Faculty of Medicine / MEDICINE / MICROBIOLOGY AND IMMUNOLOGY

Course:	MICROBIOLOGY AND IMMUNOLOGY			
Course ID	**Course status**	**Semester**	**ECTS credits**	**Lessons** (Lessons+Exercises+Laboratory)
3431	Mandatory	3,4	12	4+2+0
Programs	MEDICINE			
Prerequisites	Passed exams in Anatomy, Histology with Embryology and Human Genetics.			
Aims	Study of microorganisms and understanding their pathogenic activity. Studding immune system in humans.			
Learning outcomes	After completing two semestral course and passing the exam in the subject Microbiology and Immunology, student of medicine should have the following learning outcomes: 1. Describing the normal micro flora of the human body and the normal functioning of the immune system, as well as their mutual relationship (microbe-host-immune system). 2. Describing the possible etiological microorganisms within certain infections and immune response of host as part of the infection. 3. Choosing a proper and acceptable sample for microbiological processing based on the analyzing the infection. 4. Sample collecting independently from different systems in patients, keeping them properly, transport to the microbiological laboratory and seeding. 5. Analyzing and interpreting the basic results of microbiological analysis. 6. Using acquired knowledge on timely application of antimicrobial therapy and the possible negative consequences of its application. 7. Analyzing the map of present bacteria in a given hospital setting, and proposing basic measures for prevention and control, using methods of sterilization and disinfection.			
Lecturer / Teaching assistant	prof. dr Vineta Vuksanović, Chief of the Subject; prof. dr Gordana Mijović; dr Tamara Jovićević, mr sci med Dr Marijana Mimović; Vaid Frljučkić, grad. biotech.			
Methodology	Lectures, exercises, Seminar papers, tests, regular consultations, preparation for final exam.			
Plan and program of work				
Preparing week	Preparation and registration of the semester			
I week lectures	Introduction to microbiology. Structure, biosynthesis and function of the bacterial cell.			
I week exercises	Rules of conduct in the bacteriological laboratory. Microscope and visualization of the morphological and functional structures of the bacterial cell			
II week lectures	The bacterial genome. Pathogenicity, virulence and virulence factors of bacteria.			
II week exercises	Receiving and sending materials for bacteriological examination. Cultural examination and identification of bacteria.			
III week lectures	Mechanisms of action of antibiotics and chemotherapeutics. Bacterial resistance mechanisms.			
III week exercises	Methods of testing the sensitivity of bacteria to antibiotics and chemotherapeutics in vitro.			
IV week lectures	Characteristics and significance of pyogenic Gram-positive cocci.			
IV week exercises	Bacteriological diagnosis of infections caused by bacteria of the genus Streptococcus and Staphylococcus.			
V week lectures	Etiological agents of purulent meningitis, microbiological aspect of: Neisseria meningitidis, Streptococcus pneumoniae, Haemophylus influenzae.			
V week exercises	Diagnostics of bacteria that cause purulent meningitis:Neisseria meningitidis, Streptococcus pneumoniae, Haemophylus influenzae.			
VI week lectures	Etiological agents of respiratory tract infections: B. pertussis, C. diphtheriae, L. pneumophila, M. tuberculosis.			
VI week exercises	Diagnostics of bacteria causing respiratory tract infections: B. pertussis, C. diphtheriae, L. pneumophila, M. tuberculosis.			
VII week lectures	Characteristics and medical importance of anaerobic sporogenic bacteria.			
VII week exercises	Bacteriological diagnosis of infections caused by anaerobic sporogenic bacteria.			
VIII week lectures	Characteristics and importance of the Enterobacterales family. Escherichia coli and its pathogenic strains: EIEC, EPEC, ETEC, EHEC, EaggEC, DAEC.			
VIII week exercises	Bacteriological diagnosis of infections caused by intestinal bacteria. Bacteriological diagnostics of EIEC, EPEC, ETEC, EHEC, EaggEC, DAEC.			
IX week lectures	Primary pathogenic intestinal bacteria: Salmonella spp, Shigella spp, Yersinia enterocolitica.			

