



The syllabus of discipline "MODERN PROBLEMS OF VIROLOGY"

1. General information	
Name of the faculty	Medical
Educational program (industry, specialty, level of higher education, form of study)	22 Health care, 222 Medicine, second (master's) level of higher education, full-time
Academic year	2023/2024
Name of discipline, code (e-mail address on the website Danylo Poltava National Medical University Galician)	"Modern problems of virology"; SB 1.37 http://new.meduniv.lviv.ua/kafedry/kafedra-mikrobiologiyi/
Department (name, address, phone number, e-mail)	Department of microbiology 12, Zelena St., Lviv tel. +38(032)276-28-36 Kaf_microbiology@meduniv.lviv.ua
Head of the department (contact e-mail)	Professor, Doctor of Medical Sciences Korniychuk O.P. o_korniychuk@ukr.net
Year of study (the year in which the discipline is implemented)	2nd year
Semester (semester in which the study is realized disciplines)	3rd semester
Type of discipline/module (mandatory/optional)	Discipline of choice
Lecturers (names, surnames, academic degrees and titles of lecturers who teach the discipline, contact e-mail)	Gural A.R. - Assistant, adriana hural 43@gmail.com Kovalenko I.V. - PhD, Associate Professor iryna0012@gmail.com Pavliak U.V. - Assistant, u.pavliak@ukr.net
Erasmus yes/no (availability of the discipline for students within the Erasmus+ program)	No.
Person responsible for the silo (the person to whom comments on the silo should be provided, contact e-mail)	Associate Professor Pavliy S.Y. microvirus60@ukr.net
Number of ECTS credits	3.0 ECTS credits
Number of hours (lectures/ lectures/ practical classes/ independent work)	90 hours Lectures -12 hours Practical classes - 18 hours

<i>students)</i>	Independent work of students - 60 hours
Language of instruction	Ukrainian
Information about consultations	-

2. Brief summary of the course

Modern problems of virology include the study of the evolution and properties of viruses pathogenic to humans, patterns of interaction between viruses and macroorganisms, the effect of viruses on the immune system and mechanisms of anti-infective immunity, methods of virological diagnostics, especially rapid tests, principles of treatment and specific prevention of viral diseases.

The study of this discipline is necessary to understand the role of viruses in the pathogenesis of infectious diseases, especially the pandemic caused by Covid 19 and a number of opportunistic diseases, the importance of basic methods of rapid diagnosis. In order to integrate into the world educational and scientific space, the main directions of development of modern diagnostics, treatment and prevention of diseases caused by viruses, viruses and prions were taken into account and included in the educational material from leading international textbooks on microbiology and virology.

3. Course aims and objectives

The aim is to form students' knowledge of the structure, chemical composition of viruses and mechanisms of their interaction with cells, the role of viruses in infectious and non-infectious human pathology, principles of diagnosis, specific therapy and prevention of infectious diseases in accordance with modern ideas and achievements of science. study of the current state of development of general and special virology - and final goals - are set on the basis of the OPP of doctor training, in accordance with the block of its content module - (natural science training) and are the basis for building the content of the n The description of goals is formulated through skills in the form of target tasks (actions). Based on the ultimate goals, specific goals are formulated for each content module in the form of certain skills (actions), target tasks that ensure the achievement of the ultimate goal of studying the discipline.

General and special virology, as an academic discipline, is based on the knowledge gained in the study of general biology, a set of chemical disciplines, biophysics, and the disciplines of the morphological and physiological cycle. The study of virology is necessary to understand the role of viruses in the pathogenesis of diseases, the importance of serological methods in diagnosis, and the knowledge gained is used in the study of treatment and prevention of viral and prion diseases.

The main objectives of the discipline "Modern Problems of Virology" are:

to familiarize students with the systematics, structural organization and methods of reproduction of viruses, methods of detection, isolation and cultivation of viruses;

- interpret the biological properties of viruses, patterns of their interaction with the macroorganism and the environment;
- determine methods of virological diagnostics, rapid diagnostics, etiotropic chemotherapy and specific prevention of viral diseases; especially in coronavirus infection,
- explain the role and functions of the human body's antiviral immunity;
- interpret the main mechanisms of formation of the antiviral immune response of the human body;

According to the requirements of the Higher Education Standard, the discipline ensures that students acquire competencies:

-General (GC):

1. Ability to think abstractly, analyze and synthesize.
2. Ability to learn and master modern knowledge.
3. Ability to apply knowledge in practical situations.
4. Knowledge and understanding of the subject area and understanding of professional activities.
5. The ability to adapt and act in a new situation.
6. Ability to make informed decisions.
8. 8. Ability to interact with others.
10. Ability to use information and communication technologies. 11. Ability to search, process and analyze information from various sources.

