



## Syllabus on the discipline « Microbiology, virology and immunology including oral cavity microbiology »

<b>1. General information</b>	
<b>Faculty</b>	Dentistry
<b>Educational program</b> ( <i>field, specialty, level of higher education, form of education</i> )	22 Healthcare, 221 Dentistry, second (Master's) level of higher education, full-time
<b>Academic year</b>	2022-2023
<b>Discipline name, code</b> ( <i>electronic identification at the Danylo Halyskyi Lviv National Medical University website</i> )	Microbiology, virology and immunology including oral cavity microbiology; OK 16 <a href="http://new.meduniv.lviv.ua/kafedry/kafedra-mikrobiologiyi/">http://new.meduniv.lviv.ua/kafedry/kafedra-mikrobiologiyi/</a>
<b>Department</b> ( <i>name, address, phone, e-mail</i> )	Department of Microbiology 79005, Lviv, 12 Zelena street
<b>Chair of the Department</b> ( <i>e-mail</i> )	Prof. O.Korniychuk, MD
<b>Educational year</b> ( <i>year of the discipline study</i> )	II year
<b>Semester</b> ( <i>semester of the discipline study</i> )	III-IV Semester
<b>Type of the discipline/module</b> ( <i>mandatory / optional</i> )	Mandatory
<b>Teaching staff</b> ( <i>names, surnames, scientific degrees and titles, of the teaching staff, e-mails</i> )	assoc. prof. PhD M.Panas – <a href="mailto:panas.marta@gmail.com">panas.marta@gmail.com</a>
<b>Erasmus yes/no</b> ( <i>availability of discipline for students within the program Erasmus+</i> )	-
<b>Person, responsible for syllabus</b> ( <i>the person to whom comments on the syllabus should be given, e-mail</i> )	assoc. prof. PhD M.Panas
<b>Number of ECTS credits</b>	5 credits ECTS
<b>Number of hours</b> ( <i>lectures / practical classes / self- reliance work</i> )	Lecture – 16 hours Practical class – 59 hours Self-education work – 75 hours
<b>Language</b>	English
<b>Information on the consultations</b>	Consultations are held in accordance with the schedule approved by the Chair of the department
<b>Address, telephone and rules of operation of the clinical base, office...</b> ( <i>if necessary</i> )	-

## **2. Short resume of the discipline**

Microbiology, virology and immunology including oral cavity microbiology study the origin, evolution and properties of pathogenic microorganisms, the role of normal microflora of the human body, patterns of interaction of microorganisms with macroorganisms, immune system and mechanisms of anti-infective immunity, diagnostic methods, principles of treatment and specific prevention of infectious diseases including oral cavity. The study of this discipline is necessary to understand the role of microorganisms in the pathogenesis of infectious and a number of somatic diseases, the importance of microbiological methods in the diagnosis of these diseases, the basics of asepsis and antiseptics.

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 microorganisms were taken into account and educational material from leading international textbooks on microbiology was introduced.

## **3. Objective and tasks of the discipline**

### **1. Objective**

The purpose of teaching the discipline " Microbiology, virology, immunology, including Microbiology of the oral cavity "is the study of the properties of normal microflora of the human body, the regularity of the interaction of the microorganism with the macroorganism, the immune system and the mechanisms of antiinfectious immunity, pathogenic microorganisms, diagnostic methods, treatment principles and specific prevention of infectious diseases, incl. oral cavity.

The study of microbiology is necessary for understanding the role of microorganisms in the pathogenesis of dental diseases, the importance of microbiological methods in diagnosis; obtained knowledge is used to study the problems of treatment and prevention of dental and related diseases. The aims are established on the basis of the training of a doctor in the specialty according to the module (natural science training) and is the basis for determining the content of the discipline. The description of goals is formulated through skills of target tasks (actions). Based on the ultimate aims for each module, specific goals are formulated in the form of certain skills (actions), objectives, which ensure the achievement of the ultimate goal of studying the discipline and specific prevention of infectious diseases.

### **Tasks of the discipline**

- to interpret the biological properties of pathogenic and non-pathogenic microorganisms, patterns of their interaction with macroorganism and the external environment;
  - to define methods of microbiological and virological diagnostics, etiotropic therapy and specific prevention of infectious diseases, as well as non-infectious diseases of microbial genesis;
  - explain the role and functions of the immune system of the human body;
  - to interpret the basic mechanisms of the formation of the immune response of the human body;
2. • identify the main types of pathological response of the immune system and the relationship with the emergence of the most common human diseases.

