



**MICROORGANISMS, IMMUNITY,  
AND TUMORS**

**SECOND YEAR OF STUDY**

2025/2026.

**MEDICAL MICROBIOLOGY**

Subject:

## **MEDICAL MICROBIOLOGY**

The course carries 6 ECTS credits and includes 6 hours of active teaching per week (3 hours of lectures and 3 hours of small-group sessions).

## TEACHERS AND ASSOCIATES:

RB	First and last name	Email address	title
1.	Ivan Jovanovic	<a href="mailto:ivanjovanovic77@gmail.com">ivanjovanovic77@gmail.com</a>	Full professor
2.	Dejan Baskic	<a href="mailto:dejan.baskic@gmail.com">dejan.baskic@gmail.com</a>	Full professor
3.	Gordana Radosavljevic	<a href="mailto:perun.gr@gmail.com">perun.gr@gmail.com</a>	Full professor
4.	Marija Milovanovic	<a href="mailto:marijaposta@gmail.com">marijaposta@gmail.com</a>	Full professor
5.	Jelena Pantic	<a href="mailto:panticjelena55@gmail.com">panticjelena55@gmail.com</a>	Full professor
6.	Sladjana Pavlovic	<a href="mailto:sladjadile@gmail.com">sladjadile@gmail.com</a>	Associate Professor
7.	Nevena Gajovic	<a href="mailto:gajovicnevena@yahoo.com">gajovicnevena@yahoo.com</a>	Assistant Professor
8.	Vladimir Markovic	<a href="mailto:vladimirmarkovic.vlad@gmail.com">vladimirmarkovic.vlad@gmail.com</a>	Junior teaching assistant
9.	Isidora Kostic	<a href="mailto:isidorastanisavljevic97@gmail.com">isidorastanisavljevic97@gmail.com</a>	Junior teaching assistant
10.	Katarina Mijačić	<a href="mailto:katarinamijacic.99@gmail.com">katarinamijacic.99@gmail.com</a>	Junior teaching assistant
11.	Milica Stojkovic	<a href="mailto:miciii.stojkovic@gmail.com">miciii.stojkovic@gmail.com</a>	Junior teaching assistant

## COURSE STRUCTURE:

Module	Module name	Week	Lectures	Work in a small group per week	Teacher- module leader
1	Bacteriology	7	3	3	Prof. Dr. Dejan Baskić
2	Virology, parasitology and mycology	8	3	3	
					$\Sigma 45+45=90$

## EVALUATION:

The final grade is formed based on the number of points earned through pre-exam activities and the final exam:

**PRE-EXAM ACTIVITIES:** In this way, a student can earn up to 30 points by answering questions from that week's class during work in a small group and, in accordance with the knowledge demonstrated, earning 0-2 points, according to the attached table.

Students who obtain less than 50% of the points in the pre-exam activities must complete the requirement during the exam period by answering two questions from each module they did not pass.

MODULE	MAXIMUM POINTS
	activity during class
1	14
2	16
Σ	30

**FINAL EXAM:** In this way, a student may earn up to 70 points. The exam consists of a written part worth 50 points and an oral part worth 20 points. The written exam consists of a test with 25 questions covering the entire course material. If a student does not achieve more than 50% correct answers, the final exam is considered failed. The oral exam is taken before a committee and consists of three questions covering the entire course material. The committee is appointed on the day of the exam.

### **The final grade is formed as follows:**

In order to pass the course, a student must obtain a minimum of 51 points, pass the pre-exam activities in all modules, and pass the final exam (test and oral exam).

number of points scored	rating
0 - 50	5
51 - 60	6
61 - 70	7
71 - 80	8
81 - 90	9
91 - 100	10

## LITERATURE:

TEXTBOOK NAME	AUTHORS	PUBLISHER	LIBRARY
Medical microbiology	Branislava Savic, Sanja Mitrovic, Tanja Jovanovic	Faculty of Medicine, Belgrade, 2022	Has
Schaechter's Mechanisms of Microbial Disease. Sixth edition	N. Cary Engleberg	Walters Kluwer, 2021	Has not
Schaechter's Mechanisms of Microbial Disease. Fifth edition	N. Cary Engleberg	Walters Kluwer, 2012	Has
<b>All lectures and materials for small group work are available on the Faculty of Medical Sciences website: <a href="http://www.medf.kg.ac.rs">www.medf.kg.ac.rs</a></b>			

# **PROGRAM:**

## **FIRST MODULE: BACTERIOLOGY**

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### UNIT 1 (FIRST WEEK)

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#### **BASIC CHARACTERISTICS OF A BACTERIAL CELL**

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3 hours of lectures

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Classification and taxonomy of microorganisms. Taxonomy and classification of bacteria. Morphology and structure of the bacterial cell. Physiological conditions for the growth and reproduction of bacteria.

