

SYLLABUS

INTERNATIONAL EUROPEAN
UNIVERSITY



SCHOOL OF
MEDICINE

MICROBIOLOGY, VIROLOGY
AND IMMUNOLOGY

2023



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Discipline 

 MICROBIOLOGY, VIROLOGY AND IMMUNOLOGY

Teacher(s) 


 Associate Professor Mykhailo Mykhailovych
Associate Professor Anatolii K. Masliukov

Profile of the teacher(s) 

 <https://medicine.ieu.edu.ua/pro-yemsh/kafedry/kafedra-fundamentalnykh-dystsyplin>

Consultations

Face-to-face consultations

 Third Thursday of the month from 15:00 to 16:00

Online consultations

 Second Wednesday of the month from 15:00 to 16:00


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Discipline page 

 <https://medicine.ieu.edu.ua/pro-yemsh/kafedry/kafedra-fundamentalnykh-dystsyplin>

Form of final control

test	differentiated test	exam
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1 Brief summary of the discipline

"Microbiology, Virology and Immunology" lays the foundation for the formation of the following program learning outcomes in accordance with the Standard of Higher Education of Ukraine for undergraduate training of specialists of the second (master's) level of the specialty "Medicine".

2 Prerequisite for studying the discipline

The study of the discipline "Microbiology, Virology and Immunology" is based on the knowledge of the basic natural science disciplines: medical biology, medical and biological physics, biological and bioorganic chemistry, human anatomy, histology, cytology and embryology, Latin, history of medicine, philosophy and is integrated with these disciplines.

3 Purpose and objectives of the discipline

The purpose of the discipline follows from the objectives of the educational and professional program of training of graduates of a higher education institution and is determined by the content of the systemic knowledge and skills that a doctor must master. The knowledge that students receive from the discipline is basic for the block of disciplines that provide natural science (block NS) and professional and practical (block PP) training. The study of the discipline "Microbiology, Virology and Immunology" lays the foundation for students to study general hygiene, epidemiology, pathological physiology, pathological anatomy, immunology and allergology, infectious diseases, internal diseases, surgical diseases and pediatric diseases and other clinical disciplines, which involves the integration of teaching with these disciplines and the application of knowledge of microbiology, virology and immunology in the process of further education and professional activity.

4 Learning outcomes

PLO 1	Have a thorough knowledge of the structure of professional activity. Be able to carry out professional activities that require updating and integration of knowledge. Be responsible for professional development, the ability to further professional training with a high level of autonomy
PLO 2	Understanding and knowledge of basic and clinical biomedical sciences, at a level sufficient to solve professional problems in the field of health care.
PLO 3	Specialized conceptual knowledge, which includes scientific achievements in the field of health care and is the basis for conducting research, critical thinking of problems in the field of medicine and related interdisciplinary issues.
PLO 4	Select and identify the leading clinical symptoms and syndromes (according to list 1); according to standard methods, using preliminary data from the patient's history, examination of the patient, knowledge of the person, his/her organs and systems, establish a preliminary clinical diagnosis of the disease (according to list 2).
PLO 7	To prescribe and analyze additional (obligatory and optional) methods of examination (laboratory, functional and/or instrumental) (according to list 4) of patients with diseases of organs and body systems for differential diagnostics of diseases (according to list 2).
PLO 8	To define the main clinical syndrome or the cause of the severity of the injured person's/victim's condition (according to list 3) by making a reasoned decision and assessing the person's state in any circumstances (at a healthcare facility, beyond it), including emergency and combat situations, in the field, with the lack of information and limited time.



