

Study program: Integrated academic studies in medicine			
Type and level of the study program: integrated academic studies			
Course title: Microbiology and immunology (M2-MB/IM)			
Teacher: Vesna S. Milošević, Mira M. Mihajlovic Ukropina, Gordana M. Bojić, Vera P. Gusman			
Course status: compulsory			
ECTS Credits: 10			
Condition: Human genetics			
Course aim To integrate knowledge from fields of microbiology and immunology in order to use them in theory and practice.			
Expected outcome of the course: Theoretical preparation for establishing diagnosis and differential diagnosis. Preparation for practical work, choosing appropriate methods and their interpretation.			
Course description <i>Theoretical education</i> 1. Aims and objectives of studying microbiology. Bacterial Classification. 2. Morphology and Structure of bacteria. 3. Metabolism of bacteria. 4. Replication of bacteria. 5. Bacterial genetics. 6. Sterilization and disinfection. 7. Antibacterial agents (antibiotics and chemotherapeutic drugs); 8. Bacterial resistance to antibacterial agents; 9. Association between microorganisms and higher life forms; 10. Development of immunology and immunologic system; 11. Defense mechanisms in living organisms (nonspecific and specific); 12. Aggressive effects of microorganisms, infection; 13. Defense mechanisms against bacteria, viruses, parasites, fungi; 14. Structure and functional organization of the immune system, regulation of immune response; 15. Antigens and haptens, immunogenicity; 16. Specificities in immunology, recognition of foreign (and own), immunologic memory; 17. Cellular basis of immunological reactivity, cellular cooperation in immune response; 18. Antibody dependent cellular cytotoxicity; 19. Antibodies (immunoglobulins), biologic characteristics of antibodies and their role, modes of identification; 20. Early hypersensitivity (mechanisms and manifestations); 21. Late hypersensitivity (mechanisms and manifestations); 22. Transplantation immunology (graft rejection, GVH reaction); 23. HLA complex in humans and its role; 24. Immunosuppression, immunologic tolerance, facilitation, immune deficiency (types and significance), immunomodulation in treatment; 25. Tumor immunology, mechanisms of immune surveillance (tumor antigens, immune tolerance); 26. Complement (complement dependent reactions); 27. Antibodies against antigens on erythrocytes (role, incompatibility); 28. Types and mechanisms of autoimmune diseases; 29. Active and passive immunity (natural and artificial), special characteristics of immunity in viral infections; 30. Vaccines, immunization (problems); 31. Antigen-antibody reactions in diagnosis; 32. Immunological tests and interpretation; 33. Staphylococcus; 34. Streptococcus; 35. Neisseria; 36. Bacillus; 37. Clostridia; 38. Corynebacterium, Listeria; 39. Mycobacterium; Actinomyces; Nocardia; 40. Familia Enterobacteriaceae; 41. Escherichia; 42. Salmonella; 43. Shigella; 44. Other enterobacteriaceae; 45. Pseudomonas; 46. Haemophilus, Legionella, Bordetella; 47. Brucella, anaerobic gram-negative bacilli; 48. Vibrio, Aeromonas, Plesiomonas; 49. Ampylobacter, Helicobacter; 50. Yersinia; 51. Treponema; 52. Borrelia, Leptospira; 53. Mycoplasma, Ureaplasma; 54. Rickettsia. 