothalamo-Hypophyseal System (NHS). Pineal gland: general structure, histophysiology-circadian biorhythms. Thyroid: general structure, parafollicular cells (C cells). Parathyroid glands: histological structure. Adrenal gland: Adrenal Cortex: general structure; function. Adrenal medulla: structure; cell types, function. 2h
4. Urinary system: Kidney: cortex and medulla; nephron. Ureter: wall layers. Urinary bladder: histological

- structure. Urethra. Respiratory system: components and functions. Nasal cavity. Paranasal sinuses. Larynx: general structure, vocal apparatus. Trachea: general structure. Bronchial tree: bronchi, bronchioles, terminal bronchioles (Clara's cells), respiratory bronchioles, alveolar ducts and sacs. Alveoli-alveolar cell types, pulmonary surfactant, blood-air barrier. 2h
5. Female reproductive system. Ovary: general organization. Fallopian tube: structure of the wall. Uterus: general structure, changes in menstrual cycle; uterine cervix. Vagina: histological structure. 1h
 6. Skin and ear. Skin: epidermis (cell layers, keratinocytes-keratinizing system, melanocytes-melanin synthesis, Langerhan's cells, Merkel's cells), dermis and hypodermis; sweat glands: eccrine and apocrine; sebaceous glands. Hair: follicle and hair structure. Fingernail: histological structure. Mammary gland: general structure, resting gland and lactating gland. Ear: external ear, tympanic membrane; middle ear; internal ear-vestibular organs, cochlea. 2h
 7. Male reproductive system. Testis: general organization, blood-testis barrier. Ducts of the male reproductive system: tubuli recti, rete testis, ductuli efferentes, ductus epididymis. Epididymis: histological structure and function. Ductus deferens: wall layers. Seminal vesicles: histological structure and function. Prostate gland: histological structure and function. Penis: general organization. 2h
 8. Nervous system and eye. Brain: cerebral cortex. Cerebellum: cortex and medulla, Purkinje cells. Spinal cord. Ganglia. Eye: tunica fibrosa: cornea, sclera; tunica vasculosa (uvea): choroid, ciliary body, iris; tunica interna (retina): layers of retina, fovea centralis, optic disk; lens-histological structure. 2h

Lab classes:

1. Digestive system: Oral cavity, salivary glands, teeth. Lips: wall structure (mucous membrane-epithelium, lamina propria; submucosa; skeletal muscle). Tongue: histological structure (mucous membrane, papillae: filiform, fungiform, foliate, circumvallate). Salivary glands: parotid gland, submandibular glands, sublingual gland (histological structure: secretory portion and excretory ducts; types of glands; histophysiology). Teeth: tooth structure-enamel, cementum, dentin, pulp cavity, pulp. 2h, 15min
2. Digestive system: Esophagus: wall layers (mucous membrane-epithelium, lamina propria, esophageal cardiac glands, muscularis mucosae; submucosa-esophageal glands; muscular coat; adventitia). Stomach: wall layers (mucous membrane: surface epithelium (cell types), lamina propria, muscularis mucosae, submucosa, muscular coat, serosa); regional differences-cardia, fundus and body, pylorus; gastric pits; cardiac glands; gastric glands (structure, cell types: parietal cells, chief cells, enteroendocrine cells, mucous neck cells, undifferentiated cells, their functions); pyloric glands. 2h, 15min
3. Digestive system: Small intestine: histological structure (mucous membrane-surface epithelium: enterocytes; lamina propria: intestinal glands-cell types; villi; submucosa-duodenal Brunner's glands, muscular coat; serosa and adventitia); regional differences: duodenum, jejunum and ileum. Large intestine: histological structure (mucous membrane-intestinal glands, submucosa, muscular coat, adventitia and serosa). Appendix: histological structure, function. 2h, 15min
4. Digestive system: Liver: general structure and functions, blood supply, liver lobules (classic liver lobule, portal lobule, hepatic acinus of Rappaport), portal triad, cell types (hepatocytes, Kupffer's cells, Ito cells), biliary system. Pancreas: general structure and function, exocrine part (pancreatic acinar cells, centroacinar cells), endocrine part (islets of Langerhans). Gallbladder: histological structure (mucous membrane, muscularis, adventitia and serosa). 2h, 15min
5. Endocrine system: Hypophysis (Pituitary gland): Adenohypophysis – Pars Distalis (general structure; cell types: chromophobes, chromophils-acidophils /somatotropic cells, mammotrophic cells/, basophils /gonadotropic cells, thyrotropic cells, corticotrophic cells/; hormones secreted by chromophils and their effects; control of pars distalis; blood supply and hypophyseal portal system); Pars Tuberalis (histological structure; cell types); Pars Intermedia (histological structure; cell types). Neurohypophysis – Pars Nervosa (general structure; cell types: pituicytes and axons of secretory neurons from the supraoptic and paraventricular nuclei; neurohypophyseal hormones and their effects; control of pars nervosa); Infundibulum. Neuroendocrine Hypothalamo-Hypophyseal System (NHS). Pineal gland: general structure; cell types: pinealocytes and astroglial cells; function(melatonin); histophysiology-circadian biorhythms. Thyroid: general structure; follicular cells – morphology, normal function: synthesis, storage and liberation of thyroid hormones(T3, T4); targets of thyroid hormones; parafollicular cells (C cells) – morphology, location, function (calcitonin). Parathyroid glands: histological structure; cell types: chief cells and oxyphil cells; function (parathyroid hormone). Adrenal gland: Adrenal Cortex: general structure - zona glomerulosa, zona fasciculata, zona reticularis; function (mineralocorticoids, glucocorticoids, adrenal androgenes); Adrenal medulla: structure; cell types – chromaffin cells; function (epinephrine, norepinephrine). 2h, 15min
6. Respiratory system: Components and functions. Nasal cavity. Paranasal sinuses. Larynx: general structure; epithelia (types, location); laryngeal cartilages (types); vocal apparatus. Trachea: general structure – mucous

