

Study programme	MEDICAL STUDIES IN ENGLISH				
Cycle	INTEGRATED	Type	UNIVERSITY		
Study track	-	Module	-		
Year of study	3	Semester	VI		
Course title	PERSONALIZED MEDICINE AND BIOTECHNOLOGY	Course code	MFMSE604		
ECTS	1.5	Status	OBLIGATORY		
Teaching hours		Lectures	Exercises	Seminars	Practice
		10	10	10	0
Teachers	Assoc. prof. Sandra Kostić, PhD	4	4	4	
	Assoc. prof. Vlatka Martinović, MD, PhD	2	2	2	
	Assist. prof. Una Glamočlija, PhD	4	4	4	
Course objectives	The objectives of the Personalized medicine and biotechnology course are: - to provide the student with knowledge about the concepts of personalized medicine and the role of biotechnology, tools for diagnosis and the creation of treatment tailored to each patient; - to train the student to think critically about ethical, social and legal issues related to the use of biotechnology methods and the integration of personalized medicine into the healthcare system.				
Course learning outcomes	Learning outcome (LO) Student:			Course learning outcome code	LO code at the study program level
	- Describes and explains the types of biotechnology, with an emphasis on medical biotechnology and explains the main laboratory methodologies used in personalized medicine			IU- MFMSE604-1	IU-MSE2 IU-MSE5
	- Describes and analyses types of experiments for gain of function genes/proteins or loss of function and the basics of pharmacogenetics and pharmacogenomics			IU- MFMSE604-2	IU-MSE3 IU-MSE7
	- Explains the role of bioinformatics as a crucial tool for storing, analyzing, interpreting and translating data into clinical practice			IU- MFMSE604-3	IU-MSE1 IU-MSE7
	- Describes and analyses examples of personalized treatment for specific chronic diseases			IU- MFMSE604-4	IU-MSE6
	- Describes and explains the challenges related to the integration of personalized medicine into existing health systems, from the perspective of ethics, society and law			IU- MFMSE604-5	IU-MSE12
Prerequisites for the course enrolment	In accordance with the Rulebook on the Integrated Studies at the School of Medicine University of Mostar.				
Course content	Week / shift	Topic			
	Lectures	(P1) Introduction to biotechnology (P2) The main aspects of P4 medicine (personalized, predictive, preventive and participatory) (P3) Molecular diagnostics as basis - Laboratory methods for personalized medicine (P4) The basics of pharmacogenomics and pharmacogenetics (P5) Integration of personalized medicine into the existing healthcare system			
	Seminars	(S1) The main aspects of medical biotechnology and personalized medicine (S2) Personalized medicine in oncology (S3) How to make a model - Loss and gain of function experiments (CRISPR/CAS, knock in/out...) (S4) Pharmacogenetics of phase I and II metabolism, transporters and drug targets			

			Examples of personalized medicine based pharmacogenetics (S5) Problems of the integration of personalized medicine into the health care system from the ethical, social and legal aspects								
	Exercises		(E1) Using animal models for drug development (E2) Ethics and genome (E3) Laboratory methods of personalized medicine (sequencing, isolation and analysis of DNA and RNA, cDNA synthesis, qPCR, gene expression analysis, SNP analysis, flow cytometry...) (E4) Systematic reviews on the topic of pharmacogenomics and pharmacogenetics (Cochrane database) (E5) Examples of personalized treatments for specific chronic conditions, Children and personalized medicine								
Language	English										
E-learning	Classes are conducted in person. If necessary, lectures, seminars and part of the tutorials can be combined (in person and online) or completely online via e-learning platforms (Google Meet) up to max 20%.										
Teaching methods	Teaching, interactive and active-experiential										
Types of assessment (indicate - Bold)											
Type of pre-examination obligation					Type of exam						
midterm	seminar paper	essay/report	practical/project task	other	written exam	oral exam	practical				
Allocation of ECTS credits and share in the grade											
Student obligations		Learning outcome code	Hours of workload		Share in ECTS		Share in grade				
Class attendance			30		1						
Seminar paper		IU- MFMSE604-2 IU- MFMSE604-4 IU- MFMSE604-5	6		0.2		10%				
Pre-exam/Written exam		IU- MFMSE604-1 IU- MFMSE604-2 IU- MFMSE604-3 IU- MFMSE604-4 IU- MFMSE604-5	9		0.3		90%				
In total			45		1.5		100%				
Method of calculating the final grade											
The final grade is obtained as weighting of the grades from the seminar paper (10% of the grade) and the written exam (90% of the grade). According to the Study Regulations, the final grade is obtained as follows: 0-54% insufficient (1) 55-66% sufficient (2) 67-78% good (3) 79-90% very good (4) 91-100% excellent (5).											
Literature (indicate)	Title (title, author, year)	Edition		Language				Type of literature			
		own	other	croatian	english	other	multilingual	book	article	script	other
Compulsory	Jain KK (2015) Textbook of Personalized Medicine, 2nd Edition, Springer.		x		x			x			
	Script Personalized medicine and biotechnology	x		x						x	
Additional	Hays P (2017) Advancing Healthcare Through Personalized Medicine 1st Edition, CRC Press, Taylor & Francis Group		x		x			x			

Additional course information

Students should prepare a seminar paper on a given topic using relevant scientific literature by searching PubMed base for the keywords: Personalized or precision medicine and Disease (ie specific disease/disorder). Also, students should briefly present interesting facts and examples from practice related to the pharmacogenetics of certain enzymes, and discuss the practical application and examples.