Histology with embryology and cytophysiology

1. IMPRINT	
Academic Year	2025/2026
Department	Faculty of Medicine
Field of study	Medicine
Main scientific discipline	Medical science
Study Profile	general academic
Level of studies	Uniform MSc
Form of studies	full-time studies
Type of module / course	obligatory
Form of verification of learning outcomes	exam
Educational Unit / Educational Units	Department of Histology and Embryology Center for Biostructure Research 02-004 Warszawa, Chałubińskiego 5 Str.(Anatomicum bldg.) Web site: http://histologia.wum.edu.pl Department office is open for students on working days. Business hours 9: 30 - 14: 00, tel/fax 22 629-5282. Department of Transplantology and Main Tissue Bank Center for Biostructure Research 02-004 Warszawa, Chałubińskiego 5 Str.(Anatomicum bldg.) https://transplantologia.wum.edu.pl/ Department office is open for students on working days. Business hours 9: 30 - 14: 00, tel./fax 22 621 75 43
Head of Educational Unit / Heads of Educational Units	Paweł Włodarski, MD, PhD, Professor Artur Kamiński, Ph.D. Professor
Course coordinator	Paweł Włodarski, M.D., D.D.S., Ph.D., Professor pawel.wlodarski@wum.edu.pl

Person responsible for syllabus	Paweł Włodarski, M.D., D.D.S., Ph.D., Professor pawel.wlodarski@wum.edu.pl
Teachers	Department of Histology and Embryology: Paweł Włodarski, M.D., D.D.S., Ph.D., Professor pawel.wlodarski@wum.edu.pl Jacek Malejczyk, Ph.D., Professor jacek.malejczyk@wum.edu.pl Stanisław Moskalewski, M.D., Ph.D., Professor stanislaw.moskalewski@wum.edu.pl Monika Ołdak, Professor monika.oldak@wum.edu.pl Anna Hyc, Assoc. Prof. anna.hyc@wum.edu.p Anna Iwan, Assoc. Prof. anna.iwan@wum.edu.p Izabela Młynarczuk-Biały, M.D., Assoc. Prof. izabela.mlynarczuk-bialy@wum.edu.pl Łukasz Biały, Assoc. Prof. lukasz.bialy@wum.edu.pl Ewa Jankowska Steifer, Assoc. Prof. ewa.jankowska-steifer@wum.edu.pl Justyna Niderla-Bielińska, Assoc. Prof. justyna.niderla-bielinska@wum.edu.pl Dorota Radomska-Leśniewska Assoc. Prof. dorota.radomska-lesniewska@wum.edu.pl Aneta Ścieżyńska, Assoc. Prof. aneta.sciezynska@wum.edu.pl Ilona Kalaszczyńska, PhD. ilona.kalaszczynska@wum.edu.pl Kateryna Shevchenko, PhD. kateryna.shevchenko@wum.edu.pl Department of Transplantology and Main Tissue Bank: Artur Kamiński, Professor artur.kaminski@wum.edu.pl Dariusz Śladowski, Assoc. Prof. dariusz.sladowski@wum.edu.pl Izabela Uhrynowska-Tyszkiewicz, M.D., Ph.D. izabela.uhrynowska-tyszkiewicz@wum.edu.pl

2. BASIC INFORMATION

Year and semester of studies	**1 (1 and 2 semester)**	**Number of ECTS credits**	**12**

FORMS OF CLASSES	**Number of hours**	**ECTS credits calculation**
Contacting hours with academic teacher		
Lecture (L)	20	1
Seminar (S)	30	1
Classes (C)	70	6,5
e-learning (e-L)	-	
Practical classes (PC)	-	
Work placement (WP)	-	
Unassisted student's work		
Preparation for classes and completions	100	3,5

3. COURSE OBJECTIVES

The aim of the course of Histology and Embryology is to demonstrate and explain structure of the cell, tissues and organs. Starting from the ultrastructure of the cell, which is discussed along with the function of the organelles, microscopic anatomy of all human tissues and major organs is shown. During the classes, functional connection between microscopic anatomy of the organ and the function is highlighted. This is the background for further education of Biochemistry, Physiology and Pathology. Basis of the molecular biology and examples of diagnostic methods are lectured.

