Histology with embryology and cytophysiology

1. IMPRINT	
Academic Year	2024/2025
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 Marek Kujawa, M.D., Ph.D. marek.kujawa@wum.edu.pl Anna Hyc, Ph.D., Associate professor anna.hyc@wum.edu.p Anna Iwan, Ph.D., Associate professor anna.iwan@wum.edu.p Izabela Młynarczuk-Biały, M.D., Ph.D., Associate profesor izabela.mlynarczuk-bialy@wum.edu.pl Łukasz Biały, Ph.D., Associate professor lukasz.bialy@wum.edu.pl Ewa Jankowska Steifer, Ph.D., Associate professor ewa.jankowska-steifer@wum.edu.pl Justyna Niderla-Bielińska, Ph.D., Associate professor justyna.niderla-bielinska@wum.edu.pl Dorota Radomska-Leśniewska Associate professor dorota.radomska-lesniewska@wum.edu.pl Aneta Ścieżyńska, Ph.D., Associate professor aneta.sciezynska@wum.edu.pl Ilona Kalaszczyńska, Ph. D. ilona.kalaszczynska@wum.edu.pl Kateryna Shevchenko, Ph.D. kateryna.shevchenko@wum.edu.pl Department of Transplantology and Main Tissue Bank: Artur Kamiński Ph.D. Professor, artur.kaminski@wum.edu.pl Dariusz Śladowski Associate professor 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 **Contacting hours with academic teacher**	**Number of hours**	**ECTS credits calculation**
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.

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 specialisations;
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 physico-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. Cholesterol. 2. Mitochondria, not just an energy producing machine. 3. DNA repair and mutagenesis. 4. Regulatory RNA. 5. Proteasomes and ubiquitin in medicine. 6. The role of autophagy in maintaining cell homeostasis. 7. The role of cytokines in health and disease. 8. Remodeling and degradation of connective tissues. 9. Metaplasia and epithelial-to-mesenchymal transition. 10. Mechanisms of inflammatory reactions.	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.;

	11. Muscle fibre in health and disease – the role of satellite cells. 12. Angiogenesis - therapeutic implications. 13. Hearing and balance. Ear structure. 14. The axis hypothalamus - pituitary gland - ovary - uterus. Formation of reproductive cells. Fertilization. 15. Implantation, bilaminar germ disc, formation of three germ layers, neurulation, neural crest cells. 16. Embryo development from 4 to 8 weeks. 17. Development and structure of the placenta, the most important events occurring in the fetal period. 18. Consequences of abnormal embryonic development – selected clinical correlations. 19. The use of stem cells in medicine. Regenerative medicine and tissue bio-engineering. 20. Cell and tissue banking for medicine. Clinical use of tissue and cell transplants.	
(S) Seminars; **(C) Practical classes;**	S - Basic techniques of cell and tissue staining. Light and electron microscope. C - Various types of cells. Principles of working with a light microscope. S - Cell ultrastructure - physiology of selected cytoplasmic processes. C - Structure and physiology of cell membranes, cytoskeleton and selected organelles. S - Structure and cytophysiology of the cell nucleus. C - Regulation of gene expression. S: Cellular signal transduction mechanisms. C - Practical aspects of signal transduction in the cell. S - Cell proliferation. C - Regulation of the cell cycle. S - Cell differentiation and senescence. C - Cell death, autophagy. S - Disruption of the regulation of cellular processes – the basics of oncogenesis. C - Selected topics in cancer biology. S - Specialized structures of the epithelial cell surface. C - Epithelial tissue, glands - histological structure. S - Types of connective tissue proper. Functions of connective tissue and adipose tissue. C - Connective tissue proper - histological structure. S - Types and functions of cartilage and bone tissue. C - Development of different types of bone tissue – bone remodeling. S - Structure, organization and function of muscular tissue and nervous tissue. Peripheral and central nervous system.. C - Muscle and nervous tissue - histological structure. S - Discussion and demonstration of histological slides – general histology. C - Practical intermediate examination in general histology. S - Bone marrow - formation of particular types of blood cells. C - Assessment of blood and bone marrow cell morphology. S - Circulatory system, structure and function of endothelial cells. C - Histological structure of blood and lymphatic vessels. S - Structure of the immune system - types of cells and their functions. C - Histological structure and functions of lymphatic organs.	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 - Functions of oral and upper gastrointestinal structures. C - Digestive system (1) - structure of the tooth, salivary glands, mucous membranes of the oral cavity, esophagus and stomach. S - Structure and function of the small and large intestine, liver and pancreas. C - Digestive system (2) – histological structure of the small and large intestine, liver and pancreas. Lymphatic tissue of the digestive system. S - Functions of various sections of the respiratory system. C - Histological structure of the respiratory system. S - Kidney functions. C - Histological structure of the urinary tract. S - Function of skin. Special senses. C - Histological structure of the skin and its appendages. Sensory organs. S - Discussion and demonstration of histological slides – microscopic anatomy. C - Practical intermediate examination in microscopic anatomy. S - Functions of endocrine glands. 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 - Structure of the embryo, amniotic membranes and placenta. S - Discussion and demonstration of histological slides. C - Demonstration of histological slides before the Final examination.	

