

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

Pharmacy Faculty

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

**Syllabus of course
“HUMAN MICROBIAL ECOLOGY”**

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| Volume: | Total number of hours: 90 hours, 3 credits Semester: IV 2 nd course |
| Days, Time, Place: | According to the Schedule Department of General and Clinical Epidemiology and Biosafety with course in Microbiology and Virology, academic discipline “Microbiology, Virology and Immunology”. Odesa, 1 Knyazivska str., rooms 1-6 |
| Teacher(s) | Hruzesvkiy O.A., MD, Doctor of Science, full professor; Associate professors: Holovatiuk O.L., MD, PhD, Koltsova I.G., MD, PhD, Kurtova M.M., MD, PhD, Shevchuk H.Y., PhD; Assistant professors: Denysko T.V., Dubina A.V, MD, Kahliak M.D, Tabulina A.M., Tarasov Y.V., MD |
| Contact information | <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> onmedumicrobio@onmedu.edu.ua ; 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 and non-pathogenic microorganisms, their interaction with the human body, human microbiota, methods of its diagnosis, diseases caused by representatives of human normoflora.

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 microflora of the human body and its role in physiological processes and pathology. Formation of the applicant's ability to assess the microbiocenosis of the human body and the environment.

The tasks of the discipline:

1. To teach to interpret the biological properties of pathogenic and non-pathogenic microorganisms, viruses and 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 to assess the state of microbiocentesis of the human body and sanitary-microbiological assessment of environmental objects.

Expected result:

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

Know:

- algorithm for sanitary and microbiological assessment of environmental objects;
- algorithm for microbiological examination of biological fluids and secretions;
- algorithm of chemical, organoleptic, bacteriological types of food and water quality research.

Be able:

- to evaluate the results of laboratory studies of microbiocentesis of the human body and the environment;
- to master modern methods of microbiological research in infectious diseases;
- 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 seminar lessons (30 hours), organization of independent work of students (60 hours).

Teaching methods: conversation, explanation, discussion, discussion of the acute issues; visual methods: illustration (including multimedia presentations); testing.

The content of the discipline

Theme 1: Ecology of microorganisms.

Topic 2. Microbiota development in ontogeny and its importance for the immune system.

Topic 3. Human microbiome as a complex of distinct ecosystems.

Topic 4. Geographical, ethnic or lifestyle-related changes in the composition and diversity of the human microbiome.

Topic 5. Standardisation in the study of host-microbiota interactions: challenges, gnotobiology as a tool and prospects.

Topic 6. Microbial ecology of the oral cavity and its impact on dental diseases.

Topic 7. Microbial ecology of the intestine and its relationship with metabolic and neurological diseases.

Topic 8. Immunological functions of the appendix: An example of redundancy?

Topic 9: Methods of studying the microbiota of the vaginal biotope and its relationship with reproductive health.

Topic 10. Food poisoning of microbial etiology and its diagnosis.

Topic 11: The use of the microbiome in personalised medicine.

Topic 12: Sanitary microbiology. Sanitary and bacteriological characteristics of water. Sanitary and bacteriological control of drinking water quality. Drinking water quality standards.

Topic 13. Soil microbiota.

Topic 14. Air microbiota, its characteristics.

Topic 15. Sanitary virology.

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. 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).
5. 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.
6. Louten, J. & Reynolds, N. Essential Human Virology. (2016).
7. Rich, R. R. & Fleisher, T. A. Clinical Immunology (Fifth Edition) Principles and Practice. Clinical Immunology (2018).
8. Ream, Walt. Molecular microbiology laboratory: a writing-intensive course. (Academic Press, 2013).
9. Nath, S. K. & Revankar, S. G. Problem-based microbiology. (Saunders, 2006).
10. 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.
11. Marsh D, P., Lewis A O, M., Rogers, H., Williams W, D. & Wilson, M. Marsh and Martin's Oral Microbiology. (Elsevier Limited, 2016).
12. Wilson, J. (Nurse) & Stucke, V. A. Clinical microbiology: an introduction for healthcare professionals. (Baillière Tindall, 2000).
13. Barer, M. & Irving, W. L. Medical Microbiology 19th Edition A Guide to Microbial Infections: Pathogenesis, Immunity, Laboratory Investigation and Control. vol. 19 (2018).
14. Girard-Madoux MJH, Gomez de Agüero M, Ganal-Vonarburg SC, Mooser C, Belz GT, Macpherson AJ, Vivier E. The immunological functions of the Appendix: An example of redundancy? Semin Immunol. 2018 Apr;36:31-44. doi: 10.1016/j.smim.2018.02.005. Epub 2018 Mar 2. PMID: 29503124.
15. Mooser C, Gomez de Agüero M, Ganal-Vonarburg SC. Standardization in host-microbiota interaction studies: challenges, gnotobiology as a tool, and perspective. Curr Opin Microbiol. 2018 Aug;44:50-60. doi: 10.1016/j.mib.2018.07.007. Epub 2018 Jul 26. PMID: 30056329.
16. Gomez de Agüero, M., Rahimi-Midani, A. Don't forget the bacteriophages. Lab Anim 51, 160–161 (2022). <https://doi.org/10.1038/s41684-022-00986-1>
17. Gupta VK, Paul S, Dutta C. Geography, Ethnicity or Subsistence-Specific Variations in Human Microbiome Composition and Diversity. Front Microbiol. 2017 Jun 23;8:1162. doi: 10.3389/fmicb.2017.01162. PMID: 28690602; PMCID: PMC5481955.

CRITERIA EVALUATION

Ongoing control: individual survey on the theme, testing, evaluation of practical skills, solving situational problems, the ability to analyze and interpret research results and correctly draw reasonable conclusions, evaluation of activity in the classroom.

Criteria of ongoing assessment at the practical class

| Score | Assessment criterion |
|-----------------------|--|
| 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: Credit is given to an applicant who has completed all the tasks of the work program of the discipline, actively participated in seminars and has an average current grade of at least 3.0 and has no academic debt.

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.