



SUBJECT OUTLINE

1. Program information

1.1.	UNIVERSITY OF MEDICINE AND PHARMACY “CAROL DAVILA”
1.2.	FACULTY OF MEDICINE/ CLINIC DEPARTMENT 2
1.3.	MICROBIOLOGY DISCIPLINE
1.4.	FIELD OF STUDY: Health- Sectoral regulated within the European Union
1.5.	CYCLE OF STUDIES: LICENSE
1.6.	STUDY PROGRAMME: MEDICINE

2. Discipline data

2.1.	Name of the subject/compulsory/optional subject within the discipline: MICROBIOLOGY					
2.2.	Location of the discipline:					
2.3.						
2.4.						
2.5. Year of study II		2.6. Semester I and II		2.7. Type of assessment SEMESTER EXAM	PRACTICAL WRITTEN EXAM	2.8. Discipline regimen
						MANDATORY

3. Estimated total time (hours/semester of teaching activity) – modular education

No hours per week	4	of which: lecture	2	Laboratory Practice	2
Total hours of the curriculum	112	of which: lecture	56	Laboratory Practice	56
Time fund distribution	28 weeks	2 hours/week		2 hours/week	hours
Study by textbook, lecture support, bibliography and notes					yes
Additional documentation in the library, on specialized electronic platforms and in the field					yes
Preparation of seminars / laboratories, themes, papers, portfolio and essays					yes
Tutoring					yes
Examinations					yes
Other activities					
Total hours of self-study					
Number of credits					8

4. Preconditions (where applicable)

4.1. curriculum	
4.2. of competencies	

5. Conditions (where applicable)

5.1. of Lecture conduct	IT equipment / video projector
5.2. conducting the Laboratory Practice/ work	IT equipment / video projector, demonstration materials, bacterial cultures, laboratory materials

6. Acquired specific skills

Professional competences (expressed through knowledge and skills)	
Transversal skills (role, professional development, personal)	

7. Objectives of the discipline (based on the grid of specific competences accumulated)

5.1. General objective	Acquiring the basic notions of bacteriology, immunology, regarding antimicrobial substances, the ways through which infectious diseases are produced. Acquiring the basic notions of the bacterial genera involved in the production of infections in humans and microbiological diagnosis in the main bacterial and fungal infections
5.2. Specific objectives	Knowledge of the characteristics of the main types of bacteria involved in human pathology, epidemiology, pathogenesis and microbiological diagnosis methods, antibiotic resistance and the possibilities of therapy and prophylaxis

4. Content

8.1 Lecture	Teaching methods	Observations
1. Introduction to the study of medical microbiology. The object, methods and purpose of microbiology. History of medical microbiology. Romanian School of Microbiology. Bacteriology, as part of medical microbiology.	Presentations, ppt, video, interactive discussions	
2. Notions of bacterial morphology. The size, shape and grouping of bacteria. Mandatory bacterial structures: the nucleus, cytoplasm, cell shells. Optional bacterial structures: cilia, pili, capsule, spores. The function of each structure. Bacterial taxonomy. The main bacterial genera involved in human pathology.	Presentations, ppt, video, interactive discussions Presentations, ppt, video, interactive discussions	
3. Bacterial physiology. Growth, multiplication and death of bacteria. Microbial growth curve. Factors that influence the growth of bacteria. Cultivation of bacteria. Bacterial metabolism. Bacterial respiration.		