Bacterial cell metabolism. Bacterial genetics. Introduction to work in a microbiology laboratory. Safety and biosafety levels in a microbiology laboratory.

Types and handling of samples for microbiological analysis. Types of microscopes and microscopy methods. Culture media used in microbiology. Gram staining.

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### UNIT 2 (SECOND WEEK)

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#### **INFECTION, PATHOGENICITY, VIRULENCE AND DIAGNOSTICS**

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3 hours of lectures

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Human microbiome. Ecological associations. Opportunistic and nosocomial infections. Pathogenesis of infectious diseases. Establishment and spread of infection. Tissue damage. Transmission to a new host. Diagnostic methods. Virulence factors and bacterial toxins. Mechanisms of action of bacterial toxins.

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### UNIT 3 (THIRD WEEK)

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#### **PREVENTION AND TREATMENT OF INFECTIOUS DISEASES**

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3 hours of lectures

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Active and passive immunization. Antimicrobial drugs. Mechanisms of action of antimicrobial agents. Asepsis, antisepsis, sterilization, disinfection, antimicrobial resistance testing, and antibiogram interpretation.

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### UNIT 4 (FOURTH WEEK)

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#### **CAUSATIVE AGENTS OF PYOGENIC INFECTIONS. GRAM-POSITIVE AND GRAM-NEGATIVE COCCI AND COCCOBACILLI**

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3 hours of lectures

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*Staphylococcus, Streptococcus, Enterococcus, Neisseria, Haemophilus, Bordetella, and Legionella.* Microbiological approaches to the diagnosis of infectious diseases. Diagnosis and prevention of pyogenic infections.

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### UNIT 5 (FIFTH WEEK):

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**CAUSATIVE AGENTS OF DIARRHEAL SYNDROMES.  
ENTEROBACTERIACEAE AND OTHER GRAM-NEGATIVE BACILLI**

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3 hours of lectures

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*Enterobacteriaceae: Escherichia, Klebsiella, Enterobacter, Proteus, Morganella, and Providencia. Pathogens: Salmonella, Shigella, and Yersinia. Other Gram-negative bacilli: Pseudomonas and Acinetobacter. Spiral bacteria: Vibrio, Campylobacter, and Helicobacter.*  
Introduction to the immunological approach to the diagnosis of infectious diseases. Diagnosis and prevention of bacterial diarrheal syndromes.

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UNIT 6 (SIXTH WEEK)

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**CAUSATIVE AGENTS OF TUBERCULOSIS, LEPROSY AND DIPHTHERIA.  
ANAEROBIC AND SPOROGENIC BACTERIA**

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3 hours of lectures

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*Mycobacteriaceae: Mycobacterium tuberculosis and Mycobacterium leprae. Corynebacterium diphtheriae. Actinomycetes: Actinomyces, Nocardia, and Rhodococcus. Anaerobiosis and anaerobic bacteria.*  
*Gram-negative bacilli and cocci: Bacteroides, Fusobacterium, Prevotella, Porphyromonas, and Veillonella. Gram-positive bacilli and cocci: Bifidobacterium, Propionibacterium, and Peptostreptococcus.*  
*Spore-forming bacteria. Anaerobic Gram-positive bacilli: Clostridium. Aerobic Gram-positive bacilli: Bacillus.*  
*Diagnosis and prevention of infections caused by mycobacteria, anaerobic bacteria, and spore-forming bacteria. Ziehl–Neelsen staining.*

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UNIT 7 (SEVENTH WEEK)

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**CAUSATIVE AGENTS OF ZOOSES AND SEXUALLY TRANSMITTED  
DISEASES. SPIRAL AND OBLIGATE INTRACELLULAR BACTERIA**

