

**MINISTRY OF HEALTH OF UKRAINE  
ODESA NATIONAL MEDICAL UNIVERSITY**

**Medical, International Faculty**

**Department of General and Clinical Epidemiology and Biosafety  
with course in Microbiology and Virology**

**Syllabus of course  
«MICROBIOLOGY, VIROLOGY AND IMMUNOLOGY»**

<b>Volume:</b>	Total number of hours: 210 hours, 7 credits Semester: III - IV 2 <sup>nd</sup> course
<b>Days, Time, Place:</b>	According to the Schedule Department of General and Clinical Epidemiology and Biosafety with course in Microbiology and Virology. Odesa, 1 Knyazivska str., rooms 1-6
<b>Teacher(s)</b>	Hruzesvkyi O.A., MD, Doctor of Science, full professor; Associate professors: Holovatiuk O.L., MD, PhD, Koltsova I.G., MD, PhD, Kurtova M.M., PhD, MD, Shevchuk H.Y., PhD; Assistant professors: Denysko T.V., Dubina A.V., Kahliak M.D., Kobylnyk S.M., Tabulina A.M., Tarasov Y.V., MD
<b>Contact information</b>	<i>Phone:</i> Shevchuk Hanna, Head of studies 093-419-96-77 Dubina Anzhela, responsible for the organizational and educational work of the department 067-428-63-43 Cheban Maya, laboratory assistant 048-753-09-81 <i>E-mail:</i> <a href="mailto:onmedumicrobio@onmedu.edu.ua">onmedumicrobio@onmedu.edu.ua</a> ; Offline consultations: Thursday – 14.00 - 16.00; Saturday – 9.00 - 13.00; Online consultations: Thursday – 14.00 - 16.00; Saturday – 9.00 - 13.00; The link to the online consultation is provided to each group during the classes separately.

## COMMUNICATION

Communication with students will be carried out in the classroom (in person).

During distance learning, communication is carried out through the Microsoft Teams platform, Moodle, as well as through e-mail correspondence, Viber and Telegram messengers (through groups created in Telegram for each group, separately through the group head).

## ANNOTATION OF THE COURSE

*The subject of study of the discipline* is the properties of pathogenic representatives of the world of microorganisms, their interaction with the human body, mechanisms of the development of infectious diseases, methods of their diagnosis, specific prevention and treatment.

*Prerequisites and post-requisites of the discipline (place of the discipline in the educational program):*

*Prerequisites:* Ukrainian language (by professional direction), foreign language (by professional direction), the latin language, medical biology, medical and biological physics, biological and bioorganic chemistry, human anatomy, histology, cytology and embryology, physiology.

*Post-requisites:* Hygiene, epidemiology with a course of evidence-based medicine, pathophysiology, pathomorphology, clinical immunology and allergology, infectious diseases with children's infectious diseases, internal medicine, general surgery and other clinical disciplines.

*The purpose is:* to master the knowledge about the physiological role of microorganisms in the human body, their interaction with the human body; mechanisms of development of infectious diseases; to form the ability to determine the necessary methods of diagnosis, specific prevention and treatment of infectious diseases.

*The tasks of the discipline:*

1. To teach to interpret the biological properties of pathogenic and non-pathogenic microorganisms, viruses and the patterns of their interaction with the macroorganism, with the human population and the environment.

2. To form the ability to determine the methods of microbiological and virological diagnostics, etiotropic therapy and specific prevention of infectious diseases.

3. To explain the structure of the immune system of the human body.

4. To form the ability to interpret the main mechanisms of the formation of the body's immune response.

5. To form the ability to determine the main types of pathological reactions of the immune system and their role in the development of the most common human diseases.

*Expected result:*

*As a result of studying the discipline, the student has to:*

*Know:*

- algorithm for carrying out serological reactions in infectious diseases;
- algorithm for conducting microbiological research of biological fluids and secretions;
- an algorithm for conducting chemical, organoleptic, bacteriological types of studies on the quality of food and water.