<p>4. Bacterial genetics – Bacteriophage. Phage-bacterial relationships. Lithic and lysogenic cycle. Applications.</p> <p>Bacterial Genetics. Bacterial heredity. Genotype and phenotype. Bacterial chromosome.</p> <p>Extrachromosomal elements. Plasmids - types and roles</p> <p>Mutations in bacteria- definition, types</p> <p>Variability of bacterial genetics. Mechanisms.</p> <p>Transfer of genetic material and recombination.</p> <p>Transposable elements.</p>	<p>Presentations, ppt, video, interactive discussions</p>	
<p>5. Antimicrobial substances: Definition, bacteriostatic effects, bactericidal effects.</p> <p>Classification of antimicrobial substances according to: the origin of the substances; the type of action; spectrum of action; chemical structure. The main classes of antibiotics, examples, use.</p>	<p>Presentations, ppt, video, interactive discussions</p>	
<p>6. Bacterial resistance to antimicrobial substances.</p> <p>Types of resistance and definitions.</p> <p>Chromosomal resistance. Extrachromosomal resistance</p> <p>Mechanisms of resistance, resistance to various types of antimicrobials. Test methods. Strategies to combat the emergence of antimicrobial resistance.</p> <p>The action of physical and chemical factors on bacteria. Bacteriostatic and bactericidal effect</p> <p>Definitions of sterilization, disinfection, antisepsis, asepsis.</p> <p>Physical agents: Heat. Steam heat. Dry heat. Control of heat sterilization. Cold. Chilling. Freezing. Freeze-drying.</p> <p>Radiation. Ultraviolet and Ionizing radiation.</p> <p>Ultrasound. Mechanical pressure. Osmotic pressure.</p> <p>Chemical agents Antiseptic substances, disinfectants.</p> <p>Overview, types of antiseptics / disinfectants, rules of use.</p>	<p>Presentations, ppt, video, interactive discussions</p>	
<p>7. Microorganism-host relationships.</p> <p>The microbiota of the human body. The dynamics and roles of the microbiota.</p> <p>Factors that determine the pathogenicity of bacteria.</p> <p>Definition of pathogenicity and virulence.</p> <p>Saprophytic/ commensal bacteria, pathogenic/ parasitism. Multiplication, invasiveness and toxigenesis.</p> <p>Exotoxins. Antitoxins and anatoxins.</p> <p>Endotoxins.</p> <p>Extracellular enzymes: Bacterial structures involved in pathogenicity of bacterial species / strains.</p> <p>Stages of a bacterial infection.</p>	<p>Presentations, ppt, video, interactive Presentations, ppt, video, interactive discussions e discussions</p>	
<p>8. The natural (nonspecific) resistance of the human body. Physiological barriers: skin, mucous membranes.</p>	<p>Presentations, ppt, video, interactive discussions</p>	

Nonspecific defense: phagocytosis, complement system Inflammation. Phases of the inflammatory process.		
9. Specific immunity (passively or actively acquired). Definitions, examples. Organization of the immune system. Central and peripheral organs, location, structure and role. Cells involved in the immune response: lymphocytes, phagocytic mononuclear system, granulocytes; origin, evolution, types and functions. Cytokines.	Presentations, ppt, video, interactive discussions	
10. Antigens. Antigenicity, immunogenicity. The evolution of antigens in the body.	Presentations, ppt, video, interactive discussions	
11. Humoral immune response. Cellular immune response. Evolution, immune receptors. Cellular cooperation in the immune response.	Presentations, ppt, video, interactive discussions	
12. Antibodies: structure, functions. Classes of immunoglobulins. Antigen-antibody reactions. Principle, types, use in laboratory diagnosis.	Presentations, ppt, video, interactive discussions	
13. Hypersensitivity. Definition. Types of hypersensitivity with humoral mechanism (I,II,III) and cellular mechanism (IV), highlighting, examples, applications.	Presentations, ppt, video, interactive discussions	
14. Vaccines, biological diagnostic and therapeutic products.	Presentations, ppt, video, interactive discussions	
1. Genus <i>Staphylococcus</i> Morphological characteristics. Culture characteristics. Antigenic structure. Staphylococci classification. Biochemical properties. Toxins and enzymes. Epidemiology. Pathogenesis. Immunity. Involvement in the production of nosocomial infections. Laboratory diagnosis. Susceptibility to antibiotics. Treatment. Prophylaxis.	Presentations, ppt, video, interactive discussions	
2. Genus <i>Streptococcus</i> Morphological characteristics. Culture characteristics. Antigenic structure. Staphylococci classification. Biochemical properties. Virulence factors. Epidemiology. Pathogenesis. Immunity. Post-streptococcal diseases. Laboratory diagnosis. Treatment. Prophylaxis. <i>Streptococcus pneumoniae</i> Morphological characteristics. Culture characteristics. Antigenic structure. Biochemical properties. Epidemiology. Pathogenesis. Immunity. Laboratory diagnosis. Susceptibility to antibiotics. Treatment. Specific prophylaxis.	Presentations, ppt, video, interactive discussions	

