

1	Subject	MICROBIOLOGY AND IMMUNOLOGY			
2	Code	DMB202			
3	Study Program	Study Program of Integrated studies in dental medicine			
4	Organizing Institution (Unit, Institute, Chair, Department)	Departement of Microbiology and Parasitology, Medical Faculty, UKIM, Skopje			
5	Educational degree (first or second cycle)	Integrated study			
6	Study year/semester	2/3	7	Number of credits	7
8	Teacher	Head of the Department of Microbiology and Parasitology - prof. Dr. Zaklina Cekovska			
9	Preconditions	Signatures of first and second semester courses			
10	<p>Teaching goals:</p> <ul style="list-style-type: none"> • To gain knowledge about different types of micro-organisms; to study their morphology and physiology; • Get to know the prevalence of microorganisms in different ecosystems and their mutual associations, including the normal microflora of the host; • To study the genetics of bacteria; • To gain insights into the factors of virulence of microorganisms and to widen the understanding of the pathogenesis of infections they cause; • To be able to successfully and accurately setting microbiological diagnosis of various infectious conditions; • To explore susceptibility testing methods of the causative pathogens, which also represents a prerequisite for successful therapy (extremely important in their further practice). 				
11	Brief content				
	Theoretical course				Class
	Introduction of microbiology and immunology. Bacteria morphology: size, shape, arrangement. Structure of the bacteria: Capsule; Cell wall, cytoplasmic membrane, cytoplasm; Nucleus equivalent. Bacterial Flags and fimbriae				4
	Bacterial Physiology: Nutrition, Growth, Reproduction, Oxygen Relations; Distribution of microorganisms; Ecosystems; Normal microflora; The effect of physical and chemical agents on bacteria;				3
	Antibiotics and chemotherapeutic agents; Mechanisms of action and resistance; Antibiotics and chemotherapeutic groups; Adverse effects of antibiotics;				3
	Genetics of microorganisms: Organization of the genome of prokaryotes and viruses; Gene expression; Mutations and modifications of microorganisms; Mechanisms for genetic transfer of prokaryotes and viruses;				2
	Viruses; Characteristics of the viruses; Reproduction of viruses and antiviral agents; Prions; Mold; Mold characteristics: Antifungal agents;				2
	Pathogenicity and virulence of the microorganism; Pathogenesis of infections; Pathogens on the rise:				2
	Immunology: Main characteristics of the immune system; Complement; Tissue histocompatibility; (MNS molecule); T and B lymphocyte; Acquired resistance to infection; Antigens and haptens; Antigen processing; Cellular and humoral immune response; Immune system and oral cavity; Hypersensitivity; Vaccines and serums;				8
	Bacteriology: Classification of medically important bacteria, Gram positive: <i>Staphylococcus (aureus, epidermidis, saprophyticus, Micrococcus Streptococcus pyogenes,</i> Oral streptococces from the groups: <i>mutans, salivarius, mitis i anginosus Streptococcus pneumoniae;</i> , Gram negative cocci: <i>Neisseria meningitidis, Neisseria gonorrhoeae, Veillonella; Parvobacterium Corynebacterium diphtheriae, Difteroides, Lactobacillus, Legionella;</i>				3
	Gram negative bacilli important for urinary tract: infections: <i>Escherichia coli, Klebsiella, Proteus</i> ; Gram negative bacilli important for digestive tract infections: <i>Salmonella, Shigella Campylobacter, Helicobacter pylori, Vibrio;</i>				3
	Gram negative anaerobes: <i>Bacteroides, Porphyromonas, Prevotella Fusobacterium;</i> Spiral bacteria: <i>Treponema pallidum, Treponema denticola, Leptotricha</i> ; Gram positive sporogenes: <i>Bacillus, Clostridium Mycobacterium tuberculosis, Rickettsia Mycoplasma, Ureaplasma, Chlamydia; Actinomycetes: Actinomyces, Nocardia</i>				6

