SECOND FACULTY OF MEDICINE
CHARLES UNIVERSITY

MICROBIOLOGY II - INSTRUCTIONS FOR WINTER SEMESTER

Dear colleagues,

On September 30, 2024, the winter semester of the 3rd year begins and with it the teaching of the course "Microbiology II". You can look forward to digging deeper and learning more about the world of dangerous microorganisms. Firstly, you can extend your horizons to include other agents, viruses, and parasites, and secondly, you can apply your knowledge about microorganisms and antimicrobial agents to the problem of organ system infections. At the end of your journey through the world of microorganisms, you will take a two-part exam (practical with one question and theoretical with three questions). The following is a structured description of what you will encounter in the coming semester. Please direct any questions or concerns to **jakub.hurych@lfmotol.cuni.cz**.

Lectures and practice

You have lectures twice a week, always in the small left hall:

- Mondays from 9:50
- Tuesdays from 14:25

You have no practical exercises, so we will only meet in lectures. We have structured the topics in thematic blocks, which now last only 90 minutes (see **Syllabus** below). We hope you can better absorb the information and that we will have more space for interaction and case studies. Although, given the non-mandatory nature of the lectures, it may be tempting to skip the lectures and come straight to the exam, we highly discourage you from doing so. Compared to a textbook, lectures allow you to put the issues in context and clarify any ambiguities with the lecturer. Therefore, consider attending lectures as an essential part of your preparation to pass the exam.

Panel discussion

The two brand new features are the midterm and final lecture set as a **midterm Q&A and panel discussion.** During those, we will answer questions that may arise in preparation for tests and the exam. For our proper preparation for this discussion, please write down your questions in advance into the shared document no later than the Friday before the discussion. Please provide only the wording of the question. If necessary, you may add new lines according to the template (everyone with access has permission). Due to time constraints, we reserve the right not to answer all questions. Those that remain unanswered can be resolved by personal consultation.

Changes in the timetable

- Due to a national holiday, there is no lecture on October 28th.

Credit

A condition for obtaining credit is the successful completion of written tests before the Thursday lecture (weeks 4, 8 and 12; see **Syllabus**), in which a minimum of 20 points must be obtained in the sum of all three tests. There are no replacement terms. Each of the individual tests contains ten questions, each correctly answered question is worth 1 point. The duration of each test is 10 minutes. If a student fails to achieve the minimum score of 20 points, he/she has the option of taking a summary test during the credit week; the test lasts 30 minutes, and contains 30 questions, each of which is scored one point; the minimum score for credit is 24 points.

Circuits for credit tests

- **Test 1**: General microbiology (general bacteriology, virology, mycology, parasitology - basic concepts; antimicrobials - overview, mechanisms of action and resistance to ATBs, spectrum of action; testing methods - overview and distribution, importance, advantages and disadvantages of each method)
- **Test 2**: Special microbiology (bacteria - G+, G- and others, fungi, parasites, viruses; knowledge of individual agents - classification; pathogenicity and most important virulence factors; possibilities of diagnosis and therapy)
- **Test 3**: Clinical microbiology (nosocomial, urinary, respiratory, alimentary, nervous system, bloodstream infections - the most important agents; methods of diagnosis, treatment and prevention)

Exam

Dates for the examination will be announced during the 9th week of the winter semester in accordance with the wording of the Examination Regulations of the 2nd Faculty of Medicine, listed on the faculty's website.

Exam is theoretical

The questions for the theoretical part of the exam are new, as announced during the summer semester. You will get three questions, a list of which can be found in SIS and **Table 1:**

1st: General microbiology (subgroup I.)
2nd: Special microbiology (subgroups II.-IV)
3rd: Clinical Microbiology (subgroup V.) and Microbiologal Methods (subgroup VI.)

Study materials

- Lectures in PDF format will be published on Moodle in the course Microbiology II.
- Required (compulsory) textbooks:
  - Murray P. et al. Medical Microbiology, Elsevier Books, 2015
  - Melter O. and Castelhano R. MicroBook – Clinical Microbiology for Medical Students, 2019
- Recommended (optional) textbooks:

- Microbiology, Lippincott´s Illustrated Reviews, Lippincott Williams and Wilkins, 2012
- Mims´ Medical Microbiology and Immunology, Elsevier, 2018

Final words

We hope that you enjoy the second half of Microbiology and that you successfully pass the final exam. We wish you all the best for the upcoming semester!