<p>Genus <i>Enterococcus</i> Morphological characteristics. Culture characteristics. Antigenic structure. Biochemical properties. Epidemiology. Pathogenesis. Laboratory diagnosis. Susceptibility to antibiotics. Treatment. Prophylaxis.</p>		
<p>3. Genus <i>Neisseria</i> Overview. Morphological characteristics. Culture characteristics. Biochemical and metabolic characteristics.</p> <p><i>Neisseria meningitidis</i> Differential characteristics. Antigenic structure Epidemiology. The pathogenesis of meningitis. Immunity. Laboratory Diagnosis. Treatment. Specific prophylaxis.</p> <p><i>Neisseria gonorrhoeae</i> Differential characters. Antigenic structure. Epidemiology. Pathogenesis of gonorrhea. Immunity. Laboratory diagnosis. Treatment. Prophylaxis.</p>	<p>Presentations, ppt, video, interactive discussions</p>	
<p>4. Order Enterobacterales. Overview. Classification. Morphological characteristics. Culture characteristics. Biochemical characteristics. Toxins and enzymes. Antigenic structure.</p> <p><i>Genus Escherichia</i> Morphological characteristics. Culture characteristics. Biochemical characteristics. Antigenic structure Epidemiology. Pathogenesis: Urinary tract infection. Digestive infections - Pathotypes <i>E. coli</i>. Meningitis with <i>E. coli</i>. Sepsis produced by <i>E. coli</i>. Laboratory diagnosis Treatment. Prophylaxis.</p> <p><i>Klebsiellae</i> tribe. Genus <i>Klebsiella</i> Morphological characteristics. Culture characteristics. Biochemical characteristics. Antigenic structure. Epidemiology. Pathogenesis. Involvement in nosocomial infections. Laboratory diagnosis. Susceptibility to antibiotics. Treatment. Prophylaxis. Genus <i>Enterobacter</i>. Genus <i>Serratia</i>: Overview.</p> <p><i>Proteae</i> tribe: Genus <i>Proteus</i>.</p>	<p>Presentations, ppt, video, interactive discussions</p>	

<p>Morphological characteristics. Culture characteristics.</p> <p>Biochemical characteristics. Antigenic structure.</p> <p>Epidemiology. Pathogenesis. Involvement in nosocomial infections.</p> <p>Laboratory diagnosis. Susceptibility to antibiotics.</p> <p>Treatment. Prophylaxis.</p> <p><i>Genus Providencia. Genus Morganella: Overview.</i></p>		
<p>5. Genus <i>Salmonella</i></p> <p>Morphological characteristics. Culture characteristics. Biochemical characteristics.</p> <p>Antigenic structure. Classification of <i>Salmonella</i>.</p> <p>Epidemiology. Pathogenesis: Minor and major salmonellosis.</p> <p>Laboratory diagnosis.</p> <p>Treatment. Specific prophylaxis.</p> <p><i>Genus Shigella</i></p> <p>Morphological characteristics. Culture characteristics. Biochemical characteristics.</p> <p>Antigenic structure. Classification of <i>Shigella</i>.</p> <p>Epidemiology. Pathogenesis of bacterial dysentery.</p> <p>Laboratory diagnosis. Treatment. Specific prophylaxis.</p> <p><i>Genus Yersinia</i></p> <p><i>Yersinia pestis</i></p> <p>Morphological characteristics. Culture characteristics. Biochemical characteristics.</p> <p>Toxins and enzymes. Antigenic structure.</p> <p>Epidemiology. Pathogenesis of the plague.</p> <p>Laboratory diagnosis.</p> <p>Treatment. Prophylaxis.</p> <p><i>Yersinia enterocolitica. Yersinia pseudotuberculosis.</i></p> <p>Morphological characteristics. Culture characteristics. Biochemical characteristics.</p> <p>Antigenic structure.</p> <p>Epidemiology. Pathogenesis.</p> <p>Laboratory diagnosis.</p> <p>Treatment. Prophylaxis.</p>	<p>Presentations, ppt, video, interactive discussions</p>	
<p>6. <i>Vibrionaceae</i> family</p> <p>Genus <i>Vibrio</i>: <i>Vibrio cholerae</i></p> <p>Morphological characteristics. Culture characteristics. Biochemical characteristics. Toxins and enzymes.</p> <p>Antigenic structure. Immunity.</p> <p>Epidemiology. Pathogenesis of cholera.</p> <p>Laboratory diagnosis.</p> <p>Treatment. Prophylaxis.</p> <p><i>Vibrio cholerae non O1</i>, other vibrios – overview.</p>	<p>Presentations, ppt, video, interactive discussions</p>	