12. Determination and persistence in the tasks and responsibilities. 13. Awareness of equal opportunities and gender issues.
14. The ability to exercise one's rights and responsibilities as a member of society, to realize the values of civil (free democratic) society and the need for its sustainable development, the rule of law, human and civil rights and freedoms in Ukraine.
15. The ability to preserve and enhance moral, cultural, scientific values and achievements of society based on an understanding of the history and patterns of development of the subject area, its place in the general system of knowledge about nature and society and in the development of society, technology and technology, to use various types and forms of physical activity for active recreation and healthy lifestyle.

-Special (professional, subject) (SP):

3. Ability to establish a preliminary and clinical diagnosis of the disease. 6. ability to determine the principles and nature of treatment and prevention of diseases.
14. Ability to plan and implement preventive and anti-epidemic measures against infectious diseases.
15. Ability to conduct an examination of working capacity.
16. Ability to maintain medical records, including electronic forms.
17. Ability to assess the impact of the environment, socio-economic and biological determinants on the health of an individual, family, population.
18. Ability to analyze the activities of a physician, unit, health care institution, ensure the quality of medical care and improve the efficiency of medical resources. 19. Ability to organize and integrate the provision of medical care to the population and to conduct marketing of medical services.
20. Ability to conduct epidemiological and medical-statistical studies of public health; processing of social economic and medical information.
21. Communicate your own knowledge, conclusions and arguments on health care and related issues to professionals and non-specialists, including students, in a clear and unambiguous manner.
22. Ability to manage healthcare workflows that are complex, unpredictable and require new strategic approaches
23. Ability to develop and implement scientific and applied projects in the field of healthcare.
24. Adherence to ethical principles when working with patients and laboratory animals.
25. Maintain professional and academic integrity, be responsible for the accuracy of the scientific results obtained

4. Course prerequisites

Successful learning and mastering of competencies in the discipline "Modern Problems of Virology" is based on the knowledge gained in the study of the listed disciplines:

1. Medical biology with parasitology
2. Histology, cytology and embryology
3. Biophysics
4. Biochemistry
5. Normal physiology
6. Pathological physiology
7. Pathological anatomy

5. Program learning outcomes

PRN -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 learning with a high level of autonomy.
PRN-2	Understanding and knowledge of basic and clinical biomedical sciences at a sufficient level

	to solve professional problems in the healthcare sector.			
PRN-3	Specialized conceptual knowledge, including scientific achievements in the field of security health and is the basis for research, critical thinking in the field of medicine and related interdisciplinary issues.			
PRN-19	To plan and implement a system of anti-epidemic and preventive measures against the occurrence and spread of diseases among the population.			
PRN-24	Organize the necessary level of individual safety (own and of persons under his/her care) in the event of typical dangerous situations in the individual field activities.			
PRN-27	Communicate fluently in the state language and in English, both orally and in writing for discussing professional activities, research, and projects.			
List of learning outcomes				
Learning outcome code	Content of the learning outcome			Link to the matrix code competencies
Zn-1 Um-1	To know and be able to analyze the biological properties of pathogenic and non-pathogenic viruses, viroids, prions, patterns of their interactions with the macroorganism and the environment.			PRN-1, PRN-2; PRN-3, PRN-27
Zn-2 Um-2	To know and understand the mechanisms formation basic human antiviral immunity.			PRN-1, PRN-2; PRN-3, , PRN-27
Zn-3 Um-3	To know the main types of pathological reactions of the immune system and their connection with the occurrence of the most common viral diseases human infections.			PRN-1, PRN-2; PRN-3, PRN-27
K-1	Ability to identify virological diagnostic methods			PRN-1, PRN-2; PRN-3, PRN-24, PRN-27
K-2	Ability to identify means of etiotropic therapy and specific prevention of viral and prion infectious diseases.			PRN-1, PRN-2; PRN-3, PRN-19, PRN-24, PRN-27
AB-1 AB-2	Ability to process state, social and medical information.			PRN-1, PRN-2; PRN-3, PRN-27
6. Course format and scope				
Course format (specify full-time or part-time)	The format is face-to-face. The discipline is assigned 3.0 ECTS credits, 90 hours. <i>Content modules:</i> General virology Special virology.			
View classes	Number of hours			Number of groups
Lectures	12 h			3
Practical	18 h			3
Independent	60 h			3
7. Course topics and content				
Code of the type of occupation	Topic.	Training content	Result code training	Teaching
ЛІ-1	<i>Lectures Content modules.</i> General virology. Features of biology and physiology of viruses. Classification of viruses. Reproduction of viruses. Methods of virus	Presentation of lecture material with the use of	Zn-1; Zn-2 -Um-2 Um-2 Um	Kovalenko I.V.

