

Odesa National Medical University
Medical faculty
Microbiology, Virology and Immunology Department

Syllabus of course
Microbial ecology of human

Volum:	2 credits into ECTS, 60 hours
Semester, Year	IV semester, 2 cours
Days, Time, Place:	According the Schedule
Преподаватель (-и)	Hruzewskiy O.A., Head of Department, MD, PhD, associate professor; Golovatiuk O.L., MD, PhD, associate professor; Koltsova I.G., MD, PhD, associate professor; Venger A.M., PhD, associate professor; Hrydina T.L., PhD, associate professor; Borovik A.P., MD, PhD, senior lecturer of the department; Avratinskiy O.Y. MD, PhD, assistant of department; Denisko T.V., assistant of department; Dubina A.V., assistant of department; Kaglyak M.D., assistant of department; Kobylnik S.M., assistant of department; Kurtova M.M., MD, PhD, assistant of department; Nikolayeva O.V., PhD, assistant of department; Radkevich K.V., assistant of department; Tabulina A.M., , assistant of department; Tarasov Y.V., assistant of department; Shevchuk H.Y., PhD, assistant of department
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Workplace	Microbiology, Virology and Immunology Department, 1 Knyazeska str., app. 1-6
Consultations	<i>Face-to-face consultations: Thursday, 14.30-16.00</i>

COMMUNICATION

Communication with students will be carried out using E-mail, telephone, in classrooms.

ANNOTATION OF THE COURSE

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

Prerequisites: The basis for mastering the discipline is knowledge, skills and abilities acquired in the process of studying medical biology, medical and biological

physics, biological and bioorganic chemistry, human anatomy, histology, cytology and embryology, Latin, history of medicine, philosophy and integrates with these disciplines.

Post-requisites: Lays the foundations for students to study general hygiene, epidemiology, pathological physiology, pathological anatomy, immunology and allergology, infectious diseases, internal diseases, surgical diseases and childhood diseases and other clinical disciplines, provides for the integration of teaching with these disciplines and the use of knowledge in microbiology, virology and immunology in the process of further education and professional activity.

Purpose of the course. Lays the foundations for the study of the physiological role of microbes in the human body and the prevention of violations of these functions in the process of drug interventions.

Discipline objectives:

- to interpret the biological properties of pathogenic and non-pathogenic microorganisms, viruses and the patterns of their interaction with the macroorganism, with the human microbiota and the external environment;
- to determine the methods of microbiological and virological diagnostics, etiotropic therapy and specific prevention of infectious diseases.
- explain the structure of the immune system of the human body;
- to interpret the main mechanisms of the formation of the body's immune response;
- to determine the main types of pathological reactions of the immune system and the relationship with the occurrence of the most common human diseases.

Expected results

As a result of studying the discipline the student have **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 research on the quality of food and water.

As a result of studying the discipline the student have **be able to**:

- evaluate the results of laboratory and instrumental studies;
- provide for the negative consequences of exposure to hazardous factors on the human body;
- to master modern methods of microbiological research in infectious diseases;
- to analyze the principles of obtaining vaccine preparations, methods of their standardization and control, practical use;
- to master the principles of production of immune sera, methods of their standardization, control, practical value;
- to interpret the development of medicine in a historical retrospective;
- to interpret the main historical and medical events;
- to demonstrate possession of moral and ethical principles of attitude towards a living person, her 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 (30 hours) and practical lessons (120 hours), organization of students' independent work (105 hours).

In practical classes, the methods of educational and cognitive activity will be used: a research method for studying microorganisms - causative agents of human infectious diseases. The format of practical training includes: - checking the knowledge of the prepared material (entrance testing, survey); - receiving tasks for the next lesson and clarifying the key questions that need to be worked out.

The content of the discipline.

Topic 1. Ecology of microorganisms.

The spread of microorganisms in nature. Microflora of the environment: air, water, soil. The value of S.M. Vernadsky's works. Features of metabolism and energy in bacteria (metabolic rate, variety of types of metabolism, metabolic plasticity, excessive synthesis of metabolites and energy). Constructive and energy exchange, their relationship. The cycle of substances in nature. The role of microorganisms in these processes. Parasites. Commensal. Saprophytes.

