

Study programme	MEDICAL STUDIES IN ENGLISH				
Cycle	INTEGRATED	Type	UNIVERSITY		
Study track	-	Module	-		
Year of study	3	Semester	VI		
Course title	MEDICAL MICROBIOLOGY AND PARASITOLOGY	Course code	MFMSE601		
ECTS	8	Status	OBLIGATORY		
Teaching hours		Lectures	Exercises	Seminars	Practice
		21	44	30	0
Teachers	Assist. prof. Sanja Jakovac, MD, PhD	15	0	16	
	Professor Ivana Goić Barišić, MD, PhD	3	0	4	
	Assist. prof. Anita Novak, MD, PhD	3	0	2	
	Assistant Maja Kljakić, MD	0	19	8	
	Assistant Doris Martinović Rizikalo, MD	0	18	0	
	Assistant Andrea Mišetić, MD	0	7	0	
Course objectives	<ul style="list-style-type: none"> - to learn the basic biological characteristics of microorganisms that cause infections in humans, their pathogenic properties, prevalence and resistance to environmental conditions, ways of their transmission, sensitivity to antimicrobial drugs and the basics of human defense against infection; - to learn the types of vaccines; - to learn the basic groups of antimicrobial drugs, their spectrum and mechanisms of action, and mechanisms of resistance of microorganisms to antimicrobial drugs; - to sample the swab of the nose and throat independently, to determine the type of the most common microorganisms according to the microscopic slide or other features, to read and interpret antibiograms and to determine the mode of transmission as well as the way of defense against a specific microorganism. 				
Course learning outcomes	Learning outcome (LO) Student:			Course learning outcome code	LO code at the study program level
	Lists and describes the most important biological features of normal human flora and pathogenic microorganisms (bacteria, viruses, fungi and parasites) and explains the effects of the most important virulence factors of microorganisms that cause infections in humans.			IU-MFMSE601-1	IU-MSE1
	Describes the ways of transmission of microorganisms, pathogenesis and methods of prevention of infectious diseases.			IU-MFMSE601-2	IU-MSE5
	Describes the basic mechanisms of human immune defense against infection and types of vaccines.			IU-MFMSE601-3	IU-MSE10
	Names the basic groups of antimicrobial drugs, explains the mechanisms of their action and the mechanisms of resistance of microorganisms to these agents.			IU-MFMSE601-4	IU-MSE11
	States, describes and justifies the applicability of different methods of microbiological diagnostics and testing of the sensitivity of the bacteria to antimicrobial agents and adequately and critically selects and performs them.			IU-MFMSE601-5	IU-MSE15
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	<p>(L1) Introduction to medical microbiology. Structure, physiology and genetics of the bacterial cell. Bacterial antigens. Pathogenesis of bacterial diseases. Vaccines.</p> <p>(L2) Antibacterial chemotherapeutic agents. Bacterial resistance to antimicrobial drugs.</p> <p>(L3) Gram-negative spiral bacteria - family <i>Spirochaetaceae</i>. Bacteria without a cell wall - family <i>Mycoplasmataceae</i>. Obligate intracellular bacteria: <i>Rickettsiaceae</i>, <i>Chlamydiaceae</i>.</p> <p>(L4) Acid-resistant bacteria - genus <i>Mycobacterium</i>.</p> <p>(L5) Introduction to virology. Chemical composition and structure of viruses. Viral antigens and hemagglutination. Virus replication.</p> <p>(L6) Pathogenesis of viral diseases. Interference and interferon. Chemoprophylaxis and therapy of viral diseases. Viral vaccines. Prions.</p> <p>(L7) <i>Flaviviridae</i>, <i>Togaviridae</i>, <i>Bunyaviridae</i>, <i>Filoviridae</i>.</p> <p>(L8) Introduction to mycology. Shape, structure and reproduction of fungi. Fungal diseases – pathogenesis. Antifungal drugs.</p> <p>(L9) Introduction to medical parasitology. Blood and tissue protists - genera: <i>Toxoplasma</i>, <i>Plasmodium</i>, <i>Leishmania</i>.</p>
	Seminars	<p>(S1) Genera <i>Streptococcus</i>, <i>Staphylococcus</i>, <i>Enterococcus</i>.</p> <p>(S2) Genera <i>Neisseria</i>, <i>Moraxella</i>, <i>Haemophilus</i>, <i>Bordetella</i>, <i>Brucella</i>.</p> <p>(S3) Characteristics of bacteria from the <i>Enterobacteriaceae</i> family.</p> <p>(S4) Gram-negative non-fermenting bacteria – genera <i>Pseudomonas</i>, <i>Acinetobacter</i>.</p> <p>(S5) Gram-negative, curved, rod-shaped bacteria - genera <i>Vibrio</i>, <i>Helicobacter</i>, <i>Campylobacter</i>. Anaerobic bacteria - genera <i>Clostridium</i>, <i>Actinomyces</i>.</p> <p>(S6) Genera – <i>Bacillus</i>, <i>Corynebacterium</i>, <i>Listeria</i>, <i>Legionella</i>.</p> <p>(S7) Multiresistant bacteria.</p> <p>(S8) DNA viruses: <i>Parvoviridae</i>, <i>Papovaviridae</i>, <i>Adenoviridae</i>, <i>Poxviridae</i>.</p> <p>(S9) <i>Herpesviridae</i>. Hepatitis B, C, D viruses.</p> <p>(S10) RNA viruses: <i>Picornaviridae</i> (<i>Enterovirus</i>, <i>Hepatovirus</i>), <i>Caliciviridae</i>, <i>Reoviridae</i>.</p> <p>(S11) <i>Orthomyxoviridae</i>, <i>Paramyxoviridae</i>, <i>Coronaviridae</i>.</p> <p>(S12) <i>Rhabdoviridae</i>, <i>Retroviridae</i>.</p> <p>(S13) Medically important yeasts and molds.</p> <p>(S14) Protists of the digestive and urogenital system - genera: <i>Giardia</i>, <i>Entamoeba</i>, <i>Cryptosporidium</i>, <i>Trichomonas</i>.</p> <p>(S15) Round and flat worms - <i>Platyhelminthes</i> (<i>Taenia</i>, <i>Echinococcus</i>), <i>Nematoda</i> (<i>Trichinella</i>, <i>Trichuris</i>, <i>Enterobius</i>, <i>Ascaris</i>).</p>
	Exercises	<p>(E1) Introduction to microbiological laboratory and the basics of safe laboratory work. Laboratory-acquired infections. Microscopic examination of principal bacterial shapes. Differential staining in bacteriology. Cultivation of bacteria. Media types.</p> <p>(E2) Performance, reading and interpretation of antibiogram. Principles of isolation and identification of pyogenic cocci.</p> <p>(E3) Identification of bacteria from the genera <i>Neisseria</i> and <i>Haemophilus</i>.</p> <p>(E4) Macroscopic and biochemical identification of enterobacteria.</p> <p>(E5) <i>Pseudomonas</i>, <i>Campylobacter</i>, <i>Vibrio</i>, <i>Helicobacter</i> – microbiological diagnostics.</p> <p>(E6) Sampling, sending and processing samples for the isolation of mycobacteria.</p> <p>(E7) Hospital infections. Multiresistant bacteria.</p> <p>(E8) Methods of direct diagnosis of viral diseases.</p> <p>(E9) Methods of indirect diagnosis of viral diseases.</p> <p>(E10) Yeasts and molds - macro and micromorphology.</p> <p>(E11) Diagnostics of toxoplasmosis, leishmaniasis and malaria.</p> <p>(E12) Diagnostics of intestinal parasitosis.</p> <p>(E13) Final practical exercise - practical exam.</p>