	cultivation. Methods		3,K-1,K-2 AV-1 AV 2	
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<p>И-2</p> <p>И-3</p> <p>И-4</p> <p>И-5</p> <p>И-6</p>	<p>Indication of viruses in test systems. Identification of viruses. Modern methods of diagnosing viral infections. Features of antiviral immunity. Treatment and prevention of viral infections</p> <p><i>Special virology</i> Picornavirus family, Virological diagnostics. Specific prophylaxis. Coronaviruses. Features of biology and their role in the emergence of the Covid19 pandemic in 2019-2023</p> <p>Ortho- and paramyxoviruses. Genetic variability. Features of reproduction. Virological diagnostics. Specific prophylaxis</p> <p>Pathogens of arbovirus infections. Features of reproduction. Virological diagnostics. Specific prophylaxis.</p> <p>HIV infection and AIDS. Virological diagnostics. Specific prophylaxis Hepatitis. Classification. Virological diagnosis. Specific prevention</p> <p>Herpesviruses and adenoviruses. Features of reproduction. Virological diagnostics. Specific prophylaxis</p> <p>Content module 1: General virology</p>	<p>multimedia support. Identification of problematic issues. Providing answers to questions and resolving them</p> <p>Presentation of lecture material with the use of multimedia support. Identification of problematic issues. Providing answers to questions and their solutions</p> <p>Presentation of lecture material with the use of multimedia support. Identification of problematic issues. Providing answers to questions and their solutions</p> <p>Practical classes include:</p> <p>1. Study of the morphology and reproduction of viruses in the process of their interaction with the cell.</p> <p>2. Infection of chicken embryos to model virus cultivation, indication of viral reproduction in chicken embryos and cell cultures</p> <p>3. Formulation and interpretation of serological reactions used in virology. Study of modern diagnostic and identification methods</p>	<p>Zn-1; Zn-2 -Um-2 Um-2 Um-3, K-1, K-2 AV-1, AV-2</p> <p>Zn-1; Zn-2 -Um-1 Um-2 Um-3, K-1, K-2 AB-1, AB-2</p> <p>Zn-1; Zn-2 -Um-2 Um-2 Um-3, K-1, K-2 AV-1, AV-2</p> <p>Zn-1; Zn-2 -Um-1 Um-2 Um-3, K-1, K-2 AB-1, AB-2</p> <p>Zn-1; Zn-2 -Um-1 Um-2 Um-3, K-1, K-2 AV-1, AV-2</p> <p>Zn-1; Zn-2 -Um-1 Um-2 Um-3, K-1, K-2 AV-1, AV-2</p>	
<p>II-1</p>	<p>Features morphology and ultrastructure of viruses. The main types of interaction between virus and cell. Classification of viruses. Methods of cultivation and detection of viruses in chicken embryos, cell cultures, laboratory animals (Indication and identification of viruses)</p>	<p>reproduction of viruses in the process of their interaction with the cell.</p> <p>2. Infection of chicken embryos to model virus cultivation, indication of viral reproduction in chicken embryos and cell cultures</p> <p>3. Formulation and interpretation of serological reactions used in virology. Study of modern diagnostic and identification methods</p>	<p>Zn-1; Um-1</p>	
<p>II-2</p>	<p>Basic serological reactions used for the diagnosis of viral diseases of prevention of viral infections. RIF. I Method of DNA probes.</p>	<p>Study of modern diagnostic and identification methods</p>	<p>Zn-1, Zn-2; Um-1; Um-2 K-1;</p>	
<p>II-3</p>	<p>Content module 2.</p>		<p>Zn-1 Um-1 Zn-2 Um-2 Zn-3; Um-3;</p>	