*Be able:*

- to evaluate the results of laboratory and instrumental studies;
- to predict the negative consequences of exposure to dangerous factors on the human body;
- to master modern methods of microbiological research in infectious diseases;
- to analyze the principles of vaccines production, methods of their standardization, control and practical use;
- to master the principles immune sera production, methods of their standardization, control and practical use;
- to interpret the development of medicine in historical retrospective;
- to interpret the main historical and medical events;
- to demonstrate possession of moral and ethical principles of treating a living person, their body as an object of anatomical and clinical research.

## **DESCRIPTION OF THE COURSE**

*Forms and methods of teaching*

The course will be presented in the form of lectures (28 hours) and practical lessons (112 hours), organization of independent work of students (70 hours).

Methods of educational and cognitive activity will be used in the practical classes: the method of problem presentation, partially research, research method of studying microorganisms - the causative agents of human infectious diseases.

*Teaching methods:* conversation, explanation, discussion, discussion of the acute issues; visual methods: illustration (including multimedia presentations); solving situational tasks; testing; filling lab reports.

*The content of the discipline*

Theme 1. Subject and tasks of medical microbiology. Equipment and organization of laboratory. Microscopic method of studying microorganisms. Microscopy technique.

Theme 2. Methods of microscopic examination. Main bacterial shapes. Simple and differential staining. Gram stain.

Theme 3. The structure of a bacterial cell.

Theme 4. Morphology and cell structure of bacteria, fungi and protozoa.

Theme 5. Physiology of bacteria. Nutrient media.

Theme 6. Methods of sterilization. Disinfection.

Theme 7. Culture methods. Isolation of pure culture of aerobic and anaerobic bacteria.

Theme 8. Cultural and biochemical properties of bacteria. Identification of bacteria.

Theme 9. Phages. Genetics of microorganisms.

Theme 10. Molecular diagnostic methods.

Theme 11. Microbiological basis of antimicrobial chemotherapy and antiseptic.

Theme 12. Drilling of the algorithm of application general diagnostic methods in microbiology.

Theme 13. Infection. Biological method of investigation.

Theme 14. Concept of immunity. Types of immunity. Cellular and humoral factors of non-specific immunity. Antigens. Antibodies.

Theme 15. Cellular and humoral factors of nonspecific defense. Phagocytosis.

Theme 16. Biology of immune response.

Theme 17. Reactions of "antigen-antibody": agglutination test, precipitation test, neutralization test.

Theme 18. Reactions of "antigen-antibody": serological tests with use of the labels

Theme 19. Reactions of "antigen-antibody": reaction of immune lysis, complement fixation test,

Theme 20. Allergy.

Theme 21. Immunodeficiencies. Methods of assessment of the immune state of the organism.

Theme 22. Immunoprophylaxis. Immunotherapy.

Theme 23. Drilling of the algorithm of using general methods of examination in immunology.

Theme 24. Methods of laboratory diagnostics of the infections. Gram-positive cocci.

Theme 25. Methods of laboratory diagnostics of the infections. Gram-negative cocci.

Theme 26. Clostridia of wound anaerobic infection, tetanus, botulism. Anaerobic non-clostridial infections.

Theme 27. Spirochaetes.

Theme 28. Brucellae. *Francisella tularensis*. *Bacillus anthracis*.

Theme 29. *Corynebacteria*.

Theme 30. *Mycobacteria*.

Theme 31. *Rickettsia*.

Theme 32. *Chlamydia*. *Mycoplasmas*.

Theme 33. Drilling of the algorithm of laboratory diagnosis of bacterial infections. Part 1.

Theme 34. *Vibrio*.

Theme 35. *Escherichia*. *Shigella*.

Theme 36. *Salmonella*.

Theme 37. Other pathogenic enterobacteria: *Klebsiella*, *Enterobacter*.

Theme 38. *Yersinia*.

