### Subject: Microbiology I

**Study Programme:** DM  **Study Period:** SS  **Evaluation:** 4 credits  **Subject Type:** Total 56

Department of Medical and Clinical Microbiology

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<th>Week</th>
<th>Lectures</th>
<th>Practical Lessons</th>
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| 1.   | Microbiology and Medicine, Classification and Basic Characteristics of Microorganisms  
(history of medical microbiology, classification of microorganisms, description of the principal groups of bacteria, gliding bacteria, spirochetes, rigid bacteria, mycoplasmas, viruses, prions)  
**Dr.h.c. prof. MUDr. L. Siegfried, CSc.** | Laboratory protection of infection  
Laboratory safety rules. Laboratory equipment. Principles of laboratory diagnosis of infection. |
| 2.   | Bacterial Cell Structure (prokaryotic cell structure, nucleus, cytoplasmic membrane, cell wall, protoplasts, spheroplasts, L forms, spores, capsule, glycocalyx, flagella, pili)  
**Dr.h.c. prof. MUDr. L. Siegfried, CSc.** | Staining procedures in microbiology  
Monochromatic staining method: evaluation of morphological characteristics of bacteria |
| 3.   | Microbial Genetics (genetic organization and regulation of bacterial cell, mutation, gene transfer, plasmids, transposons, bacteriophages, genetic engineering)  
**RNDr. Marián Sabol, CSc.** | Staining procedures in microbiology  
Gram staining method: preparation of slide, staining characteristics of different bacteria |
| 4.   | Growth and Cultivation of Bacteria (growth, growth curve, requirements for growth, environmental factors affecting growth, agents affecting growth of bacteria-disinfection and sterilisation, metabolism, sources of metabolic energy, cultivation methods, microbial metabolism)  
**RNDr. Marián Sabol, CSc.** | Staining procedures in microbiology  
Ziehl-Neelsen and Neisser staining methods: preparation and evaluation of slide |
| 5.   | Pathogenicity of Bacteria (bacterial virulence factors, invasiveness, fimbrial and afimbrial adhesins, toxic enzymes, exotoxins and endotoxin)  
**Dr.h.c. prof. MUDr. L. Siegfried, CSc.** | Bacterial genetics  
Isolation and visualisation of plasmid DNA, Conjugal transfer of DNA |
| 6.   | Immune Mechanisms Against Infections (nonspecific and specific immune mechanisms, antibacterial, antiviral, antiprotozoal and antifungal defence mechanisms, hypersensitive  
**Collection, handling, transportation and processing of clinical specimen**  
Demonstration of methods for disposal of infectious material  
Preparation of culture media |
<p>| <strong>7.</strong> | <strong>Antimicrobial Agents</strong> (inhibitors of cell wall synthesis, inhibitors of protein synthesis, inhibitors of nucleic acid synthesis, miscellaneous antibacterial agents) <strong>Dr.h.c. prof. MUDr. L. Siegfried, CSc.</strong> | <strong>Culture media</strong> Inoculation of agar plates, condition for cultivation of aerobes and anaerobes, cultivation of bacteria in liquid and solid media |
| <strong>8.</strong> | <strong>Antimicrobial Agents</strong> (intrinsic and acquired resistance, plasmids and transposons, combination of antimicrobial agents, side effects of antimicrobial agents) <strong>Dr.h.c. prof. MUDr. L. Siegfried, CSc.</strong> | <strong>Identification and differentiation of bacteria</strong> Demonstration of biochemical characteristics of bacteria. Evaluation of bacteria cultivation. Demonstration of MALDI TOF Mass Spectrometry for identification of bacteria |
| <strong>9.</strong> | <strong>Antigen-antibody reactions in microbiology</strong> (agglutination, precipitation, complement fixation, ELISA, immunofluorescence, immunoblotting) <strong>RNDr. Marián Sabol, CSc.</strong> | <strong>Evaluation of virulence</strong> Determination of capsule and plasmacoagulas. Demonstration of Microarray Scanner |
| <strong>10.</strong> | <strong>Normal Microbial Flora of the Human Body. Prophylactic immunization</strong> (passive immunization - homologous and heterologous, active immunization - types of vaccine: toxoids, inactivated vaccines, attenuated live vaccines, hazards if immunization) <strong>RNDr. Marián Sabol, CSc.</strong> | <strong>Sensitivity testing of bacteria to antibiotics</strong> Diffusion method. Demonstration of BACMED 4i - analyser of inhibition zones and equivalence of MIC |
| <strong>11.</strong> | <strong>Staphylococcus</strong> (description of coagulase positive and negative staphylococci, pathogenesis, laboratory diagnosis, treatment, epidemiology) <strong>Dr.h.c. prof. MUDr. L. Siegfried, CSc.</strong> | <strong>Sensitivity testing of bacteria to antibiotics</strong> Evaluation of diffusion method from 10th practice. Dilution method. Demonstration of beta-lactamase enzyme production in bacterial population |
| <strong>12.</strong> | <strong>Streptococcus</strong> (classification of streptococci; description, pathogenesis, laboratory diagnosis, epidemiology and chemotherapy of ß-haemolytic streptococcal infections; clinical infections due to <em>S. pyogenes</em>; complications of streptococcal infections, treatment, epidemiology, control) <strong>Credit test</strong> <strong>Dr.h.c. prof. MUDr. L. Siegfried, CSc.</strong> | <strong>Serology</strong> Evaluation of dilution method from 11th practice Direct (tube) agglutination |
|  | <strong>Pneumococcus and enterococcus</strong> (classification of pneumococci and enterococci, pathogenesis, laboratory diagnosis, treatment, epidemiology, control) | <strong>Serology</strong> Slide agglutination (identification of bacterial antigens Immunofluorescence, precipitation |</p>
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<th>Dr.h.c. prof. MUDr. L. Siegfried, CSc.</th>
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| 14. | **Neisseria** (classification, description, pathogenesis, clinical infections, laboratory diagnosis, treatment, epidemiology, control)  
      Dr.h.c. prof. MUDr. L. Siegfried, CSc. | **Retake credit test** |

Dr.h.c. prof. MUDr. Leonard Siegfried, Ph.D.  
The Head of Institute of Medical and Clinical Microbiology