### **3. Competencies and results of studying**

#### *Common Competences:*

CC-1. Ability to abstract thinking, analysis and synthesis.

CC-2. Knowledge and understanding of the subject area and understanding of professional activity.

CC-4. Ability to communicate in the state language both orally and in writing.

CC-6. Skills in the use of information and communication technologies.

CC-7. Ability to search, process and analyze information from various sources.

CC-8. Ability to adapt and act in a new situation.

CC-9. Ability to identify, pose and solve problems.

CC-10. Ability to be critical and self-critical.

CC-11. Ability to work in a team.

CC-13. Ability to act socially responsibly

CC-15. Ability to preserve and multiply moral, cultural, scientific values and achievements of society based on understanding 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, techniques and technologies, use different types and forms of physical activity for active recreation and a healthy lifestyle

#### *Professional competencies (PC)*

PC-2. Ability to interpret the results of laboratory and instrumental studies.

<p>PC-3. Ability to diagnose: determine the preliminary, clinical, final, concomitant diagnosis, emergencies.</p> <p>PC-4. Ability to plan and implement measures for the prevention of diseases of organs and tissues of the oral cavity and maxillofacial region.</p> <p>PC-5. Ability to design the process of providing medical care: to determine the approaches, plan, types and principles of treatment of diseases of organs and tissues of the oral cavity and maxillofacial region.</p>		
<b>4. Prerequisites of the discipline</b>		
<ol style="list-style-type: none"> <li>1. Medical biology with parasitology</li> <li>2. Histology, cytology and embryology</li> <li>3. Biophysics</li> <li>4. Biochemistry</li> <li>5. Normal physiology</li> <li>6. Pathological physiology</li> <li>7. Pathological anatomy</li> </ol>		
<b>5. Program results of study</b>		
<b>List of the results of study</b>		
Code of the result of study	Content of the result of study	Link to the code in the matrix of competencies
<i>Kn -1 Ab -1</i>	Ability to analyze the biological properties of pathogenic and non-pathogenic microorganisms, patterns of their interaction with the macroorganism and the environment.	PIP-2; PIP-20
<i>Kn -2 Ab -2</i>	The ability to interpret the basic mechanisms of formation of the immune response of the human body.	PIP-2
<i>Kn -3 Ab -3</i>	The ability to identify the main types of pathological reactions of the immune system and their relationship to the most common human diseases.	PIP-2
<i>C -1</i>	Ability to determine methods of microbiological and virological diagnostics	PIP-3
<i>C -2</i>	Ability to determine means of etiotropic therapy and specific prevention of infectious diseases, as well as non-infectious diseases of microbial origin.	PIP-6, PIP-8, PIP-25
<i>AR -1</i>	Ability to process state, social and medical information.	PIP-3, PIP-20
<b>6. Discipline format and scope</b>		
Discipline format ( <i>full-time / part-time</i> )	<p>Full-time 5 ECTS credits, 150 hours are allocated for the study of the discipline</p> <p>Content modules: Morphology and structure of prokaryotes and parasitic unicellular eukaryotes. Staining of microorganisms. Microscopy. Bacterial physiology. Genetics of microorganisms. Microbiological basis of antimicrobial chemotherapy. Infection. The body's immune system. Reactions of nonspecific protection against infectious agents. Antigens, antibodies. Fundamentals of transplant immunology. Immune reactions. Immunopathology. Immunoprophylaxis and immunotherapy. General virology. Special virology. Pathogenic prokaryotes and eukaryotes. Fundamentals of clinical microbiology. Sanitary microbiology and virology.</p>	
Type of classes	Number of hours	Number of groups
lectures	20	1

