



Syllabus for academic year: 2021/2022 Training cycle: 2021/22-2026/2027														
Description of the course														
Course	HISTOLOGY WITH CYTOPHYSIOLOGY HISTOLOGIA Z CYTOFIZJOLOGIĄ		Group of detailed education results											
			Group code	Group name										
			A	Morphological Science										
			B	Scientific basis of medicine										
Faculty	Faculty of Medicine													
Major	medicine													
Level of studies	<input checked="" type="checkbox"/> uniform magister studies <input type="checkbox"/> 1 st degree studies <input type="checkbox"/> 2 nd degree studies <input type="checkbox"/> 3 rd degree studies <input type="checkbox"/> postgraduate studies													
Form of studies	<input checked="" type="checkbox"/> full-time <input type="checkbox"/> part-time													
Year of studies	I		Semester:	<input checked="" type="checkbox"/> winter <input checked="" type="checkbox"/> summer										
Type of course	<input checked="" type="checkbox"/> obligatory <input type="checkbox"/> limited choice <input type="checkbox"/> free choice / optional													
Language of study	<input type="checkbox"/> Polish <input checked="" type="checkbox"/> English													
Number of hours														
Form of education														
	Lectures (L)	Seminars (SE)	Auditorium classes (AC)	Major Classes – not clinical (MC)	Clinical Classes (CC)	Laboratory Classes (LC)	Classes in Simulated Conditions (CSC)	Practical Classes with Patient (PCP)	Foreign language Course (FLC)	Physical Education (PE)	Vocational Practice (VP)	Directed Self-Study (DSS)	E-learning (EL)	
Winter semester:														
Department of Histology and Embryology														
Direct (contact) education ¹				20*										
Distance learning ²	10			20*										
Department of ultrastructural research														
Direct (contact) education				20*										
Distance learning				20*										

¹ Education conducted with direct participation of university teachers or other academics

² Education with applied methods and techniques for distance learning



Summer semester:														
Department of Histology and Embryology (Dep. in charge of the course)														
Direct (contact) education				60*										
Distance learning	10													
Department of ultrastructural research														
Direct (contact) education				60*										
Distance learning														
Total per Year														
Department of Histology and Embryology (Dep. in charge of the course)														
Direct (contact) education				80*										
Distance learning	20			20*										
Department of ultrastructural research														
Direct (contact) education				80*										
<ul style="list-style-type: none"> Each unit realizes 100 CN hours in the academic year with assigned student groups 														
Educational objectives (max. 6 items) C1. In the classes of <u>histology</u> students are acquainted with: <ul style="list-style-type: none"> The principles of the basic techniques used in the morphological studies, The organization of the cell model with cell organelles, their structure and functions, Structure and function of selected, important specialized cells, Classification, characteristics, origin, histological organization and role of the tissues, Histological organization of systems and organs as well as their role and basic mechanisms regulating their function. C2. In the classes of <u>cytophysiology</u> students are acquainted with: <ul style="list-style-type: none"> processes taking place in cell organelles and mechanisms of their regulation, life cycle, cell differentiation, regulation of these processes and cell aging, types of cell death (apoptosis, necrosis, autophagy, mitotic catastrophe) intercellular interactions and their importance, more important processes related to, inter alia, with immune response, neoplasm and cell adhesion selected cytoplasmic processes C3. Development of social competences needed to practice the medical profession, in accordance with graduate's profile.														
Education result for course in relation to verification methods of the intended education result and the type of class:														
Number of detailed education result	Student who completes the course knows/is able to							Methods of verification of intended education results	Form of didactic class <i>*enter the abbreviation</i>					