On behalf of the teaching staff of the Department of Medical Microbiology,

Jakub Hurych, MD, PhD
Deputy Head for Teaching

Syllabus

Week	Date	Time	Topic	Teacher
1	30.09.2024	09:50-11:30	**Sequencing techniques in microbiology. Human microbiome, physiological microbiota.**	MUDr. Jakub Hurych, Ph.D.
1	01.10.2024	14:25-16:05	**Medical Mycology**	MUDr. Daniela Lžičařová
2	07.10.2024	09:50-11:30	**General virology, diagnostic methods in virology**	MUDr. Petr Hubáček, Ph.D.
2	08.10.2024	14:25-16:05	**Viral exanthematous diseases**	MUDr. Petr Hubáček, Ph.D.
3	14.10.2024	09:50-11:30	**Herpesviruses**	MUDr. Petr Hubáček, Ph.D.
3	15.10.2024	14:25-16:05	**Protozoa I**	doc. MVDr. Oto Melter, Ph.D.
4	21.10.2024	09:50-11:30	**Protozoa II, Trematoda CREDIT TEST I**	doc. MVDr. Oto Melter, Ph.D.
4	22.10.2024	14:25-16:05	**Cestoda, Nematoda**	doc. MVDr. Oto Melter, Ph.D.
5	28.10.2024		**NATIONAL HOLIDAY - NO LECTURE**	
5	29.10.2024	14:25-16:05	**Intestinal serotypes of E. coli and shigella**	doc. MVDr. Oto Melter, Ph.D.
6	04.11.2024	09:50-11:30	**GIT infections**	doc. MVDr. Oto Melter, Ph.D.
6	05.11.2024	14:25-16:05	**Respiratory tract infections**	doc. MVDr. Oto Melter, Ph.D.
7	11.11.2024	09:50-11:30	**MIDTERM CONSULTATIONS - Q&A**	Melter + Hurych
7	12.11.2024	14:25-16:05	**Respiratory viruses**	MUDr. Petr Hubáček, Ph.D.
8	18.11.2024	09:50-11:30	**Arboviruses; haemorrhagic fevers CREDIT TEST II**	MUDr. Petr Hubáček, Ph.D.
8	19.11.2024	14:25-16:05	**Neuroinfections**	doc. MVDr. Oto Melter, Ph.D.
9	25.11.2024	09:50-11:30	***Clostridioides difficile infections (CDI)***	Mgr. Marcela Krůtová, Ph.D.
9	26.11.2024	14:25-16:05	**Introduction to HAI, Catheter Infection; Surgical Site Infections; Hospital-Aquired & Ventilator-Associated Pneumonia**	Prof. RNDr. Alexander Nemec, Ph.D. et Ph.D.
10	02.12.2024	09:50-11:30	**Bloodstream infections (BSI)**	prof. MUDr. Pavel Dřevínek, Ph.D.
10	03.12.2024	14:25-16:05	**Urinary tract infections (UTI)**	doc. MVDr. Oto Melter, Ph.D.
11	09.12.2024	09:50-11:30	**Multi-drug resistant bacteria & reserve antibiotics**	Mgr. Jan Tkadlec, Ph.D.
11	10.12.2024	14:25-16:05	**Sexually transmitted infections (STI)**	doc. MVDr. Oto Melter, Ph.D.
12	16.12.2024	09:50-11:30	**Bone and joint infections CREDIT TEST III**	MUDr. Anežka Gryndlerová
12	17.12.2024	14:25-16:05	**Soft tissue infections**	MUDr. Anežka Gryndlerová
13	06.01.2025	09:50-11:30	**HIV & hepatitis viruses (HBV a HCV)**	MUDr. Petr Hubáček, Ph.D.
13	07.01.2025	14:25-16:05	**Infections in pregnancy and newborns**	MUDr. Petr Hubáček, Ph.D.
14	13.01.2025	09:50-11:30	**Vaccination from a microbiologal perspective**	prof. MUDr. Pavel Dřevínek, Ph.D.
14	14.01.2025	14:25-16:05	**Panel discussion: ask us anything**	All teachers

Table 1.

Rules: combination of three questions from three groups:
1. General microbiology (subgroup I.)
2. Special microbiology (subgroups II.-IV)
3. Clinical Microbiology (subgroup V.) and Microbiologal Methods (subgroup VI.)

I. General Microbiology (26 questions)

1. Cell wall composition of G+ and G- bacteria. Classification of bacteria.
2. Structure of bacterial cell and surface structure, bacterial spore.
3. Exotoxins and their classification according to mechanism and site of action.
4. The bacterial genome and its plasticity. Mobile genetic elements.
5. Structure of viral particles. Classification of viruses.
6. Pathogenesis of viral infections.
7. General mycology. Classification of micromycetes.
8. General parasitology. Classification of parasites.
9. Mechanisms of action of antibiotics.
10. Mechanisms of antibiotic resistance.
11. Reserve antibiotics
12. Principles of rational antibiotic therapy.
13. Penicillin antibiotics.
14. Generation I to V cephalosporins, carbapenems
15. Glycopeptides. Oxazolidinones (linezolid)
16. Antimicrobials with beta-lactamase inhibitors
17. Macrolide and lincosamide antibiotics.
18. Tetracyclines, including tigecycline. Chloramphenicol.
19. Aminoglycosides. Polypeptide antibiotics (polymyxin).
20. Quinolone antibiotics.
21. Cotrimoxazole. Metronidazole. Nitrofurantoin.
22. Antituberculosis.
23. Virostatics, including covid-19 treatment.
24. Antifungals.
25. Antiparasitics (emphasising antimalarials), including anti-infectives used to treat parasitic infections.
26. Side effects of antibiotics.

