



<b>Study program:</b> Integrated Academic Studies in Medicine
<b>Course title:</b> Microbiology and Immunology
<b>Teacher:</b> Ivana B. Hrnjaković Cvjetković, Gordana M. Smieško, Vera P. Gusman, Deana D. Medić, Anika Đ. Trudić, Aleksandra V. Patić, Nataša M. Nikolić
<b>Course status:</b> compulsory
<b>ECTS Credits:</b> 8
<b>Condition:</b> Human Genetics (exam)
<b>Course aim</b> To integrate knowledge from fields of microbiology and immunology in order to use them in theory and practice.
<b>Expected outcome of the course:</b> Theoretical preparation for establishing diagnosis and differential diagnosis. Preparation for practical work, choosing appropriate methods and their interpretation.
<b>Course description</b> <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 polyomaviridae, 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</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), precipitations (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 selectivity and tropism, inclusion; 24. Preparation techniques in virology; 25. Virus hemagglutination; 26. Serologic reactions of etiologic and random specificity; 27. Protozoa; 28. Plasmodium, toxoplasma; 29. Helminths, 30. Medical mycology

**Literature**

*Compulsory*

1. Murray PR, Rosenth KS, Pfaller MA. Medical Microbiology, 7th Edition, Elsevier, 2017
1. Carol KC, Morse SA, Mietzner T, Miller S. Jawetz, Melnick & Adelbergs Medical Microbiology, 27th Edition, Mc Graw Hill Education, 2015

<b>Number of active classes</b>	<b>Theoretical classes: 90</b>	<b>Practical classes: 60</b>	
<b>Teaching methods</b> Lectures, practice			
<b>Student activity assessment (maximally 100 points)</b>			
<b>Pre-exam activities</b>	<b>points</b>	<b>Final exam</b>	<b>points</b>
Lectures	5	Written	60
Practices	5	Oral	
Colloquium	20	.....	
Essay	10		