	Класификација на вирусите. <i>Picornaviridae</i> ; <i>Orthomyxoviridae</i> : <i>Influenzae virus</i> ; <i>Paramyxoviridae</i> : <i>Paramyxovirus</i> ; (<i>Parotitis virus</i> , <i>Parainfluenza virus</i>), <i>Morbillivirus</i> ; <i>Pneumovirus</i> (RSV), <i>Rubivirus</i> ; <i>Herpesviridae</i> HPV, <i>Retroviridae</i> : HIV <i>Hepadnaviridae</i> , HCV;		6	
	Molds relevant for dentistry; <i>Candida (albicans and non-albicans)</i> , <i>Cryptococcus</i> ; Protozoa-in general; Protozoa relevant for dentistry (important for oral cavity)		2	
	Oralen ecosystem, plaque biofilm in the mouth; Microbiology of dental caries; Periodontal diseases		5	
	Oral cavity infections; Salivary gland infections; Infection of the cardiovascular system; Sepsis; Bloodcultures;		6	
	Intrahospital infections in dentistry; Control infections; Hand hygiene; Hygiene in hospital environment; Sterilization and disinfection in dentistry;		5	
	Total		60	
	Practical lessons:		Class	
	Purpose of testing in microbiological laboratories and Method of functioning of microbiological laboratories; Properly collect, transport and process microbiological test specimens; Microbiological examination of microorganisms - different types of microbiological dyes		5	
	Cultivation and Isolation of Microorganisms; Testing the Biochemical Activity of Microorganisms; Automated methods (automated diagnosis of microorganisms - detection and sensitivity of antimicrobials); Antimicrobial effect of screening techniques - different methods (antibiogram, dilution methods); Sterilization and disinfection;		5	
	Study of serological reactions in laboratory diagnostics and their application; Molecular methods in microbiological laboratories and their application; Diagnosis of viral infections		5	
	Microbiological diagnosis of infections with pyogenic cocci; Microbiological diagnosis of oral cavity infections, caries triggers and periodontal diseases;		5	
	Microbiological diagnosis of gastrointestinal tract infections; Study of methods for anaerobic cultivation Diagnosis of infections with sporogenic and anaerobic bacteria;		5	
	Viral infections in dentistry; Fungal infections and their microbiological diagnosis; Microbiological diagnosis of intrahospital infections; prevention and control;		5	
	Total		30	
12	Methods of studying: class room oriented lectures, interactive lectures, group work, practical training, seminar paper			
13	Total available time	240 classes		
14	Organization of the course	60 classes - theoretical course, 30 classes- practical course, 130 hours - home individual learning and other activities		
15	Forms of teaching activities	15.1.	Theoretical course	60 classes
		15.2.	Practical course, seminars	Practical course- 30 classes Seminars, work in groups– 20 classes
16	Other forms of activities	16.1.	Project tasks	
		16.2.	Individual tasks	20 hours
		16.3.	Individual (home) learning	110 hours
17	Method of assessment	17.1.	Tests	Points
			First test (General part) Second test (Special part)	19,5 – 32, 5 points 19,5 – 32,5 points
		17.2.	Active participation, seminar paper/project (oral/written presentation)	0,5 – 3 points
		17.3.	Third test (practical part)	4,5 – 9 points
18	Grading criteria (points / grade)	< 60 points		5 (five) (F)
		from 60 to 67 points		6 (six) (E)

		from 68 to 75 points	7 (seven) (D)																																								
		from 76 to 84 points	8 (eight) (C)																																								
		from 85 to 93 points	9 (nine) (B)																																								
		from 94 to 100 points	10 (ten) (A)																																								
19	Requirement for signature and taking the final exam	<p>The student is required to follow all activities to obtain a signature (obtained min 8 points from practical and 8 points from theoretical course)</p> <table style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 40%;"></th> <th style="width: 10%; text-align: center;">min.</th> <th style="width: 10%; text-align: center;">max.</th> <th style="width: 10%;"></th> <th style="width: 10%;"></th> </tr> </thead> <tbody> <tr> <td>Theoretical instruction</td> <td style="text-align: center;">8</td> <td style="text-align: center;">13</td> <td></td> <td></td> </tr> <tr> <td>Practical teaching</td> <td style="text-align: center;">8</td> <td style="text-align: center;">10</td> <td></td> <td></td> </tr> <tr> <td>Seminar work</td> <td style="text-align: center;">0.5</td> <td style="text-align: center;">3</td> <td></td> <td></td> </tr> <tr> <td>First test</td> <td style="text-align: center;">19,5</td> <td style="text-align: center;">32,5</td> <td></td> <td></td> </tr> <tr> <td>Second test</td> <td style="text-align: center;">19,5</td> <td style="text-align: center;">32,5</td> <td></td> <td></td> </tr> <tr> <td>Practical test</td> <td style="text-align: center;">4,5</td> <td style="text-align: center;">9</td> <td></td> <td></td> </tr> <tr> <td>Total</td> <td style="text-align: center;">60</td> <td style="text-align: center;">100</td> <td></td> <td></td> </tr> </tbody> </table> <p>Presence of theoretical instruction 50% - 70% -> 8 points 71% - 80% -> 9 points 81% - 98% -> 10-12 points 98% - 100% -> 13 points</p>			min.	max.			Theoretical instruction	8	13			Practical teaching	8	10			Seminar work	0.5	3			First test	19,5	32,5			Second test	19,5	32,5			Practical test	4,5	9			Total	60	100		
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20	Language of the course	English																																									
21	Method for evaluation of the quality of education	Anonymous student's evaluation of the subject, teachers and collaborators involved in the educational activities																																									
22	Literature																																										
	22.1.	Mandatory textbooks																																									
		No.	Author	Title	Publisher	Year																																					
		1	Prof. d-r Kakja Popovska and all. (members of Departement)	Microbiology for dental students	Departement of Microbiology and Parasitology	2016																																					
		2	Panovski Nikola and all.	"Medical Microbiology - general part"	Departement of Microbiology and Parasitology	2008																																					
		3	Prof. d-r Gordana Jankoska and all. (members of Departement)	Practicum in Microbiology and parasitology for dental students	Departement of Microbiology and Parasitology	2017																																					
	22.2.	Additional literature																																									
		No.	Author	Title	Publisher	Year																																					
			Simon Bejker, Xejn Niklin, Navid Kan, Ricard Kilington	A brief overview of Microbiology	Translated within the project of the Government of the Republic of Macedonia. Macedonia for translation of experts and scientists	2010																																					

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