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3 hours of lectures

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Zoonotic pathogens. Obligate intracellular bacteria: Rickettsia, Coxiella, and Bartonella. Spiral bacteria: Borrelia and Leptospira. Enterobacteria: Yersinia pestis.  
Causative agents of sexually transmitted diseases. Spiral bacteria: Treponema pallidum. Obligate intracellular bacteria: Chlamydia. Bacteria without a cell wall: Mycoplasma and Ureaplasma. Other bacteria: Gardnerella vaginalis and Haemophilus ducreyi.  
Immunological approaches in the diagnosis of infectious diseases: ELISA and Western blot.  
Diagnosis and prevention of bacterial zoonoses and sexually transmitted infections.

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**SECOND MODULE: VIRUSOLOGY, PARASITOLOGY AND  
MYCOLOGY**

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UNIT 8 (EIGHTH WEEK)

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**GENERAL VIROLOGY**

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3 hours of lectures

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Taxonomy and classification of viruses. Virus structure and viral genome. Viral replication and viral genetics. Virus–host cell interactions. Tumor viruses. Antiviral drugs and their mechanisms of action. Interferons.

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UNIT 9 (NINETH WEEK)

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**VIRUSES IMPORTANT FOR THE DEVELOPMENT OF INFECTIONS OF THE CENTRAL NERVOUS SYSTEM AND RESPIRATORY TRACT**

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3 hours of lectures

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*Picornaviridae: Enterovirus (Poliovirus, Coxsackievirus, Echovirus), Rhinovirus.*

*Orthomyxoviridae: Influenza virus.*

*Paramyxoviridae: Mumps virus, Parainfluenza virus, Respiratory syncytial virus.*

*Coronaviridae: MERS-CoV, SARS-CoV, SARS-CoV-2.*

Molecular biology approaches to the diagnosis of infectious diseases: polymerase chain reaction (PCR) and sequencing.

Diagnosis and prevention of central nervous system (CNS) and respiratory viral infections.

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UNIT 10 (TENTH WEEK)

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**VIRUSES IMPORTANT FOR THE DEVELOPMENT OF DIARRHEAL SYNDROME: ARBOVIRUSES, ZOONOSES AND ONCOGENIC VIRUSES**

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3 hours of lectures

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*Reoviridae: Rotavirus and other viruses important in the development of diarrheal syndromes:*

*Astroviridae, Caliciviridae (Norwalk virus), Adenoviridae.*

*Viral zoonoses and arbovirus infections. Rabies virus: Rabies virus.*

*Oncogenic viruses: Papillomavirus. Polyomaviridae: Polyomavirus (JCV, BK, SV40). Parvoviridae: Parvovirus B19.*

Diagnosis and prevention of viral diarrheal syndromes, arbovirus, and zoonotic infections. Diagnosis of HPV infection, prevention, and its role in the development of cervical cancer.

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UNIT 11 (ELEVENTH WEEK)

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**HERPES VIRUSES AND OTHER CAUSES OF COLD SORES**

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3 hours of lecture

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*Herpesviridae: Herpes simplex virus 1 and 2, Varicella-zoster virus, Cytomegalovirus, Epstein-Barr virus, HHV6, HHV7, HHV8.*

*Paramyxoviridae: Morbillivirus. Rubivirus: Congenital and postnatal rubella.*

*Poxviridae: Variola virus, Vaccinia virus.*

Diagnosis and prevention of herpesvirus infections and other causes of febrile rash.

TORCH infections.

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UNIT 12 (WEEK TWELFTH)

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**HEPATITIS VIRUSES. RETROVIRUSES AND PRIONS**

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3 hours of lectures

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The course covers hepatitis viruses (HAV, HEV, HBV, HDV, HCV, HGV), retroviruses (HIV, HTLV), as well as prions and viroids, with a focus on the diagnosis and prevention of viral hepatitis and retroviral infections.