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PLO 9	To define the character and principles of disease treatment (conservative, operative) (according to list 2), taking into account patient's age, at a healthcare facility, beyond it, and at medical evacuation stages, including in the field, based on the provisional clinical diagnosis, complying with appropriate ethical and legal standards, by making a reasoned decision according to the current algorithms and standard patterns, to be able to justify personal recommendations under the control of a supervising physician at the healthcare facility when the standard pattern should be expanded.
PLO 14	To determine techniques of providing emergency medical aid (according to list 3) in the context of limited time according to current clinical protocols and treatment standards.
PLO 19	To plan and implement the system of anti-epidemic and preventive measures against the emergence and spread of infectious diseases among the population.
PLO 20	To analyze the epidemiological state and conduct mass and individual, general and local prevention of infectious diseases.
PLO 21	Find necessary information in professional literature and databases of other sources, analyze, evaluate and apply this information.
PLO 23	To assess the environmental impact on human health to define the incidence rate of the population.
PLO 24	To organize the required level of individual safety (your own and persons you care for) in case of common dangerous situations occurring in the individual activity area.
PLO 25	To render your knowledge, conclusions and arguments about health and related issues to specialists and non-specialists in a clear and unambiguous manner.
PLO 28	To make efficient decisions about healthcare problems, assess the required resources; to take into account social, economic and ethical consequences.
PLO 29	To plan, organize and carry out measures for the specific prevention of infectious diseases, particularly according to the National Calendar of preventive vaccinations, both obligatory and recommended. To manage vaccine residues, organize additional vaccination campaigns, including immunization measures.

5 ECTS Credits

9 ECTS credits / 270 hours, of which 40 are lectures, 104 are practical classes, 126 are independent work

6 Structure of the discipline

Titles of content sections and topics	Number of hours			
	total	Among them		
		l	pr	Ind
SECTION I. Morphology and physiology of microorganisms. The infection. Immunity.				
Content section 1, 2. Introduction to microbiology Morphology and structure of prokaryotes and parasitic unicellular eukaryotes. Staining of microorganisms. Microscopy.				
Topic 1: Introduction to the discipline. Medical microbiology as a subject. History of microbiology as a science. Organization of work in	6	1	2	3

bacteriological, immunological and virological laboratories.				
Topic 2. Morphology of bacteria.	6	1	2	3
Topic 3. Classification of microorganisms. Morphology and ultrastructure of bacteria. Methods of microscopy.	6	1	2	3
Topic 4. Dyes and methods of manufacturing drugs.	5	-	2	3
Topic 5. Simple methods of staining bacteria.	6	1	2	3
Topic 6. Structure of the bacterial cell.	6	1	2	3
Topic 7. Gram staining of bacteria and other complex methods of staining.	5	1	2	2
Topic 8. Morphology of spirochetes, actinomycetes, fungi and pathogenic protozoa.	6	2	2	2
Content section 3. Physiology of microorganisms (prokaryotes). Evolution and classification of microorganisms.				
Topic 9: Physiology of bacteria.	5	2	2	3
Topic 10. Culture media.	4	-	2	2
Topic 11. Sterilization and disinfection.	4	-	2	2
Topic 12. Growth and reproduction of microorganisms. Isolation of pure cultures of aerobes.	7	2	2	3
Topic 13. Growth and reproduction of microorganisms. Isolation of pure cultures of anaerobes. Identification of pure cultures of microorganisms.	4	-	2	2
Content section 4. Genetics of microorganisms. Content section 5. Microbiological bases of antimicrobial chemotherapy.				
Topic 14: Genetics of bacteria. Variability	6	1	2	3
Topic 15. Chemotherapeutic drugs. Antibiotics	5	1	2	2
Content section 6. Infection				
Topic 16. The infectious process.	6	1	2	3
Topic 17: Modern methods of diagnosis of infectious diseases.	5	1	2	2
Content section 7. The immune system of the body. Reactions of nonspecific defense of the body against microorganisms. Content section 8. Antigens. Antibodies. Content section 9. Immune reactions. Immunopathology.				
Topic 18. Organs of the human immune system	6	1	2	3
Topic 19. Factors of non-specific defense of the body.	5	1	2	2
Topic 20: Antigens. Antibodies.	7	1	2	3
Topic 21. Serological reactions. Serological reactions with labels	4	1	2	2
Topic 22. Vaccines and immune sera. Final lesson on section I	4	-	2	2
SECTION II. General and special virology. Pathogenic prokaryotes, eukaryotes, fungi. Content section 10. General virology				
Topic 23. Morphology and ultrastructure of viruses.	5	1	2	2
Topic 24. Cultivation of viruses in the chicken embryo and in the body of laboratory animals.	6	1	2	3
Topic 25. Cultivation of viruses in cell cultures. Indication of viral reproduction. Serological reactions in virology.	5	1	2	2
Topic 26. Genetics of viruses. Bacteriophages. Practical use.	5	1	2	2
Content section 11. Special virology.				
Topic 27: Orthomyxoviruses, paramyxoviruses.	5	1	2	2
Topic 28. Picornaviruses. Enteroviruses	4		2	2
Topic 29. Retroviruses. AIDS. RNA-genomic viruses: reoviruses, Arenaviruses, rhabdoviruses. Herpesviruses, adenoviruses. Hepatitis viruses.	5	1	2	2
Topic 30. Herpesviruses, adenoviruses. Hepatitis viruses	6	2	2	2
Topic 31: Vesicular stomatitis virus, togaviruses, filoviruses, coronaviruses.	4	-	2	2
Topic 32. Poxviruses, papoviruses, parvoviruses.	4	-	2	2
Topic 33. Arboviruses. Oncogenic viruses. Prions	4	-	2	2
Content section 12. Pathogenic prokaryotes and eukaryotes.				
Topic 34. Staphylococci. Streptococci.	5	2	2	1

