

Study program: Integrated academic studies in pharmacy			
Type and level of the study program: integrated academic studies			
Course title: Immunology with virology (PhIII-IMV)			
Teacher: Vesna S. Milošević			
Course status: compulsory			
ECTS Credits: 4			
Condition: Human genetics			
Course aim The aim of this course is to provide students with comprehensive knowledge in the fields of immunology and virology, and to apply them in theory and practice.			
Expected outcome of the course: Theoretical preparation of undergraduates for making diagnosis and differential diagnosis. Preparation of students for practical work, for selection of appropriate methods and their interpretation.			
Course description <i>Theoretical education</i> 1. Immunology – a review of development. Development of the immunologic system. 2. Defence mechanisms and organism integrity (nonspecific and specific). Aggressive action of microorganisms. Infection. Defence mechanisms from bacteria, viruses, parasites, and fungi. 3. Structure and functional organization of the immunologic system. Regulation of immunologic reactions. 4. Antigens and heptanes. Conditions of immunogenicity. Specific issues in immunology. Recognition of foreign (and self) immunologic memory. 5. Cellular basis of immunologic reactivity. Cellular collaboration in the immune response. Antibody dependent cellular cytotoxicity. 6. Antibodies (immunoglobulins). Biological features of antibodies and their roles. Ways of their establishment. 7. Human HLA complex and its roles. 8. Immunosuppression. Immunologic tolerance, and facilitation. Immuno-modulations in therapy. 9. Complement. Antibodies against antigens in erythrocytes (their role, incompatibility). 10. Immunological deficiency (types and role). 11. Active and passive immunity (natural and artificial). Special properties of immunology in viral, bacterial, parasite and mycotic infections. Vaccines and vaccination (problems). 12. Hypersensitivity of early type (mechanisms and manifestations). 13. Hypersensitivity of late type (mechanisms and manifestations). 14. Transplantation immunity. 15. Neoplasm immunity. Mechanism of immune surveillance. 16. Autoimmune diseases – classification and mechanisms of development. 17. Application of antigen – antibody reaction in diagnosis. Immunological tests and their interpretation. 18. Differences between viruses and other microorganisms and their role in medicine. 19. Viral particle . Virion. Determination of the form and size of the virus. Electric microscope. 20. Chemical structure of viruses (viral proteins, viral nucleic acids, viral antigens). 21. Hemagglutinins and viral hemagglutination. 22. Classification of viral infections. 23. Pathogenesis of virus diseases. Syndrome manifestations of virus diseases. 24. Stages of virus multiplication. Selectivity and tropism of viruses. 25. Virus genetics. 26. Defective viruses. Prions. 27. Virus variability. 28. Virus associations (association of infections, interferences and exaltations). 29. Interferon (role and application). 30. Viral vaccines. 31. Physical and chemical agents' action and chemotherapy of viruses (antiviral agents). Principles of rational antiviral therapy. 32. Virus multiplication in lab conditions (cell cultures, embryo eggs and lab animals). 33. Establishment of etiologic diagnosis of virus diseases. 34. classification of viruses. The most important families of viral DNA and RNA. 35. Picornaviridae. 36. Orthomyxoviridae. 37. Paramyxoviridae. 38. Rhabdoviridae. 39. Togaviridae and arboviruses. 40. Adenoviridae and parvoviridae. 41. Papillomaviridae and polyomaviridae. 42. Herpesviridae. 43. Poxviridae. 44. Human hepatitis viruses. 45. HIV. <i>Practical education: exercises, other forms of education, research related activities</i> 1. Physiological role of immunologic reaction. 2. Antigen-independent and antigen-dependent phases in the maturation of t and b lymphocytes. 3. Antigens. Haptens. The role of adjuvants 4. Antibodies – Immunoglobulins. Primary and secondary immunological reaction 5. Basic properties of antigens, antibodies and development of antigen-antibody complex (in vitro). 6. Agglutination. Precipitation. Immunoelectrophoresis. 7. Complement. 8. Neutralization test (nt). Fluorescent microscopy techniques. 9. ELISA and immune peroxidation. 10. Radio-immune techniques. 11. Nucleic acid hybridization techniques. Polymerase chain reaction (pcr). 12. Diagnosis of IGM class antibodies (in rapid and early diagnosis). 13. Monoclonal antibodies. 14. Immune-electronic microscopy. 15. Determination of the cellular immunologic reactions and their role. 16. Result interpretation of immunological diagnostic tests and serological reactions. 17. Determination of the quantity of immunoglobulins in complements. 18. Determination of the immune-prophylaxis efficacy. 19. Selection, sapling and transportation of materials for virology testing. 20. Interpretation of results of virology tests. 21. Virus isolation in cell cultures. 22. Electronic and immune-electronic microscopy. 23. Nucleic acids hybridization techniques and PCR. 24. Isolation of viruses in embryonated chicken eggs. 25. Isolation of viruses in lab animals. 26. Virus selectivity and tropism. 27. Inclusions. 28. Preparation methods in virology. 29. Virus hemagglutination. 30. Serologic reactions of etiologic and random specificity.			
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: 30	Practice: 30	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	5	Written	60
Practices	5	Oral	
Colloquium	2x10	
Essay	2x5		