SYLLABUS – A COURSE DESCRIPTION
I. General informaion
    1. Course name: **Tumors and their microenvironment - cellular and histopathological aspects**
    2. Course code: **01-BTA-TUMORENV**
    3. Course type (compulsory or optional): **optional**
    4. Study programme name: **Biotechnology**
    5. Cycle of studies (1st or 2nd cycle of studies or full master's programme): **2nd cycle of studies**
    6. Educational profile (general academic profile or practical profile): **general academic profile**
    7. Year of studies (if relevant): **II**
    8. Type of classes and number of contact hours (e.g. lectures: 15 hours; practical classes: 30 hours):
        lectures: 20 hours
        practical classes: 10 hours
    9. Number of ECTS credits: **3**
    10. Name, surname, academic degree/title of the course lecturer/other teaching staff:
        dr Agnieszka Knopik-Skrocka, askro@amu.edu.pl
    11. Language of classes: **English**
    12. Online learning – yes (partly – online / fully – online) / no: **the module will be run as classes with teacher and partly using e-learning AMU platform; in some special cases (e.g. epidemic/pandemic) online classes partly or fully can be lead by teacher (using e.g. MS Teams).**
II. Detailed information
    1. Course aim (aims)
        The main aim of the module is to present actual knowledge about biology of malignant tumors and their microenvironment in cellular and histopathological aspects.
        With regard to the main aim of the module, additional aims will be implemented:
        - introduction to scientific terminology used in oncology, tumor cell biology, histology and tumor microenvironment
        - presentation of epidemiological data of malignant tumors in Poland and in the World (similarities/differences/trends)
        - introduction to methods used in tumor visualization and in studies on malignant tumors, including these with tumor cell lines in searching new therapies
        - presentation of actual scientific data about heterogeneity of tumor cells, mechanisms of cross-talk between tumor cells and microenvironment, immunogenicity and immunosuppression of tumors, targets in cancer cells and in microenvironment to find effective anticancer therapies
        - acquiring skills in recognition of histological and cellular features of different human tumors during work with histological preparations after HE staining and after immunohistochemical reactions (IHC)
        - acquiring skills in proper interpretation of literature data, discussion them and form of their presentation
    2. Pre-requisites in terms of knowledge, skills and social competences (if relevant)
        General knowledge about human`s histology and cell biology
    3. Course learning outcomes (EU) in terms of knowledge, skills and social competences and their reference to study programme learning outcomes (EK)

Course learning outcome symbol (EU)	On successful completion of this course, a student will be able to:	Reference to study programme learning outcomes (EK)
EU_01	use with understanding scientific terminology in the field of oncology, tumor cell biology, tumor microenvironment and histology	BT_W04, BT_W09, BT_U04, BT_U05, BT_K02
EU_02	mention and characterize methods used in tumor visualisation and studies, including these with cell lines in searching new therapies	BT_W01, BT_W02, Bt_W04, BT_W08, BT_W09, BT_U03,

		BT_U04, BT_U05, BT_K01, BT_K02
EU_03	use with understanding epidemiological data of human malignant tumors in Poland and in the World and indicates similarities, differences, trends	Bt_W04, BT_W09, BT_U05, BT_K02
EU_04	explain heterogeneity of tumor cells with respect of tumor development, metastasis and resistance to therapy	BT_W01, BT_W02, BT_W04, BT_W09, Bt_U05, BT_K01, BT_K02
EU_05	describe and explain the role of tumor microenvironment in tumor development, metastasis, angiogenesis and immunosuppression	BT_W01, BT_W02, BT_W04, BT_W09, BT_U03, BT_U04, BT_U05, Bt_K01, Bt_K02
EU_06	indicate and describe targets (in tumor cells and their microenvironment) of traditional anticancer therapies and new therapies, including immunotherapy with checkpoint inhibitors	BT_W01, Bt_W04, BT_W09, BT_U02, BT_U03, BT_U04, BT_U05, BT_K01, BT_K02
EU_07	explain why triple negative breast cancer is one of the tumors with very poor prognosis using actual view on diagnostic/therapeutic limitations and the role of whole genome sequencing and new clinical trials in anticancer strategy	BT_W01, BT_W04, BT_W06, Bt_W09, BT_K01, BT_U03, BT_U04, BT_U05, BT_K01, BT_K02
EU_08	recognise in preparations, interpret histological/cellular features of human`s tumors and explain the contribution of immunohistochemical reactions in tumor diagnostics/classification	BT_W01, BT_W04, BT_W09, BT_U01, BT_U03, BT_U04, BT_U05, BT_K01, BT_K02
EU_09	independently select and use literature data, present and discuss them	BT_W09, BT_U03, BT_U04, BT_U05, BT_U07, BT_K02, BT_K04, BT_W09
EU_10	work in group and prepare exercise reports and SCAMPER task	BT_U05, BT_U06, BT_K02, BT_W04, BT_W09, BT_U02, BT_U01, Bt_U04, BT_K01

4. Learning content with reference to course learning outcomes (EU)

Course learning content	Course learning outcome symbol (EU)
Scientific terminology in oncology, tumor cell biology, tumor microenvironment and histology	EU_01, EU_02, EU_03, EU_04, EU_05, EU_06, EU_07, EU_08, EU_09, EU_10
Methods used in tumor visualisation and studies, including these with tumor cell lines in searching new therapies	EU_01, EU_02, EU_04, EU_06, EU_09
Epidemiological data of human malignant tumors in Poland and in the World (similarities, differences, trends)	EU_01, EU_03, EU_07, EU_09