A.W1.	The student is familiar with histological nomenclature;	Oral response, written examination	L, MC
A.W4.	The student knows the basic cell structures and their functional specialization	Oral response, written examination	L, MC
A.W5.	The student knows the microarchitecture of the tissues, extracellular matrix and organs.	Oral response, written examination, proper drawing preparation	L, MC
B.W14.	The student knows function of the genome, transcriptome and proteome of the human and essential methods used in their analyses, and describes the process of replication, DNA repair and recombination, transcription and translation, and degradation of DNA, RNA and protein, knows gene regulation concepts	Oral response, written examination	L, MC
B.W17.	The student knows the ways of communication between cells, and between the cell and extracellular matrix, and signal transduction pathways in the cell, and examples of disorders in these processes leading to the development of neoplastic and other diseases	Oral response, written examination	L, MC
B.W18.	The student is familiar with processes such as cell cycle, proliferation, differentiation, and cell aging, apoptosis and necrosis, and understands their importance to the functioning of the body.	Oral response, written examination	L, MC
B.W19.	The student is familiar with the basic issues of stem cells and their use in medicine	Oral response, written examination	L, MC
B.W20.	The student knows the basics of stimulation and conduction in the nervous system, and higher nervous activity and physiology of smooth muscle fibers and functions of the blood.	Oral response, written examination, proper drawing preparation	L, MC
A.U1.	The student knows how to use optical microscope	Practical examination	MC
A.U2.	The student recognizes in images from optical or electron microscope histological structures corresponding to the organs, tissues, cells and cellular structures, shall describe and interpret their structure and the relationship between structure and function	Oral response, written examination, proper drawing preparation, practical examination	MC
A.U5.	The student properly uses the spoken and written histological nomenclatures.	Oral response, written examination, practical examination	MC



* L- lecture; SE- seminar; AC- auditorium classes; MC- major classes (non-clinical); CC- clinical classes; LC- laboratory classes; CSC- classes in simulated conditions; PCP- practical classes with patient; FLC- foreign language course; PE- physical education; VP- vocational practice; DSS- directed self-study; EL- E-learning

Student's amount of work (balance of ECTS points):

Student's workload (class participation, activity, preparation, etc.)	Student Workload
1. Number of hours of direct contact:	80
2. Number of hours of distance learning:	40
3. Number of hours of student's own work:	93,5
4. Number of hours of directed self-study	n/a
Total student's workload	213,5
ECTS points for course	10

Content of classes: (please enter topic words of specific classes divided into their didactic form and remember how it is translated to intended educational effects)

Lectures

Winter semester (10h)

1. Epithelial tissue: epithelia and glands, cell surface specializations, intercellular connections. (1 hour)
2. Connective tissue: connective tissue cells and extracellular substance. Connective tissue proper (reticular tissue, yellow and brown adipose tissue, tendon tissue). (1 hour)
3. Cartilage: structure, function, types. (1 hour)
4. Bone tissue: function, structure, types. Bone development. (1 hour)
5. Nervous tissue. (1 hour)
6. Blood, blood cells and hemopoiesis. (1 hour)
7. Muscle tissue: types of contractile cells and their function. (1 hour)
8. Heart and vascular system. (1 hour)
9. Immune system: cells of the immune system, structure and function of the immune system. (1 hour)
10. The digestive tract: the oral cavity and its equipment, the conducting sections and the digestive part. (1 hour)

Summer semester (10h)

1. Alimentary tract: liver and pancreas. (1h)
2. Endocrine system: the hypothalamus, pituitary gland, thyroid and parathyroid, adrenal, pancreas, ovary and testis, neuroendocrine system. (1h)
3. Respiratory: conductive and respiratory parts. (1h)
4. Urinary system: kidney structure and function of the nephron – corpuscle and tubules. (1h)
5. Reproductive system: male and female: ovary and uterus, testis and epididymis, hormonal control
6. Nervous system: structure and function of neurons, glial tissue, central and peripheral nervous system. (1h)
7. The skin and mammary gland. (1h)
8. Sensory organs: eye and ear. (1h)
9. Recognition of histological sections (repeat). (1h)
10. Recognition of histological sections (repeat). (1h)

Seminars - not applicable

Classes (MC -40h) – Winter semester - Histology

Content of classes:

1. Histological techniques, microscopy, cell structure and function. Instruction and presentation of the class rules (presented slides - examples of different staining techniques: H + E, AZAN, silvering, injection). (3 hours)
2. Epithelial tissue: epithelia and glands, cell surface structures, intercellular connections (presented slides: simple cuboidal, columnar epithelium, transitional and stratified squamous epithelium). (3 hours)



3. Connective tissue: connective tissue cells and extracellular matrix - structure and function. (presented slides: reticular tissue, loose connective tissue, dense fibrous tissue irregular, white adipose tissue) (3 hours)
4. Support cell family: cartilage (presented preparations: hyaline cartilage, elastic cartilage, fibrous cartilage) (3 hours)
5. Supporting tissues family: bone tissue and bone development (presented slides: compact bone tissue - longitudinal and transverse section, ossification on membranous base and cartilage). (3 hours)
6. Muscle tissue: types of contractile cells and their function (presented preparations: smooth muscle, transverse striated skeletal and cardiac). (3 hours)
7. Nervous tissue: neuron structure, neuron classification, histological organization of nerve cells; glial cells - types and function. (presented preparations: Nissle's bodies in nerve cells, pear-shaped cell, nerve trunk in longitudinal and transverse section) (3 hours)
8. Blood: blood cells and hemopoiesis. Heart and vascular system (presented preparations: human blood - smear, capillaries, artery and muscle vein, aorta, large vein) (3 hours)
9. Immune system: cells of the immune system, structure and function of the immune system (presented preparations: lymph node, young thymus and thymus involution, palatine tonsil, spleen). (3 h)
10. Gastrointestinal tract part I: oral cavity and its equipment, general structure of the oral cavity wall, salivary glands - structure and function, morphological characteristics differentiating secretory sections of salivary glands (presented preparations: tongue, oral lip, parotid and sublingual salivary glands) (3 h)
11. The gastrointestinal tract part II: the tooth organ - the structure of the tooth and periodontium; the lower part of the gastrointestinal tract - general diagram of the structure of the gastrointestinal tract, the construction of the esophagus and stomach (presented preparations, the decalcified tooth, tooth in situ, esophagus, stomach - fundus) (3 h)
12. The digestive tract part III: c.d. the lower part of the gastrointestinal tract - the small intestine - the structure of the small intestinal mucosa, characteristic features of individual sections of the small intestine; large intestine (presented preparations - duodenum, jejunum and ileum, large intestine, appendix). (3 h)
13. Repetition part I - general histology (2 hours)
14. Repetition part II - general histology (2 hours)

CLASSES (MC -30H) – SUMMER SEMESTER – HISTOLOGY;

1. Alimentary tract: the digestive glands. Presentation: liver and pancreas. (3h)
2. Endocrine system: the hypothalamus, pituitary gland, thyroid and parathyroid, adrenal, pancreas, neuroendocrine system. Presentation: pituitary, thyroid, parathyroid, adrenal gland. (3h)
3. Respiratory: conductive and respiratory parts. Presentation: nasal cavity, trachea, lung. (3h)
4. Urinary system: kidney, structure and function of the nephron, exit tubules (presented preparations: kidney - H + E staining and injected preparation - analysis of kidney vascularization in connection with function, ureter, urinary bladder).
5. Male reproductive system: testicle, epididymis, vas deferens, prostate; hormonal regulation. (presented preparations: testicle, epididymis, prostate gland, vas deferens. (3 h)
6. Female reproductive system: ovaries, fallopian tubes, uterus, hormonal control - ovarian cycle and uterine cycle (presented preparations: ovary, fallopian tube, uterus).
7. Nervous system: structure and function of neurons, glial tissue, central and peripheral nervous system. Presentation: the spinal cord, nerve ganglia, brain, cerebellum, nerve trunk. (3h)
8. Skin and mammary gland (presented preparations: hairy skin - hair structure, sebaceous gland; hairless skin - epidermis structure; sweat glands, nerve endings; mammary gland) (3 h)
9. Sensory organs: eye and ear. (3h) Presentation: eye - the front part, the eye - the optic disc, eyelid, inner ear. (3h)
10. Recognition of histological slides (repetition). (3h)
11. Recognition of histological slides (repetition). (3h)