		K-1; K-2	
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	The family Picornaviridae (poliomyelitis, Coxsackie, and ESRD viruses). Features of structure and reproduction. Virological diagnostics. Specific prophylaxis. The role of coronaviruses. diagnostics. Specific prevention	viruses. 4.Practice practical skills based on the ability to isolate. Identify viruses. and analyze the results of the study	Features of the rep	of the research. Virus.
II-4	Viruses influenza (family orthomyxoviruses). Genetic variability. Features of reproduction. Virological diagnostics. Specific prophylaxis. Paramyxoviruses. Classification. Features of reproduction. Virological diagnostics. Specific prophylaxis.	their biological properties, epidemiology and pathogenesis of viral infections. 5. Solving situational problems that have a clinical focus, and their solution is based on knowledge and ability to interpret quantitative and qualitative data from virological research results Ability to analyze the biological properties of viruses pathogenic to humans;	Zn-1 Um-1 Zn-2 Um-2 Um-3; K-1; K-2	
II-5	Pathogens of arboviral infections. Family of filoviruses (Marburg and Ebola viruses). Family of flaviviruses (tick-borne encephalitis virus). Features. Virological diagnostics. Specific prophylaxis	Determination of the role of viruses in human pathology; Interpretation results diagnosis of viral infections. Ability to do conclusions based on the research results. Ability to select drugs used for specific prevention and treatment of viral infections.	Zn-1 Um-1 Zn-2 Um-2; Um-3; K-1; K-2	
II-6	HIV infection and AIDS. Features. Virological diagnostics. Specific prophylaxis	Ability to do conclusions based on the research results. Ability to select drugs used for specific prevention and treatment of viral infections.	Zn-1 Um-1 Zn-2 Um-2 Um-3; K-1; K-2	
II-7	Hepatitis. Classification. Features of reproduction. Virological diagnosis and specific prevention.	Ability to do conclusions based on the research results. Ability to select drugs used for specific prevention and treatment of viral infections.	Zn-2; Um-2; K-1; K-2	
II-8	Herpesviruses and adenoviruses. Features of reproduction. Virological diagnostics. Specific prevention	Ability to do conclusions based on the research results. Ability to select drugs used for specific prevention and treatment of viral infections.	Zn-1 Um-1 Zn-2 Um-2 Um-2; Um-3; K-1; K-2	
II-9	Prions. Viroids. Virusoids. Role in infectious pathology.	6. Drawing up schemes for diagnosing infections caused by viruses. Preparing for the		

		license exam "Krok-1.		
SRS-1	Modern views on the origin of viruses	Work with	Zn-1; AV-1	Pavlyak U.V.
SRS-2	Features of the structure of viral proteins and viral nucleic acids	educational and methodological literature, Internet resources; filling workbooks for students' independent work;	Zn-1; AV-1	Kovalenko I.V. Gural A.R.
SRS-3	Immunoassay systems in the diagnosis of viral infections		K-1	
SRS-4	Polymerase chain reaction in the diagnosis of viral infections		K-1	
SRS-5	Immunoblotting		K-1	
SRS-6	Restriction analysis of viral nucleic acids		K-1	
SRS-7	Virus interference	preparation for the license exam "Krok-1; work on solving individual situational tasks.	Zn-1 Um-1 Zn-2 Um-2	
SRS-8	Features of antiviral immunity		Zn-1 Um-1 Zn-2 Um-2	
SRS-9	Immunopathological reactions - delayed type reactions to counteraction viruses to the body's defense reactions		Um-3	
SRS-10	Virus-virus associations		Zn-1; K-1; K-2	
SRS-11	Genetics of viruses. Molecular basics of virulence of viruses		Zn-1; K-1;	
SRS-12	Prions, viroids		Zn-1; K-1; K-2	
SRS-13	A group of arboviruses. Crimean-Congo hemorrhagic fever virus.		Zn-1; K-1; K-2	
SRS-14	Tick-borne encephalitis virus		K-1; K-2	
SRS-15	Causative agents of rotavirus infections		Zn-1; K-1; K-2	
SRS-16	Coronaviruses. SARS virus (SARS). Flaviviruses (Zika virus).		AB-1; Zn-1; K-1; K-2	
SRS-17	Family of poxviruses. Smallpox virus		AB-1; K-1	
SRS-18	The virus of contagious fever		Zn-1; K-1; K-2	
SRS-19	Pathogens of slow viral diseases Infections (measles virus, PSPE, rubella virus)		Zn-1; K-1; K-2	
SRS-20	Oncogenic RNA-genomic viruses. Oncogenic DNA genomic viruses		Zn-1; K-1; K-2	

8. Verification of learning outcomes

Current control

Mastery of the topic is monitored during practical classes in accordance with specific goals.