Topic 35. Meningococci. Gonococci.	5	-	2	3
Topic 36. Salmonellae. Typhoid fever. Paratyphi.	5	-	2	3
Topic 37. Salmonellae of gastroenteritis.	5	-	2	3
Topic 38. Shigellae. Dysentery.	5	-	2	3
Topic 39. Vibrios. Cholera. Corynebacteria.	6	2	2	2
Topic 40. Diphtheria. Bordetella. Whooping cough.	4	-	2	2
Topic 41. Mycobacteria. Tuberculosis. Leprosy	4	-	2	2
Topic 42. Anaerobes. Botulism. Zooanthroponosis.	4	-	2	2
Topic 43. Plague. Brucellosis.	4	-	2	2
Topic 44. Tularemia. Anthrax.	5	1	2	2
Topic 45. Rickettsia. Typhoid fever. Ku-fever.	4	-	2	2
Topic 46. Chlamydia. Mycoplasmas	5	1	2	2
Topic 47. Spirochetes. Syphilis. Reverse typhus. Borreliosis. Leptospirosis	6	1	2	3
Topic 48. Pathogenic fungi. Microbiological diagnosis of mycoses.	4	1	2	1
Content section 13. Fundamentals of clinical and environmental microbiology. Content section				
Topic 49. Clinical microbiology. Normal microflora of the body.	2	1	2	1
Topic 50. Dysbioses. Correction	5	-	2	3
Topic 51. Hospital-acquired infections. Iatrogenic infections.	6	1	2	3
Content section 14. Sanitary microbiology and virology				
Topic 52. Sanitary microbiology. Microflora of soil and food and food products. Microflora of water and air	7	2	2	3
IN THE DISCIPLINE	270	40	104	126