- membrane (epithelium-cell types, lamina propria, glands, cartilage), muscular layer, adventitia. Bronchial tree: bronchi-wall layers (epithelium, glands, cartilage), bronchioles-wall layers (epithelium), terminal bronchioles (Clara's cells), respiratory bronchioles, alveolar ducts and sacs. Alveoli-alveolar cell types, pulmonary surfactant, blood-air barrier. 2h, 15min
7. Practical recognising of slides. Partial test. 2h, 15min
 8. Female reproductive system: Ovary: general organization: external coverings and internal structure; ovarian cortex-ovarian follicles: primordial, unilaminar primary, multilaminar primary, secondary, mature Graafian, atretic follicles; corpus luteum; corpus albicans; ovarian hormones; hormonal regulation of ovary-FSH and LH. Oviduct: wall structure, epithelium. Uterus: general structure; endometrium - stratum basale, stratum functionale: zona compacta and zona spongiosa, epithelium, changes in menstrual cycle; myometrium; serosa; uterine cervix – surface epithelia, cervical glands. Vagina: histological structure (mucosa-epithelium, lamina propria; muscularis; adventitia). 2h, 15min
 9. Urinary system: Kidney: cortex and medulla; nephron: renal corpuscle (Bowman's capsule-podocytes; glomerulus; mesangium; renal filtration barrier-components, functions); histological structure and histophysiology of renal tubule (proximal convoluted tubule, loop of Henle, distal convoluted tubule); collecting tubules and collecting ducts; juxtaglomerular apparatus; renal calyces and renal pelvis. Ureter: wall layers (mucous membrane-surface epithelium, lamina propria; muscular coat; adventitia). Urinary bladder: histological structure (mucous membrane-transitional epithelium, lamina propria; muscular coat; adventitia). Urethra. 2h, 15min
 10. Skin and ear: Skin: epidermis (cell layers, keratinocytes-keratinizing system, melanocytes-melanin synthesis, Langerhan's cells, Merkel's cells), dermis and hypodermis; sweat glands: eccrine and apocrine; sebaceous glands. Hair: follicle and hair structure. Fingernail: histological structure. Mammary gland: general structure, resting gland and lactating gland. Ear: external ear, tympanic membrane; middle ear; internal ear-vestibular organs, cochlea. 2h, 15min
 11. Male reproductive system: Testis: general organization: external coverings and internal structure (lobules); seminiferous tubules: seminiferous epithelium-spermatogenic cells and supportive Sertoli's cells, basal lamina, tunica propria; interstitial Leydig's cells; blood-testis barrier; tubuli recti; rete testis; ductuli efferentes. Epididymis: histological structure and function (surface epithelium). Ductus deferens: wall layers. Seminal vesicles: histological structure and function. Prostate gland: histological structure and function. Penis: general organization-corpora cavernosa, corpus spongiosum. 2h, 15min
 12. Nervous system and Eye: Cerebral cortex. White and grey matter. Cerebellum. Spinal cord. Ganglia. Eye: tunica fibrosa: cornea, sclera; tunica vasculosa (uvea): choroid, ciliary body, iris; tunica interna (retina): layers of retina, fovea centralis, optic disk; lens-histological structure. 2h, 15min
 13. Partial test : Practical recognizing of slides and Partial test. 2h, 15min
 14. Slide review. 2h, 15min
 15. Final practical recognising of slides. 2h, 15min