practical classes	70			1
self-reliance	60			1
<b>7. Topics and scope of the discipline</b>				
Code of the class type	Topic	Scope of study	Code of	Teaching staff
L-1	Medical microbiology, its tasks. Morphology of bacteria. Modern systematic and nomenclature of microorganisms. Microbial genetics. Physiology of bacteria.	Methods of educational and cognitive activity: explanatory-illustrative method, method of problem statement. This is done using multimedia presentations. The focus is on preparing for the Step-1 licensing exam. Lectures include the study of the principles of taxonomy, genetics, morphology, physiology, pathogenicity factors and antigenic structure of pathogenic microbes; causes of resistance of microorganisms to antimicrobials; basics of biotechnology. The factors and mechanisms of nonspecific and specific immune response of the human body to the invasion of foreign agents, the immune status of the human body, as well as immunopathology are studied. study of pathogenesis, features of infectious process, main clinical manifestations, features of immunity, methods of diagnosis, principles of treatment and prevention of infectious and a number of somatic diseases is carried out. Sanitary and clinical microbiology are	Kn-1	assoc. prof. PhD M.Panas
L-2	Concept of infection. Antibiotics. Classification of antibiotics by origin, chemical structure, mechanisms of action. Antimicrobial therapy at inflammatory process of oral cavity.		Kn -1	
L-3	Immunity. Non-specific resistance factors of oral cavity. Mechanisms of specific immunity. Mechanisms of immune response. Immunotherapy and immunoprophylaxis.		Kn -2; Kn -3	
L-4	Viruses. Morphology, ultrastructure, physiology. Principles of classification of viruses. Interaction of virus with the cell. The methods of cultivation of viruses. RNA-viruses. General characteristics. Orthomyxoviruses. Retroviruses. Coronaviruses.		C-2	
L-5	DNA-viruses. General characteristics. Herpesviruses. Adenoviruses. Hepatitis (general characteristics, pathogenesis, microbiological diagnosis treatment and prophylaxis)		Kn -1; Ab-1	
L-6	Pathogenic pyogeni cocci staphylococci, streptococci, meningococci, gonococci.		Kn -1; C-1; C-2	
L-7	Causative agents of diphtheria and tuberculosis		Kn -1; C-1; C-2	
L-8	Clinical microbiology		Kn -1; C-1; C-2	

		studied separately.		
P-1	Structure, equipment and safety precautions in microbiological laboratory. The basic groups of microorganisms. The microscopic method of investigation. The main shape of bacteria. Simple methods of staining.	Teaching methods: verbal; visual; practical, explanatory-illustrative method, methods of stimulation and motivation of educational and cognitive activity, interactive methods: "Brainstorming", "Method of competitive groups", "Method of cases". Educational videos and multimedia presentations are used to implement these methods.  Practical classes include: 1. Preparation by students of smears-preparations from cultures of microorganisms grown on liquid and solid nutrient media. Students perform self-seeding of the studied material on nutrient media, isolation of pure cultures of bacteria, study of morphological, tinctorial, cultural and biochemical properties of bacteria, as well as their pathogenic factors. Carrying out the autopsy of an animal that has died from an experimental infection. The antibioticogram is set up independently, its results are interpreted, as well as the method of serial dilutions. students self-	Kn-1; C-1	assoc. prof. PhD M.Panas
P-2	Microscopic method of investigation. Complex methods of staining. Gram's, Ziehl-Neelsen's staining. An ultrastructure of bacterial cell.		Kn-1; C-1	
P-3	Physiology of microorganisms. Nutrition and respiration of microorganisms. Cultivation of bacteria. Bacteriological method of investigation. Isolation of pure cultures of aerobes from caries dens (the first day of investigation). Sterilization and disinfection of dentistry instruments.		Kn-1; C-1	
P-4	Bacteriological method of investigation. Isolation of pure culture of aerobes from caries dens (the second day of investigation). Microbial genetics.		Kn-1; C-1	
P-5	Bacteriological method of investigation. Isolation of pure culture of aerobes from caries dens (the third day of investigation). Methods of cultivation and isolation of pure culture of anaerobes.		Kn-1; C-1	
P-6	Bacteriological method of investigation. Isolation of pure cultures of aerobes from caries dens (the fourth stage of investigation). Identification of pure culture of bacteria. Experimental method of investigation. Virulence factors of microorganisms and its role in development of dental diseases.		Kn-1; C-1	
P-7	Antibiotics and chemical drugs. Requirements to antimicrobial drugs in dentistry practice.		Kn-1; C-1	
P-8	Immunity. Factors of nonspecific resistance of the organism. Nonspecific factors of oral cavity. Antigens and antibodies.		Kn-1; C-1	
P-9	Principles of serological identification of microorganisms and diagnosis of infectious diseases. Agglutination and precipitation tests, complement fixation test. Modern methods of rapid diagnosis of infectious		Kn-1; C-1; C-2; Ab-1	