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, 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 and Embryology for medical students 6ED
2024/2025

Organization of classes and seminars

1. Histology and Embryology is taught during lectures, seminars and practical classes.
2. The presence in lectures, seminars and practical classes is obligatory. Coming late to class by more than 15 minutes will be treated as an absence.
3. Classes begin with the seminar followed by a practical part.
4. Students have to be prepared for the class. The Tutor will verify student's preparation to the class. Subject of seminars and classes are specified in the Topics of classes and lectures.
5. During the class, students discuss with their professor topics of the class and inspect microscopic slides, schemes and electronograms. Images of tissues and organs inspected under the microscope should be drawn with color crayons in the notebook. All drawings have to be properly described (legend to the drawing). Microscopes are provided for every student in the class. At the end of the class student should switch off the microscope and cover it. Microscopic slides, electronograms, microscopes or their parts must not be removed from the class.
6. During the period preceding intermediate or final examinations, every student group can borrow a set of demonstration slides for an at-home training. Sets can be exchanged any number of times. Before exchanging or returning the set, students have to put slides in order, according to the attached list. Students are financially liable for lost or damaged slides.

Presence in the classes and seminars

7. To get the credit for the semester Student must be present in lectures and seminars and get credit in all classes.
8. The prerequisite for getting a credit for the class is a positive note received on the knowledge of the discussed subject and properly done drawings of microscopic slides.
9. Days of classes, including days of intermediate examinations, are days of obligatory presence.
10. **It is permitted to be absent up to 2 times during lectures and 2 times during classes in each semester.** Absence must be justified with the tutor. **Absence on 3 or more classes, regardless of the reason, results in not getting a credit for the semester**, hence student will not be admitted to the intermediate examination.
11. **When students are absent, they are expected to negotiate with professors the form for make-up of lectures, seminars or classes missed.**
12. Classes uncredited because of an absence or being unprepared must be passed in the form established by the Head of the Department. Head of the Department will appoint the date of this test.

Credit

13. Dates of the intermediate examinations are decided by the university Pedagogical Council and cannot be changed.
14. Only students who were present in lectures, seminars and got credit for all the classes are admitted to the intermediate examination.
15. Intermediate examination in general histology and in microscopic anatomy consist of two parts: practical (slide recognition) and theoretical.
16. Intermediate examination in embryology has no practical part.

17. Intermediate examinations on the first and the second date are MCQ tests. Third final attempt of the intermediate examination (commission) have the form that is determined by the Head of the Department and is set after the permission obtained from the Dean's office.
18. Electronic intermediate examination tests online consist of 50 single choice questions. The duration of intermediate examination is 50 minutes. Electronic test examinations are held in the building of Main Library in the computer room.
19. The criteria to pass the test are determined by the Head of the Department, after the test, and they are expected to be not less than:
    - 60% of all questions in the test.