The control of practical skills is based on the assessment of the ability to investigate virological drugs, study the biological and antigenic properties of viruses, study their interaction with a sensitive host cell (in the study of cell culture), perform and interpret the results of serological reactions with paired sera, interpret the results of modern methods of virological diagnostics, analyze the mechanism of action of antiviral drugs. Assessment is carried out by direct control of the student's performance of the skill by the teacher, as well as using illustrated tests and situational tasks.

At each practical lesson, students' knowledge is assessed on a four-point system ("5," "4," "3," "2") according to the criteria for evaluating the student's current performance.

The calculation of the number of points for the current activity in general for the discipline is based on the grades received by the student on the traditional scale for each practical lesson during the study of the discipline, by calculating the arithmetic mean (AM), rounded to two decimal places. The resulting value is converted to points on a multi-point scale as follows:

$$x = \frac{CA * 120}{5}$$

The minimum number of points that a student can score for the current activity in the course of studying the discipline is 72 points.

The maximum number of points that a student can score for current activities in the course of studying a discipline is 120 points.

Evaluation of student's independent work

The material for students' independent work, which is provided for in the topic of the practical class simultaneously with the classroom work, is assessed during the current control of the topic at the relevant classroom session. The assessment of topics that are submitted for independent study and are not included in the topics of classroom training sessions is carried out during the final control (examination).

Learning outcome code	Code of the type of occupation	Verification method learning outcomes	Admission criteria
Zn-1, Um-1, Zn-2, Um-2, Um-3, K-1, K-2, AB-1 AB-2	P - 1-6, SRS - 1- 20.	For current control of students' knowledge, test tasks have been created that contain typical tests on the topic of the lesson (including tests with several correct answers), theoretical questions, including questions from independent work; situational tasks (with 3 questions); practical skills in accordance with the topic of the lesson. Evaluation of test tasks: Excellent ("5") - Student correctly is 90-100% compliant	Excellent ("5") - The student correctly answers to 90-100% of tests correctly, clearly, logically and fully answers all questions. Can closely link theory and practice, correctly demonstrates the implementation of practical skills. Solves situational problems

			of increased complexity, is able to
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		<p>tests.</p> <p>Good ("4") - The student answered 71-89% of the tests correctly.</p> <p>Satisfactory ("3") - The student answered 60-70% of the tests correctly.</p> <p>Unsatisfactory ("2") - The student answered less than 60% tests</p> <p>Unsatisfactory ("2") - The student answered less than 60% tests</p> <p>Unsatisfactory ("2") - The student answered less than 60% of the tests.</p> <p>Assessment of practical skills:</p> <p>"5" demonstration of the skill is correct, complete;</p> <p>"4" - demonstration of the skill with 2-3 minor errors;</p> <p>"3" - demonstration of a skill with 1 significant, gross error or more than 3 minor errors.</p> <p>"2" - the demonstration of the skill is completely wrong or with 2 or more gross errors.</p> <p>Evaluation of the theoretical issue:</p> <p>"5" correct, complete answer</p> <p>"4" correct, incomplete</p> <p>"3" response with errors, incomplete</p> <p>"2" - the answer is not substantive, illogical</p> <p>Assessment of the situational task:</p> <p>"5" - correct , complete answers to all questions</p> <p>"4" - correct, complete answers to two questions</p> <p>"3" - correct, complete answer to one question</p> <p>"2" - answers to all questions are incorrect or</p>	<p>summarize material, knows research methods to the extent necessary for the doctor's activity.</p> <p>Good ("4") - The student answered 71-89% of the tests correctly. The student answered the questions correctly and that demonstrates the performance of practical skills. Correctly uses theoretical knowledge solve practical problems. Knows solve easy and of medium complexity situational problems. Has the necessary practical skills and by means of their implementation in excess of the required minimum.</p> <p>Satisfactory ("3") - The student answered correctly on 60-70% tests. Incomplete, with the help of additional questions, answered the question. Cannot independently construct a clear , logical answer . When answering and demonstrating practical skills, the makes mistakes. Student decided only</p>
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		are missing.	easiest tasks, has only a mandatory minimum of research methods. Unsatisfactory ("2") - The student answered less than 60% of the tests. Does not know the material current topic, does not can build a logical answer, does not answer additional questions, does not understand the material answering and demonstrating practical skills, makes significant, gross mistakes.
Final control			
General evaluation system	Participation in work during the semester/exam - 60%/40% on a 200-point scale		
Scales evaluation	traditional 4-point scale, multi-point (200-point) scale, ECTS rating scale		
Conditions of admission to the final control	The student attended all practical classes and received at least 120 points for current academic performance		
View of the final control	Methodology for conducting final control	Criteria. enrollment	
Credit	All topics submitted for the current control must be credited. Grades out of 4 scales are converted into points on a multi-point (200-point) scale in accordance with the Regulation "Criteria, Rules and Procedures Assessment of students' learning outcomes"	<i>Maximum the number of points is 200.</i> <i>Minimal number of points - 120</i>	

