

SYLLABUS

INTERNATIONAL EUROPEAN
UNIVERSITY



SCHOOL OF
MEDICINE

MICROBIOLOGY, VIROLOGY
AND IMMUNOLOGY

2023



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Course Name				
		MICROBIOLOGY, VIROLOGY AND IMMUNOLOGY		
Lecturer (s)				
		Associate Professor Mykhailiuk Mykhailo Associate Professor Maslyukov Anatolii		
Lecturer's profile				
		https://medicine.ieu.edu.ua/pro-yemsh/kafedry/kafedra-fundamentalnykh-dystsyplin		
Consultations				
online consulting		Third Thursday of the month from 15:00 to 16:00		
offline consulting		Second Wednesday of the month from 15:00 to 16:00		
Contact number				
		+38 067-935-20-84		
E-mail				
		mykhailiukmykhailo@ieu.edu.ua		
Discipline page				
		https://medicine.ieu.edu.ua/pro-yemsh/kafedry/kafedra-fundamentalnykh-dystsyplin		
Form of final control	test	def. test	exam	
	☐	☒	☐	



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1 Brief discipline annotation

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

2 Background for studying 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 Goal 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

PLR 1

Have a thorough knowledge of the structure of professional activity. Be able to carry out professional activities that require updating and integrating knowledge. To be responsible for professional development, the ability to further professional training with a high level of autonomy

PLR 2

Understanding and knowledge of basic and clinical biomedical sciences, at a level sufficient to solve professional problems in the field of health care.

PLR 3

Specialized conceptual knowledge that includes scientific achievements in the field of health care and is the basis for research, critical thinking in the field of medicine and related interdisciplinary issues.

PLR 4

Identify and identify the leading clinical symptoms and syndromes (according to list 1); using 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).

PLR 7

To prescribe and analyze additional (mandatory and optional) methods of examination (laboratory, functional and/or instrumental) (according to the list 4), patients with diseases of organs and body systems for differential diagnosis of diseases (according to the list 2).



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4

Learning outcomes

PLR 8

Determine the main clinical syndrome or what causes the severity of the victim's/injured person's condition (according to list 3) by making an informed decision and assessing the person's condition under any circumstances (in a health care facility, outside it), including in an emergency situation and hostilities, in the field, in conditions of lack of information and limited time.

PLR 9

Determine the nature and principles of treatment of patients (conservative, surgical) with diseases (according to list 2), taking into account the patient's age, in a health care facility, outside it and at the stages of medical evacuation, including in the field, based on a preliminary clinical diagnosis, observing the relevant ethical and legal standards, by making an informed decision according to existing algorithms and standard schemes, if necessary, expand the standard scheme, be able to justify personalized recommendations under the supervision of a medical supervisor

PLR 14

Determine the tactics and provide emergency medical care for urgent conditions (according to list 3) in a time-limited environment in accordance with existing clinical protocols and treatment standards

PLR 19

To plan and implement a system of anti-epidemic and preventive measures against the occurrence and spread of diseases among the population.

PLR 20

Analyze the epidemiological situation and carry out measures of mass and individual, general and local prevention of infectious diseases

PLR 21

Find the necessary information in professional literature and databases and other sources, analyze, evaluate and apply this information.

PLR 23

To assess the impact of the environment on human health to assess the state of morbidity of the population

PLR 24

Organize the necessary level of individual safety (own and those under their care) in the event of typical hazardous situations in their individual field of activity.

PLR 25

Clearly and unambiguously communicate own knowledge, conclusions and arguments on health care and related issues to specialists and non-specialists

PLR 28

To make effective decisions on health care issues, to assess resources, and consider social, economic and ethical implications

PLR 29

Plan, organize and carry out measures for the specific prevention of infectious diseases, including in accordance with the National Vaccination Schedule, both mandatory and recommended. Manage vaccine stocks, organize additional vaccination campaigns, including immunization activities



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5 ECTS credits

3 ECTS credits / 90 academic hours, of which lectures - 16, practical work - 16, independent work - 58 hours.

6 Course Content

Titles of content sections and topics	Total	Among them		
		l	p	i.w.
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 subject. History of microbiology as a science. Organization of work in bacteriological, immunological and virological laboratory.	6	1	2	3
Topic 2. Morphology of bacteria.	6	1	2	3
Topic 3. Classification of microorganisms. Morphology and rastructure 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. The structure of a bacterial cell.	6	1	2	3
Topic 7. Gram staining of bacteria and other complex staining thods.	5	1	2	2
Topic 8: Morphology of spirochetes, actinomycetes, fungi and hogenic 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. Nutrient mediums.	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 basis 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 diagnosing 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. Reactions of immunity. Immunopathology.				
Topic 18: Organs of the human immune system	6	1	2	3
Topic 19: Factors of nonspecific 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 serums. 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 chicken embryo and 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 application.	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. Zooanthroposis.	4	-	2	2
Topic 43. Plague. Brucellosis.	4	-	2	2
Topic 44. Tularemia. Anthrax.	5	1	2	2

Topic 45. Rickettsia. Typhoid fever. Cu-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. Protozoan infections.	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. Microflora of water and air	7	2	2	3
OF THE WHOLE 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 cellular, 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. Inhibitors of viruses.
14. Scarlet fever streptococcus. Streptococcus pneumoniae. Enterococci. Anaerobic staphylococci and streptococci.

