SECOND FACULTY OF MEDICINE
CHARLES UNIVERSITY

MICROBIOLOGY II - INSTRUCTIONS FOR WINTER SEMESTER

Dear colleagues,

On September 29th, 2025, 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

We are not offering the discussion anymore, as there was no demand from your side last year. However, if you would appreciate some interaction, you can contact your group teacher from the previous semester.

Changes in the timetable

- Due to a national holiday, there is no lecture on October 28th and November 17th.

Credit

A condition for obtaining credit is the successful completion of written tests before the Thursday lecture (weeks 4, 7 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.

Topics 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)

Consultations with teachers

To stay in touch with your lecturers, you can arrange consultations on the topics covered during the semester. All our teachers are ready to hear from you. Ideally, please coordinate contact with the teacher as a group. Here are the contacts:

Teacher	Group	Email
Oto Melter	3+4	oto.melter@lfmotol.cuni.cz
Sergii Romanov	1+2	sergii.romanov@lfmotol.cuni.cz

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

You will get a combination of 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
Deputy Head for Teaching

Syllabus

w	date	start	end	Lecture (Small Left Hall)	teacher
1	29.09.2025	9:50	11:30	**Introduction. Virology I: general virology, diagnostic methods in virology**	prof. MUDr. Pavel Dřevínek, Ph.D.; MUDr. Petr Hubáček, Ph.D.
1	30.09.2025	14:25	16:05	**Virology II: Herpesviruses**	MUDr. Petr Hubáček, Ph.D.
2	06.10.2025	9:50	11:30	**Mycology I: general principles, antifungal agents, dermatophytes**	MUDr. Daniela Lžičařová
2	07.10.2025	14:25	16:05	**Mycology II: Candidiasis, cryptococcosis, aspergillosis, mucormycosis, *Pneumocystis jirovecii* pneumonia**	MUDr. Daniela Lžičařová
3	13.10.2025	9:50	11:30	**Parasitology I: Protozoa - 1st part**	doc. MVDr. Oto Melter, Ph.D.
3	14.10.2025	14:25	16:05	**Parasitology II: Protozoa - 2nd part, Trematoda**	doc. MVDr. Oto Melter, Ph.D.
4	20.10.2025	9:50	11:30	**Parasitology III: Cestoda, Nematoda + CREDIT TEST 1**	doc. MVDr. Oto Melter, Ph.D.
4	21.10.2025	14:25	16:05	**Revision of antimicrobials - including AWaRe classification**	doc. MVDr. Oto Melter, Ph.D.
5	27.10.2025	9:50	11:30	**Human microbiome, physiological microbiota**	MUDr. Jakub Hurych, Ph.D.
5	28.10.2025	14:25	16:05	**holiday - no lecture**	
6	03.11.2025	9:50	11:30	**Neuroinfections**	doc. MVDr. Oto Melter, Ph.D.
6	04.11.2025	14:25	16:05	**Virology III: Arboviruses; virues of haemorrhagic fever**	MUDr. Petr Hubáček, Ph.D.
7	10.11.2025	9:50	11:30	**Virology IV: viruses of exanthematous diseases + CREDIT TEST 2**	MUDr. Petr Hubáček, Ph.D.
7	11.11.2025	14:25	16:05	**Respiratory tract infections I: bacterial and fungal agents**	doc. MVDr. Oto Melter, Ph.D.
8	17.11.2025	9:50	11:30	**holiday - no lecture**	
8	18.11.2025	14:25	16:05	**Respiratory tract infections II: viral agents**	MUDr. Petr Hubáček, Ph.D.
9	24.11.2025	9:50	11:30	**GIT infections I: viral, bacterial and parasitic agents; special focus of *E. coli* pathotypes and shigella**	doc. MVDr. Oto Melter, Ph.D.
9	25.11.2025	14:25	16:05	**GIT infections II: *Clostridioides difficile infections (CDI)***	Mgr. Marcela Krůtová, Ph.D.
10	01.12.2025	9:50	11:30	**Introduction to HAI: Catheter Infection; Surgical Site Infections; Hospital-Aquired & Ventilator-Associated Pneumonia**	Prof. RNDr. Alexander Nemec, Ph.D. et Ph.D.

10	02.12.2025	14:25	16:05	**Bloodstream infections (BSI)**	prof. MUDr. Pavel Dřevínek, Ph.D.
11	08.12.2025	9:50	11:30	**Multi-drug resistant bacteria & reserve antibiotics**	Mgr. Jan Tkadlec, Ph.D.
11	09.12.2025	14:25	16:05	**Bone and joint infections**	MUDr. Anežka Gryndlerová
12	15.12.2025	9:50	11:30	**Soft tissue infections +** **CREDIT TEST 3**	MUDr. Anežka Gryndlerová
12	16.12.2025	14:25	16:05	**Sexually transmitted infections I: bacterial and parasitic agents**	doc. MVDr. Oto Melter, Ph.D.
13	05.01.2026	9:50	11:30	**Sexually transmitted infections II: HIV & hepatitis viruses (HBV a HCV)**	MUDr. Petr Hubáček, Ph.D.
13	06.01.2026	14:25	16:05	**Urinary tract infections (UTI)**	MUDr. Jakub Hurych, Ph.D.
14	12.01.2026	9:50	11:30	**Infections in pregnancy and newborns**	MUDr. Petr Hubáček, Ph.D.
14	13.01.2026	14:25	16:05	**Vaccination from a microbiologal perspective**	prof. MUDr. Pavel Dřevínek, Ph.D.

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.