Language	English										
E-learning	Classes are conducted in person (live). If necessary, lectures, seminars and part of the exercises can be combined (live and online) or completely online via e-learning platforms (Google Meet) up to a maximum of 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			
Attending classes				95		3.2					
Pre-exam/Written exam (B + V+ MaP)		IU- MFMSE601-1 IU- MFMSE601-2 IU- MFMSE601-3 IU- MFMSE601-4		75		2.5		50 %			
Practical exam		IU- MFMSE601-5		25		0.8		20 %			
Oral (final) exam		IU- MFMSE601-1 IU- MFMSE601-2 IU- MFMSE601-3 IU- MFMSE601-4		45		1.5		30 %			
In total				240		8		100 %			
Method of calculating the final grade											
The final grade is the result of the ratio of grades achieved in written exams (50% of the grade), practical (20%) and oral part of the exam (30% of the final grade).											
Literature (indicate)	Title (title, author, year)	Edition		Language				Type of literature			
		own	other	croatian	english	other	multilingual	book	article	script	other
Compulsory	Brooks GF, Carroll KC, Butel JS, Morse SA, Mietzner TA, eds. Jawetz, Melnick and Adelbergs Medical Microbiology. 26th ed. New York: McGraw-Hill; 2013.		x		x			x			
	Jakovac S, et al. Medical microbiology – laboratory manual for medical students. University of Mostar School of Medicine, 2022.	x			x					x	
	PowerPoint Presentations	x			x						x
Additional	http://phil.cdc.gov/phil/home.asp http://www.microbelibrary.org/				x						x
Additional course information											
All forms of teaching are obligatory. Students are allowed to miss up to 20% of the total course hours justifiable, provided that all absences are compensated through a colloquium. Students must be prepared for seminars and practical work, according to the topics in the schedule. Active participants will be given extra pluses that will be added to the points achieved on written part of the exam (3 pluses = 1 point). Unprepared seminars and exercises will be punished with a											