O1	Gaining knowledge regarding structure and function of the cell organelles, tissues and organs, as well as morphological adaptation of tissues to their function.
O2	Gaining knowledge regarding the development of the embryo, development and function of fetal membranes and the most common fetal abnormalities.
O3	Gaining knowledge regarding identification of histological specimens and characteristic elements of the tissues under the microscope.
O4	Gaining knowledge regarding processes related to the regulation of differentiation and functions of individual cells and their populations.
O5	Gaining knowledge regarding molecular mechanisms of apoptosis and how cells receive signals from the environment, transmit them into the cell, and regulate intracellular processes.
O6	Gaining knowledge regarding the mechanisms of the cell cycle, the mechanism controlling cell proliferation, and the consequences of their disturbances, which often lead to cancer development.
O7	Gaining knowledge regarding current views on cellular aging and explanation of why cancer cells are considered immortal.
O8	Gaining knowledge regarding basic histochemical and immunocytochemical methods used in modern microscopic diagnostics.
O9	Gaining knowledge regarding methods for preserving tissues intended for transplantation for therapeutic purposes and discussion of the behavior of such grafts in the body.
O10	Gaining knowledge regarding the basics of molecular biology and the fundamental molecular research methods used in modern medical diagnostics.

4. STANDARDS OF LEARNING – DETAILED DESCRIPTION OF EFFECTS OF LEARNING

Code and number of effect of learning in accordance with standards of learning	**Effects in time**
Knowledge – Graduate* knows and understands:	
A.W1.	structure of the human body in the topographical approach (upper and lower limb, chest, abdomen, pelvis, back, neck, head) and the functional approach (skeletal system, muscular system, urinary system, reproductive system, nervous system and sensory system, integumentary system); appropriate Polish and English anatomical, histological and embryological terminology;
A.W2.	cellular structures and their functional specializations;
A.W3.	micro-architecture of tissues, extracellular matrix and organs;
A.W4.	the stages of development of the human embryo, the structure and function of the membranes and placenta, the stages of development of the various organs and the effects of harmful factors on embryonic and foetal development (teratogenic);
B.W.6.	the physio-chemical and molecular basis of the sensory organs;

B.W9.	the structure of lipids and polysaccharides and their functions in cellular and extracellular structures;
B.W10.	I-, II-, III- and IV-order structures of proteins and post-translational and functional modifications of proteins and their significance;
B.W11.	the function of nucleotides in the cell, the I- and II-strand structures of DNA and RNA and the structure of chromatin;
B.W12.	functions of the human genome, transcriptome and proteome and the methods used to study them, the processes of DNA replication, repair and recombination, transcription and translation and degradation of DNA, RNA and proteins, and the concepts of regulation of gene expression;
B.W16.	ways of communication between cells and between the cell and the extracellular matrix and signal transduction pathways in the cell, and examples of disruption of these processes leading to cancer and other diseases;
B.W17.	processes: cell cycle, cell proliferation, differentiation and ageing, apoptosis and necrosis and their importance for organismal functioning;
B.W18.	functions and applications of stem cells in medicine;
B.W19.	basics of excitation and conduction in the nervous system and higher nervous functions, as well as striated and smooth muscle physiology;
B.W21.	ageing processes and organ function changes associated with ageing;
Skills– Graduate* is able to:	
A.U1.	operate an optical microscope, including the use of immersion;
A.U2.	recognise in microscopic images structures corresponding to organs, tissues, cells and cellular structures, describe and interpret their structure and the relationship between structure and function;
B.U8.	use medical databases and correctly interpret the information they contain to solve problems in basic and clinical sciences;

** In appendix to the Regulation of Minister of Science and Higher education from 26th of July 2019 „graduate", not student is mentioned.*

5. ADDITIONAL EFFECTS OF LEARNING	
Number of effect of learning	**Effects of learning i time**
Knowledge – Graduate knows and understands:	
K5	perceiving and recognizing own limitations and self-assessment of deficits and educational needs
K7	readiness to use objective sources of information
Skills– Graduate is able to:	
S1	
Social Competencies – Graduate is ready for:	