	diseases. (enzyme-linked immunosorbent assay, immunofluorescence test, polymerase chain reaction).	inactivated vaccine, studying the features of means for	
P-10	Immunopathological process of oral cavity. Allergy. Methods of diagnosis. Estimation of an immune status of oral cavity. Immunoprophylaxis and immunotherapy of infection diseases.	immunoprophylaxis and immunotherapy at the present stage.	Kn-2; C-2
P-11	Morphology and structure of viruses. Methods of viral cultivation. Methods of virological diagnosis, treatment and prevention of viral diseases.	2. Implementation of infection of chicken embryos in order to model the cultivation of viruses, indication of viral reproduction in chicken embryos and cell cultures.	Kn-2; C-2
P-12	Herpesviruses. Laboratory diagnosis of herpesviruses' infections. Coronaviruses. Laboratory diagnosis of COVID-19	Interpretation of serological reactions used in virology.	Kn-3; C-3
P-13	Causative agents of viral hepatitis. Laboratory diagnosis of viral hepatitis. Retroviruses. Human immunodeficiency virus. Laboratory diagnosis of HIV-infection	Study of virus identification methods. caused by viruses.	Kn-3; C-3
P-14	Staphylococci, streptococci, meningococci and gonococci. Microbiological diagnosis diseases, caused by grampositive and gramnegative cocci.	Development of algorithms for etiotropic therapy, non-specific and specific prevention of viral infections	Kn-3; C-3
P-15	Pathogenic enterobacteria.. Microbiological diagnosis of colienteritits, typhoid fever, paratyphoid fever A and B, salmonellosis, shigellosis.	3.Study of students morphological, tinctorial, cultural and biochemical properties of pathogens of bacterial infections, as well as their pathogenicity factors. principles of etytropic treatment and specific prevention.	C-2; Ab-1
P-16	Corynebacteria. Microbiological diagnosis of diphtheria. Mycobacteria. Microbiological diagnosis of tuberculosis.	Development of an algorithm of actions in the diagnosis of nosocomial nosocomial infection.	Kn-1; C-1
P-17	Spirochetes. Microbiological diagnosis of syphilis, borreliosis and leptospirosis. Spirochetes of oral cavity. Pathogenic Spirilla. Campylobacteria (Campylobacter). Helicobacteria (Helicobacter).	Study of the normal microflora of the human body. sanitary microbiology.	Kn-1; C-1
P-18	Pathogenic actinomycetes and fungi. Actinomycosis and mycoses of oral cavity. Microbiological diagnosis, medical preparations.		Kn-3; C-3; C-1; C-2
P-19	Microbiota of oral cavity. Microflora of dental plaque. Stomatitis, caries, pulpitis.		Kn-3; C-3; C-1; C-2
P-20	Microbiological diagnosis of pyogenous inflammatory processes in dentistry practice caused by aerobic and anaerobic bacteria (abcesses,		Kn-3; C-3; C-1; C-2

	thrombophlebitis, phlegmones, osteomyelitis).	4. Preparation for the licensing exam "Step-1". 5. Practice of practical skills based on the ability to identify microorganisms and analyze the results of studying their biological properties and the study of pathogenic factors. 6. The solution of situational problems that have a clinical direction, and their solution is based on knowledge and ability to interpret quantitative and qualitative data of microbiological research results.		
SEW-1	Morphology and structure of other representatives of procaryotes: rickettsiae, chlamydia, mycoplasmas.	Teaching methods: visual; practical, explanatory-illustrative method, methods of stimulation and motivation of educational-cognitive activity.	Kn-1; Ab-1	assoc. prof. PhD M.Panas
SEW-2	Types of biological oxidation of the substrate and methods of obtaining energy in heterochemoorganotrophs (oxidative metabolism, decay, fermentation, nitrate breathing).		Kn-1; Ab-1	
SEW-3	Genetic methods of research: DNA sequences, DNA probe method, PCR, nucleic acid hybridization, and others.	Work with educational - methodical literature, illustrative material (tabular and video fund of the department); Internet - resources; filling in workbooks for independent work of students, preparation for the license exam "Step-1", solving individual situational tasks.	Kn-2	
SEW-4	Human histocompatibility antigens.		Kn-2	
SEW-5	Antiviral chemotherapeutic drugs, their classification. Mechanism of antiviral action.		Kn-3	
SEW-6	Microbiological methods of environmental control in dentistry clinic. Disbacteriosis of oral cavity		Kn-2; Kn-3	
SEW-7	Orto- and paramyxoviruses (parainfluenza, measles, mumps, respiratory syncytial virus). Methods of virological diagnosis, treatment, prevention.		C-2	
SEW-8	Enteroviruses. Poliomyelitis virus, ECHO, foot-and-mouth disease virus.		C-2	
SEW-9	The ecological group of arboviruses (the family Flaviviridae, the family Bunyaviridae, the family Togaviridae). Virus of tick-borne encephalitis.	Study of the history	YM-3	

