



48SJO-CYTOPHY
2025
ECTS: 3.00

Course syllabus – part A

Cytophysiology

SUBJECT MATTER CONTENT:

Classes

Methods used in research on cells and tissues: optical and electron microscopy. Digital and virtual microscopy. Immunohistochemistry. Products of the apical surface of epithelial cells. Cytoskeleton. Intercellular interactions. Adhesion molecules. Intercellular connections. Basement membrane of epithelia. Extracellular matrix. Vesicular transport: endocytosis, phagocytosis, transcytosis and exocytosis. Cell nucleus, chromatin and nucleolus. Ribosomes, RER, translation. Golgi apparatus, protein modification and secretion. Regulation of intracellular protein turnover. Cellular secretion and its regulation. Protein degradation: proteasomes and lysosomes. Cytoplasmic inclusions. Mitochondrion. Changes in the energy level of the cell. Peroxisomes. Highly reactive oxygen species. Cell cycle: apoptosis and necrosis. Cell differentiation: selected differentiated cells. Inflammatory response cells: B lymphocyte, T lymphocyte, phagocytic cells, mast cell. Cytophysiology of the development of the local inflammatory response. Diapedesis. Cell interaction: macrophage-fibroblast.

Lecture

The structure of cell membranes. Membrane transport and its mechanisms. Multidrug resistance. Cell nucleus and chromatin structure. Regulation of gene expression. Epigenetic regulation. Mechanisms of mitosis and meiosis. Nondisjunction. Cell cycle and its regulation. Cyclins, cyclin-dependent kinases, cell cycle restriction points. Protooncogenes and tumor suppressor genes. Mechanisms of cell cycle regulation and their disturbances in the cancer process. Cell growth, differentiation and aging processes. Intercellular communication. Membrane and intracellular receptors and signal transduction pathways. Stem cells. Selected aspects of undifferentiated cell therapy. Selected elements of regenerative medicine. Bone marrow transplantation and principles of tissue selection.

TEACHING OBJECTIVE:

The main objective of the course is to provide students with knowledge about the morphology and functions of normal human cells as well as dysfunctions of basic molecular mechanisms. Knowledge in the field of cytophysiology is the basis for continuing teaching in the field of preclinical sciences: physiology, pathophysiology and pathomorphology. An important part of teaching are practical tasks in which students recognize and describe cells and structures within cells or extracellular matrix on a microscopic images.

Legal acts specifying learning outcomes:

467/2024 (Medicine),

Status of the course: None

Group of courses: None

Discipline: Medical Sciences

Classes:

Lecture (10 h)

Classes (30 h)

Step: Kierunek lekarski pierwszy rok (oferta w jęz. angielskim dla obcokrajowców)

Program: Medicine

Form of studies: full-time

Level of studies: uniform master's studies

Introductory subject: NA

Prerequisites: Basic knowledge of cell biology

Coordinators:

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DESCRIPTION OF THE LEARNING OUTCOMES OF THE COURSE IN RELATION TO THE DESCRIPTION OF THE CHARACTERISTICS OF THE SECOND LEVEL LEARNING OUTCOMES FOR QUALIFICATIONS AT LEVELS 6-8 OF THE POLISH QUALIFICATION FRAMEWORK IN RELATION TO THE SCIENTIFIC DISCIPLINES AND THE EFFECTS FOR FIELDS OF STUDY:

Symbols for outcomes related to the discipline:

M/NMA_P7S_KO++, M/NMA_P7S_UW++++, M/NMA_P7S_WG+++++

Symbols for outcomes related to the field of study:

K.5+, K.7+, A.U1., A.U2., B.U8., B.U11., A.W2., A.W3., B.W16., B.W17., B.W18.+

LEARNING OUTCOMES (Knowledge, Skills, Social competence):