1. The main features and trends in the development of modern microbiology.
2. Dependence of the results of staining of microorganisms on their properties. Theories explaining the mechanism of Gram staining of various microorganisms. Methods for detecting structural elements of bacteria: spores, capsules, flagella, inclusions, etc.
3. Methods of studying the morphology of fungi and actinomycetes.
4. Modern nutrient media for growing bacteria.
4. Test systems for determining the enzymatic activity of microorganisms. Origin and evolution of microorganisms.
5. Basic principles of microorganism systematics.
6. Modern classification of prokaryotes. Growth and method of reproduction of bacteria, phases of reproduction of bacterial culture in stationary conditions. Criteria for the identification of microorganisms.
7. Classification of microorganisms, main taxa. Characterization of the species. The doctrine of infection. The role of microorganism, macroorganism and environment in the infectious process.
8. Characterization of cell-tissue, physiological and humoral factors of nonspecific defense. The principle and essence of the polymerase chain reaction.
9. History of discovery and main stages of virology development. Contribution of domestic scientists. Methods of studying viruses, their evaluation.
10. Modern views on the nature and origin of viruses. The place of viruses in the living system.
11. Principles of virus classification and their evaluation.
12. Bacteriophages, morphology and structure. Methods of qualitative and quantitative determination of bacteriophages.
13. Nonspecific factors of protection of the macroorganism from viral agents, their characteristics. Interferons, mechanism of action, interferonogens. Virus inhibitors.
14. Scarlet fever streptococcus. Streptococcus pneumoniae. Enterococci. Anaerobic staphylococci and streptococci.
15. General characteristics of other representatives of the family Neisseria: genera Moraxella, Acinetobacter, Kindella, their role in human pathology. Salmonellae. General characteristics.
16. Classification of Salmonella by Kaufman and White.
17. Comparative properties of pathogenic protozoa. The causative agent of amoebic dysentery.
18. Parahemolytic vibrios, properties. Role in human pathology.
19. Bordetella pertussis bacteria. Haemophilus influenzae. Legionellae.
20. Non-fermentative gram-negative anaerobic bacteria of the genera: bacteroids, fusobacteria.
21. Anaerobic cocci of the genera Peptococcus and Peptostreptococcus.
22. Anaerobic bacteria of the genus Waylonella.



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Selective tasks

1. Create multimedia presentations on the topics of practical classes
2. Creating biological crosswords on the topics of practical classes
3. Making tables
4. Participation in the work of the student scientific club
5. Participation in the student olympiad in the discipline
6. Participation in student scientific and practical conferences
7. Organization and visiting of thematic museums
8. Publication of abstracts of scientific conference reports in co-authorship with a teacher

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Signs of discipline

Term of Teaching	Semester	International disciplinary integration	Course (year of study)	Cycles: general training/ vocational training/ free choice
2 semesters	III, IV	Yes	2st	General training

10

Grading System and Requirements

The current performance of students is assessed on a 4-point scale (2; 3; 4; 5) at each practical, taking into account the approved evaluation criteria for the relevant discipline. The student must receive a grade for each topic for further conversion of grades into points on a multi-point (200-point) scale.

Criteria for assessing current academic performance:

Excellent ("5") - the student answered 90-100% of the questions correctly. Solves situational problems of increased complexity, is able to summarize the material.

Good ("4") - the student answered 70-89% of the questions correctly. Possesses the necessary practical skills and techniques for their implementation in excess of the required minimum.

Satisfactory ("3") - the student answered 50-69% of the questions correctly. Has only the required minimum of research methods.

Unsatisfactory ("2") - the student answered 50% of the questions correctly. When answering and demonstrating practical skills, he/she makes significant, gross mistakes.

Evaluation of students' independent work in preparation for classroom practical classes is carried out during the current control of the topic at the relevant classroom.

The semester credit is evaluated on a two-point scale (passed/not passed) and a 200-point scale by determining the arithmetic mean of current grades for each practical lesson on a 4-point scale and its subsequent conversion to 200-point scale. The minimum number of points that a student must score is 120.

The final control of knowledge in the discipline "Microbiology, Virology and Immunology" is carried out in the form of an exam. The exam in the discipline is conducted in the form of a written test for individual options, each of which contains 3 theoretical questions.

<https://ie.u.edu.ua/docs/rate-of-study.pdf>

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Conditions for admission to the final control

Students who have completed all types of work and assignments provided for in the semester curriculum in accordance with the discipline, attended all classes provided for in the curriculum, written and submitted a medical history, and have an average grade for current academic activities of at least "3" (72 points on a 120-point scale) are admitted to the semester final control.

<https://ie.u.edu.ua/docs/rate-of-study.pdf>



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12 Discipline policy

Teaching the discipline involves openness to new and extraordinary ideas, tolerance, a friendly partnership atmosphere of mutual understanding and creative development.

Different models of classroom work, including work on solving problems, allow students to maximize their own potential, learn to trust their partners, and develop skills of intellectual teamwork.

All lectures and practical classes must be conducted by teachers in accordance with the established schedule, and all tasks provided for in the program must be completed by students on time.