Topic 2. Sanitary microbiology.

Subject, tasks. The importance of sanitary microbiology in the work of a doctor. Sanitary indicative microorganisms, requirements for them, their significance for the characteristics of environmental objects. Ecology of microorganisms. Microflora of the environment: air, water, soil. Principles and methods of sanitary microbiological studies of environmental objects, their assessment.

Topic 3. Sanitary bacteriological characteristics of water.

Microflora of water. Water self-purification factors. Water as a medium for the preservation and reproduction of microorganisms. Autochthonous and allochthonous microflora of open water bodies. Saprobity. Microorganisms - indicators of the water self-purification process.

Topic 4. Sanitary bacteriological control over the quality of drinking water. Drinking water quality standards.

Requirements of the State Standard for Drinking Water. The role of water in the transmission of infectious diseases. The viability of pathogenic microorganisms in water. Sanitary indicative microorganisms used to assess water quality. Methods of sanitary and bacteriological research of water and their assessment.

Topic 5. Soil microflora.

The role of soil in the transmission of infectious diseases. Factors affecting the possibility of survival of pathogenic microorganisms in the soil. Sanitary indicative microorganisms used to assess soil contamination. Methods for sanitary and microbiological soil research.

Tema 6. Topic 6. Air microflora, its characteristics.

The role of air in the transmission of infectious diseases. Microbial count and sanitary indicative microorganisms of indoor air. Methods for their determination and their assessment.

Topic 7. Sanitary Virology.

Subject, tasks, significance of sanitary virology in the activity of a doctor. The role of water, soil, air in the transmission of pathogens of viral infections. Viruses

that are most often found in the environment. Methods for detecting enteroviruses in soil and water. Sanitary and virological research of water. Sampling, concentration methods. Viruses, bacteriophages in wastewater. Methods for their detection. The role of air in the spread of pathogens of respiratory viral infections. Air sampling methods and indication of respiratory viruses.

Topic 8. Principles of sanitary and bacteriological research of food products. Food poisoning of microbial etiology and their diagnosis.

Classification of food poisoning and causative agents. Causative agents of foodborne diseases. Principles of sanitary and bacteriological research of food products. Identification of botulinum toxin in food. Identification of salmonella - the causative agents of acute gastroenteritis. Sanitary and bacteriological examination of food products for the presence of pathogenic staphylococci.

Topic 9. Normal human microflora. Characteristics of the microflora of the oral cavity and respiratory tract.

Normal human microflora. Characteristics of the microflora of the oral cavity, its age characteristics. General characteristics of primary and secondary diseases of the oral mucosa.

The concept of normal human microflora (eumikrobioti). List the main groups of normal microflora (autochthonous, indigenous, resident, facultative, allochthonous, transient). List sterile organs and tissues of a healthy person. The main factors regulating the qualitative and quantitative composition of the microflora of the body (mechanical, chemical, physical, microbial antagonism, factors of specific and nonspecific protection of the human body). The role of normal flora in physiological processes and the occurrence of human pathology. Microflora of the oral cavity. Her age features. The role of microorganisms in the etiology and pathogenesis of caries. The role of microorganisms in periodontal disease. The role of oral microorganisms in the formation of dental plaque, etiology and pathogenesis of dental caries.

General characteristics of primary and secondary diseases of the oral mucosa. Purulent diseases of the oral mucosa. Characteristics of the causative agents of these processes. The defeat of the oral mucosa with tuberculosis, leprosy, actinomycosis. Characteristics of mycobacteria and actinomycetes. The defeat of the oral mucosa with syphilis. Characteristics of the pathogen. Vincent's ulcerative necrotizing stomatitis. Microbiological diagnosis of bacterial lesions of the oral mucosa. Damage to the oral mucosa in viral diseases - influenza, herpes infection, infectious mononucleosis, foot and mouth disease, vesicular stomatitis. Characterization of the corresponding viruses. Methods of virological diagnosis of these pathogens.

Microflora of the respiratory tract (strepto- and staphylococci, Klebsiella, mycobacteria, diphtheroids, Neisseria). List sterile respiratory organs.