SEW-10	Slow viral infections. Prions	of microbiology. Introduction to the principles of taxonomy of microorganisms. Detailed study of the mechanisms of resistance of microorganisms to antimicrobial agents. Detailed study of serological reactions, interpretation of their results. Analysis of the results of the study of immune status, study of immunopathological conditions. Interpretation of serological reactions used in virology. Study of virus identification methods.	Kn-1; C-1; C-2
SEW-11	Adenoviruses. Biological properties. Pathogenesis of diseases. Laboratory diagnosis.		Kn-1; K-1; K-2
SEW-12	Coronaviruses: SARS, MERS. Biological properties. Pathogenesis of diseases. Laboratory diagnosis.		Kn-1; C-1; C-2
SEW-13	Genus Klebsiella. Characteristics and biological properties. Klebsiella pneumonia, ozena and rhinoscleroma. Role in pathology. Microbiological diagnostics. Proteus (Proteus), Morganella and providencia (Providencia).		Kn-1; C-1; C-2
SEW-14	Cholera vibrio. Microbiological diagnosis of cholera		C-1; C-2
SEW-15	Mycobacterium lepra. Actinomycetes. Nocardia. causative agent of pertussis.		Kn-1; C-1; C-2
SEW-16	Causative agents of zoonotic infections.		AB-1; Kn-1; C-1; C-2
SEW-17	Rickettsia. Chlamydia. Mycoplasma.		AB-1; C-1
SEW-18	Pathogenic Spirilla. Campylobacteria (Campylobacter). Helicobacteria (Helicobacter).		Kn-1; C-1; C-2
SEW-19	Opportunistic infection. Hospital infections (nosocomial).		Kn-1; C-1; C-2
SEW-20	Anaerobic nonclostridial bacteria: Bacteroides, Prevotella, Porphyromonas, Fusobacterium, Propionibacterium. Anaerobic cocci: Peptococcus, Peptostreptococcus, Veillonella.	Development of schemes for the diagnosis of infections caused by viruses. Students study independently morphological, tinctorial, cultural and biochemical properties of pathogens of bacterial infections, as well as their pathogenic factors. determination of principles of etyotropic treatment and specific prevention. Development of algorithm of actions at diagnostics and search of ways of overcoming of intra - nosocomial infection. Development of	
SEW-21	Gram-negative non-fermenting bacteria: genus Pseudomonadaceae. Others pathogenic bacteria: (family Legionellaceae, genus Pasteurella, genus Haemophilus, genus Listeria).		Kn-1; C-1; C-2
SEW-22	Pathogenic protozoa. Classification. Biological properties.		Kn-1; C-1; C-2
SEW-23	Opportunistic infection. Hospital infections (nosocomial).		Kn-1; C-1; C-2
SEW-24	Periodontopathogenic microorganisms. Microbiological investigation in dentistry.		Kn-1; C-1; C-2
SEW-25	Septic conditions, microbiological diagnosis and prevention.		Kn-1; C-1; C-2



SEW-26	The basis of sanitary microbiology. Sanitary microbiology of water, soil and air. Sanitary virology.	algorithm of correction of dysbacteriosis. Study of the principles of biotherapy.  Interpretation of the results of the study of the environmental microflora in sanitary microbiology.	Kn-1; C-1; C-2	
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### 8. Results of study verification

Assimilation of the topic is controlled in practical classes in accordance with specific objectives. means, formulation and interpretation of the results of serological reactions, interpretation of the results of microbiological examination of various clinical material, as well as the study of the microflora of the environment. Assessment is carried out by the teacher's direct control of the student's performance of the skill, as well as with the use of illustrated tests. with criteria for assessing the current activities of the student.