Theme 39. *Pseudomonas*.

Theme 40. *Campylobacter*. *Helicobacter*.

Theme 41. Drilling of the algorithm of laboratory diagnosis of bacterial infections. Part 2.

Theme 42. General virology. Classification of viruses.

Theme 43. Cultivation of viruses. Methods of diagnostics of viral infections. Prions.

- Theme 44. Orthomyxoviruses.
- Theme 45. Paramyxoviruses
- Theme 46. Picornaviruses.
- Theme 47. Rhabdoviruses. Arboviruses.
- Theme 48. Arboviruses: yellow fever, dengue fever, Crimean-Congo hemorrhagic fever, tick-borne encephalitis, West Nile fever.
- Theme 49. Coronaviruses.
- Theme 50. Herpesviruses.
- Theme 51. Adenoviruses. Papillomaviruses. Parvoviruses.
- Theme 52. Poxviruses.
- Theme 53. Causative agents of viral hepatitis.
- Theme 54. Retroviruses. HIV. Oncoviruses.
- Theme 55. Drilling algorithm of the laboratory diagnosis of viral infections.
- Final test control.

*List of recommended literature:*

*Main:*

1. Anantharyan R. Jayaram Paniker C. K. Textbook of Microbiology. 12-th Edition.- Orient Longman, 2022.
2. Abbas, A., Litchman, A. H. & Pillai, S. Basic Immunology - 6th Edition. (Elsevier Ltd, 2019).
3. Male, D., Peebles, S. & Male, V. Immunology. (2020).

*Additional:*

4. Barer, M. & Irving, W. L. Medical Microbiology 19th Edition A Guide to Microbial Infections: Pathogenesis, Immunity, Laboratory Investigation and Control. vol. 19 (2018).
5. Burrell, C. J., Howard, C. R. & Murphy, F. A. Fenner and White's Medical Virology: Fifth Edition. Fenner and White's Medical Virology: Fifth Edition (Elsevier Inc., 2016).
6. Cann, A. J. Principles of Molecular Virology: Sixth Edition. Principles of Molecular Virology: Sixth Edition (Elsevier Inc., 2015). doi:10.1016/C2014-0-01081-7.
7. Jawetz, Melnick, & Adelberg's Medical Microbiology, 26th Edition, 2012, English. 880 p.
8. Louten, J. & Reynolds, N. Essential Human Virology. (2016).
9. Marsh D, P., Lewis A O, M., Rogers, H., Williams W, D. & Wilson, M. Marsh and Martin's Oral Microbiology. (Elsevier Limited, 2016).
10. Nath, S. K. & Revankar, S. G. Problem-based microbiology. (Saunders, 2006).
11. Ream, Walt. Molecular microbiology laboratory: a writing-intensive course. (Academic Press, 2013).
12. Review of Medical Microbiology and Immunology, 12 edition/ Warren E. Levinson. McGraw-Hill Prof Med.-Tech., 2012. 688 p.
13. Rich, R. R. & Fleisher, T. A. Clinical Immunology (Fifth Edition) Principles and Practice. Clinical Immunology (2018).
14. Sandle, T. Pharmaceutical Microbiology: Essentials for Quality Assurance and Quality Control. Pharmaceutical Microbiology: Essentials for Quality Assurance and Quality Control (Elsevier Inc., 2015). doi:10.1016/C2014-0-00532-1.
15. Wilson, J. (Nurse) & Stucke, V. A. Clinical microbiology: an introduction for healthcare professionals. (Baillière Tindall, 2000).

## **CRITERIA EVALUATION**

*Ongoing control:*

- oral control: individual survey on the theme;
- written control: assessment of the solution of situational tasks, evaluation of lab reports.

- test control: assessment of performance of tests on the theme.

