NAME OF THE COURSE	Cancerogenesis and Mutagenesis					
Code	**PMB714**	Year of study	2			
Course teacher	Jasminka Omerovic, PhD, Assistant Professor	Credits (ECTS)	3			
Associate teachers		Type of instruction (number of hours)	L	S	E	F
			15	15	0	
Status of the course	Mandatory	Percentage of application of e-learning	10%			

COURSE DESCRIPTION

Course objectives	The aim of the subject is to give an overview of fundamental molecular mechanisms that govern tumor development and progression. The focus will be on understanding fundamental signalling pathways activated in tumor cells. Moreover, therapeutical strategies evolved to target crucial molecular players in individual cancers will be discused. Finaly, the students will gain an overview of carcinogenesis and mutagenesis that could be translated into comprehensive and improved therapeutic strategies.
Course enrolment requirements and entry competences required for the course	1) Biochemistry 2) Genetics 3) Molecular biology
Learning outcomes expected at the level of the course (4 to 10 learning outcomes)	After completion of the course, students are able to • Present an overview of the most important signaling pathways in tumor carcinogenesis. • Be familiar with the effect of targeted therapy on the components of cellular signaling pathways in the cell for treatment purposes. • Recommend targeted therapy or a combination of the same. • Interpret the possible mechanisms of resistance resulting from a new mutation in tumor cells; Follow-up care.
Course content broken down in detail by weekly class schedule (syllabus)	1) Genetic instability and mutational changes (mutations, amplifications, rearangements), DNA mutagenesis and DNA repair. 2) Mutagen interactions with the DNA. The genetic mutations caused by mutagens and their consequences on phenotype changes in the cells; correlation between mutagenesis and carcinogenesis. 3) Oncogenes, tumor supressor genes and genes for DNA repair. Chromosomal translocations and development of leukemias. 4) Cell signalling pathways: RTKs, Ras/MAPK, PI3K/Akt, JAK-STAT,...General view on tumor genetics 5) Euckaryotic cell cycle, different cyclin-CDK complexes, cell-cycle checkpoints, p53 and Rb. Cell dead, apoptosis and the apoptotic signalling. Viruses associated with human cancers. Avoidance of apoptosis, regulation of apoptosis. 6) Metastasis, angiogenesis and epithelial-mesenchimal transition. 7) Cancer immuntherapy-dual role of immune system in carcinogenesis.

	8) Development of rationally designed therapies- chemotherapy, biological therapies (targeted therapy, immunotherapy-monoclonal antibodies, inhibition of immunosupression)... 9) The concept of precision medicine will be analysed among wide-ranging cancer, with focus on breastm lung, brain cancers and melanomas. 10) Limmited success of precision therapies and the mechanisms of resistance developed in tumor cells. 11) Application of the new techniques- in early diagnosis and follow up care. Promisses of new gene therapies, iexosomes,iliposomes.... and clinical applications of dendritic cell vaccines and peptides.

Format of instruction	X lectures X seminars and workshops ☐ exercises ☐ *on line* in entirety ☐ partial e-learning ☐ field work	X independent assignments X multimedia ☐ laboratory ☐ work with mentor ☐ (other)
Student responsibilities		

Screening student work *(name the proportion of ECTS credits for each activity so that the total number of ECTS credits is equal to the ECTS value of the course)*	Class attendance	0,5	Research		Practical training	
	Experimental work		Report		(Other)	
	Essay		Seminar essay		(Other)	
	Tests		Oral exam	1.5	(Other)	
	Written exam	1	Project		Other)	

Grading and evaluating student work in class and at the final exam	

	Title	**Number of copies in the library**	**Availability via other media**
Required literature (available in the library and via other media)	Molecular Biology of Cancer Mechanisms, Targets, and Therapeutics, Fourth Edition, Lauren Pecorino, June 2016		
	Cancer: Principles and Practice of Oncology, Primer of the Molecular Biology of Cancer, Author(s): Vincent T. DeVita Jr. MD, Theodore S. Lawrence MD, PhD, Steven A. Rosenberg MD PhD		

Optional literature (at the time of submission of study programme proposal)	Original and review scientific articles and other literature suggested during the lectures.

Quality assurance methods that ensure the acquisition of exit competences	Active interaction with students during lectures and seminars. Student survey for subject and teacher evaluation.
Other (as the proposer wishes to add)	