SC1	

6. CLASSES

Form of class	Class contents	Effects of Learning
W – Lectures	1. Structure of cell membranes, membrane transport. 2. Cytoplasm organization – cytoskeleton and adhesion molecules. Selected cell compartments – mitochondrion. 3. Genome structure, DNA replication, DNA repair, DNA transcription. 4. Regulation of transcription and translation, cell differentiation. 5. Protein modifications – post-translational processing, intracellular transport, protein degradation, protein export. 6. Cell receptors and signal transduction. 7. Cell cycle regulation, cell division. 8. Cell aging and death. 9. Basics of oncogenesis. 10. Liver. 11. Kidney. 12. Mucosal lymphoid tissue. 13. Eye. 14. Inner ear. 15. Formation of reproductive cells. Fertilization. Implantation. 16. Bilaminar embryonic disc, gastrulation, neurulation, embryo folding. 17. Embryo development from week 4 to 8. 18. Key phenomena during the fetal period. Development and structure of the placenta. 19. Embryonic development disorders – selected clinical syndromes. 20. Cell and tissue banking for medical purposes. Clinical application of tissue and cell transplants.	A.W1.; A.W2.; A.W3.; A.W4.; B.W6.; B.W9.; B.W10.; B.W11.; B.W12.; B.W16.; B.W17.; B.W18.; B.W19.; B.W21.;
(S) Seminars; (C) Practical classes;	S - Microscope, histological technique. C - Cell types. Principles of working with a light microscope. S - Electron microscope. Cellular compartments. C - Ultrastructure of cytoplasmic organelles. S - Ultrastructure of the cell nucleus. C - Cell division. S - Epithelial tissue. C - Specialized structures on the epithelial surface. Glands – histological structure. S - Types of connective tissue proper, adipose tissue – white and brown. C - Connective tissue proper. Adipose tissue. S - Types of cartilage and bone tissue. C - Development of various types of bone tissue – bone remodeling. S - Types of muscle tissue. C - Muscle tissue – skeletal, cardiac, and smooth. S - Nervous tissue. C - Peripheral nervous system – ganglia and peripheral nerves. S - Bone marrow and blood cell formation. C - Evaluation of blood and bone marrow cell morphology. S - Slide demonstration – general histology. C - Practical intermediate examination in general histology.	A.W1.; A. W2.; A.W3.; A. W4.; A.U1.; A.U2.; B.W6.; B.W9.; B.W10.; B.W11.; B.W12.; B.W16.; B.W17.; B.W18.; B.W19.; B.W21.; B.U8.; K5; K7;

	S - Circulatory system, structure and function of endothelial cells. C - Histological structure of the heart, blood vessels, and lymphatic vessels. S - Lymphatic system – cell types and their functions. C - Histological structure and functions of lymphatic organs. S - Structure of oral cavity components; tooth development. C - Digestive system (1) – structure of the tooth and oral mucosa, oesophagus. S - Structure and function of the stomach, small and large intestines. C - Digestive system (2) – histological structure of different sections of the digestive tract. S - Structure and function of the liver, pancreas, and salivary glands. C - Digestive system (3) – histological structure of digestive glands. Lymphatic tissue of the digestive system. S - Functions of different parts of the respiratory system. C - Histological structure of the respiratory system. S - Kidney functions, mechanisms of diuresis. C - Histological structure of the urinary system. S - Skin and skin appendages. C - Structure of the epidermis and dermis. Skin receptors. Structure of hair, sweat and sebaceous glands. Mammary gland. S - Histological structure of the central nervous system. C - Structure of the eye, cerebral cortex, cerebellum, spinal cord. S - Endocrine glands – structure and function. C - Histological structure of endocrine glands. S - Formation of female reproductive cells. C - Histological structure of the female reproductive system. S - Formation of male reproductive cells. C - Histological structure of the male reproductive system. S - Mechanisms of embryogenesis. C - Fertilization, implantation. Structure of the embryo, fetal membranes, and placenta. S - Slide demonstration – microscopic anatomy and embryology. C - Practical intermediate examination in microscopic anatomy and embryology. S - Slide review before the final exam. C - Pre-exam slide demonstration.	