The calculation of the number of points for the current activity in general for the discipline is based on the student's marks on the traditional scale for each practical lesson during the study, by calculating the arithmetic mean (CA), rounded to two decimal places. The value obtained is converted into 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 study of the discipline is 72 points. .

The maximum number of points that a student can score for the current activity in the study of the discipline is 120 points.

#### Assessment of student independent work

Material for independent student work, which is provided in the topic of practical classes at the same time as classroom work, is assessed during the current control of the topic in the relevant classroom. Assessment of topics that are submitted for independent study and are not included in the topics of classroom training, is carried out during the final control (exam).

#### Current control

is carried out during the training sessions and aims to check the assimilation of educational material by students (it is necessary to describe the forms of current control during the training sessions). Forms of assessment of current educational activities should be standardized and include control of theoretical and practical training. The final grade for the current educational activity is set on a 4-point (national) scale

Result of study code	Code of the class	Result of study verification method	Enrollment criteria
Kn-1, Kn-2, Kn-3, C-1, C-2, Ab-1	P - 1- 20, SEW – 1- 26.	For the current control of students' knowledge, test tasks have been created, which contain standard tests on the topic of the lesson (including tests with several correct answers), theoretical questions, which include questions from the lecture course and questions from independent work; situational tasks (with 3 questions); practical skills according to the topic of the	<b>Excellent ("5")</b> – The student correctly answered 90-100% of the A format tests. Correctly, clearly, logically and completely answered all questions. May closely link theory and practice, correctly shows practical skills performance. Freely reads the results of the

		<p>lesson.</p> <p>Assessment of test tasks:  Excellent ("5") - The student answers 90-100% of the tests correctly.  Good ("4") - The student correctly answered 71-89% of the tests.  Satisfactory ("3") - The student answered 60-70% of the tests correctly  Unsatisfactory ("2") - The student answered less than 60% of the tests. Unsatisfactory ("2") - The student answered less than 60% of the tests. Unsatisfactory ("2") - The student answered less than 60% of the tests.</p> <p>Assessment of practical skill:  "5" - demonstration of skill correct, complete;  "4" - demonstration of skill with 2-3 minor errors,  "3" - demonstration of skill with 1 significant, gross error or more than 3 minor errors.  "2" - demonstration of skill completely incorrect or with 2 or more gross errors.</p> <p>Assessment of the theoretical question:  "5" - the answer is correct, complete  "4" - the answer is correct, incomplete  "3" - the answer with errors, incomplete  "2" - the answer is not essential, illogical</p> <p>Assessment of the situational problem:  "5" - correct, complete answers to all questions  "4" - correct, complete answers to two questions  "3" - correct, complete answer to one question  "2" - answers to all questions are incorrect or missing.</p>	<p>works, solves case studies of high complexity, is able to generalize material, possesses research methods to the extent necessary for the activity of the doctor. Performed planned individual work.</p> <p><b>Good ("4")</b> – The student correctly answered 70-89% of the A format tests. Correctly and essentially answered the questions. Shows practical skills performance. Correctly uses theoretical knowledge in solving practical tasks. Is able to solve easy or moderate case studies. Possesses the necessary practical skills and techniques for their implementation to the extent that exceeds the required minimum.</p> <p><b>Satisfactory ("3")</b> – The student correctly answered 50-69% of the A format tests. Incompletely, with additional questions, answers the questions. Can not build a clear, logical answer on his own. The student makes mistakes while answering and demonstrating practical skills. The student solves only the easiest tasks, possesses only mandatory minimum of the investigation methods.</p> <p><b>Unsatisfactory ("2")</b> – The student answered less than 50% of the A format tests. Does not know the current theme material, can not construct a logical answer, does not answer any additional questions, does not</p>
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			understand the material. While answering and demonstrating practical skills makes significant, serious errors.
<b>Final control</b>			
General evaluation system		Participation to the classes during the semester - 100% on a 200-point scale	
Evaluation scales		traditional 4-point scale, multi-point (200-point) scale, ECTS rating scale	
Conditions for admission to the final control		The student attended all practical classes and received at least 120 points for current performance	
Type of final control		Methods of final control	Enrollment criteria
Credit		It is necessary to enroll all topics submitted for current control. Grades from the 4-point scale are converted into points on a multi-point (200-point) scale in accordance with the Regulation "Criteria, rules and procedures for evaluating the results of students' learning activities".	<i>The maximum number of points is 200.</i> <i>The minimum number of points is 120</i>
<b>Criteria for assessing the exam / differentiated test</b>			
Exam	Methods and means of standardized assessment when taking the exam Exam rules The exam consists of the following stages: Stage I - written answer to test tasks of format A (blank test control). The student responds to a test package. Each package contains 40 tests of A format with the topics of each content module. Stage II - written detailed answer to 4 theoretical questions and 2 situational problems. The student receives a block of questions - 4, which must be answered in writing, as well as a block of situational tasks - 2, which must be solved in writing. Stage III - testing of practical skills. The student demonstrates knowledge and performance of 2 practical skills.	The correct answer to each of the 40 test tasks of format A is evaluated in 1 point. Evaluation of each of the 4 theoretical questions is as follows: <b>5 points</b> - the student answers the questions correctly, clearly, logically and in detail. <b>4 points</b> - student correctly, in fact, but incompletely answers the question. <b>3 points</b> - student incompletely answers questions, makes mistakes. <b>0-2 points</b> - student answers incorrectly to questions, does not know the material, makes significant, gross mistakes. Evaluation of each of the 2 situational tasks is as follows: <b>5 points</b> - correct complete answers to the questions of the problem. <b>4 points</b> - correct incomplete answers to the question. <b>3 points</b> - answers to the	