Topic 10. Normal human microflora. Age features of the normal microflora of the skin, mucous membranes, genitals, intestines. Sterile organs. Gnotobiology.

List the main types of resident skin microflora (Staph. Aureus, Staph. epidermidis, Str. Faecalis, Str. Mutans, micrococci, diphtheroids, Pseudomonas aeruginosa, bacteroids). The values of the main factors of nonspecific skin protection (pH, temperature, sebum, epidermis peeling, microbial antagonism, etc.).

Microflora of the conjunctiva (Neisseria, pneumococci, diphtheroids, streptococci, staphylococci, moraxels). Main defense mechanisms (lysozyme, SIgA, mechanical tear wash).

Microflora of the genitourinary system in men (spirochetes, *M. smegmatis*, *E. coli*, mycoplasma, staphylococcus). Microflora of the genitourinary system in a woman (streptococci, lactobacilli, proteus, Doderlein's bacillus). Age features of changes in the resident microflora of a woman.

Microflora of the pharynx, stomach. The importance of these representatives in the occurrence of diseases (*E. coli*, *Helicobacter pylori*, streptococci, diphtheroids, lactobacilli). Microflora of the small intestine. The microflora of the large intestine. Age-related changes in the bacterial microflora of the large intestine.

Dysbacteriosis and the causes of its occurrence. Prebiotics, probiotics, eubiotics. Their characteristics. Mechanisms of action

List of recommended literature

Main:

1. Medical Microbiology, Virology Immunology (Медична мікробіологія, вірусологія та імунологія). Підручник. Shyrobokov V.P. (Широбоков В.П.). Нова книга, 2019

2. Gaidash L.S., Flegontova V.V. Microbiology, virology and immunology. – Lugansk-2004 vol. 1 – 3.

Additional:

1. Anantharyan R. Jayaram Paniker C. K. Textbook of Microbiology. 9-th Edition.- Orient Longman, 2012.

2. Warren Levinson, Medical Microbiology Immunology: Examination & Board Review . -Eighth edition / Lange Medical Book /McGraw-Hill Medical Publishing Division/ - 2004/ -649 p

3. Arora, D.R. Textbook of Microbiology.-CRS publishers and Distributors, 2001

4. Chan E.C.S., Pelczar Michael J., Krieg Noel R. Microbiology. Concepts and Applications.- McGraw-Hill, Inc.,1993

5. Chakraborty P. A Textbook of Microbiology.- New central book agency(P) LTD., 2001

6. Chopra H.L. Prof. Textbook of Medical Microbiology,1995

7. Greenwood David, Peutherer John, Slack Richard. Medical Microbiology.- Churchill Livingstone, 1997

8. Gupte, Satish M.D. The Short Textbook of Medical Microbiology. Fifth Edition.- Jaypee Brothers, Medical Publishers, New Delhi (India),1993

9. Jawetz, Melnick and Adelberg's Medical Microbiology. 21st Edition/ Edited by Brooks G.F., Butel J.S., Morse S.A.-Librairie du Liban, Lebanon, Appleton and Lange, California,1998

10. Kabajashi George S., Murray Patrick R., Pfaller Michael A., Rosenthal Ken S. Medical Microbiology.- Mosby,1998

11. Mackie and McCartney. Practical Medical Microbiology. 14th Edition/ Edited by Colle J.G., Fraser A.G., Marmion B.P., Sinmons A.- New York, Edinburgh, London, Madrid, Melbourne, Tokyo, 1996

Informational resources

1. Microbiology and immunology on-line
<http://www.microbiologybook.org/>

2. On-line microbiology note <http://www.microbiologyinfo.com/>

3. Centers for diseases control and prevention www.cdc.gov

CRITERIA EVALUATION

Current control.

At the current stage, students' answers to theoretical questions, the performance of practical work (research), the quality of maintaining the research protocol in accordance with the requirements, the ability to analyze and interpret research results and correctly draw informed conclusions, solving situational problems are taken into account. The assessment is carried out according to the traditional 4-point scale. The final control provides for an oral answer.

