



Syllabus 2020/2021														
Description of the course														
Module/Course	Immunohistochemistry and electron microscopy methods in evaluation of the morphology of various tissues and organs										Group of detailed education results			
											Group code	Group name		
											A	Morphological Science,		
											B	Scientific Basis of Medicine,		
											C	Preclinical Science		
Faculty	Medicine													
Major	medicine													
Specialties	not applicable													
Level of studies	Uniform magister studies X * 1 st degree studies <input type="checkbox"/> 2 nd degree studies <input type="checkbox"/> 3 rd degree studies <input type="checkbox"/> postgraduate studies <input type="checkbox"/>													
Form of studies	X full-time <input type="checkbox"/> part-time													
Year of studies	I-II					Semester		<input type="checkbox"/> Winter					X Summer	
Type of course	<input type="checkbox"/> obligatory <input type="checkbox"/> limited choice <input checked="" type="checkbox"/> free choice / elective													
Course	X major <input type="checkbox"/> basic													
Language of instruction	<input type="checkbox"/> Polish <input checked="" type="checkbox"/> English <input type="checkbox"/> other													
* mark <input type="checkbox"/> with an X														
Number of hours														
Form of education														
Unit teaching the course	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)	Specialist Classes – magister studies (SCM)	Foreign language Course (FLC)	Physical Education obligatory (PE)	Vocational Practice (VP)	Self-Study (Student's own work)	E-learning (EL)
	Winter Semester													
Summer Semester														



Division of Histology and Embryology					10									
TOTAL per year: 10														
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Educational objectives (max. 6 items)														
<p>C1. To familiarize students with major methods used in immunohistochemistry (IHC), which are routinely used in morphological examination and histopathological diagnosis and with the principle of transmission electron microscope (TEM) operation.</p> <p>C2. To familiarize students with IHC reactions and their results showing the correct structure of cells and tissues, and tumor specific antigens applicable in the differential diagnosis of benign and malignant neoplasms.</p> <p>C3. To familiarize students with the process of preparing biological material for IHC reactions and methods of evaluating their results.</p> <p>C4. To familiarize students with the method of preparing research material for TEM and the possibilities of using this method in the evaluation of cells and tissues ultrastructure and in clinical diagnostics (the so called ultrastructural pathology).</p> <p>C5. To familiarize students with typical ultrastructural images of normal and pathological cells</p>														
Education result matrix for module/course in relation to verification methods of the intended education result and the type of class														
Number of course education result	Number of major education result	Student who completes the module/course knows/is able to	Methods of verification of intended education results (forming and summarising)	Form of didactic class <i>**enter the abbreviation</i>										
K 01	A. W4.	The student knows and understands basic cellular structures and their functional specializations	Oral response	LC										
K 02	B. W29.	The student knows and understands the principles of scientific, observational and experimental research and <i>in vitro</i> studies aimed at the development of medicine	Oral response	LC										
K 03	B. W29.	The student knows the equipment of immunohistochemical and TEM laboratories as well as basic reagents and laboratory equipment	Oral response	LC										
K 04	B. W29	The student explains the process of preparing biological material for the IHC reaction and for research at TEM	Activity in the discussion	LC										
K 05	C. W26.	The student operates the pathological nomenclature	Activity in the discussion	LC										
K 06	C. W31.	The student explains basic issues in the field of detailed ultrastructural pathology of organs, microscopic images and clinical course of pathomorphological changes in individual organs	Oral response	LC										
S 01	A. U1.	The student operates the light microscope	Presentation	LC										
S 02	A. U2.	The student recognizes in the images from the light and electron microscope	The student performs the task at the electron	LC										



		histological structure corresponding to organs, tissues, cells and cellular structures, describes and interprets their structure and relationships between the structure and function.	microscope and applies the acquired knowledge during description the electronograms	
S03	C. U8.	The student uses the antigen - antibody reaction in current modifications and techniques for the diagnosis of cancer	The student performs the basic IHC reaction	LC
S04	C. U9	The student is able to prepare biological material and microscopic preparation for research in TEM	The student makes the microscopic preparation	LC
S05	C. U9	The student is able to make a basic assessment of the results of IHC reactions and images in TEM (electronograms)	The student interprets the results of the IHC reaction and describes the selected photos in TEM	LC

** L - lecture; SE - seminar; AC – auditorium classes; MC – major classes (non-clinical); CC – clinical classes; LC – laboratory classes; SCM – specialist classes (magister studies); CSC – classes in simulated conditions; FLC – foreign language course; PCP practical classes with patient; PE – physical education (obligatory); VP – vocational practice; SS – self-study, EL – E-learning .

Please mark on scale 1-5 how the above effects place your classes in the following categories:

communication of knowledge, skills or forming attitudes:

Knowledge: 5

Skills: 3

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

Student's workload (class participation, activity, preparation, etc.)	Student Workload (h)
1. Contact hours:	10
2. Student's own work (self-study):	3
Total student's workload	13
ECTS points for module/course	0.5
Comments	

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

not applicable

Seminars

not applicable

Practical classes

Laboratory classes (LC)

I Immunohistochemistry methods (IHC, 5 hours)

1. Markers used in immunohistochemical methods.
2. Preparation of material for the IHC reaction (tissue fixation, paraffin sections obtaining).
3. Antibodies - characteristics, production, detection.
4. Types and selection of immunohistochemical reactions with special methods (avidin-biotin system).
5. Examples of applied stainings, evaluation of reaction, methodological problems in IHC and their solutions.
6. Immunohistochemistry in the diagnosis and histogenesis of tumors (selection of chemical reactions,

the role of immunohistochemistry in determining the origin of the tumor markers specific for certain types of cancer, the importance of the results of immunohistochemistry in determining the prognostic and predictive factors of some cancers).