7. LITERATURE

Obligatory

1. Junqueira's Basic Histology: Text and Atlas, last edition
2. Sadler T. W. “Langman’s Medical Embryology”, 2015, Wolters Kluwer Health, thirteenth edition.
3. Cell and Molecular Biology Lippincott’s illustrated Review by Chandar, Viselli

Supplementary

1. Stevens A., Lowe J. “Human Histology” 2005, Elsevier Mosby, third ed.
2. Ross M.H., Pawlina W. “Histology: A text and atlas”, 2011, Lippincott Williams & Wilkins, sixth ed.
3. Gartner L. P., “Textbook of Histology”, Elsevier, last edition.
4. Schoenwolf, Bleyl, Brauer, Francis-West “Larsen's Human Embryology” 5th Ed.
5. Nanci A. “Ten Cate’s - Oral Histology”, 2008, Elsevier, seventh edition or newer

8. VERIFYING THE EFFECT OF LEARNING

Code of the course effect of learning	Ways of verifying the effect of learning	Completion criterion
A.W1., A. W2., A.W3., A. W4., B.W6., B.W9., B.W10., B.W11., B.W12., B.W16., B.W17., B.W18., B.W19., B.W21.,	intermediate examination, final examination	minimum 60 % of good answers in total
A.U1; A.U2..	practical class – notebook drawings with descriptions of structures, practical intermediate examination, practical final examination	credit from the teacher; minimum 60 % of good answers in total in practical intermediate and final examinations
K5; K7	observation by the teacher during the classes	credit from the teacher

9. ADDITIONAL INFORMATION

1. The student research club is supervised by Izabela Młynarczuk-Biały, M.D, Ph.D. and Ryszard Galus, M.D. Ph.D., Associate professor http://histologia.wum.edu.pl - Studenckie Koło Naukowe

General regulations - Histology with Embryology and Cytophysiology for medical students 6ED 2025/2026

Organization of lectures, seminars and classes

1. Teaching of Histology, Embryology, and Cytophysiology is conducted in the form of practical classes, seminars, and lectures.
2. Attendance at lectures, practical classes, and seminars is mandatory. Being more than 15 minutes late will be treated as an absence.
3. Each class begins with a seminar, which is a compulsory part of the session.
4. Students must be substantively prepared for each class. The scope of material is provided in the Topics of classes and lectures.
5. During practical classes, students discuss the topic with the assistant and observe microscopic slides, diagrams, and electronograms. Tissue and organ images viewed under the microscope must be drawn and described (with a legend) in a notebook. Microscopes are placed on tables. After viewing the slides, students must turn off the microscope light and cover the microscope. Removing slides, electronograms, microscopes, or their parts from the classroom is prohibited.
6. Before intermediate examinations and final exam, each student group may borrow a set of demonstration slides. Sets can be exchanged multiple times. Before returning/exchanging a set, slides must be arranged according to the attached list. Students are financially responsible for lost or damaged slides.

Presence in the classes and seminars - Class Completion

1. To pass the semester, students must attend lectures, practical classes, and seminars, and complete all practical classes.
2. To pass a practical class, students must receive a positive grade for the material covered and complete accurate drawings and descriptions of slides.
3. Days scheduled for practical classes and midterms are mandatory.
4. Students are allowed to miss up to 2 lectures and 2 practical classes (with seminars) per semester. A third absence results in failing the semester and disqualification from the intermediate examination, regardless of the reason.
5. Missed or failed classes due to unpreparedness must be made up in a form determined by the Head of the Department at a designated time.

Intermediate examinations

1. Intermediate examination dates are agreed upon with the Teaching Council and are not subject to change.
2. The Department organizes two intermediate examination dates for each section.
3. To be credited for intermediate examination, students must attend lectures, practical classes, and seminars, and complete all practical classes.

4. The program includes three theoretical intermediate examinations: (1) Cytophysiology and General Histology; (2) Microscopic Anatomy and (3) Embryology, and two practical intermediate examinations: (1) General Histology and (2) Microscopic Anatomy with Embryology.
5. Theoretical intermediate examinations (MCQ) for the entire course are conducted in-person using an electronic exam system.
6. Practical intermediate examinations are held in class groups. Failure to pass a practical intermediate examination disqualifies the student from the final exam.
7. A third and final (commission) intermediate examination is conducted in a form determined by the Head of the Department with the Dean's approval.
8. The midterm test consists of 50 single- or multiple-choice questions and lasts 50 minutes.
9. A minimum of 60% correct answers is required to pass.

