Attachment No. 5 to Rector's ordinance No. 22/2020

DESCRIPTION OF THE COURSE OF STUDY

Course code	**0912.7.LEK.D.BCC**	
Name of the course in	Polish	**Podstawy biologii komórki nowotworowej**
	English	**The basics of cancer cell biology**

1. LOCATION OF THE COURSE OF STUDY WITHIN THE SYSTEM OF STUDIES

1.1. Field of study	medicine
1.2. Mode of study	Full-time
1.3. Level of study	Uniform Master's studies
1.4. Profile of study*	General academic
1.5. Person preparing the course description	dr. hab. Sylwia Terpiłowska
1.6. Contact	sylwia.terpilowska@ujk.edu.pl

2. GENERAL CHARACTERISTICS OF THE COURSE OF STUDY

2.1. Language of instruction	English
2.2. Prerequisites*	none

3. DETAILED CHARACTERISTICS OF THE COURSE OF STUDY

3.1. Form of classes		Classes: 25h (including 10h of e-learning)
3.2. Place of classes		classes in the didactic room of CM UJK
3.3. Form of assessment		Credit with grade
3.4. Teaching methods		Classes: typical classes,brain storm
3.5. Bibliography	**Required reading**	Xie H, Simon MC. Oxygen availability and metabolic reprogramming in cancer. J Biol Chem. 2017; 292(41): 16825–16832. Samanta D, Semenza GL. Metabolic adaptation of cancer and immune cells mediated by hypoxia-inducible factors. Biochim Biophys Acta Rev Cancer. 2018; 1870(1): 15–22. Gentric G, Mechta-Grigoriou F. Tumor Cells and Cancer-Associated Fibroblasts: An Updated Metabolic Perspective. Cancers (Basel). 2021; 13(3).
	Further reading	Cassim S, Vučetić M, Ždralević M, et al. Warburg and Beyond: The Power of Mitochondrial Metabolism to Collaborate or Replace Fermentative Glycolysis in Cancer. Cancers (Basel). 2020; 12(5). Liao D, Johnson RS. Hypoxia: a key regulator of angiogenesis in cancer. Cancer Metastasis Rev. 2007; 26(2): 281–290. Lee M, Yoon JH. Metabolic interplay between glycolysis and mitochondrial oxidation: The reverse Warburg effect and its therapeutic implication. World J Biol Chem. 2015; 6(3): 148–161.

4. OBJECTIVES, SYLLABUS CONTENT AND INTENDED LEARNING OUTCOMES

4.1. Course objectives *(including form of classes)*

Classes

Understanding the mechanisms leading to cancerous cell transformation.
(including e-learning)
Preparation for understanding cancer cell metabolism and the differences between normal and cancerous cells.

4.2. Detailed syllabus *(including form of classes)*

Classes

Proliferation of cancer cells vs. normal cells. Disorders of cancer cell differentiation and maturation. Change in aerobic metabolism – the Warburg effect. Adaptive abilities of cancer cells. The role of transport through biological membranes. The role of GLUT transporters. Apoptosis in cancer cells.
(including e-learning)
Genetic mutations. Tumor microenvironment. Angiogenesis. Immune surveillance. Targeted therapy.