55. Sanitary bacteriology; 56. Development of virology, differences between viruses and microorganisms, significance in medicine; 57. Viral particle – virion, shape and size of viruses. Electron microscope, preparation techniques in virology. Ultracentrifuge, ultrafilters; 58. Chemical compounds of viruses (proteins, nucleic acids, antigens), hemagglutinins and viral hemagglutination; 59. Biosynthesis of viral compounds, virus replication stages; 60. Selective tropism of viruses, virus genetics, defective viruses, prions, virus variability; 61. Types of virus infections, pathogenesis of virus diseases, syndrome manifestations of virus diseases; 62. Virus associations (coinfections, interference and exaltation), interferon (role and application); 63. Virus vaccines; 64. Effects of physical, chemical and chemotherapy agents on viruses (antiviral drugs), principles of rational antiviral therapy; 65. Virus replication in laboratory settings (cell cultures, embryonated eggs and laboratory animals); 66. Etiological diagnosis of virus diseases, serologic techniques (for antigens and antibodies). Fast diagnostic methods, hybridization tests and PCR; 67. Virus classification, DNA and RNA virus families; 68. Picornaviridae; 69. Orthomyxoviridae; 70. Paramyxoviridae; 71. Rhabdoviridae; 72. Togaviridae; 73. Arbo viruses; 74. Arenoviridae, Filoviridae; 75. Viruses as etiologic factors of gastroenteritis; 76. HIV; 77. Adenoviridae; 78. Parvoviridae, 79. Papillomaviridae and polymaviridae, Herpesviridae; 80. Poxviridae; 81. Human hepatitis viruses; 82. Chlamydia, 83. Introduction into parasitology, classification; 84. Classis sarcomastigophora; 85. Plasmodium, Pneumocystis, Cryptosporidium; Toxoplasma; 87. General features of helminths; 88. Cestodes; 89. Nematodes; 90. Medical mycology. <i>Practical education: exercises, other forms of education, research related activities</i> 1. Basic rules of behavior in microbial laboratory, microscope and use of microscope; 2. Microscopic examination of unstained microorganisms; Microscopic examination of stained microorganisms; 3. Culture media; Bacteria variation; 4. Biochemical, physiological and serological testing; 5. Antimicrobial sensibility testing; 6. Basic data about antigens, antibodies and formation of antigen-antibody complex (in vitro). Application of antigen-antibody reaction in diagnosis (qualitative, semiquantitative and quantitative reactions); 7. Agglutination (various techniques), preprecipitations (various techniques in liquid and gel medium); 8. Complement (bacteriolysis and chemolysis). Reading results of immunologic diagnostic tests and serologic reactions. Determination of immunoglobulin and complement quantities. Efficacy of immunoprophylaxis; 9. Staphylococcus; Streptococcus; 10. Neisseria, Moraxella, 11. Mycobacterium; 12. Corynebacterium; 13. Enterobacteriaceae family; 14. Escherichia coli, Klebsiella; 15. Salmonella, Shigella; 16. Proteus, Morganella, Providencia; 17. Pseudomonas, Campylobacter; 18. Bacillus, Clostridium; 19. Serologic diagnosis of bacterial infections; 20. Sanitary bacteriology; 21. Selection, collection and transport of samples for viral analysis. Reading results of viral examination; 22. Isolation of viruses in culture cells, electronic and immunoelectronic microscopy, virus isolation on embryonated hicken eggs; 23. Virus isolation in laboratory animals. Virus selectioctivity and trophism, inclusion; 24. Preparation techniques in virology; 25. Virus hemagglutination; 26. Serologic reactiouns of etiologic and random specificity; 27. Protozoa; 28. Plasmodium, toxoplasma; 29. Helminths, 30. Medical mycology			
Literature <i>Compulsory</i> 1. Jawetz , Melnick & Adelberg's E. Medical Microbiology, 26th edition, 2013. 2. Abbas AK, Lichtman AH, Pillai S. Basic immunology, 4 th edition. Elsevier, 2014. 3. Murray PR, Rosenthal KS. Medical Microbiology, 7 th edition. Elsevier, 2013. <i>Additionaly</i> -			
Number of active classes			Other:
Lectures: 90	Practice: 60	Other types of teaching: Research related activities:	
Teaching methods Lectures, practice			
Student activity assessment (maximally 100 points)			
Pre-exam activities	points	Final exam	points
Lectures	10	Written	55
Practices	10	Oral	
Colloquium	25	
Essay			