minus and must be compensated through a colloquium, because these are condition for partial written exams and final exam. Minuses and all absences must be compensated through a colloquium, before gaining entry to a partial test-exam, and the entire exam.

To work in the practice room, students need a white coat, manual, a pen or ballpoint pen, and wooden crayons. No food, drink, cigarettes or chewing gum should be brought into the practice room. After the practical work, students **MUST** wash their hands thoroughly according to the enclosed instructions and after that must not touch or take out the working materials.

EXAM

The exam in the subject Medical Microbiology and Parasitology is written, practical and oral. During the classes, three partial test exams will be organized. Only students who attend the 6th semester of this academic year, and who have not missed classes or have justified their absences and made up for them with a colloquium, have the right to access the partial exam.

PARTIAL WRITTEN EXAMS

The first partial test contains questions from bacteriology (60 questions - 60 minutes). The second partial test contains questions from virology (40 questions - 40 minutes). The third partial test contains questions from mycology and parasitology (30 questions - 30 minutes).

The percentage of correct answers required for a positive grade for each test exam is 55% (bacteriology - 33 points; virology - 22 points parasitology and mycology - 16 points). Passed partial exams are recognized as passed written part of the exam. Results achieved in partial exams and points collected by active participation in classes are valid only during the academic year in which they are passed.

PRACTICAL EXAM

The practical part of the exam consists of 10 tasks, as follows:

1. description of 3 microscopic slides, one of which is parasitological
2. readings of grown cultures on the 3 media (bacteriological and/or mycological)
3. recognition and description of the phenomenon that can be recognized on 3 nutrient media
4. reading of antibiogram

ORAL EXAM

The exam card for the oral part of the exam contains five questions according to the following schedule:

1. one question from general microbiology (general bacteriology, mycology, parasitology or virology)
2. one question from special bacteriology
3. one question from special parasitology
4. one question from special virology
5. one question from special mycology

The final grade is the result of the ratio of grades achieved in written exams (50% of the grade), practical (20%) and oral part of the exam (30% of the final grade).