<u>W1</u>	In terms of knowledge, the graduate knows and understands anatomic, histological, and embryological nomenclature in the Polish and English languages
<u>W2</u>	In terms of knowledge, the graduate knows and understands: the basic cell structures and their functional specialisations
<u>W3</u>	In terms of knowledge, the graduate knows and understands the microarchitecture of tissues, extracellular matrix, and organs
<u>W4</u>	In terms of knowledge, the graduate knows and understands the stages in the development of the human embryo, the composition and functions of the foetal membranes and the placenta, the stages in the development of individual organs, and the impact of harmful factors on the development of the embryo and foetus (teratogenic)
<u>W5</u>	In terms of knowledge, the graduate knows and understands the methods of intercellular communication and of the communication between the cell and the extracellular matrix, and the signal transduction pathways in cells, plus examples of disturbances in the processes leading to the growth of neoplasms and other diseases
<u>U1</u>	In terms of skills, the graduate can operate an optical microscope, including the use of immersion
<u>U2</u>	In terms of skills, the graduate can: recognise the histological structures corresponding to organs, tissues, cells, and cell structures in the images of the optical or electronic microscope, describe and interpret their structure and the relationships between their composition and function
<u>U3</u>	In terms of skills, the graduate can use databases, including those available on the Internet, and find the necessary information with the available tools
<u>U4</u>	In terms of skills, the graduate can plan and perform simple scientific studies, interpret its results, and draw conclusions
<u>K1</u>	In terms of social skills, the graduate is prepared to perceive and recognise own limitations, and assess his/her deficits and educational needs
<u>K2</u>	In terms of social skills, the graduate is prepared to use objective sources of information

TEACHING FORMS AND METHODS:

Classes-['K1', 'K2', 'U1', 'U2', 'U3', 'U4', 'W1', 'W2', 'W3', 'W4', 'W5']-Classes

(W1;W2;W3;W4;W5;W6;U1;U2;U3;K1;K2;): Multimedia presentations (PowerPoint presentations) preceding the practical part. Microscopic analysis of histological slides. The teaching process is supported by tablets and remote education systems based on MS Teams platform (lectures, communication), Moodle (teaching materials, practical tasks, practical tests and colloquia) and CaseCenter (virtual digital microscopy). Students identify histological structures on slides using light microscopy and/or using virtual digital microscopy. Lecture-['K1', 'K2', 'U4', 'W1', 'W2', 'W3', 'W4', 'W5']-Lecture (W1;W2;W3;W5;U2;U3;K1;K2;):Multimedia presentation (PowerPoint presentation) using remote learning platforms (MOODLE, MS TEAMS).

FORM AND CONDITIONS OF VERIFYING LEARNING OUTCOMES:

Classes-(Written test)-['K1', 'K2', 'U4', 'W1', 'W2', 'W3', 'W4', 'W5']-A short test on a given topic is carried out at the beginning of the classes (5 open questions, included 2 open questions on the presented diagrams/figures, 8 minutes, 1 point each for a correct answer). (W1;W2;W3;W4;W5;K1;K2;);

Classes-(Presentation)-['K1', 'K2', 'U1', 'U2', 'U3', 'W1', 'W2']-In the case of classes using a microscope the student shall perform a practical tasks in which students recognize and describe cells and structures within cells or extracellular matrix on a microscopic images or/and electronograms. The practical task is graded on a scale from 0 to 4 (4 points for a faultless task). W1, W2, U1, U2, K1, K2

Lecture-(Colloquium test)-['K1', 'K2', 'U4', 'W1', 'W2', 'W3', 'W4', 'W5']-After all lectures and classes theoretical colloquium is organized (60 questions: 40 test questions - one-choice test, 8 short answer questions and 12 open questions on the 6 presented diagrams/figures; 1 point each for a correct answer, 80 minutes). A. To pass the Course, two requirements must be met simultaneously:

- 1) a minimum of 60% of the points obtained for the classes (short tests + practical tasks) and
- 2) a minimum of 60% of the points obtained for theoretical colloquium. For students who have not fulfilled the requirements of the regulations at the end of a given semester, revision theoretical colloquium (additional retake credit) is organized. The pass mark is 60% of the correct answers.

Literature:

1. **JUNQUEIRA'S Basic Histology, Text & Atlas**, A.L. Mescher, Edra and Urban, 2020, Strony: 15e, Tom: (literatura podstawowa)
2. **Cell and Molecular Biology**, Chandar, Viselli, Lippincott Illustrated Reviews, 2018, Strony: 2nd ed, Tom: (literatura podstawowa)



Detailed description of ECTS credits awarded - part B
Cytophysiology

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The number of ECTS credits awarded consists of:

1. Contact hours with the academic teacher:

- participation in: Lecture	10 h
- participation in: Classes	30 h
- consultation	2 h
Total:	42 h

2. Independent work of a student:

Perform practical tasks.	3.00 h
Preparing for classes based on textbooks and providing materials.	30.00 h
Total:	33.00 h

Total (contact hours + independent work of a student): 75.00 h

1 ECTS credit = 25-30 h of an average student's work, number of ECTS,
ECTS Points = 75.00 h : 25 h/ECTS = **3.00** ECTS

Average: 3.00 ECTS

- including the number of ECTS credits for contact hours with the direct participation of an academic teacher	1.68 ECTS
- including the number of ECTS credits for hours of independent work of a student	1.32 ECTS