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UNIT 13 (THIRTEENTH WEEK)

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**PROTOZOA**

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3 hours of lectures

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Taxonomy and classification of protozoa, helminths and fungi.  
Morphology and physiology of protozoa, helminths and fungi.  
Amoebae and ciliates: *Entamoeba histolytica*, *Entamoeba coli*, *Balantidium coli*.  
Flagellates of the digestive and urogenital tract: *Giardia lamblia*, *Trichomonas vaginalis*.  
Flagellates of blood and tissues: *Leishmania*, *Trypanosoma*.  
Apicomplexes and microsporidia: *Plasmodium*, *Toxoplasma gondii*, *Cryptosporidium*. Antiparasitic drugs. Mechanisms of action of antiparasitic drugs, Diagnosis and prevention of protozoan infections.

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UNIT 14 (WEEK FOURTEENTH)

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**HELMINTHS**

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3 hours of lectures

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Intestinal and tissue nematodes: *Ascaris lumbricoides*, *Trichuris trichiura*, *Enterobius vermicularis*, *Ancylostoma duodenale*, *Necator americanus*, *Strongyloides stercoralis*, *Trichinella spiralis*, *Toxocara canis/cati*, *Wuchereria bancrofti*, *Brugia malayi/timori*, *Loa loa*, *Onchocerca volvulus*, *Dracunculus medinensis*.  
Intestinal and tissue cestodes: *Taenia solium*, *Taenia saginata*, *Hymenolepis nana*, *Diphyllobothrium latum*, *Echinococcus granulosus*. Trematodes: *Fasciola hepatica*, *Fasciolopsis buski*, *Schistosoma*.  
Antiparasitic drugs. Mechanisms of action of antiparasitic drugs, Diagnosis and prevention of infections/infestations caused by helminths.

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UNIT 15 (FIFTEENTH WEEK)

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**FUNGI**

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3 hours of lectures

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Opportunistic fungi: yeasts: *Candida*, *Cryptococcus*, *Rhodotorula*, *Pneumocystis* and molds: *Aspergillus*, *Penicillium*, *Mucor*, *Rhizopus*, *Rhizomucor*.  
Pathogenic fungi: dermatophytes: *Trichophyton*, *Microsporum*, *Epidermophyton* and biphasic fungi: *Sporothrix schenckii*, *Histoplasma capsulatum*, *Blastomyces dermatitidis*, *Paracoccidioides brasiliensis*, *Coccidioides immitis*. Antimycotics. Mechanisms of action of antimycotics. Diagnosis and prevention of fungal infections.

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## Schedule of teaching lectures

**PHARMACOLOGICAL HALL (H5)**

**MONDAY**

**17:25 - 19:40**

## Schedule of practical classes

<b>WEDNESDAY</b>		
<b>R37</b>	<b>R39</b>	<b>R40</b>
<b>08:00 - 10:15</b> I group	<b>08:00 - 10:15</b> III group	<b>08:00 - 10:15</b> V group
<b>10:15 - 12:30</b> II group	<b>10:15 - 12:30</b> IV group	<b>10:15 - 12:30</b> II group

[Schedule of lectures, practical classes and tests – academic calendar](#)

## CLASS SCHEDULE

Sunday	type	name of the method unit	teacher
1	L	Basic characteristics of a bacterial cell. Introduction to work in a microbiology laboratory. Safety and levels of protection in a microbiology laboratory. Types and handling of samples for microbiological analysis. Types of microscopes and microscopy methods. Culture media used in microbiology. Gram staining	<b>Dejan Baskic</b>
	P		Dejan Baskic Isidora Kostic Milica Stojkovic
2	L	Infection, pathogenicity, virulence and diagnostics. Virulence factors and bacterial toxins. Mechanisms of action of bacterial toxins	<b>Sladjana Pavlovic</b>
	P		Sladjana Pavlovic Vladimir Markovic Milica Stojkovic
3	L	Prevention and treatment of infectious diseases. Asepsis, antisepsis, sterilization, disinfection, resistance testing, antibiogram	<b>Dejan Baskic</b>
	P		Dejan Baskic Katarina Mijačić Milica Stojkovic
4	L	Causative agents of pyogenic infections. Gram-positive and gram-negative cocci and coccobacilli. Microbiological approach to the diagnosis of infectious diseases. Diagnosis and prevention of pyogenic infections	<b>Sladjana Pavlovic</b>
	P		Sladjana Pavlovic Isidora Kostic Milica Stojkovic
5	L	Causative agents of diarrheal syndromes. Enterobacteriaceae and other gram-negative bacilli. Introduction to the immunological approach in the diagnosis of infectious diseases. Diagnosis and prevention of bacterial diarrheal syndromes.	<b>Jelena Pantic</b>
	P		Jelena Pantic Vladimir Markovic Milica Stojkovic
6	L	Causative agents of tuberculosis, leprosy and diphtheria. Anaerobic and sporogenic bacteria. Diagnosis and prevention of infections caused by mycobacteria, anaerobic and sporogenic bacteria. Ziehl-Neelsen staining.	<b>Gordana Radosavljevic</b>
	P		Gordana Radosavljevic Katarina Mijačić Milica Stojkovic
7	L	Causative agents of zoonoses and sexually transmitted diseases. Spiral and obligate intracellular bacteria. Immunological approach in the diagnosis of infectious diseases: ELISA and Western Blot. Diagnostics and	<b>Nevena Gajovic</b>