4.3. Intended learning outcomes

Code	A student, who passed the course	Relation to learning outcomes
	within the scope of **KNOWLEDGE**:	
W01	Know the ways of communication between cells as well as between the cell and the extracellular matrix and signal transduction pathways in the cell as well as examples of disorders in these processes leading to the development of tumors and other diseases;	B.W16.
W02	Recognise the processes such as: cell cycle, proliferation, differentiation and cell aging, apoptosis and necrosis, and their importance for the functioning of the body;	B.W17.
W03	Describe genetic mechanisms of drug resistance acquisition by microorganisms and tumor cells;	C.W.9
W04	Know possibilities and types of biological, cell, gene and targeted therapy in specific diseases;	C.W33.
W05	Understand the influence of the oxidative stress on cells and its importance in the pathogenesis of diseases and in aging processes;	C.W38.
W06	Describe topics in oncology, including: 1. Genetic, environmental, and epidemiological determinants, causes, symptoms, principles of diagnosis, and therapeutic management in the most common cancers and their complications; 2. Clinical symptoms of the most common paraneoplastic syndromes; 3. Basics of early cancer detection, principles of screening tests, and preventive actions in oncology; 4. Possibilities and limitations of contemporary cancer treatment (surgical methods, radiotherapy, and systemic methods, including immunotherapy), indications for cellular and gene therapies, and targeted and personalized treatments; 5. Early and late complications of oncological treatment; 6. The role of supportive care, including nutritional support; 7. Principles of organizing care for oncology patients, including genetic counseling and multidisciplinary care; 8. Practical aspects of statistics in oncology, including principles of interpreting clinical trial results; 9. Most important scales and classifications used in oncology; 10. Principles of conducting targeted physical examinations of adults in the area of the breast and prostate gland; 11. Principles of planning diagnostic, therapeutic, and preventive procedures in cancer treatment based on test results and provided medical documentation.	E.W24.
	within the scope of **ABILITIES**:	
U01	Be able to use medical databases and properly interpret the information contained therein necessary to solve problems in the field of basic and clinical sciences;	B.U8.
	within the scope of **SOCIAL COMPETENCE**:	
K01	Can recognize his/her own limitations and self-evaluate educational deficiencies and needs;	K.S5.
K02	Use reliable information sources;	K.S7.
K03	Give opinions concerning various aspects of professional activity;	K.S10.
K04	Take responsibility for own decisions made during professional activities including own safety and safety of other people;	K.S11.

4.4. Methods of assessment of the intended learning outcomes

Teaching outcomes *(code)*	Method of assessment (+/-)																					
	Exam oral/written*			**Test***			**Project***			**Effort in class***			**Self-study***			**Group work***			**Others* Observation**		
	Form of classes			***Form of classes***			***Form of classes***			***Form of classes***			***Form of classes***			***Form of classes***			***Form of classes***		
	L	*C*	...	*L*	*C*	...	*L*	*C*	...	*L*	*C*	...	*L*	*C*	...	*L*	*C*	...	*L*	*C*	...
W01-W06					+						+			+							

U01					+						+			+						
K01-K04					+						+			+						

delete as appropriate

4.5. Criteria of assessment of the intended learning outcomes		
Form of classes	**Grade**	**Criterion of assessment**
Classes (C) (including e-learning)	**3**	Active participation in classes. From 61% to 68% of learning programme content on the basic level, replies chaotic, leading questions necessary. Test for given grade 61%-68%
	3,5	Active participation in classes. From 69% to 76% of learning programme content on the basic level, answers are systematised and require assistance from the teacher. Test for given grade 61%-68%
	4	Active participation in classes. From 77%-84% of learning programme content on the basic level, answers are systematized and independent. Solving problems in typical situations. Test for given grade 77%-84%
	4,5	Active participation in classes. From 85%-92% the scope of presented knowledge exceeds the basic level based on the supplementary literature provided. Solving problems in new complex situations. Getting from 85% to 92% of correct answers from the test.
	5	Active participation in classes. From 93%-100% the scope of presented knowledge exceeds the basic level based on independently acquired scientific sources of information. Getting from 93 to 100% of correct answers from the test.

5. BALANCE OF ECTS CREDITS – STUDENT'S WORK INPUT

Category	**Student's workload**
	Full-time studies
NUMBER OF HOURS WITH THE DIRECT PARTICIPATION OF THE TEACHER /CONTACT HOURS/	**25**
*Participation in lectures**	
*Participation in classes, seminars, laboratories**	15
*Preparation in the exam/ final test**	
Others (e-learning)*	10
INDEPENDENT WORK OF THE STUDENT/NON-CONTACT HOURS/	**25**
*Preparation for the lecture**	
*Preparation for the classes, seminars, laboratories**	25
*Preparation for the exam/test**	
*Gathering materials for the project/Internet query**	
Preparation of multimedia presentation	
*Others**	
TOTAL NUMBER OF HOURS	**50**
ECTS credits for the course of study	**2**

delete as appropriate

Accepted for execution *(date and signatures of the teachers running the course in the given academic year)*

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