Faculty of Medicine / PHARMACY / PHARMACEUTICAL MICROBIOLOGY

Course:	PHARMACEUTICAL MICROBIOLOGY			
Course ID	**Course status**	**Semester**	**ECTS credits**	**Lessons** (Lessons+Exercises+Laboratory)
5954	Mandatory	3	5	2+0+2
Programs	PHARMACY			
Prerequisites	No preconditions.			
Aims	Introduction to the basic principles of work in microbiological laboratory and etiological agents of infectious diseases, their identification and importance; The effect of antimicrobials agents, acquisition of resistance and the importance of rational use of antimicrobial medicaments; Epidemiology and prevention of infectious diseases; Sterilization and disinfection; Application of microorganisms in the pharmacy.			
Learning outcomes	1. Recognise the importance of the normal microflora of the human body, as well as their mutual relationship; 2. Recognise significant etiological microorganisms within certain infections; 3. Use the acquired knowledge about the application of antimicrobial therapy and the possible negative consequences of its application; 4. Analyse the connection between microorganisms from the external environment and the normal human flora, and the contamination of pharmaceutical products, as well as be aware of the importance of the principles of good manufacturing practice; 5. Use the acquired knowledge to contribute to preventing the development of resistant microorganisms and to preserving health in the community.			
Lecturer / Teaching assistant	Prof. dr Vineta Vuksanović – Chief of the Subject, Prof. dr Gordana Mijović, Dr Milena Lopičić, Dr Marijana Mimović, Dipl.bioteh. Vaid Frljučkić.			
Methodology	Lectures and exercises, seminars, control tests, regular consultations, preparation for the final exam.			
Plan and program of work				
Preparing week	Preparation and registration of the semester			
I week lectures	Introduction in microbiology and classification of the microorganism. Structure, function and bacterial physiology.			
I week exercises	Rules of conduct in the microbiological laboratory. Staining and visualization of bacterial structure by microscopy.			
II week lectures	The genome of the bacteria. Pathogenicity, virulence factors and virulence of bacteria			
II week exercises	Sampling and transport of material for bacteriological analysis. Cultivation and identification of bacteria.			
III week lectures	Antibiotics and chemotherapeutics. Mechanisms of bacterial resistance.			
III week exercises	Susceptibility testing of bacteria in vitro (antibiogram) and the destruction of bacteria (sterilization and disinfection).			
IV week lectures	Staphylococcus aureus and Streptococcus pyogenes.			
IV week exercises	Diagnostics of: Staphylococcus aureus, Streptococcus pyogenes.			
V week lectures	Pathogens of the Neisseria genus and Haemofilus influenza. The etiological agents of tuberculosis.			
V week exercises	Diagnostics of pathogenic Neisseria, Haemofilus influenzae and Mycobacterium tuberculosis.			
VI week lectures	The primary pathogenic intestinal bacteria. The anaerobic and non-fermentative bacteria.			
VI week exercises	Diagnostics of family Enterobacteriaceae. Diagnostics of genus Clostridium, other anaerobic bacteria and non-fermentative bacteria.			
VII week lectures	STD and bacteria: Treponema pallidum, Chlamydia trachomatis, genital mycoplasmas.			
VII week exercises	Diagnostics of sexually transmitted bacteria: Treponema palidum, Chlamydia trachomatis, genital mycoplasmas.			
VIII week lectures	The microbiological control of pharmaceutical products: Principles of good manufacturing practices and methods to prevent contamination.			
VIII week exercises	I semester practical exam (from I to VII week of practice).			
IX week lectures	Medical mycology.			
IX week exercises	Sampling and diagnostics: Candida, cutaneous mycoses, dermatomycoses , moldes.			
X week lectures	Medical Parasitology: Protozoa and antiprotozoal agents.			

X week exercises	Sampling and diagnostics in medical protozoology and parasitology.
XI week lectures	Medical Parasitology: nematode and cestode of the intestinal and tissue. Control test (from I to XI week of practice).
XI week exercises	Diagnostics of viruses: cell culture, electron microscopy, hybridization techniques and serological reactions.
XII week lectures	Structure, replication and morphogenesis of the virus. Virological characteristics and medical significance of intestinal and respiratory viruses. HPV.
XII week exercises	Diagnostics of of intestinal, respiratory and HPV virus.
XIII week lectures	Paramyxoviridae and Orthomyxoviridae.
XIII week exercises	Diagnostics of hepatotropic, herpesviride and HIV viruses.
XIV week lectures	Virological characteristics and medical importance of the Herpesviridae family and HIV.
XIV week exercises	II semester practical exam (from IX to XIII week of practice)
XV week lectures	Hepatotropic viruses.
XV week exercises	Consultations for the final exam.
Student workload	Weekly: 4 credits x 40/30 = 5 hours and 20 minutes 2 hours of lectures 2 hours of exercises 1 hour and 20 minutes Individual work In the semester: Lectures and final exam: (5h 20 min) x 16 = 85h 20 min Necessary preparations (administration, enrolment, verification): 2 x 5 h 20 min = 10 h 40 min Cumulative course load: 4 x 30 = 120 h Additional work: preparation for correction exam period, including final exam up to 30h. Load structure: 85h 20 min+ 10 h 40 min + 20 h

Per week	**Per semester**
5 credits x 40/30=6 hours and 40 minuts 2 sat(a) theoretical classes 2 sat(a) practical classes 0 excercises **2 hour(s) i 40 minuts** of independent work, including consultations	Classes and final exam: **6 hour(s) i 40 minuts x 16 =106 hour(s) i 40 minuts** Necessary preparation before the beginning of the semester (administration, registration, certification): **6 hour(s) i 40 minuts x 2 =13 hour(s) i 20 minuts** Total workload for the subject: **5 x 30=150 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) **30 hour(s) i 0 minuts** Workload structure: **106 hour(s) i 40 minuts (cources), 13 hour(s) i 20 minuts (preparation), 30 hour(s) i 0 minuts (additional work)**
Student obligations	Regular attendance at lectures, exercises, presentations of seminars, passing tests, practical and final exams.
Consultations	Tuesday 13:00 - 14:00 h.
Literature	Basic literature: Smilja Kalenić et al. Medical microbiology. Medical edition 2013 Zagreb. Additional literature: Medical Bacteriology, group of authors, editor Milena Švabić Vlahovic. Modern administration, Belgrade 2005. Medical Virology, Ljubisa Krstic
Examination methods	I. Before exams: 50 points. − Attendance at lectures/exercises: up to 10 points. − Seminar paper: up to 5 points. − Practical exam: up to15 points. − Control test: 10 to 20 points. II. Final exam: up to 50 points. Final exam provides possibility to defin
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