<p>Genus <i>Aeromonas</i>. Genus <i>Plesiomonas</i> – overview.</p> <p><i>Spirilaceae</i> family Genus <i>Campylobacter</i>. <i>C. jejuni</i> and <i>C. coli</i> Morphological characteristics. Culture characteristics. Biochemical characteristics. Antigenic structure. Epidemiology. Pathogenesis. Laboratory diagnosis. Treatment. Prophylaxis.</p> <p>Genus <i>Helicobacter</i>. <i>Helicobacter pylori</i> Morphological characteristics. Culture characteristics. Biochemical characteristics. Toxins and enzymes. Antigenic structure. Epidemiology. Pathogenesis. Involvement in the production of gastroduodenal ulcer. Laboratory diagnosis. Treatment. Prophylaxis.</p> <p>Genus <i>Pseudomonas</i> and other nonfermentative bacteria. <i>Pseudomonas aeruginosa</i>. Morphological characteristics. Culture characteristics. Biochemical characteristics. Toxins and enzymes. Antigenic structure. Immunity. Epidemiology. Pathogenesis: involvement in the production of nosocomial infections. Laboratory diagnosis. Susceptibility to antibiotics. Treatment. Prophylaxis. Other pseudomonadaceae - <i>Burkholderia pseudomallei</i>, <i>Burkholderia mallei</i> Other Gram-negative nonfermentative bacteria – overview. Genus <i>Acinetobacter</i> Overview. Epidemiology. Pathogenesis. Involvement in nosocomial infections. Antibiotic resistance. Treatment. Prophylaxis Genus <i>Bartonella</i> – overview.</p>		
<p>7. <i>Haemophilus influenzae</i>. Morphological characteristics. Culture characteristics. Biochemical characteristics. Antigenic structure. Epidemiology. Pathogenesis. Laboratory diagnosis. Treatment. Prophylaxis.</p> <p><i>Haemophilus ducreyi</i>. <i>Haemophilus aegyptius</i> <i>Haemophilus aphrophilus</i>. <i>Haemophilus parainfluenzae</i> – overview.</p>	<p>Presentations, ppt, video, interactive discussions</p>	

<p>Genus <i>Bordetella</i>. <i>Bordetella pertussis</i>. Morphological characteristics. Culture characteristics. Biochemical characteristics. Toxins and enzymes. Antigenic structure. Epidemiology. Pathogenesis of whooping cough. Laboratory diagnosis. Treatment. Specific prophylaxis.</p> <p><i>Bordetella parapertussis</i>, <i>Bordetella bronchiseptica</i> - overview.</p> <p>Genus <i>Brucella</i>. Morphological characteristics. Culture characteristics. Biochemical characteristics. Antigenic structure. Epidemiology. Pathogenesis. Laboratory diagnosis. Treatment. Prophylaxis.</p> <p>Genus <i>Legionella</i>. Morphological characteristics. Culture characteristics. Biochemical characteristics. Antigenic structure. Epidemiology. Pathogenesis. Laboratory diagnosis. Treatment. Prophylaxis.</p> <p><i>Francisella tularensis</i>. Morphological characteristics. Culture characteristics. Epidemiology. Pathogenesis of tularemia. Laboratory diagnosis. Treatment.</p> <p>Genus <i>Pasteurella</i>. <i>Pasteurella multocida</i>. Morphological characteristics. Culture characteristics. Epidemiology. Pathogenesis. Laboratory diagnosis. Treatment.</p>		
<p>8. Genus <i>Corynebacterium</i>. <i>Corynebacterium diphtheriae</i>. Morphological characteristics. Culture characteristics. Biochemical characteristics. Toxins and enzymes. Antigenic structure. Epidemiology. Pathogenesis. Laboratory diagnosis. Treatment. Specific prophylaxis. Other species of <i>Corynebacterium</i> with medical importance – overview.</p>	<p>Presentations, ppt, video, interactive discussions</p>	