   Grading scale:
   2.0 (failed): up to 59%
   3.0 (satisfactory): 60–68%
   3.5 (rather good): 69–76%
   4.0 (good): 77–84%
   4.5 (better than good): 85–92%
   5.0 (very good): 93–100%

10. Any concerns or irregularities regarding the examination or question content must be reported only via the Examination Portal to the Examination Team during or immediately after the test, before leaving the computer room (per "WUM Written Exam Regulations," point 16). Students may review questions only via the Examination Portal immediately after the test, before leaving the room.
11. Objections to questions must be submitted exclusively through the electronic exam system.
12. In case of absence due to health reasons, a medical certificate must be submitted within three working days of the scheduled midterm, or a failing grade will be recorded.

Final examination

1. The final exam covers the content from practical classes, seminars, and lectures.
2. To be eligible for the final exam, students must pass all midterms included in the program.
3. Exam dates are agreed upon with the Teaching Council and are not subject to change.
4. The exam consists of two independent parts: practical and theoretical.
5. Failure in either the practical or theoretical part results in a failing grade for the entire exam.
6. The Head of the Department may allow students who scored in the 96th percentile on midterms to take an early oral exam. Eligible students will be notified by the Department. The application for the early exam must be submitted in writing (form available on the Department's website).
7. Students approved for the early exam must complete the practical part before the oral exam date.
8. In case of absence due to health reasons, a medical certificate must be submitted within three working days of the scheduled exam, or a failing grade will be recorded.
9. The retake exam is held during the retake session. If the retake is failed, the Dean may grant a commission exam upon student request.

Practical examination

1. The practical exam is conducted in a mini-OSCE format.
2. It involves identifying 10 histological slides. A minimum of 6 correct identifications is required. Each additional correct identification earns 1 point; identifying all 10 earns 5 points.
3. Students who fail the practical part in the first attempt can take a test, and a passing result will count as a retake of the practical exam (student needs to retake only practical part during retake session).
4. Students who pass the practical part but fail the theoretical test do not need to retake the practical part in the second exam term (student needs to retake only theoretical part during retake session).
5. Students have the right to review their answer sheets for 2 days after the practical exam during hours designated by the Department.

Theoretical examination

1. The theoretical part is a stationary test conducted via the electronic exam system, consisting of 100 single-choice questions covering general and special histology and embryology. The test lasts 100 minutes.
2. The test includes material discussed in lectures, seminars, and practical classes.
3. A minimum of 60% correct answers is required to pass.

Grading scale:
2.0 (failed): up to 59%
3.0 (satisfactory): 60–68%
3.5 (rather good): 69–76%
4.0 (good): 77–84%
4.5 (better than good): 85–92%
5.0 (very good): 93–100%

4. Any concerns or irregularities regarding the exam or question content must be reported only via the Examination Portal to the Examination Team during or immediately after the test, before leaving the computer room (per "WUM Written Exam Regulations," point 16). Students may review questions only via the Examination Portal immediately after the test, before leaving the room.
5. Objections to questions must be submitted exclusively through the electronic exam system.

Final grade

1. The final grade is based on the results of both parts of the exam. Points from both parts are combined.
2. Points from the practical exam are added only for students who passed the theoretical test.
3. Practical exam points are added only once. They are not awarded during the retake session.

Department Policy on Cheating

Cheating during exams violates ethical standards and the WUM Study Regulations. Active and passive participants will be removed from the exam and receive a failing grade. Disciplinary action will also be taken.

Active cheating includes copying answers from others or using unauthorized notes or electronic devices during the exam. Bringing such devices to exams is prohibited. Passive cheating includes allowing others to copy your answers. Students must take care to prevent others from copying their work.

The Head of the Department requires strict adherence to these rules by both students and examiners.

ATTENTION

The final 10 minutes of the last class in the block/semester/year should be allocated to students'
Survey of Evaluation of Classes and Academic Teachers