9. Course policy

Academic integrity.

During the scientific and pedagogical process, students (applicants) and teachers are obliged to be guided by the Code of Academic Ethics of Danylo Halytsky Lviv National Medical University as a document that defines the standards of educational and scientific activities of higher education students and university staff generally accepted by the world community and creates an environment of intolerance to violations of academic integrity and ethics of academic relations.

<https://nauka.meduniv.lviv.ua/wp-content/uploads/kodeks-akademichnoyi-etiki-2021.pdf>

The educational process is organized on the basis of a credit transfer system with the use of a rating assessment of student performance. Unacceptable: cheating and plagiarism; absences and lateness to classes; use of a mobile phone, tablet or other mobile devices during classes (except as provided by the curriculum).

plan and methodological recommendations of the teacher); untimely fulfillment of tasks set by the teacher during the current, final control of knowledge, as well as independent

student work. Detecting signs of academic dishonesty in a student's work is grounds for the teacher not to accept it, regardless of the extent of plagiarism or cheating. https://nauka.meduniv.lviv.ua/wp-content/uploads/2019/11/plagiat_viyavlennya-ta-sanktsiyi-dlya-zdobuvachiv.pdf

No form of violation of academic integrity will be tolerated. In the event of such events, the response is in accordance with the Code <https://nauka.meduniv.lviv.ua/wp-content/uploads/kodeks-akademichnoyi-etiki-2021.pdf>

Appeal procedure and algorithm

The applicant has the right to familiarize himself/herself with the results of his/her examination (test) written work no later than 2 working days after writing it and to receive explanations for the grade received. In case of violations of the procedure, disagreement with the grade, the applicant has the right to file a written appeal to the head of the department, stating the specific reasons for disagreement with the grade. The appeal procedure and evaluation rules and procedures are described in detail in the Regulations on the Criteria for Evaluation Rules and Procedures. An appeal against the results of the final control of knowledge of higher education students is a component of the organizational support of the educational process, which is carried out to determine the objectivity of the grade. The main task of the appeal procedure is to overcome the elements of subjectivity in the assessment of knowledge, to avoid misunderstandings and disputes, to create the most favorable conditions for the development and realization of the legitimate rights and interests of the student. The head of the department, together with the examiner, involving other specialists, forms a commission to consider the issue of compliance with the procedure and within three working days ensures the consideration of the appeal and orally informs the student of the results of the consideration. In case of confirmation of the circumstances set forth in the application of the student, a new control measure with a different composition of the commission is carried out by order of the rector (vice-rector for scientific and pedagogical work).

10. 10.

Required:

1. Medical microbiology, virology and immunology (ed. by academician **V.P. Shyrobokov**) - Vinnytsia: Nova Knyha, 2011. 951 p.
2. S.I. Klymnyuk, I.O. Sytnyk, V.P. Shyrobokov Practical microbiology: a textbook; under the editorship of: V.P. Shyrobokov, S.I. Klymniuk. - Vinnytsia: Nova Knyha, 2018. - 576 c.
3. Microbiology, virology and immunology in questions and answers; edited by V.P. Shyrobokov, S.I. Klymnyuk. - Ternopil: Ukrmedkniga, 2019. - 340 c.
4. Sytnyk IO Microbiology, virology, immunology / Sytnyk IO, Klymnyuk SI, Tvorako MS - Ternopil: Ukrmedkniga, 2003. - 392 p.
5. Microbiology, Virology and Immunology (ed. Vinnytsia, "Nova Knyha", 2017.- 371 p.
6. Gaidash IS, Flegontova VV Medical virology - Luhansk, 2002.
7. Virology. Study guide for laboratory classes / V. P. Polishchuk, I. G. Budzanivska, T. P. Shevchenko et al.
8. Viral infections in humans and animals: epidemiology, pathogenesis, features of antiviral immunity, therapy and prevention: a textbook / O. M. Andriychuk, H. V. Korotieieva, O. V. Molchanets, A. V. Kharina - Kyiv: Kyiv University Publishing and Printing Center, 2014. 415 p.
9. Gudz S.P., Peretyatko T.B., Galushka A.A. Virology.

