<table>
<tr><td>1.</td><td>Subject</td><td colspan="4">MICROBIOLOGY WITH PARASITOLOGY</td></tr>
<tr><td>2.</td><td>Code</td><td colspan="4">DA – 216</td></tr>
<tr><td>3.</td><td>Study program:</td><td colspan="4">Three-year professional studies for graduate obstetricians</td></tr>
<tr><td>4.</td><td>Conducted by</td><td colspan="4">UKIM – Medical faculty
Department of Microbiology with Parasitology</td></tr>
<tr><td>5.</td><td>Degree of education (first or second cycle)</td><td colspan="4"></td></tr>
<tr><td>6.</td><td>Academic year/semester</td><td>II/III</td><td>7.</td><td>Credits</td><td>2</td></tr>
<tr><td>8.</td><td>Professor</td><td colspan="4">The Chair of the Department of Microbiology with Parasitology – prof. dr. Elena Trajkovska Dokikj
The lessons are held by the professors of the Department of Microbiology with Parasitology</td></tr>
<tr><td>9.</td><td>Prerequisite</td><td colspan="4"></td></tr>
<tr><td>10.</td><td>Goals</td><td colspan="4">The main aim of the subject program (after the lessons and the exam) is for the students to gain basic knowledge of the microorganisms that a person encounters in his life. The gained knowledge will be the base for understanding the beneficial effects of the so called “helpful microorganisms”, as well as the harmful influence of the pathogenic microorganisms on the person’s health.
After finishing the program, the students will gain knowledge about:
Morphology and physiology of different types of microorganisms
The prevalence of microorganisms in different ecosystems and their mutual association, including the normal microflora of the host
Genetics of microorganisms
Microbial virulence factors and pathogenesis of the diseases they cause
Proper microbiological diagnosis in case of different infectious conditions
Analyzing the sensitivity to antibiotics of the testing methods for infection causers
Infectious agents defense
Appearance of allergic reactions
Viruses as important microorganisms
Composition and structure of fungi
Detection techniques of fungi as etiological agents of different mycotic infections
Composition, structure and classification of parasites</td></tr>
<tr><td>11.</td><td colspan="5">Content summary:
Theoretical lessons:
Introduction to microbiology
Morphology, structure and multiplication of bacteria
Morphology, structure and multiplication of fungi – with special attention to yeasts
Viruses as microorganisms, their structure and characteristics
Classification of viruses and their multiplication
Physiology of bacteria
The effect of physical and chemical agents on microorganisms
Antimicrobial agents
The prevalence of microorganisms and their mutual interactions</td></tr>
</table>