Heterogeneity of tumor cells (biochemical, morphological features, cancer stem cells, epithelial-mesenchymal transition in metastasis, resistance to apoptosis/anticancer drugs)	EU_01, EU_02, EU_04, EU_06, EU_08, EU_09, EU_10
Communication of tumor cells with their microenvironment (cross-talk via different mechanisms e.g. tunneling membrane nanotubes, exosomes, trogocytosis, intercellular connections)	EU_01, EU_05, EU_09, EU_10
The role of cross-talk in tumor in invasion, migration, metastasis, angiogenesis and immunosupression of tumors (recruitment of cells, tumor blood vessels formation, mimicry, extravasation/intravasation, organ/tissue specificity of tumor metastasis, sentinel lymph nodes	EU_01, EU_05, EU_09, EU_10
Tumor cells and elements of their microenvironment as targets of traditional anticancer therapies and new therapies, including immunotherapy with checkpoint inhibitors (PD-1, PD-L1, CTLA-4)	EU_01, EU_04, EU_06, EU_07, EU_08, EU_09, EU_10
Triple negative breast cancer as the tumor with very poor prognosis - actual view on the possibilities and obstacles in tumor classification and application of effective therapy	EU_01, EU_03, EU_04, EU_05, EU_06, EU_07, EU_08, EU_09
Histological/cellular features of human`s tumors in preparations (HE staining/immunohistochemical reactions (e.g. ER, PR, Her-2, ki67, p53, PSA, AMACR, CD3, CD20, CD34, CD68) and the role of immunohistochemistry in tumor diagnostics/classification/mode of treatment	EU_01, EU_04, EU_05, EU_06, EU_07, EU_08, EU_09, EU_10

5. Reading list: fragments provided by the teacher

1. Domagała et al. : Atlas of histopathology - – the mysterious world of diseased human cells, PZWL, , 2006

2. Pawlina W.: Histology: a text and atlas: with correlated cell and molecular biology. Wolters Kluwer Health Philadelphia, , 2016

3. Bascetta S: Histology of different organs and their histopathology with estimation of microenvironment and vascularization (Erasmus Project Supervisior dr A. Knopik-Skrocka), , , 2016

4. EroscheBTo V.P. diFiore`s : Atlas of Histology with functional correlations., Lippincott Williams@Wilkins, , 2005

5. Cormack D. et al.: Essential Histology, Lippincot Williams&Wilkins Philadelphia, Baltimore, , 2001

6. : The internet pathology Laboratory for Medical education: hhtp://library.med.utah.edu./WebPat/htmal#MENU, , ,

7. Alberts B. et al.: Molecular Biology of the Cell, Garland Science , Taylor&Francis Group New York, , 2015

8. : The cancer process https://www.wcrf.org/sites/default/files/The-cancer-process.pdf, American Institute of Cancer Research, , 2018

Artykuły w czasopismach

1. (): original scientific articles and reviews available at the lecturer, ,

2. A. Knopik-Skrocka, P, Kręplewska, D. Jarmołowska-Jurczyszyn (2017): Tumor blood vessels and vasculogenic mimicry – current knowledge and searching for new cellular/molecular targets of anti-angiogenic therapy , Advances in Cell Biology,

3. Knopik-Skrocka A., Śniegowska A (2014): Participation of membrane nanotubes in intercellular communication. , Advances in Cell Biology,

III. Additional information
1. Teaching and learning methods and activities to enable students to achieve the intended course learning outcomes (please indicate the appropriate methods and activities with a tick or/and suggest different methods)

Teaching and learning methods and activities	
Lecture with a multimedia presentation	X
Interactive lecture	
Problem – based lecture	X
Discussions	X
Text-based work	
Case study work	X
Problem-based learning	
Educational simulation/game	
Task – solving learning (eg. calculation, artistic, practical tasks)	X
Experiential work	
Laboratory work	
Scientific inquiry method	
Workshop method	
Project work	
Demonstration and observation	X
Sound and/or video demonstration	
Creative methods (eg. brainstorming, SWOT analysis, decision tree method, snowball technique, concept maps)	X
Group work	X

2. Assessment methods to test if learning outcomes have been achieved (please indicate with a tick the appropriate methods for each LO or/and suggest different methods)

Assessment methods	Course learning outcome symbol									
	EU_1	EU_2	EU_3	EU_4	EU_5	EU_6	EU_7	EU_8	EU_9	EU_10
Written exam										
Oral exam										
Open book exam										
Written test	X	X	X	X	X	X	X	X	X	
Oral test										
Multiple choice test										
Project										
Essay										
Report	X			X				X		X
Individual presentation										
Practical exam (performance observation)										
Portfolio										
Discussion activity	X	X	X	X	X	X	X	X	X	X
SCAMPER	X			X	X	X	X		X	X

3. Student workload and ECTS credits

Activity types	Mean number of hours spent on each activity type
Contact hours with the teacher as specified in the study programme	30
Preparation for classes	10
Reading for classes	10
Essay / report / presentation / demonstration preparation, etc.	10
Project preparation	
Term paper preparation	
Test preparation	10
Total hours	80
Total ECTS credits for the course	3

4. Assessment criteria according to AMU in Poznan grade system

Very good (bdb; 5,0): Student's level of activity (understanding content, activity during classes) is flawless, final test 88-100%

Good plus (+db; 4,5): Student's level of activity (understanding content, activity during classes) is very good, final test80-87,5%

Good (db; 4,0): Student's level of activity (understanding content activity during classes) is good, final test 70-79,5%

Satisfactory plus (+dst; 3,5): Student's level of activity (understanding content activity during classes) is satisfactory, final test 61-69,5%

Satisfactory (dst; 3,0): Student's level of activity (understanding content, activity during classes) is satisfactory, but including many mistakes, final test 50-60,5%

Unsatisfactory (ndst; 2,0): Student's level of activity (understanding content, activity during classes) is unsatisfactory, final test <50%