IX week exercises	Bacteriological diagnosis of infections caused by primarily pathogenic intestinal bacteria: Salmonella spp, Shigella spp, Yersinia enterocolitica.
X week lectures	Intestinal infections caused by curved bacteria: Vibrio cholerae, Campylobacter spp, Helicobacter pylori. Gram-negative nonfermentative bacteria: properties and medical importance.
X week exercises	Bacteriological diagnosis of infections caused by intestinal curved bacteria (Vibrio cholerae, Haelicobacter pylori, Camphylobacter spp) and afferents (P. aeruginosa, A. baumannii).
XI week lectures	Bacterial sexually transmitted diseases of the genera: Treponema, Neisseria, Chlamydia, Mycoplasma, Ureaplasma.
XI week exercises	Diagnostics of STD bacteria: Treponema pallidum, Neisseria gonorrhoeae, Chlamydia trachomatis, Mycoplasma hominis, Ureaplasma urealyticum.
XII week lectures	Colloquium
XII week exercises	Practical exam
XIII week lectures	Introduction to medical parasitology. Morphology of protozoa. Antiprotozoal agents Protozoa of the digestive and urogenital tract.
XIII week exercises	Diagnostic methods in parasitology Laboratory diagnostics of protozoa of GIT and UGT.
XIV week lectures	Blood and tissue protozoa.
XIV week exercises	Diagnostics of blood and tissue protozoa.
XV week lectures	Morphology and biology of helminths. Intestinal and tissue nematodes. Cestodes of intestines and tissues.
XV week exercises	Diagnostics of helminths of the GIT and tissues.
XVI week lectures	Fungi as etiological agents of human infections. Superficial mycoses.
XVI week exercises	Medical entomology. The selection and clinical sampling, methods of isolation and identification of fungi. Testing of antifungal susceptibility. Serological and molecular methods.
XVII week lectures	Etiological agents of systemic mycoses, opportunistic molds and other fungi.
XVII week exercises	Laboratory diagnostic of fungal infections of the skin and mucous membranes, deep and systemic mycoses.
XVIII week lectures	Test and colloquium in parasitology and mycology.
XVIII week exercises	Practical exam of parasitology and mycology.
XIX week lectures	Functional anatomy of the immune system. Natural immunity, antigens and antibodies.
XIX week exercises	The antigen-antibody reactions, immunoprecipitation and complement-dependent antigen-antibody reactions.
XX week lectures	Major histocompatibility complex.
XX week exercises	The antigen-antibody reaction with the labeled antibody or antigen (ELISA, DIF, IIF, RIA).
XXI week lectures	Cellular immunity and “T” lymphocytes.
XXI week exercises	Laboratory methods for testing cells of adaptive immune system.
XXII week lectures	Humoral immunity.
XXII week exercises	Laboratory methods for testing cells of natural immune system.
XXIII week lectures	The immune response against tumors and transplanted tissue. Hypersensitivity reactions.
XXIII week exercises	The use of molecular biology techniques in microbiology and immunology.
XXIV week lectures	Test and oral colloquium in Immunology.
XXIV week exercises	Practical exam in immunology.
XXV week lectures	Structure, replication and morphogenesis of the virus. The ratio of virus and cells. Virological characteristics and medical significance of HPV, respiratory and intestinal viruses.
XXV week exercises	The basic principles of viral diagnostics. Taking, sending, processing and storage of materials.
XXVI week lectures	Virological characteristics and medical significance of family Orthomyxoviridae and Paramyxoviridae.
XXVI week exercises	The techniques for virus isolation in living systems, and identification of the virus.
XXVII week lectures	Family Herpesviridae and human retroviruses.
XXVII week exercises	Serological diagnostics of viral infections. Titration of the virus in vitro and in vivo, plaque assay and quantitative methods.

XXVIII week lectures	The etiological agents of viral hepatitis.
XXVIII week exercises	Diagnostics of the Herpesviridae family of viruses, hepatitis viruses and HIV.
XXIX week lectures	Test and oral colloquium of Virology.
XXIX week exercises	Practical exam in virology.
XXX week lectures	Konsultacije za popravne praktične ispite.
XXX week exercises	Consultation for the correctional practical exams.
Student workload	Weekly: 5 credits x 40/30 = 6 hours and 40 minutes 2 hours of lectures 2 hours of exercises 1 hour and 20 minutes Seminar papers 1 hour and 20 minutes Individual work In the semester: Lectures and final exam: (6h 40 min) x 16 = 106h 40 min Necessary preparations (administration, enrolment, verification): 2 x 6 h 40 min = 13 h 20 min Cumulative course load: 5 x 30 = 150 h Additional work: preparation for correction exam period, including final exam up to 30h Load structure: 106h 40 min+ 13 h 20 min + 30 h

Per week	**Per semester**
12 credits x 40/30=16 hours and 0 minuts 4 sat(a) theoretical classes 0 sat(a) practical classes 2 excercises **10 hour(s) i 0 minuts** of independent work, including consultations	Classes and final exam: **16 hour(s) i 0 minuts x 16 =256 hour(s) i 0 minuts** Necessary preparation before the beginning of the semester (administration, registration, certification): **16 hour(s) i 0 minuts x 2 =32 hour(s) i 0 minuts** Total workload for the subject: **12 x 30=360 hour(s)** Additional work for exam preparation in the preparing exam period, including taking the remedial exam from 0 to 30 hours (remaining time from the first two items to the total load for the item) **72 hour(s) i 0 minuts** Workload structure: **256 hour(s) i 0 minuts (cources), 32 hour(s) i 0 minuts (preparation), 72 hour(s) i 0 minuts (additional work)**
Student obligations	Regular attendance at lectures, exercises, presentations of seminars, passing tests, practical and oral exams.
Consultations	Tuesday from 13:00 to 14:00 h.
Literature	Basic literature: Smilja Kalenić et al. Medical microbiology. Medical edition 2013 Zagreb. Additional literrature: The basic immunology, Abul Abbas and Andrew Lichtman third edition 2007. Editor Zorica Ramic Medical Bacteriology, group of authors, edi
Examination methods	I. Before exams: 50 points. − Attendance at lectures/exercises: up to 5 points. − Seminar paper: up to 5 points. − Practical exam: 10 to 20 points. − Colloquiums: 10 to 20 points. II. Final exam: up to 50 points. Oral exam. Final exam provides poss
Special remarks	
Comment	Additional information can be received by Chief of the Subject.

Grade:	F	E	D	C	B	A
Number of points	less than 50 points	greater than or equal to 50 points and less than 60 points	greater than or equal to 60 points and less than 70 points	greater than or equal to 70 points and less than 80 points	greater than or equal to 80 points and less than 90 points	greater than or equal to 90 points