7 List of obligatory tasks

15. General characteristics of other representatives of the Neisseria family: 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.

8 List of 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

9 Discipline features

Period of teaching	Semester	International disciplinary integration	Year of study	Courses: general training/ professional training/elective
2 semester	3,4 semester	available	2	General training

10 Assessment system and requirements. General system of discipline assessment

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. The student has the necessary practical skills and techniques to perform them to an extent that exceeds 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.



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10 Assessment system and requirements. General system of discipline assessment

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 "Bioethics and medical communications" is carried out in the form of a differentiated test. The differentiated test in the discipline is conducted in the form of an oral survey according to the questions compiled in accordance with the material covered.

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

11 Assessment system and requirements. General system of discipline assessment

A condition for student admission to the final control is the absence of missed or completed practical classes, as well as an average current grade of at least 3 points on a 4-point scale \ 120 points on a 200-point scale.

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

12 Admission to final control

The study of the discipline "Labor Protection in the Industry" requires compliance with the rules that ensure effective mastery of the subject, both in theory and in practice, namely

- regular, without absences, attendance at lectures and practical classes
- the presence of the teacher and students in the classroom in accordance with the schedule and the established time regulations of classes
- the presence of the teacher and students in the classroom neatly dressed in appropriate clothing, namely in a white coat
- full presentation of the course by the teacher in accordance with the program of the discipline
- students keep lecture notes and notes on practical classes
- the study of the discipline is based on collegiality, cooperation and solidarity of the teacher and students
- discussion of educational issues takes place in the form of a discussion between the teacher and students, and students among themselves
- lectures and practical classes, with the exception of the final control of knowledge, involve independent work of students with the use of information technology and means of processing, storing and transmitting information, including computers, personal gadgets and other electronic devices, as well as textbooks, manuals, methodological developments, etc.
- scientific search and research work of students is welcome
- Writing essays on the topics specified in the list of compulsory assignments is a part of the training
- writing essays on the list of topics of optional assignments is desirable and mandatory if a student wants to improve his or her grade
- the topics of the discipline are considered in terms of their practical application and bioethical capacity
- the mutual behavior of the teacher and students, and students among themselves in the classroom and out of class time complies with generally accepted norms and role models of behavior that provide for mutual respect and collegiality of relationships, and exclude religious, racial, ethnic, cultural, age, gender, social, political, and other prejudices and prejudices, as well as bullying, sexual harassment, and other manifestations and forms of intolerance and humiliation of human dignity
- any manifestations of corruption in the educational process, both on the part of the teacher and the students, are unacceptable.



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13 Discipline policy

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 gives 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 by 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>

14 Policy of absence and late task performance

Participants in the educational process are guided by the principles of academic integrity
<https://ieu.edu.ua/docs/011.pdf>

15 Recommended sources of information

Primary 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. Korniyuchuk, I.I. Soloninko. 3rd edition - Kyiv: Medicine, 2020. - 376 c.

Supporting literature:

1. Danileichenko V.V. Microbiology with the basics of immunology: a textbook for medical universities / V.V. Danileichenko, Y.M. Fedechko, O.P. Korniyuchuk - 2nd ed.
2. Practical microbiology: A manual / S.I. Klymnyuk, I.O. Sytnyk, M.S. Tvorak, V.P. Shirobokov - Ternopil, Ukrmedkniga. - 2004. - 440c.
3. Shirobokov V.P.. Microbial ecology of man with a color atlas. Study guide. / V.P. Shyrobokov, 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. Vorobiev. - 2nd ed: Medical Information Agency LLC, 2008. - 704 p.
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 human existence. / V.P. Shirobokov, D.S. Yankovsky, G.S. Dymant. - K: FOP Veres O.I., 2014. - 464 c.
8. Yankovskiy D.S. Integral 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 Organization <http://www.who.int/en/>.
2. Microbiology and immunology on-line <http://www.microbiologybook.org/>.
3. On-line microbiology note <http://www.microbiologyinfo.com/>
4. Centers for diseases control and prevention www.cdc.gov



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16

Tips on successful study during the course

Attendance at classes

Dialogue with the teacher on all issues of the curriculum

Completion of assignments in accordance with the program

Writing essays on the topics of the program

Discussion of topics and assignments in groups outside of class time

Use of Internet resources