Selfwork of students. The work of students consists of independent study with a specific list of topics or topics requiring in-depth study. CP controlled in the form of tests and control works. The question is with the fact that reserved for self-study is included in the control activities. The entire volume of SR contains tasks that require systematic independent work from the student.

Evaluation criteria

The university uses various forms of control of classes in a particular discipline (oral, written, combined, testing, practical skills, etc.). The results of students' academic performance are presented in the form of a grade on the national scale, 200-point and ECTS scale and have standardized generalized criteria for knowledge assessment: national scale: - grade "excellent" is given to a student who worked systematically during the semester. knowledge of program material, is able to successfully perform tasks provided by the program, mastered the content of basic and additional literature, realized the relationship of individual sections of the discipline, their importance for future professions, showed creative abilities in understanding and using curriculum, showed the ability to independently updating and replenishing knowledge; level of competence - high (creative); - a grade of "good" is given to a student who has shown full knowledge of the curriculum, successfully completes the tasks provided by the program, mastered the basic literature recommended by the program, showed a sufficient level of knowledge of the discipline and is able to independently update and update during further study and professional activity; level of competence - sufficient (constructive-variable); - the grade "satisfactory" is given to the student who has shown knowledge of the basic educational program material in the volume necessary for the further training and the subsequent work on a profession, copes with performance of the tasks provided by the program, has made separate mistakes in answers on examination and at performance of examination tasks, but has the necessary knowledge to overcome mistakes under the guidance of a researcher; level of competence - average (reproductive); - the grade "unsatisfactory" is given to the student who did not show sufficient knowledge of the basic educational and program material, made fundamental mistakes in performance of the tasks provided by the program, cannot use the knowledge at the further training without the teacher's help, failed to master skills of independent work; level of competence - low (receptive-productive). 29 Final control in the form of tests is assessed on a two-point scale: - grade "credited" is given to a student who has completed the curriculum of the discipline, has no academic debt; level of competence - high (creative); - the grade "not credited" is given to a student who has not fulfilled the curriculum of the discipline, has an

academic debt (average score below 3.0 and / or absences); level of competence - low (receptive-productive). The multi-point scale characterizes the actual success of each student in mastering the discipline. Conversion of the traditional grade from the discipline to 200-point is performed by the information and computer center of the university program "Contingent" by the formula: average grade point average (current / from the discipline) x 40

national grade	point
"5"	185-200
"4"	151-184
"3"	120-150

The ECTS rating scale evaluates the achievements of students in the discipline who study in one course of one specialty, according to their scores, by ranking, namely:

ECTS grade	Statistical indicators
"A"	Top 10% of students
"B"	next 25% of students
"C"	next 30% of students
"D"	next 25% of students
"E"	last 10% of students

The ECTS scale establishes the student's belonging to the group of best or worst among the reference group of classmates (faculty, specialty), ie his rating. When converting from a multi-point scale, as a rule, the limits of grades "A", "B", "C", "D", "E" do not coincide with the limits of grades "5", "4", "3" on the traditional scale. Grade "A" on the ECTS scale cannot be equal to grade "excellent", and grade "B" - grade "good" and so on. Students who receive grades "Fx" and "F" ("2") are not included in the list of ranked students. Such students automatically receive a score of "E" after re-assembly. The grade "Fx" is given to students who scored the minimum number of points for the current educational activity, but who did not pass the final 30 control. Grade "F" is given to students who have attended all classes in the discipline, but did not score an average score (3.00) for current academic activities and are not admitted to the final control. Criteria for assessing the current performance of students should be reflected by the departments in the work programs in the disciplines, indicating a clear structure of student receipt in the assessment class.

COURSE POLICY

Deadline and retake policy:

To prepare for the tests, a certain period is given. Control tests that are passed in violation of the deadlines without good reason are evaluated for a lower grade (-1 or 2 points). After the deadlines, it is impossible to get the maximum number of points for the test.

Academic Integrity Policy: Cheating during exams is prohibited (including using mobile devices).

Attendance Policy: Practical classes are compulsory and no points will be awarded for attending lectures. Illness is considered a good reason for absence from classes, confirmed by a certificate from a doctor (sick leave).

Mobile devices: the use of mobile devices during the control of students' knowledge is prohibited in the classroom.