Links to professional periodicals:

1. https://fems-microbiology.org/about_fems/network-and-activities/journals/
2. <https://elibrary.escmid.org/> ; <https://www.escmid.org/escmid-publications/manual-of-microbiology>
3. <https://asm.org/a/Microcosm-Digital-Magazine>
4. Microbiological Journal <https://microbiolj.org.ua/ua/archiv>
5. World of Medicine and Biology <https://womab.com.ua/ua/arcive>
6. Microbiology and Biotechnology <http://mbt.onu.edu.ua/issue/archive>
7. Regulatory mechanisms in Biosystems <https://medicine.dp.ua/index.php/med/issue/archive>

Additional :

1. Bukrinskaya A.G. Virology. Moscow: Medicine, 1986. - p.336
2. V.V. Danileichenko, Y.M. Fedechko, O.P. Korniychuk, I.I. Soloninko Microbiology with the Basics of Immunology (textbook) - Medicine, 2019.
3. Balakliets N.I., Tsyhanenko A.Y., Minukhin V.V. General microbiology.
4. S.P. Gudz, T.B. Peretyatko, A.A. Galushka. Virology. - Lviv: Ivan Franko National University of Lviv, 2018. - 536 p.
5. Gudz S.P., Gnatush S.O., Zvir G.I. Sanitary microbiology. - Lviv: Ivan Franko National University of Lviv, 2016.
6. Protchenko P. Z. General microbiology, virology and immunology. Selected lectures: Study guide.-Odesa: Odesa Medical University, 2002.
7. Paliy G.K., Paliy V.G., Mrug V.M. Microbiology, virology, immunology, infectious diseases. Dictionary / Edited by G.K. Paliy, V.G. Paliy - Kyiv: Zdorovye, 2004.
8. Dziublyk I.V., Shyrobokov V.P. Influenza and its prevention.
9. K. D., Krivoshein Yu. S. Microbiology.
10. Shyrobokov V.P., Yankovsky D.S., Dymant G.S. Microbial ecology of man.
11. Shyrobokov V.P. et al. To the history of microbiology development in research and educational institutions of Ukraine - Kyiv, Book Plus, 2006.
12. Review of Medical Microbiology and Immunology, 12edition / Warren E. Levinson / McGraw-Hill Prof Med.-Tech., 2012. - 688 p.
13. Jawetz, Melnick, & Adelberg's Medical Microbiology, 26th Edition, 2012, English. ISBN-13: 978-0071790314
14. Atlas R. M. Principles of microbiology.-McGraw-Hill, Boston, Massachusetts, 2001
15. State Emergency Service of Ukraine <http://www.dsns.gov.ua/>
16. World Health Organization <http://www.who.int/en/>
17. Microbiology and immunology on-line <http://www.microbiologybook.org/>
18. On-line microbiology note <http://www.microbiologyinfo.com/>
19. Centers for diseases control and prevention www.cdc.gov

11. Equipment, material, technical and software of the discipline/course
Access to the Internet

Panasonic multimedia interactive projector - available, put into operation in 2013.
TV sets - 2 pcs.
Luminescent microscope LUMAM R-8MBI-6
(900213) - No. 1
Autoclave Oven
Refrigerators
Analytical scales VLR-
200 - No. 1,
Thermostat TS-80 M - No. 5
Dispensers 10-1000.0 µL from Q3 2016 - No. 4,
Measuring utensils
Cell cultures to demonstrate viral reproduction to students
Media for cell culture (199, Igla, Versen's solutions, trypsin, aminopeptide)
Fixed microsections of clinical material for the indication of viral CDV Polystyrene plates for
serological reactions
Systems for rapid chromatographic diagnosis of viral infections (demonstration material)

12. Additional information

Practical classes are held at the address: 12 Zelena St., Lviv.
Students are allowed to attend the practical training only in a medical gown, cap, and change of shoes.

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