	• Microbial pathogenesis and pathogenesis of infections • Pathogenesis of microorganisms defence; Allergic reaction • Basic principle of microbiological diagnosis **Bacteriology and virology** **Specific bacteriology:** Analysing specific bacteria: staphylococcus and streptococcus (*Streptococcus pyogenes, Streptococcus agalactiae),* Neisseria (*Neisseria meningitides, Neisseria gonorrhoeae),* Enterobacteriaceae (*E. Coli, Slamonella, Shigella), Campylobacter, H. Pylori, Pseudomonas, Acinetobacter,* Chlamydia, Mycoplasma, *Lysteria monocytogenes,* spiral bacteria (*Treponema pallidum),* anaerobic bacteria (*Bacterioides, Clostridium), Mycobacterum.* **Specific virology:** Analysing specific viruses **RNA viruses:** *Picornaviridae, Paramyxoviridae, Ortohomyxoviridae, Retroviridae, Reoviridae, Coronaviridae, Rubella virus, Flaviviridae (Hepatit C virus);* **DNA viruses:** *Hepadnaviridae, Parvoviridae, Herpesviridae, Papovaviridae* **Mycology and parasitology:** • Analysing fungus: *Candida albicans, Candida non-albicans* • The term parasites and their classification • The most important parasites: *Toxoplasma gondii, Trichomonas vaginalis* **Practical lessons:** • Aim and ways of function of a microbiological laboratory • Types of staining and Gram staining • Microscopic analysis of bacteria • Cultivation and isolation of bacteria • Analysing bacterial biochemical activity • Sterilization and disinfection; Providing and following the conditions of sterile working environment; Control of the sterilization success • Using serological reactions in laboratory diagnostics • Techniques of analysing the antimicrobial effect • Antibiogram • Proper taking, transporting and analysis of samples for microbiological analysis • Analysis and interpreting serological reactions: agglutination, hemagglutination, hemadsorption, precipitation, PVK, ASO, fluorescence (direct and indirect), ELISA, neutralization test • Analysis of cytopathogenic effect of viruses, cultivation in chick embryos and tissue culture • Cultivation of fungus; analysis of colonies and microscopic specimens • Analysis of parasitic pictures	
12.	Teaching methods: • Interactive theoretical lessons • Self-supporting practice • Practical lessons/seminars • Problem-solving • Independent analysis of microscopic structures, bacterial cultures, biochemical reactions for bacterial identification • Independent analysis of viral structure – electronic microscope images, cell culture, viruses cytopathogenic effect, application of embryonic chick eggs; Seeing parasites images	
13.	Total classes:	45

14.	Organization				
15.	Types of teaching activities		15.1	Lessons: theoretical classes	25 lessons + seminars
			15.2	Practical lessons	20
16.	Other types of activities		16.1	Projects	
			16.2	Self-supporting practice	
			16.3	Learning at home	
17.	Knowledge assessment		Points		
	17.1	Tests: 2			Min. – Max.
			Written test – part of the theoretical lessons		27 - 45
			Written test – part of the practical lessons		21 - 35
	17.2	Active participation			Min. - Max.
			Theoretical lessons		2 - 5
			Practical lessons		10 - 15
	Grading criterion (points/grades)	Up to 59 points	5 (F)		
		From 60 to 68 points	6 (E)		
		From 69 to 76 points	7 (D)		
		From 77 to 84 points	8 (C)		
		From 85 to 92 points	9 (B)		
		From 93 to 100 points	10 (A)		
19.	Requirements for obtaining a signature and attending the final examination	To obtain a signature, the student must gain at least 70% of the points and to attend the theoretical and practical lessons. The final grade for the subject is formed according to the table for grading, and is based on the sum of the points from all the activities.			
20.	Language	Macedonian			
21.	Method of evaluating the quality of the lessons	Students' anonymous evaluation of the subject, the professors and the collaborators who participate in the lessons.			
22.	Literature				
	22.1	Mandatory literature			
		1.	Prof. dr. K. Popovska, prof. dr. N. Panovski, prof. dr. M. Petrovska, Prof. dr. E. Trajkovska Dokikj, Microbiology with Parasitology Textbook and Practicum for the students of professional studies, Department of Microbiology and Parasitology, 2008		
		2.	Prof. dr. Panovski Nikola et al., Medical Microbiology – general part, Department of Microbiology and Parasitology, 2011		
		3.	Prof. dr. Panovski Nikola et al. Medical Microbiology – specific part, Department of Microbiology and Parasitology		
		4.	Prof. dr. Milena Petrovska et al. Practicum of medical microbiology and parasitology, Department of microbiology and parasitologym 5th edition, 2010		

		5.	Greenwood D. et al., Translation: prof. dr. Nikola Panovski, prof. dr. Milena Petrovska, prof. dr. Kakja Petrovska and prof. dr. Elena Trajkovska Dokikj, Medical microbiology, 17th edition 2006, translated in 2011 as part of the Government project Translation of professional and scientific books, 2006
	22.2	Additional literature	
		1.	Jawetz E, Melnik II, Adelberg EA., Medical microbiology, Savremena Administracija, Belgrade, 21st edition, 2004