No late arrivals are allowed, both for teachers and students. Class attendance is mandatory.

The teacher should monitor anatomical classes, medical and chemical classrooms where classes are held and pay special attention to students in practical classes when working with medical equipment and instruments. Prejudice and discrimination regardless of race, ethnicity and religious beliefs, as well as any manifestations of corruption are not allowed.

Students must wear medical gowns during classes.

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Policy on missing classes and completing assignments late

A student who, for valid reasons, confirmed by documentary evidence, was not subject to current control has the right to undergo current control within two weeks after returning to study.

A student who was absent from classes without valid reasons, did not participate in current control activities, did not eliminate academic debt, is not allowed to take the final semester control of knowledge in this discipline, and on the day of the exam, the academic staff member assigns a grade of "not admitted" in the examination record. Retaking the differentiated test in the discipline is assigned subject to the completion of all types of educational, independent (individual) work provided for in the working curriculum of the discipline and is carried out in accordance with the schedule of liquidation of academic debt approved by the directorate.

<https://ieu.edu.ua/docs/050.pdf>

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Academic integrity policy

Participants in the educational process are guided by the principles of academic integrity

<https://ieu.edu.ua/docs/011.pdf>

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Recommended sources of information

Main literature:

1. Medical microbiology, virology and immunology. 3rd edition, updated and supplemented. Shirobokov V.P. - Vinnytsia: "New Book", 2021 - 920 pp.
2. Microbiology with the basics of immunology: textbook / V.V. Danileichenko, Y.M. Fedechko, O.P. Korniychuk, I.I. Soloninko. 3rd edition - Kyiv: Medicine, 2020. - 376 c.

Additional literature:

1. Danileichenko V.V. Microbiology with the basics of immunology: a textbook for medical universities / V.V. Danileichenko, Y.M. Fedechko, O.P. Korniychuk - 2nd edition, revised and supplemented - Kyiv: Medicine, 2009. 391 p.
2. Practical microbiology: Manual / S.I. Klymnyuk, I.O. Sytnyk, M.S. Tvorak, V.P. Shyrobokov - Ternopil, Ukrmedkniga. - 2004. - 440c.
3. Shirobokov V.P.. Microbial ecology of man with a color atlas. Textbook. / V.P. Shirobokov, D.S. Yankovsky, G.S. Dymant - K: Chervona Ruta-Tours LLC, 2010, - 340 p.
4. Vorobiev A.A. Medical and sanitary microbiology. Study guide for university students. /A.A. Vorobiev, Y.S. Krivoshein, V.P. Shirobokov - Moscow: Publishing center "Academy", 2010. - 464 p.
5. Medical microbiology, virology and immunology. Textbook for students of medical universities / edited by A.A. Vorobyov. - 2nd ed. - M: LLC "Medical Information Agency", 2008. - 704 c.



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15 Recommended sources of information

6. Jawets. Medical microbiology / Jawets, Melnick, Adelberg. - The McGraw-Hill Companies, Inc, 2011. - 919 p.
7. V.P. Shirobokov. Microbes in biochemical processes, biosphere evolution and the existence of mankind. / V.P. Shirobokov, D.S. Yankovsky, G.S. Dymant. - K: FOP Veres O.I., 2014. - 464 c.
8. Yankovsky D.S. Intergranular role of symbiotic microflora in human physiology / D.S.Yankovskiy, V.P.Shirobokov, G.S.Dymant. - K: TOV "Chervona Ruta-Tours", 2011. - 169 c.

Information resources

1. World Health Organisation <http://www.who.int/en/>
2. Microbiology and Immunology online <http://www.microbiologybook.org/>
3. Microbiology Notes online <http://www.microbiologyinfo.com/>
4. Centres for Disease Control and Prevention www.cdc.gov

16 Tips for successful studying on the course

1. Be active, persistent, inquisitive, consistent
2. Be tidy and polite
2. Systematically prepare for practical classes
3. Attend lectures and take notes
4. Perform tasks for independent work and defend them in class.
5. Handle the equipment of the department, including microscopes, with care.