		<p>problem questions are incomplete, with errors.  <b>0-2 points</b> - the answer is incorrect or absent.  Assessment of each of the 2 practical skills carried out as follows:  <b>5 points</b> - correctly demonstrates the implementation of practical skills, correctly, clearly and logically interprets the results of serological reactions, antibioticograms, correctly and completely describes the microscopic picture, correctly takes into account the cultural and biochemical properties of microorganisms, determines the factors of pathogenicity, clearly and logically interprets the results of the accounting. Closely connects theory with practice.  <b>4 points</b> - correctly uses theoretical knowledge in solving practical problems. Has the necessary practical skills and techniques to perform them in excess of the required minimum; gives correct incomplete answers to questions.  <b>3 points</b> - during the demonstration of practical skills and answers the student makes mistakes.  <b>0-2 points</b> - the answer is incorrect or missing.</p>
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**The maximum number of points of the final control (exam) is 80.**

Exam passed - the student scored 50 or more points.

Exam failed - the student scored less than 50 points.

The number of points assigned to students at the end of the discipline is calculated as the sum of points for current educational activities and points for final control (exam).

## **9. Policy of the discipline**

### **Academic integrity.**

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

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

The organization of the educational process is carried out on the basis of the credit-transfer system with the use of rating evaluation of students' success. Inadmissible: copying and plagiarism; absences and lateness to classes; using a mobile phone, tablet or other mobile devices during class (except for cases provided for by the curriculum and methodical recommendations of the teacher); untimely completion of tasks set by the teacher during the current, final control of knowledge, as

well as independent work of students. The discovery of signs of academic dishonesty in a student's work is a reason for the teacher not to enroll it, regardless of the scale of plagiarism or deception. [https://nauka.meduniv.lviv.ua/wp-content/uploads/2019/11/plagiat\\_viyavlennya-ta-sanktsiyi-dlya-zdobuvachiv.pdf](https://nauka.meduniv.lviv.ua/wp-content/uploads/2019/11/plagiat_viyavlennya-ta-sanktsiyi-dlya-zdobuvachiv.pdf)

Any form of violation of academic integrity will not be tolerated. In case of such events, respond in accordance with the Code