7. Performance of exemplary IHC reaction.

8. Evaluation of slides.

II Transmission electron microscopy (TEM, 5 hours)

1. The construction and principle of operation a transmission electron microscope.

2. Preparation of samples for study (obtaining, dual fixation method, dehydration and embedding material in the epoxy resin).

3. Performing semithin sections and staining them with toluidine blue.

4. Epon blocks trimming.

5. Demonstration of ultra-thin sections cutting with diamond knife.

6. Counterstaining, the principle of image formation in the TME.

7. Observation of selected cells in TME and discuss their ultrastructure, documentation design in the form of electronograms.

8. The ultrastructural basis of selected diseases.

Other

not applicable

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

1. Junqueira's Basic Histology Text and Atlas. 15th Edition, The McGraw-Hill Companies, 2018r.

2. B. Young & G. O'Dowd & P. Woodford, Wheater, s functional histology A text and Colour Atlas. Churchill Livingstone Elsevier, 2013r.

3. Immunohistochemistry: Basics and Methods, Igor B. Buchwalow and Werner Bocker, 2010r.

Literatura uzupełniająca i inne pomoce: (nie więcej niż 3 pozycje)

1. Immunohistochemistry and Immunocytochemistry: Essential Methods, Second Edition
Editor(s): S. Renshaw, 2016r.

2. Podstawy technik mikroskopowych. wyd. 7, Jan A. Litwin, Mariusz Gajda. Wydawnictwo Uniwersytetu Jagiellońskiego, Kraków 2011r.

3. Ultrastructural Pathology. The comparative cellular basis of disease. N. F. Cheville. Wiley-Blackwell, 2nd edition, 2009r.

Didactic resources requirements (e.g. laboratory, multimedia projector, other...)

Laboratory, fume hood, Autostainer Link 48, optical microscope, transmission electron microscope Jeol JEM 1011, ultramicrotome, laboratory desks, laboratory glass, IHC and TEM reagents, seminar room, multimedia projector.

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

lack

Conditions to receive credit for the course (specify the form, criteria and conditions of receiving credit for classes included in the module/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).

- Active participation in the discussion during each class.
- Presence in all classes. Each absence must be made up, including rector's days or dean's hours. The student is required to pass material from canceled classes in a form agreed with the teacher (e.g. presentation, oral answer).
- For each grade, the student needs to meet the following criteria defined below:



Grade:	Criteria for course
Very Good (5.0)	Student makes documentation in the form of electronograms with the usage of a transmission electron microscope. The student knows the possibilities of using TEM method in the evaluation of cells and tissue ultrastructure and in clinical diagnostics (ultrastructural pathology). The student makes a presentation on a given subject.
Good Plus (4.5)	The student is able to make a basic assessment of the results of IHC reactions and describes electronograms of normal and pathological cells in TEM. The student knows the ultrastructural basis of selected diseases and the principle of TEM operation. Students make in pairs the presentation on a given subject.
Good (4.0)	Student knows tumor-specific antigens applicable in the differential diagnosis of benign and malignant neoplasms and the role of IHC in determining the origin of specific types of cancer. The student recognizes the cellular structure in the typical ultrastructural images (electronograms) and makes descriptions and interprets their structure and the relationship between the structure and function. Students make in pairs the presentation on a given subject.
Satisfactory Plus (3.5)	Student knows the major types of immunohistochemical reactions (IHC). The student knows basic cellular structures and their functional specializations.
Satisfactory (3.0)	Student possesses the necessary knowledge of biological material preparation for the IHC reaction and TEM examination (embedding in epoxy resin). Student knows the equipment of immunohistochemistry (IHC) and transmission electron microscopy (TEM) laboratories and basic reagents.

Name of unit teaching course:	Division of Histology and Embryology, Department of Human Morphology and Embryology
Address	Chalubinskiego 6a, 50-368 Wrocław
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Person responsible for course:	Prof. dr hab. n. med. Paweł Surowiak
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<i>List of persons conducting specific classes:</i>	<i>degree/scientific or professional title</i>	<i>Discipline</i>	<i>Performer profession</i>	<i>Form of classes</i>
Paweł Surowiak	MD, PhD, Prof.	Medical sciences and health sciences	Professor	Laboratory classes (LC)
Katarzyna Haczkiwicz-Leśniak	PhD	Medical sciences and health sciences	Adjunct	Laboratory classes (LC)

Date of Syllabus development

Syllabus developed by

31.05.2020r.

Prof. Paweł Surowiak

Signature of Head of teaching unit


.....
prof. dr. hab. Piotr Dziągwa

Signature of Faculty Dean


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Wrocław Medical University
Faculty of Medicine
Vice-Dean
prof. Beata Scbieszczańska, PhD