<p>Genus <i>Listeria</i>. <i>Listeria monocytogenes</i>. Morphological characteristics. Culture characteristics. Biochemical characteristics. Toxins and enzymes. Antigenic structure. Epidemiology. Pathogenesis. Laboratory diagnosis. Treatment. Prophylaxis.</p>		
<p>9. Genus <i>Bacillus</i>. <i>Bacillus anthracis</i>. Morphological characteristics. Culture characteristics. Biochemical characteristics. Toxins and enzymes. Antigenic structure. Epidemiology. Pathogenesis of anthrax. Laboratory diagnosis. Treatment. Prophylaxis. Other <i>Bacillus</i> species.</p> <p>Genus <i>Clostridioides</i>. Morphological characteristics. Culture characteristics. Biochemical characteristics. Antigenic structure. <i>Clostridium botulinum</i>. Epidemiology. Toxins. Pathogenesis of botulism. Laboratory diagnosis. Treatment. Prophylaxis <i>Clostridium tetani</i>. Epidemiology. Toxins. Pathogenesis of tetanus. Laboratory diagnosis. Treatment. Specific prophylaxis Clostridies of gaseous gangrene. Species. Morphological characters. Culture characteristics. Biochemical characteristics. Toxins and enzymes. Antigenic structure. Epidemiology. Pathogenesis. Laboratory diagnosis. Treatment. Prophylaxis. <i>Clostridioides difficile</i> – overview, toxins, laboratory diagnosis. Unsporulated anaerobic bacteria: Genus <i>Bacteroides</i>, Genus <i>Fusobacterium</i> – overview.</p>	<p>Presentations, ppt, video, interactive discussions</p>	
<p>10. Genus <i>Mycobacterium</i>. <i>Mycobacterium tuberculosis</i>. Morphological characteristics. Culture characteristics. Biochemical characteristics. Antigenic structure. Particularities of the chemical structure of mycobacteria related to pathogenicity. Immunity and hypersensitivity. Epidemiology. Pathogenesis of tuberculosis. Laboratory diagnosis. Antibiotic resistance of mycobacteria. MDR tuberculosis Treatment. Specific prophylaxis.</p>		

<p>Other mycobacteria: Photochromogenic mycobacteria, scotocromogenic mycobacteria, non cromogenic mycobacteria with rapid growth. Epidemiology and pathogenesis of diseases with atypical mycobacteria. <i>Mycobacterium leprae</i> – overview.</p> <p><i>Actinomycetaceae</i> family. Genus <i>Actinomyces</i>. Morphological characteristics. Culture characteristics. Biochemical characteristics. Pathogenesis. Laboratory diagnosis. Genus <i>Nocardia</i>. Morphological characteristics. Culture characteristics. Biochemical characteristics. Pathogenesis. Laboratory diagnosis.</p>		
<p>11. <i>Spirochetaceae</i> family Genus <i>Treponema</i>. <i>Treponema pallidum</i>. Morphological characteristics. Growth. Biochemical characteristics. Antigenic structure. Immunity in <i>Treponema pallidum</i> infection Epidemiology. Pathogenesis of syphilis. Laboratory diagnosis. Treatment. Prophylaxis. Other treponemas – overview.</p> <p><i>Genul Leptospira</i>. Morphological characteristics. Biochemical characteristics. Antigenic structure. Epidemiology. Pathogenesis. Laboratory diagnosis. Treatment. Prophylaxis.</p> <p>Genus <i>Borrelia</i>. <i>Borrelia recurrentis</i>. Morphological characteristics. Biochemical characteristics. Antigenic structure. Epidemiology. Pathogenesis of recurrent fever. Laboratory diagnosis. Treatment. Prophylaxis. <i>Borrelia burgdorferi</i>. Morphological characteristics. Biochemical characteristics. Antigenic structure. Epidemiology. Pathogenesis of Lyme disease. Laboratory diagnosis. Treatment. Prophylaxis.</p>		
<p>12. <i>Rickettsiaceae</i> family. General characteristics. Morphological and cultural characteristics. The action of physical and chemical factors. Antigenic structure. Pathogenesis. Epidemiology. Prophylaxis</p> <p><i>Genul Chlamydia</i>. General characteristics. Morphological characteristics and culture characteristics. Development cycle. Action of physical and chemical factors</p>	<p>Presentations, ppt, video, interactive discussions</p>	