CLASSES (MC -30H) – SUMMER SEMESTER – CYTOPHYSIOLOGY

1. Methods of studying the structure and function of cells, images of cell ultrastructure from an electron microscope (presented electronograms: nucleus, nucleolus, nuclear envelope, mitochondria, Golgi apparatus, rough endoplasmic reticulum, free ribosomes). (3 hours)
2. Organization and functioning of the cell nucleus. Genes and Genetic Engineering. (3 hours)
3. Biological membranes and transport across membranes (cell membrane, lipid bilayer, membrane proteins, glycocalyx, simple, facilitated, active, endocytosis, caveolae, multidrug resistance, membrane fusion). (2 hours)
4. Cell cycle and cell aging. (2 hours)
5. Types of cell death: apoptosis, autophagy, necrosis. (3 hours)
6. Cytoskeleton (microtubules, MAP, karyokinetic spindle, cilia and twigs, intermediate filaments, microfilaments, actin binding proteins, motor proteins, microvilli, cell cortex). (2 hours)
7. Selected cytoplasmic processes (addressing proteins in the cell, translocation of proteins to the endoplasmic reticulum, sorting proteins of membranous organelles, vesicular transport, chaperones, protein ubiquitination, peroxisomes, proteasomes). (3 hours)
8. Intercellular communication (receptor, ligand, agonist, antagonist, primary and secondary informant, methods of intercellular communication depending on the method of information spreading and origin of the informant, G protein, protein kinases and phosphatases, types of synapses). (2 hours)
9. Adhesive molecules and intercellular substance (selectins, integrins, cadherins, immunoglobulin superfamily, collagen, elastin, fibrillin, fibronectin, laminin, structure of connective tissue intercellular substance, importance of adhesive molecules in physiology and pathology). (2 hours)
10. Basics of immune defense (antigen, acute phase proteins, cytokines, defensins, complement, NK cell, immune response cells, lysozyme, MHC, acquired response, innate response, antibody, TNF). (2 hours)
11. Endothelium (role of endothelial cells in angiogenesis, endothelial regeneration, dysfunction of endothelial cells in cardiovascular diseases, role of endothelium in neoplastic diseases - tumor angiogenesis, endothelium and inflammatory processes). (2 hours)
12. Carcinogenesis (basic disorders in a cancer cell, no immune defense against cancer, immune tolerance, clonal tumor growth, benign and malignant neoplasms, oncogenes, viral oncogenes, oncogen suppressor genes). (2 hours)
13. Repertory - test I / II deadline (2 hours)

Other – not applicable

- 1.
 - 2.
 - 3.
- ect.

Basic literature (list according to importance, no more than 3 items)

1. Basic Histology. L. Carlos Junqueira, Jose Carneiro, Robert O. Kelly, XVth edition, 2020
2. Histology. Alan Stevens, James Lowe, 3rd edition, 2004
3. Exercise notebook for medicine and dentistry student (ed. Maciej Zabel). Elsevier Urban & Partner, Wrocław

Additional literature and other materials (no more than 3 items)

1. Histology and Cell Biology: An Introduction to Pathology. Abraham Kierszenbaum, 5th edition 2019
2. Histology: a text and atlas. Michael H. Ross, Gordon I. Kaye, Wojciech Pawlina, 2019
3. Medical Cell Biology. Steven R. Goodman, 4th edition, 2020

Preliminary conditions: (minimum requirements to be met by the student before starting the course)



Students should be prepared to exercise according to the schedule at the beginning of the semester. Continuation of the course in the summer semester is conditional upon passing the winter semester.

Conditions to receive credit for the course: (specify the form and conditions of receiving credit for classes included in the course, admission terms to final theoretical or practical examination, its form and requirements to be met by the student to pass it and criteria for specific grades)

Attention! Attendance can not be a condition for passing the course

CONDITIONS TO RECEIVE CREDIT FOR THE WINTER SEMESTER- Stationary/On-line*:

The condition for completing the course in the winter semester is an oral or written credit for individual exercises and a general histology test (form: written, 10 open questions, maximum number of points 30, a minimum of 18 points required for a satisfactory grade).