II. Special Virology and Mycology (19 questions)

27. Herpesviruses - HSV1, HSV2 and VZV.
28. Herpesviruses - EBV, CMV and HHV-6.
29. Influenza viruses.
30. Parotitis virus. Measles virus.
31. Rubella virus and parvovirus B19.
32. Rabies virus.
33. Adenoviruses.
34. Rotavirus. Caliciviruses.
35. Polioviruses and other enteroviruses.
36. Flaviviruses causing encephalitis
37. Viral hemorrhagic fever.
38. Papillomaviruses. Human pathogenic poxviruses.
39. RSV, parainfluenza viruses, rhinoviruses.
40. SARS-CoV-2 and other coronaviruses
41. Agents of viral hepatitis.
42. HIV and other retroviruses.
43. Yeasts (candida)
44. Filamentous micromycetes (aspergilli, mucormycetes, dermatophytes).
45. Cryptococcus. Pneumocystis.

III. Special bacteriology (33 questions)

46. *Staphylococcus aureus*.
47. Coagulase-negative staphylococci.
48. *Streptococcus pyogenes*.
49. Beta haemolytic streptococci other than *S. pyogenes*.
50. *Streptococcus pneumoniae* and oral streptococci.
51. Enterococci.
52. Neurotoxic clostridia.
53. Histotoxic clostridia.
54. *Clostridioides difficile*.
55. *Bacillus anthracis* and other bacilli.
56. *Listeria monocytogenes.*
57. Corynebacteria.
58. Actinomycetes and nocardia.
59. *Pseudomonas aeruginosa* and other G- nonfermenting rods.
60. Bordetelly.
61. Brucella and *Francisella tularensis. Legionella pneumophila*.
62. *Campylobacter. Helicobacter pylori.*
63. *Haemophilus influenzae* and other haemophiles.
64. *Vibrio cholerae* and other vibrio.
65. *Escherichia coli*. Shigely.
66. Yersinia.
67. Salmonella (Typhi, Enteritidis and other serotypes).
68. *Klebsiella. Enterobacter*.
69. *Citrobacter, Serratia, Proteus* and *Providencia*.
70. *Neisseria meningitidis.*
71. *Neisseria gonorrhoeae*.
72. Anaerobic bacteria other than clostridia and actinomycetes.
73. Treponema pallidum.
74. Borrelia and leptospires.
75. Rickettsie, coxiellas, bartonells.
76. Chlamydia.
77. Mycoplasmas and ureaplasmas.
78. Mycobacteria.

IV. Parasitology (11 questions)

79. Trypanosomes and leishmania.
80. *Giardia*. *Cryptosporidium*. *Trichomonas*.
81. *Entamoeba* and other amoeboid protozoa.
82. The causative agents of malaria.
83. *Toxoplasma gondii*.
84. Schistosomes.
85. Taeniae and other agents of intestinal cestodes.
86. Echinococci and other agents of tissue cestodes.
87. *Enterobius* and *Ascaris*. Other agents of intestinal nematodes.
88. *Trichinella* and other agents of tissue nematodes (including filariasis).
89. Ectoparasites.

V. Clinical Microbiology (18 questions)

90. The human microbiome. Physiological microbiota.
91. Upper respiratory tract infections.
92. Lower respiratory tract infections.
93. Diarrhoeal diseases.
94. Urinary tract infections.
95. Sexually transmitted infections.
96. Non-infectious (aseptic) neuroinfections.
97. Suppurative meningitis.
98. Blood-stream infections. The concept of sepsis.
99. Healthcare-associated infections.
100. Multi-resistant strains and treatment options.
101. Exanthemic diseases.
102. Skin and soft tissue infections.
103. Infection of bones and joints.
104. Infections caused by anaerobic bacteria.
105. Infection of the fetus and newborn.
106. Types of vaccines. Compulsory vaccination.
107. Recommended vaccinations and vaccinations at the request of the individual.

VI. Investigation procedures and diagnostics (12 questions)

108. Microbiological diagnosis of bacterial infections
109. Microbiological diagnosis of viral infections
110. Microbiological diagnosis of mycotic infections
111. Microbiological diagnosis of parasitic infections
112. Microscopy in the diagnosis of infectious diseases.
113. Cultivation of bacteria.
114. Procedures leading to the identification of bacteria.
115. Antibiotic susceptibility tests. Interpretation of results
116. Serological reactions (agglutination, ELISA, WB, immunochromatography).
117. Molecular biology methods and their advantages and disadvantages in the diagnosis of infectious diseases.
118. PCR and its use in the diagnosis of infectious diseases (including POCT mode).
119. Sequencing and its use in the microbiology laboratory.