<p>Antigenic structure. Pathogenesis: eye infections, genital infections, venereal lymphogranulomatosis (LGV), lung infections, infections in pregnant women.</p> <p>Immunity. Epidemiology Prophylaxis.</p> <p><i>Mycoplasmataceae</i> family</p> <p>Morphological characteristics. Biochemical characteristics. Antigenic structure. Epidemiology. Pathogenesis. Respiratory infections. Urogenital infections. <i>Mycoplasma</i> in pregnant women and in newborns.</p> <p>Infections in immunodeficient host. Epidemiology Prophylaxis.</p>		
<p>13. Fungi with medical importance – etiological agents of localized/ systemic infections.</p> <p><i>Candida</i>, <i>Cryptococcus</i>, <i>Aspergillus</i>.</p> <p>Morphological characteristics. Culture characteristics.</p> <p>Epidemiology. Pathogenesis. Types of infections.</p> <p>Treatment. Prophylaxis.</p>	<p>Presentations, ppt, video, interactive discussions</p>	
<p>14. Microbiological diagnosis in the case of the main clinical specimens (urine for urine culture, stool for stool culture, blood for blood culture, sputum, aspirated, exudates, secretions).</p>		

8.2 Laboratory practice/ works	Teaching methods	Observations
1. Microbiology laboratory – organization, functions. Presentation of equipment, devices and materials from the laboratory. Labor protection measures/ Laboratory safety in the microbiology laboratory.	Presentations, Demonstrations, video projection, individual practical activity of students, microscopy	
2. Methods of sterilization and disinfection. Sterilization control. Antiseptics and disinfectants. Elementary techniques of working in the microbiology laboratory.		
3. Laboratory diagnosis of bacterial infections: the general scheme. Bacteriological diagnosis. Immunological diagnosis. Molecular diagnosis of bacterial infections - generalities. Sources of errors (preanalytic, analytical, postanalytic). Performance of laboratory tests (sensitivity, specificity, positive prediction, negative prediction)		
4. Techniques of collection, transport and processing of the main clinical samples. General requirements.		
5. Microscopic examination of bacteria (1) – fresh preparations, smears, dyes, staining. The technique of smear execution from pathological products and cultures. Methylene blue, Gram coloration, Ziehl-Neelsen staining techniques.		
6. Microscopic examination of bacteria (2) – Staining (continued). How to use the optical microscope. The technique of microscopic examination of smears stained with methylene blue, Gram, Ziehl-Neelsen. Descriptive elements of smears made of clinical samples and bacterial cultures.		
7. Growth media. Classification of growth media. Presentation of culture environments; growth requirements. Common techniques of inoculating growth media.		
8. Culture characteristics of bacteria. Identification of bacteria based on culture, biochemical and metabolic characteristics. Types of colonies/cultures, hemolysis, pigment production. Emphasizing the biochemical characteristics on differential media, multi-test. Use of chromogenic media.		
9. Antimicrobial susceptibility testing. Disk diffusion (Kirby Bauer method). Determination of MIC, MBC, dilution method, E-test. Automatic methods of		

determining the antimicrobial susceptibility of pathogenic bacteria. Antimicrobial treatment surveillance.		
10. Antigen-antibody reactions: overview, classification. The usefulness of Ag-Ab reactions in the diagnosis of bacterial infections. Ag-Ab precipitation reactions in liquid medium, qualitative and quantitative. Demonstrations, interpretation, applications. Ag-Ab precipitation reactions in the gel, qualitative and quantitative. Simple and double radial immunodiffusion. Immuno- and counter-immunoelectrophoresis.	Presentations, Demonstrations, video projection, individual practical activity of students, microscopy	
11. Ag-Ab agglutination reactions, qualitative and quantitative. Direct agglutination, co-agglutination, heme- and latex agglutination.		
12. Ag-Ab seroneutralization reactions <i>in vivo</i> and <i>in vitro</i> . ASLO reaction. <i>C. botulinum</i> toxin typing. Complement fixation reaction. Demonstrations, interpretation of qualitative, quantitative and semi-quantitative reactions, applications.		
13. Ag-Ab reactions that use marked components, principle, qualitative and quantitative reactions. Immunoenzymatic reactions (variants). Immunofluorescence reactions. Radio-immunoassays. Demonstrations, interpretation, applications. Cellular immunity tests, usefulness. IDR to tuberculin. Biopreparations used in medical practice. Antigens and immune sera used in diagnosis. Vaccines, immune sera used in therapy, specific human immunoglobulins, immunomodulators, applications.		
14. Practical examination.		
1. Blood culture. Identification of the genus <i>Staphylococcus</i> . Antimicrobial susceptibility testing of staphylococci. Involvement of staphylococci in the production of community and nosocomial infections.		
2. Laboratory diagnosis of respiratory tract infections. Identification of streptococci (<i>S. pyogenes</i> , <i>Streptococcus agalactiae</i> , group C streptococci, G, F, <i>Streptococcus pneumoniae</i> , <i>Enterococcus</i> spp.). Direct diagnosis, serological diagnosis. Antimicrobial susceptibility testing of streptococci. Laboratory diagnosis in poststreptococcal diseases.		
3. Laboratory diagnosis of CNS infections. Identification of aerobic Gram negative cocci (<i>N. meningitidis</i> , <i>N. gonorrhoeae</i>).		