The grade obtained from the general histology test is the final grade for completing the winter semester.

* Depending on the epidemic situation in accordance with the Rector's order

CONDITIONS TO RECEIVE CREDIT FOR THE SUMMER SEMESTER:

The condition for completing the course in the summer semester is oral or written credit for individual exercises and:

- CHECKING PRACTICAL SKILLS:** 10 general preparations, 5 targeted preparations, 2 electronograms (maximum 17 points) - correct recognition of at least 7 general preparations, 3 targeted preparations and 1 electronogram (minimum 11 points - 7 + 3 + 1) must be passed. Failure to obtain the minimum number of points in a specific category (general preparation, targeted preparation, electronogram) results in an unsatisfactory grade, despite obtaining a total of 11 points or more. The student takes the second term of the practical test.
- CYTOPHYSIOLOGY TEST,** form: written, 50 single-choice questions. 26 correct answers required to pass.

The final grade for passing the subject in the winter semester is the result of the PRACTICAL TEST. The criteria for individual assessments are presented in the table below.

Admission to the theoretical final exam: completion of the second semester.

Grade:	Criteria for passing the course with a grade in the winter semester
Very Good (5.0)	28-30 points
Good Above (4.5)	26-27points
Good (4.0)	24-25 points
Satisfactory Plus (3.5)	21-23 points
Satisfactory (3.0)	18-20 points
Grade:	Criteria for passing the course with a grade in the summer semester ³
Very Good (5.0)	Practical test – 17 pkt
Good Above (4.5)	Practical test – 16 pkt
Good (4.0)	Practical test – 15 pkt
Satisfactory Plus (3.5)	Practical test – 13-14 pkt
Satisfactory (3.0)	Practical test– 11-12 pkt
Grade:	Criteria of exam:
Very Good (5.0)	The form of the examination: MCQ type A test minimum 88% correct answers



Good Above (4.5)	minimum 81% correct answers
Good (4.0)	minimum 74% correct answers
Satisfactory Plus (3.5)	minimum 67% correct answers
Satisfactory (3.0)	minimum 60% correct answers
Department in charge of the course:	Department of Histology and Embryology
Department address:	ul. Chalubinskiego 6a, 50-368 Wrocław
Telephone:	(71) 784-13-54(55), fax: (71) 784-00-82
E-Mail:	justyna.kosek@umed.wroc.pl

Person in charge for the course:	Marzenna Podhorska-Okolow MD, PhD, Prof.
Telephone:	71 784 13 54
E-Mail:	marzenna.podhorska-okolow@umed.wroc.pl

List of persons conducting specific classes:

Name and surname	Degree/scientific or professional title	Discipline	Performed profession	Form of classes
Marzenna Podhorska-Okolow	Prof, PhD, MD	Medical science	Academic teacher, Medical doctor - ophthalmologist	L, MC
Urszula Ciesielska	PhD	Medical science	Academic teacher	L, MC
Christopher Kobierzycki	PhD, MD	Medical science	Academic teacher, Medical doctor - gynecologist	L, MC
Katarzyna Haczkiwicz-Leśniak	PhD	Medical science	adjunct	L, MC
Karolina Jabłonska	PhD	Medical science	adjunct	L, MC
Mateusz Olbromski		Medical science	Academic teacher	MC

Date of Syllabus development

30.06.2021

Signature of Head of teaching unit

Signature of Faculty Dean

Wrocław Medical University
Faculty of Medicine
Vice Dean for Postgraduate Studies

prof. Beata Szalewska-Zachara, PhD

Syllabus developed by

Urszula Ciesielska

Uniwersytet Medyczny we Wrocławiu
ZAKŁAD HISTOLOGII I EMBRIOLOGII

prof. dr hab. Piotr Dzięgiel