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

#### **The procedure and algorithm of the appeal.**

The student has the right to get acquainted with the results of his examination (credit) written work no later than 2 working days after its writing and to receive an explanation of the received grade. In case of procedural violations, disagreement with the assessment, the student has the right to submit a written appeal to the head of the department, indicating the specific reasons for disagreement with the assessment. The appeal procedure and the evaluation rules and procedures are described in detail in the Regulations on Evaluation Rules and Procedures Criteria. The appeal regarding the results of the final control of the knowledge of the students of higher education is a component of the organizational support of the educational process, which is carried out to determine the objectivity of the given assessment. The main task of the appeal procedure is to overcome the elements of subjectivism during the evaluation of knowledge, to avoid misunderstandings and controversial situations, to create the most favorable conditions for the development and real provision of the legal 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 consideration of the appeal and verbally informs the student of the results of the review. In the case of confirmation of the circumstances stated in the student's application, by order of the rector (vice-rector for scientific and pedagogical work), a new control event is held with a different composition of the commission.

## **10. Literature**

### *Basic literature*

1. Medical microbiology, virology and immunology = Медична мікробіологія, вірусологія та імунологія : a textbook for English-speaking students of higher medical schools: translation from ukr. Published / [T.V. Andrianova, V.V. Bobyr, V.V. Danyleichenko, ect.] ed. by V. P. Shyrobokov. Vinnytsia: Nova Knyha, 2019. - 744 p. : ill.
2. Medical microbiology and immunology = Медична мікробіологія та імунологія : підручник / Тимків М. З., Корнійчук О. П., Павлій С. Й. [та ін.]. – Вінниця : Нова Книга, 2019. – 416 с.
3. Ananthanarayan and Paniker's Textbook of Microbiology.- 7th ed.-N.Y., 2005.- P. 7 – 24.  
Fritz H. Kayser, Kurt A. Bienz, Johanenes Eckert, Rolf M. Zinkernagel Medical Microbiology. – Thieme, 2010. – P. 4 – 6, 146 - 148.

### *Additional literature*

5. Lakshman P., Samaranayake Essential Microbiology for Dentistry. – 3ed ed. – Elsevier Limited, 2006. – P. 7 – 15.
6. Richard J. Lamont and Howard F. Wiley Oral Microbiology at a Glance, 1st ed.. – Blackwell Jenkinson, 2010.
7. Philip D. Marsh, Michael V. Martin Oral Microbiology Text and Evolve eBooks Package, 5th ed. – FRCPath FFGDPDCS (UK), 2009.
8. Jawetz Melnick & Adelbera's Medical Microbiology.- 25th ed.- Mc Graw Hill Medical, 2010. – P. 8 - 13, 39.
9. Michael J. Pelczar, JR, E.C.S. Chan, Noel R. Krieg Microbiology. – 5th ed. – Tata McGraw-Hill Publishing Company Limited, 2002.- P.50 – 99.
10. Kathleen Park Talaro, Arthur Talaro Foundations in Microbiology.- 4th ed.- Mc Graw Hill, 2002.- P. 8 – 9, 18 – 21, 70 – 79, 87 – 107.

***Links to professional periodicals:***

1. [https://fems-microbiology.org/about\\_fems/network-and-activities/journals/](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. The 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>

***Information resources***

Microbiology and immunology on-line <http://www.microbiologybook.org/>  
On-line microbiology note <http://www.microbiologyinfo.com/>  
Centers for diseases control and prevention [www.cdc.gov](http://www.cdc.gov)

**11. Equipment, material and technical and software of the discipline / course**

Internet access

Panasonic multimedia interactive projector - available, put into operation in 2013.

TVs - 2 pcs .

LUMAM R-8 fluorescent microscope

MBI-6 (900213) - № 1

Autoclave

Dry oven

Refrigerators

Analytical scales

VLR-200 - №1,

Thermostat TS-80 M - № 5

Dispensers 10-1000,0 µl from 3 sq.m. 2016 - № 4,

Petri dishes, bacteriological loops, tweezers

Disks with antibiotics - №50

Measuring utensils

Nutrient media Endo, BA, MPA, MPB, YSA, Saburo.

Burners

**12. Additional information**

Lectures and practical classes are held at: Lviv, st. Zelena, 12.

Responsible for the educational process at the department - Assoc. prof. Shykula R.G

Responsible for the scientific circle of the department - As. Konechnyi Y.

Students are allowed to practice only in a medical gown, hat and change of shoes.

Compiler of syllabus:

Panas M.A., Assoc. Prof., Ph.D.

(Signature)

Head of the department:

Korniychuk OP, prof., Ph.D.

(Signature)