Obligatory literature:

1. Textbook of Histology by Leslie P. Gartner, James L. Hiatt, fourth edition 2017
2. Before we are born by KL. Moore, TVN. Persaud, MG. Torchia, 9th edition

Complementary literature:

1. Basic Histology by L. Carlos Junqueira, 11th edition, 2005
2. Wheater's Functional Histology by B. Young, J.W. Heath 4th ed.
3. Netter's Atlas of Human Embryology by L.R. Cochard, 2012, 9th ed.

Requirements for didactic aids (e.g. laboratory, multimedia projector, others...)

- Laptop
- Multimedia projector
- TV
- Optic microscopes
- Microscopic specimens
- Electron microscope photos

Conditions for obtaining a credit for the subject:

1. The coursework includes 40 hours of lectures (25 in the first semester and 15 in the second semester) and 110 hours of practical classes (labs) conducted during two semesters (75 hours in the first semester and 35 in the second semester). It is ended with the Practical Exam and Final Exam (test). In the first semester will be three partial tests. The first and second partial tests in the first semester will be preceded by

practical recognising of slides. The third partial test will include embryology issues. In the second semester will be two partials with practical recognising of slides.

2. The partial test and practical recognising of slides will be conducted during the labs hours (the presence is obligatory). The final test will be timed in the schedule of session.

3. The detailed plan of labs and lectures will be placed on the web side and on the table in the corridor before the Department of Histology and Embryology.

Requirements

1. Students are obliged to prepare themselves earlier for each practical classes according to the topics.

2. Presence at the lectures is obligatory. This is due to the implementation of the course of the Histology and Embryology with Cytophysiology.

3. The labs are obligatory. Unexcused Absences: Student can have a maximum one (1) of the unjustified absences during the whole cycle of teaching the subject (including the semester I and II). More than one unjustified and undocumented absence makes it impossible to pass the semester and take the Final test. (§ 21 of the Rules of Study).

Excused Absences: Student can have a maximum three (3) of the excused absences during the entire cycle of teaching the subject (including I and II semester). In random events, which results in a greater number of justified absences, Head of the Department decides about continuation of learning. Justification the absence are: a) a medical certificate b) certificate of Dean or Vice Dean of Education (this absence is not included to the limit of justified absence).

4. Justification on the basis of a medical certificate the student presents within 7 days of the absence.

Thereafter, they will not be honored. In the case of excusable absences students shall have the opportunity to pass a practice test on the following after the absence of exercise, or in the period to be agreed with the Assistants.

5. Each Student is obliged to come for the labs on time. Delayed Students can enter the class only if the time of delaying does not exceed 15 minutes from the moment a lab has been started.

6. In the case of absence or delay (more than 15 minutes) the Students can take the lab during the same week with another group provided that they receive the permission from the Teacher. In the case of absence and not taking the quiz Student is obliged to take the quiz in the next week.

7. In the case of the prolonged illness lasting more than one week the Student will be exempt from taking the labs but the Student is obliged to pass the material which was covered during the labs.