<b>Sunday</b>	<b>type</b>	<b>name of the method unit</b>	<b>teacher</b>
		prevention bacterial zoonoses and sexually transmitted infections.	
	<b>P</b>		Nevena Gajovic Isidora Kostic Milica Stojkovic
<b>8</b>	<b>L</b>	General virology. Antiviral drugs. Mechanism of action of antiviral drugs. Interferons.	<b>Dejan Baskic</b>
	<b>P</b>		Dejan Baskic Vladimir Markovic Milica Stojkovic
<b>9</b>	<b>L</b>	Viruses important for the development of infections of the central nervous system and respiratory tract. Molecular biological approach in the diagnosis of infectious diseases. Polymerase chain reaction. Sequencing. Diagnosis and prevention of CNS and respiratory viral infections.	<b>Dejan Baskic</b>
	<b>P</b>		Dejan Baskic Katarina Mijačić Milica Stojkovic
<b>10</b>	<b>L</b>	Viruses important for the development of diarrheal syndrome include arboviruses, zoonoses and oncogenic viruses. Diagnosis and prevention of viral diarrheal syndromes, arbovirus and zoonotic infections. Diagnosis of HPV infection, prevention and significance in the development of cervical cancer.	<b>Dejan Baskić</b>
	<b>P</b>		Dejan Baskic Isidora Kostic Milica Stojkovic
<b>11</b>	<b>L</b>	Herpes viruses and other causes of rash fever. Diagnosis and prevention of herpes virus infections and other causes of rash fever. TORCH.	<b>Marija Milovanovic</b>
	<b>P</b>		Marija Milovanovic Vladimir Markovic Milica Stojkovic
<b>12</b>	<b>L</b>	Hepatitis viruses. Retroviruses and prions. Diagnosis and prevention of viral hepatitis and retroviral infections	<b>Nevena Gajovic</b>
	<b>P</b>		Nevena Gajovic Katarina Mijačić Milica Stojkovic
<b>13</b>	<b>L</b>	Protozoa. Antiparasitic drugs. Mechanisms of action of antiparasitic drugs, Diagnosis and prevention of protozoal infections.	<b>Ivan Jovanovic</b>
	<b>P</b>		Ivan Jovanovic Isidora Kostic Milica Stojkovic
<b>14</b>	<b>L</b>	Helminths. Antiparasitic drugs. Mechanisms of action of antiparasitic drugs, Diagnosis and prevention of infections/infestations caused by helminths.	<b>Dejan Baskic</b>
	<b>P</b>		Dejan Baskic Vladimir Markovic Milica Stojkovic

<b>Sunday</b>	<b>type</b>	<b>name of the method unit</b>	<b>teacher</b>
<b>15</b>	<b>L</b>	Fungi. Antimycotics. Mechanisms of action of antifungals. Diagnosis and prevention of fungal infections.	<b>Dejan Baskic</b>
	<b>P</b>		Dejan Baskic Katarina Mijačić Milica Stojkovic

**Oral exam committees**

<b>Commission 1</b>	<b>Commission 2</b>	<b>Commission 3</b>
Dejan Baskic	Gordana Radosavljevic	Ivan Jovanovic
Sladjana Pavlovic	Jelena Pantic	Nevena Gajovic
Milica Stojkovic	Katarina Mijačić	Vladimir Markovic