Note	Criteria
2,0 (failed)	0 – 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 %

20. **Any reservations and irregularities regarding the course of the test or the content of the questions should be reported by the student only via the Examination Portal platform to the members of the Examination Team only during or immediately after the end of the test, before leaving his/her position in the computer room ("Regulations of Written Examinations of the Medical University of Warsaw", point 16.). Students have access to the questions only through the Examination Portal platform immediately after the end of the test, before leaving their workstation in the computer room.**
21. Intermediate practical part must be passed before the date of the retake MCQ test. Students who failed practical part of any intermediate examination before the date of the retake examination will not qualify for the retake and last retake of MCQ test.

Final examination

22. The final examination comprises topics discussed during classes, seminars and lectures.
23. Student must pass all intermediate examinations scheduled in the program of the course to be admitted to the final examination.
24. Dates of the final examinations are decided by the university Pedagogical Council and cannot be changed.
25. The final examination consists of two parts: practical and theoretical.
26. Failing practical or theoretical part results in failing the examination.
27. **Head of the Department can set an oral appointment of THEORETICAL final examination for students, who obtained at least 92% of all points received on intermediate examinations. For such appointment student needs to apply to the Head of the Department in writing (template of the application is available on the Department web site). Student IS NOT exempted from PRACTICAL examination.**
28. **PRACTICAL EXAMINATION must be taken BEFORE the appointment with the Head for the Department.**
29. In the case of an absence during the final examination caused by medical condition, should present doctor's leave during three working days from the date of examination, or will receive a failing mark.
30. Retake of the examination is held during the retake examination session. If the student fails this examination, he/she can apply to the Dean for the permission for the second retake of the examination.

Practical examination

31. Practical part of the examination consists of recognizing 10 histological slides. Minimal number of recognized slides is 6. For each additionally recognized slide, the student receives 1 point, and for recognizing 10 slides - 5 points.
32. Students who failed practical examination on the first date will take the MCQ test, whose positive result will be treated as the result of retake examination (student has to take again only practical examination).
33. Students who passed practical examination on the first date, but failed the MCQ test, do not have to take the practical examination once again during the retake (student has to take again only MCQ test).

Theoretical examination

34. The theoretical part of the examination is the MCQ test that consists of 100 single choice questions. The duration of intermediate examination is 100 minutes. Electronic test examinations are held in the building of Main Library in the computer room.
35. The examination test contains questions on topics discussed in the course.
36. The criteria to pass the test are determined by the Head of the Department, after the test, and they are expected to be not less than:
    - 60% of questions in the remaining part of the test.

Note	Criteria
2,0 (failed)	0 – 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 %

37. **Any reservations and irregularities regarding the course of the test or the content of the questions should be reported by the student only via the Examination Portal platform to the members of the Examination Team only during or immediately after the end of the test, before leaving his/her position in the computer room ("Regulations of Written Examinations of the Medical University of Warsaw", point 16.). Students have access to the questions only through the Examination Portal platform immediately after the end of the test, before leaving their workstation in the computer room.**

Final grade

38. Final mark is set on the basis of both: practical and theoretical examination. Points received on both parts of the examination are considered.
39. Points from the practical examination are added to the points received on the MCQ test only to students, who had passed the MCQ test.
40. Points from the practical examination are added only once. These points are not added in examinations conducted during the retake session.

Position of the Chair regarding cheating during examinations

Cheating on examinations is a breach of ethics and Regulations of Studies at the Warsaw Medical University. Person actively or passively participating in cheating shall be punished by being expelled from the examination and receiving a failing mark. On the top of that, the Department shall institute disciplinary procedure against the cheating students.

Person actively participating in cheating is the one, **who copies results from other students or uses illegal notes or electronic devices. Bringing such devices to examinations is forbidden.**
Passive participation in cheating means allowing other students copy one's own responses. Thus, a student is obliged to behave honestly, not to allow other students copy his/her own responses.
Head of the Department obliges students and examiners to strictly obey these regulations.

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