### **Criteria of ongoing assessment at the practical class**

<b>Score</b>	<b>Assessment criterion</b>
Excellent «5»	The student takes an active part in practical classes, demonstrates deep knowledge, gives complete and detailed answers to questions. Takes an active part in discussing problem situations, demonstrates good skills and abilities in performing practical tasks, correctly evaluates the results. Test tasks are completed in full.
Good «4»	The student participates in practical classes; has a good command of the material. Demonstrates the necessary knowledge, but answers questions with some mistakes; participates in the discussion of problem situations. Test tasks are completed in full, at least 70% of answers to questions are correct.
Satisfactory «3»	The student sometimes participates in practical classes; partially speaks and asks questions; makes mistakes when answering questions; shows passive work in practical classes. Demonstrates skills and abilities in performing practical tasks, but evaluates the results obtained insufficiently fully and accurately. Testing is completed in full, at least 50% of answers are correct, answers to open questions are not logical, with obvious significant errors in definitions.
Unsatisfactory «2»	The student does not participate in the practical lesson, is only an observer; never speaks and does not ask questions, is not interested in learning the material; gives incorrect answers to questions, demonstrates insufficient skills and abilities, cannot cope with practical work and evaluation of the results. Testing is not completed.

*Final control:* The student is admitted to the exam provided that the requirements of the curriculum are fulfilled and if they received at least 3.00 points for the current educational activity and passed the final test control of the "Krok-1" format by at least 90% (50 tasks).

*Possibility and conditions for receiving additional (bonus) points:* not provided.

### **INDEPENDENT WORK OF STUDENTS**

Independent work involves preparation for each seminar, independent study of a certain list of topics or topics that require in-depth study. Questions on topics assigned for independent study are included in the control measures.

### **COURSE POLICY**

*Policy on deadlines and retakes:*

- Unexcused absences will be made up as scheduled by the teachers on duty.
- Excused absences are made up on an individual schedule with the permission of the dean.

*Policy on academic integrity:*

It is obligatory to observe academic integrity by students, namely independent performance of all types of work, tasks, forms of control provided by the work program of this discipline:

- references to sources of information in case of using ideas, developments, statements, information;

- compliance with copyright and related rights legislation;

- providing reliable information about the results of their own educational (scientific) activities, used research methods and sources of information.

Unacceptable in educational activities for participants in the educational process are:

- the use of family or official ties to obtain a positive or higher grade during any form of control of learning outcomes or advantages in scientific work;

- use of prohibited auxiliary materials or technical means (cribs, notes, micro-headphones, phones, smartphones, tablets, etc.) during control assessments;

- passing the procedures for controlling the results of training by fictitious persons.

For violation of academic integrity, students may be brought to such academic responsibility:

- lowering the results of the assessment of control work, assessment in the classroom, test, etc;

- repeated passing of assessment (control work, test, etc.)

- appointment of additional control assessments (additional individual tasks, control works, tests, etc.);

- conducting an additional check of other works of the offender's authorship.

#### *Policy on attendance and lateness:*

Uniform: medical gown that completely covers the outer clothing, or medical pajamas, cap, mask, change of shoes.

Equipment: notebook, pen.

Health status: students with acute infectious diseases, including respiratory diseases, are not allowed to attend classes.

Lateness to classes is not allowed. A student who is late for the lesson may attend it, but if the teacher has put "ab" in the register, they must make it up in the general order.

#### *Use of mobile devices:*

The use of any mobile devices is prohibited. In case of violation of this paragraph, the student must leave the class and the teacher puts "ab" in the register, which they must make up in the general order.

Mobile devices can be used by students with the permission of the teacher if they are needed to complete the task.

#### *Behaviour in the classroom:*

The behavior of students and teachers in the classroom must be working and calm, strictly comply with the rules established by the Regulations on Academic Integrity and Ethics of Academic Relations at Odesa National Medical University, in accordance with the Code of Academic Ethics and Relations of the University Community of Odesa National Medical University, the Regulations on the Prevention and Detection of Academic Plagiarism in the Research and Educational Work of Higher Education Students, Researchers and Teachers of Odesa National Medical University.