4. Laboratory diagnosis of urinary tract infections. Identification of the following genuses: <i>Escherichia</i> , <i>Klebsiella</i> , <i>Enterobacter</i> , <i>Proteus</i> . Antimicrobial susceptibility testing.	Presentations, Demonstrations, video projection, individual practical activity of students, microscopy	
5. Laboratory diagnosis in acute diarrheal disease. Stool culture. Identification of the following genuses: <i>Shigella</i> , <i>Salmonella</i> , <i>Yersinia</i> . Laboratory diagnosis in enteric fever.		
6. Laboratory diagnosis of infections produced by <i>Vibrio</i> . Laboratory diagnosis of infections produced by <i>Campylobacter</i> and <i>Helicobacter</i> . Laboratory diagnosis of hospital acquired infections. Identification of the following genuses: <i>Pseudomonas</i> , <i>Acinetobacter</i> . Antimicrobial susceptibility testing.		
7. Laboratory diagnosis of infections produced by <i>Haemophilus</i> , <i>Bordetella</i> , <i>Brucella</i> .		
8. Laboratory diagnosis of infections produced by bacteria from <i>Corynebacterium</i> genus. ELEK test. Laboratory diagnosis of infections produced by <i>Listeria</i> .		
9. Laboratory diagnosis of infections produced by bacteria from genus <i>Bacillus</i> . Laboratory diagnosis of infections produced by unsporulated anaerobic bacteria. Laboratory diagnosis of infections produced by anaerobic Gram-positive bacilli of the genus <i>Clostridium</i> . Toxin typing.		
10. Laboratory diagnosis of infections produced by bacteria of the genus <i>Mycobacterium</i> . Molecular methods used in the diagnosis of tuberculosis. Antimicrobial susceptibility testing of mycobacteria.		
11. Laboratory diagnosis of sexually transmitted infections. Laboratory diagnosis of infections produced by <i>Treponema</i> , <i>Leptospira</i> and <i>Borrelia</i> .		
12. Laboratory diagnosis of infections produced <i>Rickettsia</i> , <i>Chlamydia</i> si <i>Mycoplasma</i> . Laboratory diagnosis of bacterial infections.		
13. Laboratory diagnosis of infections produced by fungi. Localized infections, systemic infections. Antifungal susceptibility testing.		
14. Practical examination.		

Bibliography (Lecture and Laboratory practice)

Courses taught at the discipline headquarters (word format), theoretical notions taught during practical works, ppt presentations

Brooks GF, Butel JS, Morse SA : Jawetz, Melnick, Adelberg's Medical Microbiology,

McGraw Hill, 26th ed, 2013

Procop GW, Church GL, - Koneman's Color Atlas and Textbook of Diagnostic Microbiology, Lippincott, 7th ed, 2016

9. Corroborating the contents of the discipline with the expectations of the representatives of the epistemic community, professional associations and representative employers in the field related to the program

Lecture and laboratory practice corresponding to the general training necessary for a physician upon graduation in the field of medical microbiology, Correlated with the residency training curriculum (medical microbiology, infectious diseases, epidemiology)

10. Assessment

Type of activity	Evaluation criteria	Evaluation methods	Weighting from the final grade
Lecture	Biannual written exam	Narrative/grid written exam	80%
Laboratory practice	Half-yearly test	Narrative written test	10%
	Practical examination	Practical test and description	10%
Minimum performance standard: 50% for the practical and written exams			

Date of completion: 21.10.2022

Date of endorsement in the Department's Board:

Signature of the Director of Department

Prof. Dr. Adrian Streinu- Cercel, MD, PhD