8. Students are obliged to change shoes and coat while taking the labs at the Department of Histology and Embryology.

9. Students are obliged to bring color pencils and exercises books on the labs. Students are obliged to make a pictures of organs and tissues due to a program of lectures and classes.

10. Eating, drinking, and using mobile phones during the labs are prohibited.

11. Students participating in the course of Histology and Embryology with Cytophysiology (labs and lectures) are required to have a student ID. If students do not have the required ID, Assistant has the right not to allow the student to participate in the classes.

Point system.

1. Each lab (except the 1st lab in the first semester) will be entered with a small test (quiz- 6 questions: 4 multiple choice, 2 open questions). The partial tests are consisted of 50 questions: multiple choice questions. For each correct answer the Student will receive one point (for open questions - 2 points). The first and second partial tests in the first semester and all partial tests in the second semester are preceded by practical recognising of slides (5 slides per one – 10 points). Student pass the practical part, if he obtain 6 points. The Student who failed the practical part, can take the written part but he is obliged to retake the practical part in the next week. In this case, if student pass practical retake, he can get 6 points only.

In this case extra privilege will not be added to the final score. All tests and credits must be completed by the end of the semester.

2. The maximal number of points possible to obtain through the whole year equals 442 points (242 in the

first semester: 72 points from entrance test, 20 points from practical recognising of slides, 150 points from partials; second semester: (200): 80 points from entrance test, 100 points from partials, 20 points from practical recognising of slides).

3. Students who will obtain less than 145 points in the first semester will have to take retake test (50 questions) at the end of the first semester. In this case extra percentages will not be added to the Final Score. If student pass retake, the number of points from the first semester will be 140 (the minimal number which is need to pass).

4. The first semester is ended by grade:

>221 points	5
211-220 points	4,5
186-210 points	4
180-185 points	3,5
146-179 points	3
<145 points	2

5. Only students who will gain at least 260 points can take the Final Test.

6. Students who will obtain less than 260 points will have to take the retake in order to be allowed to take the Final Test. In this case extra privilege will not be added to the Final Score.

7. The Final test will be timed in the schedule of session.

8. The additional privilege will be added only in the case of obtaining the minimum number of points received through the whole year and successfully passed the Final test and practical part in the first term.

9. In summary in order to pass the labs it is obligatory:

• taking part in ALL of the labs

unexpected absences have to be justified and documented

obtaining the minimum number of points per year (260 points)

the notebook with pictures of tissues and organs

FINAL TEST

1. The Final test is a multiple choice questions test (100 questions).

2. It is preceded by practical recognising of slides (10 slides – 10 points). Maximal number of points from the final exam – 110.

3. The Student who failed the practical exam can take the written part but he is obliged to retake the practical part. In this case extra percentages will not be added to the final score.

4. Cheating is equal with the failed Final Test.

5. Students who failed the Final Test are obliged to retake the test.

6. The final scores of the Final Test are not changeable.

7. The scores of the failed Final Test and the retake will be confirmed by a signature in the Student Book as two separated scores but not as the mean of these two.

8. An excuse for absence should be submitted to the examiner on the same day of the Final Test, or in justified circumstances, within three days after the Final Test.

9. The Student who has not taken the Final test at a given date for not justified reason receives an unsatisfactory mark in his Student Book and Examination Record. The unsatisfactory mark equals with losing the first term of an exam and denying all the rights to receiving the privileges related only to the first term .

THE CRITERIA OF THE FINAL SCORE:

The criteria of the final score include:

1. Final test
2. Entrance test and partial tests

The additional privilege from the above criteria will be added only in the case of the successfully passed Final Test for the first time and practical part in the first term. Retakes of the final test or of the practical exam deny all the rights to receive the additional privilege.

The privilege: In the case when the Student obtained more than 360 points from both semesters, the final grade will be higher by half grade.

Criteria of Final exam:

Percentage of points obtained from the test

0-60 %	2
61-68 %	3
69-76 %	3,5
77-84%	4
85-91%	4,5
92-100%	5

Criteria of I and II retake

Percentage of points obtained from the test

0-60%	2
61-75%	3
76-86%	3,5
87-90%	4
91-95%	4,5
96-100%	5

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Dean's signature

Date of submission: