National Pirogov Memorial Medical University, Vinnytsya

APPROVE

Higher Educational Institition
Vice-Rector for Scientific and
Academic Work and International Links

_____ Inna ANDRUSHKO

"30" 08 2024 year

AGREED

Head of microbiology department,
professor of HEI

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"29" 08 2024 year

SYLLABUS
of academic discipline

"Clinical microbiology"

Specialty	222 Medicine
Educational level	the second (master`s) level
Educational programme	EPP Medicine, 2022
Academic year	2024-2025
Department	*Microbiology*
Teachers	Prof. Nazarchuk Olexandr A., ass-prof. Vovk, Irina M.
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Syllabus compiler	Ass-prof. Vovk Irina M.

1. Status and structure of the discipline

Discipline status	Elective
Discipline code in EPP / discipline place in EPP	EB 3.6, a discipline of elective professional block EB 3 "Surgery"
Course / semester	6^{th} year (XI or XII semester)
The amount of discipline (the total number of hours / number of credits ECTS)	45 hours / 1,5 credits ECTS
The structure of the discipline	Practical classes 25 hours (55,6%) Independent extracurricular work 21 hours (44,4%)
Number of content modules	3
Language of study	English
Form of study	Full-time

2. Description of the discipline

Short annotation of the course, relevance.

The subject area of the discipline is clinical microbiology. The main focus of the program is to acquire knowledge of clinical microbiology and modern approaches in microbiological diagnostics and etiotropic treatment of opportunistic infections and infections associated with medical care (IAMC). The study of the discipline "Clinical microbiology" allows forming clinical thinking, discovers the main problems of development, laboratory diagnostics and antimicrobial therapy strategy of opportunistic infections, arising in patients, as well as hospital infections or IAMC in ICU, gives knowledge about current etiology of opportunistic infections depending on their localization and comorbid pathology, introduces the main measures to control the spread of hospital infections and the impact on hospital strains of microorganisms.

Prerequisites. For successful mastering of discipline, the student needs the knowledge received in the course of studying of the following general and professional disciplines: Microbiology, virology and immunology; Latin language and medical terminology; biological and bioorganic chemistry; Pathology; Pharmacology; Clinical Pharmacology; Internal Medicine; Surgery; Otolaryngology; Urology; Gynecology, etc.

The purpose of the course and its significance for professional activities. The purpose of the discipline is to form knowledge about the current causes of opportunistic infections, their spead in hospital setting, and significance in human pathology; about biological properties of opportunistic pathogens and patterns of their interaction with the human body, measures to prevent them in hospitals; to deepen knowledge of such infections` pathogenesis, features of the immune response and the course of microbial complications in violation of the immune system of the human body; to choose the right methods of laboratory diagnostics, and interpret their results and diagnostic value; to choose adequate methods to control distribution of hospital strains in a medical institution. As a result of studying the discipline, the student will master the methods of proper sampling for bacteriological / virological research from different loci of the human body, will be able to choose an adequate method of laboratory diagnostics depending on the location and course of microbial complications; to evaluate the diagnostic value of the results of laboratory research and to choose the most rational etiotropic treatment, to evaluate the results of sanitary-bacteriological research of medical and diagnostic equipment from the point of view of epidemiological safety.

Postrequisites. In the process of studying the discipline, a student acquires knowledge, which is necessary for successful mastering of professional training disciplines, which involves the integration of teaching with these disciplines and the application of acquired knowledge, skills and abilities in the process of further education and professional activities.

3. Learning outcomes.

After successful study of the discipline the applicant will be able to:

1. Interpret the manifestations of the different types of interaction between microorganisms and macroorganism, explain biological properties of opportunistic microorganisms;
2. Estimate risk factors of possible microbial sequalae at different morbid states;
3. Explain the main mechanisms of the formation of the human body's immune response to microbial complications
4. Choose adequate and informative methods of microbiological diagnostics, etiotropic therapy and prevention of hospital and opportunistic infections;
5. Assess information about the diagnosis (according to list 2: 8, 18, 27, 29, 34, 35, 38, 46, 49, 62, 75, 91, 95, 96, 114, 115, 118, 120, 122, 123, 130, 137, 140, 179, 180, 235, 244), using information about the patient, his organs and systems, based on the results of laboratory and instrumental studies according to list 4: 32, 33, 35, 37, 38-41, 44);
6. Employ antimicrobial measures and anti-epidemic regime during the collection and microbiological examination of samples from different loci of the human body.
7. Correctly choose the standard method of taking biological material depending on the location of the entrance gate of infection, store and send infectious material for laboratory testing (according to list 4: 44);
8. Conduct microbiological examination of biological fluids and secretions (according to list 4: 44): microscopic, pure culture isolation and identification of isolated germs;
9. Inoculate a sample for semi- quantitative culture, determine the level of microbial load based on results of quantitative culture;
10. Isolate pure cultures of pathogens of opportunistic and hospital infections; to identify selected cultures on the basis of their biological properties;
11. Carry out and evaluate the results of antibiotic sensitivity testing, make a conclusion about effectiveness of etiotropic therapy based on laboratory results;
12. Analyze diagnostic value of molecular-genetic assay at infectious disease diagnostics;
13. Carry out and evaluate the results of sanitary-bacteriological examination of hospital items (air, medical and diagnostic equipment), health care workers for biosafety conclusion;
14. Apply antimicrobial measures and adhere to the anti-epidemic regime in the study of infectious material and provide these rules in hospital practice.

4. Content and logistic of the discipline

Module 1 Clinical microbiology	XII semester 45 hours / 1,5 credits	Practical classes №№ 1-9 Topics for self- study №№ 1-8

The course includes 13 topics, which are divided into 3 content modules.

Module 1. Clinical microbiology.

Content module 1. General characteristics of clinical microbiology

Topic 1. Clinical microbiology, definition. Research objects. Pathogenic and opportunistic microorganisms, biological differences. Characteristics of the main causative agents of opportunistic infections. Risk factors for the development of opportunistic infections.

Topic 2. Microbiocenosis of normal and pathologically changed human body`s biotopes. Dysbiosis as a sign of disorder in body`s resistance. Internal and external risk factors that induce development of dysbiosis. Correction of dysbiotic conditions resulting from antimicrobial and immunosuppressive therapy. Characteristics of probiotics, symbiotics. General characteristics of

prebiotics. Opportunistic mycoses. Candidiasis, causes, features of laboratory diagnostics. Diagnostic criteria

Content module 2.

Topic 3. Skin and soft tissue opportunistic infections (SSTI). Wound and surgical site infections (SSI). Spectrum of pathogens. Features of microbiological diagnostics. Etiotropic and target antibacterial therapy. Wound anaerobic infection, peculiarities of etiology, principles of etiotropic treatment.

Topic 4. Bones and joints opportunistic infections. Etiology of osteomyelitis, purulent arthritis, spectrum of pathogens and features of antibacterial therapy.

Topic 5. Opportunistic infections of respiratory system. Etiology of upper respiratory tract bacterial infections, bronchitis, pneumonia depending on age and comorbid pathology. Microbiome of the respiratory system in patients with COPD. Principles of microbiological diagnostics, antimicrobial treatment and specific prevention.

Topic 6. Opportunistic infections of cardio-vascular system. Etiology of bacterial endocarditis, the most common causative agents of carditis, pericarditis. Diagnostic criteria and principles of rational antibiotic therapy. Etiology of sepsis. Characteristics of the main pathogens. Peculiarities of microbiological diagnostics. Antibacterial therapy of sepsis, modern approaches.

Topic 7. Opportunistic infections of digestive system. The causative agents of abdominal infections and bacterial intestinal infections with diarrheal syndrome. Dysbiosis associated with the antibiotic therapy, diagnostic criteria, managment. Antibiotic-associated pseudomembranous enterocolitis, etiology, principles of microbiological diagnosis and therapy.

Topic 8. Opportunistic infections of central nervous system. The main causative agents of meningitis, meningoencephalitis. Differentiation of viral and bacterial infections of the central nervous system, main criteria in CSF; microbiological examination of CSF, rules for sample collection and transportation. Principles of etiotropic therapy of bacterial meningitis.

Topic 9. Opportunistic infections of urinary system. Etiology of cystitis, pyelonephritis. Principles of laboratory diagnostics, diagnostic criteria for bacteriuria, pyuria. Etiotropic and target antibacterial therapy.

Topic 10. Opportunistic infections of reproductive system. Vaginal microbiome and causes of its disorder. Microbiological criteria for diagnosis of vaginosis and nonspecific vaginitis. Etiology of pelvic inflammatory disease (PID), features of microbiological diagnosis, principles of etiotropic therapy.

Topic 11. Opportunistic infections of ears and eyes. Etiology of otitis media in adults, principles of diagnosis and antimicrobial therapy. Eye infections associated with wearing contact lenses. Biological properties of pathogens. Features of laboratory diagnostics

Content module 3. Hospital infections and infections arising in result of medical care (iatrogenic infections)

Topic 12. Etiology and manifestations of most common hospital infections, criteria for microbiological diagnosis. Etiology of hospital and ventilator-associated pneumonia (HAP, VAP), catheter-associated infections of the systemic bloodstream and urinary tract. Diagnostic criteria and principles of rational antibiotic therapy. Viral hospital infections: viral hepatitis B, C, adenovirus conjunctivitis, etc.

Topic 13. General measures to control hospital infections. Alternative methods of etiotropic treatment of opportunistic and hospital infections. Prospects of specific prevention of opportunistic infections: current state of the problem.

Types of education according to the curriculum are: a) practical classes, b) independent work of students, c) consultations.

Practical classes provide a theoretical justification of the main issues of the topic and the acquisition of the following practical skills:

1) research of bacterial morphology, cultural and other biological properties, studying of bacterial sensitivity to chemotherapeutic agents and their evaluation independently or on

the basis of experiments recorded in videos, movies presented in computer programs and other educational technologies;

2) quantitative seeding of the material to determine the microbial load, evaluation of the results, interpretation of the obtained results to determine the etiological factor of the infection;
3) studying the sensitivity of bacteria to antimicrobials and their assessment, analysis of antibiotic profiles;
4) solving of clinical situational tasks and tests in laboratory diagnostics of opportunistic infections, sanitary-microbiological assessment of the environment state, etc.), which have experimental, clinical-diagnostic or sanitary-hygienic meaning.

In practical classes, students write down protocols of their research in workbooks, make a summary on the topic and solve clinically-oriented situational tasks and tests.

The student's independent work involves preparation for practical classes and development of practical skills, study of topics for independent extracurricular work, preparation of presentations, tables, processing of scientific literature and writing reviews of the provided topics for individual work. Control of mastering the topics of independent extracurricular work is carried out at practical classes.

Thematic plan of practical classes, thematic plan of independent extracurricular work are published on the site of the department.

The route for obtaining materials: Microbiology department / for students / Full-time education / medicine / 6 course / Educational materials / or through the link https://www.vnmu.edu.ua/ microbiology department #. Access to the materials is carried out through the student's corporate account s000XXX@vnmu.edu.ua.

5. Forms and methods of monitoring academic performance

Current control in practical studies	Methods: oral or written survey, testing, electronic survey, solving situational problems, conducting laboratory studies, interpreting them and evaluating their results (drawing up a protocol in a workbook)
Final control (credit)	According to the Regulation of the Academic process in National Pirogov Memorial Medical University (link https://www.vnmu.edu.ua/en/general-regulations)
Learning success diagnostic tools	Theoretical questions, tests, clinically-oriented situational tasks, practical tasks, practical skills demonstration

6. Assessment criteria

Knowledge assessment is carried out in accordance with the Regulations of the Academic process in National Pirogov Memorial Medical University (link https://www.vnmu.edu.ua/en/general-regulations)

Continuous assessment	On a system of traditional assessments: 5 «excellent», 4 «good», 3 «satisfactory», 2 «unsatisfactory»
Control of practical skills	On a system of traditional assessments: 5 «excellent», 4 «good», 3 «satisfactory», 2 «unsatisfactory»
Pass-fail exam (credit) = Final control of the discipline	On a 200-point scale (the arithmetic average grade for the semester is converted into points) Credited: 122 to 200 points Not credited: less than 122 points (See Grading Scale)

Discipline Score Scale: National and ECTS

The sum of grades for all types of educational activities	Score ECTS	Score on a national scale	
		For exam, course project (work), practice	for credit test
180-200	**A**	excellent	credited
170-179,9	**B**	good	
160-169,9	**C**		
141-159,9	**D**	satisfactory	
122-140,99	**E**	satisfactory	
60-121,99	**FX**	unsatisfactory with the possibility of reassembly	is not credited with the possibility of reassembling
0-59,99	**F**	unsatisfactory with a mandatory reexamination of discipline	is not credited with mandatory reexamination of discipline

Criteria for student knowledge assessment

Assessment of oral / written response during the current assessment

The grade **"excellent"** is given to a student who has deeply and comprehensively mastered the theoretical material, competently and logically teaches it. He is fluent in Latin terminology, clearly answers non-standard questions on the topic of the lesson, is able to link the material of the topic with previously studied sections, which indicates knowledge of the recommended literature and the ability to analyze the material studied, and clearly demonstrates the importance of theoretical knowledge for practice. Medicine

The grade **"good"** is given to a student who knows and has a good theoretical material, teaches it correctly, does not allow inaccuracies in the answer, is able to reveal the topic from the standpoint of its medical significance and practical application, but the answers do not go beyond the textbook, guidelines.

A grade of **"satisfactory"** is given to a student who knows the basic concepts and definitions of the studied topic, but admits significant inaccuracies or has difficulty in formulating the answer, does not understand the medical aspects of the topic, can not relate theoretical material to practice.

The grade **"unsatisfactory"** is given to a student who does not know the theoretical foundations of the topic, makes gross mistakes in answering, does not understand the basic concepts and definitions, can not explain the importance of theoretical material for practical medicine.

Assessment of practical skills during the current assessment

The grade **"excellent"** is given to a student who knows the course and sequence of independent practical work to perform a practical task, finds the best options for setting up a microbiological experiment, demonstrates the correct implementation of the necessary practical skills, and correctly formulates generalizations and conclusions, draws up a protocol.

A grade of **"good"** is given to a student who admits inaccuracies in the performance of microbiological practice, but is able to identify errors and can demonstrate the implementation of practical skills in general, carefully draws up research results in the protocol of the practical lesson.

Assessment of **"satisfactory"** is given to a student who knows the basics of the practical task, but has difficulty at performing microbiological practice, can not demonstrate the correct sequence of practical skills, can not fully interpret the results of research, sloppy protocol.
The grade **"unsatisfactory"** is given to a student who cannot demonstrate the performance of practical skills, experiences significant difficulties in performing microbiological practice, violates the procedure for performing practical work, does not register the progress of work in the protocol.

Evaluation of testing during the current assessment

The grade **"excellent"** is given to the student who at carrying out test control is allowed no more than 10% of incorrect answers (volume of correct answers 90-100%). Provides correct answers to all test questions when solving clinically-oriented test tasks.
A grade of **"good"** is given to a student who makes no more than 20% of mistakes during the test. (volume of correct answers 80-89%). Provides correct answers to most test questions when solving clinical-oriented test tasks.
The grade **"satisfactory"** is given to a student who makes mistakes in no more than 40% of test tasks (the amount of correct answers is 60.5-79%). When solving clinically-oriented test tasks, it provides the correct answers to only some questions to the test.
A grade of **"unsatisfactory"** is given to a student who correctly solves less than 60% of the test tasks in a test survey. When solving clinical-oriented test tasks, he cannot provide the correct answers to the test questions.

Assessment of final control (credit)

Final control is credited if the student has mastered the discipline in full, as evidenced by the current assessment of each practical lesson, and attended a lecture course. To assess the final control, the calculation of the arithmetic average mark of the traditional assessment for the discipline is performed.

Assessment of individual extracurriculum work

Individual work is not planned according to curriculum

7. Policy of discipline / course

The student has the right to receive high-quality educational services, access to contemporary scientific and educational information, qualified tutoring during the study of discipline and mastering practical skills. The policy of the department during the providing of educational services is a student-centered, based on normative documents of the Ministry of Education and the Ministry of Health of Ukraine, the Statute of the University and the Procedure for the Providing of Educational Services regulated by the main principles of the organization of the educational process in National Pirogov Memorial Medical University and the principles of academic integrity (https://www.vnmu.edu.ua/en/general-regulations).

Adherence to the rules of VNMU, safety techniques in practical classes.

Observance of the rules of the VNMU regulations, safety precautions at practical classes. Instruction on biosafety, safety of handling chemical reagents and burners, and the actions in case of signal "Air Alarm" are conducted at the first practical lesson by the teacher. The instructed students are registered in the Safety Instruction Journal. A student who has not been instructed is not allowed to perform practical work.

Requirements for preparation for practical classes.

The student should be prepared for a practical lesson, testing tasks for the current topic should be solved in a workbook, diagrams and tables are filled.
A student should come to class on time, without delay. A student who is more than 10 minutes late is not allowed to the practical class and must work it in the prescribed manner.

In practical classes, the student must be dressed in a work uniform (medical gown, hat). Students who do not have a work uniform are not allowed to practice.
The student must follow the rules of safety in practical rooms and at the department.
When discussing theoretical issues, students should demonstrate tolerance, courtesy and respect for their colleagues and the teacher; when performing practical tasks, the workplace should be kept in order and be cleaned after performing practical work.
Usage of mobile phones and other electronic devices.
The use of mobile phones and other electronic devices in the classroom is allowed only during electronic testing or surveys.
Academic integrity. When studying the discipline, the student must be guided by the Code of Academic Integrity and Corporate Ethics of National Pirogov Memorial Medical University (link : https://www.vnmu.edu.ua/en/general-regulations)/ Code of Academic Integrity). In case of violation of the norms of academic integrity during the current and final controls student receives a grade of "2" and must work it out to his teacher in the prescribed manner within two weeks after receiving an unsatisfactory assessment).
Missed classes. Missed classes are working out in the manner prescribed by Regulations of the Academic process in National Pirogov Memorial Medical University (link https://www.vnmu.edu.ua/en/general-regulations) at the time of workout schedule (published on the website of the department https://www.vnmu.edu.ua/ Department of Microbiology #) to the teacher on duty or with the teacher, who carries practical classes. To work out missed lesson student must be interviewed or be tested on the relevant topic.
The procedure for admission to the discipline final control is given in the Regulation of the Academic process in National Pirogov Memorial Medical University (link https://www.vnmu.edu.ua/en/general-regulations). Students who do not have missed practical classes and received an average traditional grade of at least "3" are allowed to final control.
Additional points. As individual work is not planned, individual points are not assesed.
Conflict resolution. In case of misunderstandings and complaints to the teacher because of the quality of educational services, knowledge assessment and other conflict situations, student should submit his / her claims to the teacher. If the issue is not resolved, the student has a right to apply to the head of the department according to Complaints Consideration Procedure (https://www.vnmu.edu.ua/ General information / Basic documents).
Politics in terms of remote learning. Distance learning regulated by the Regulations of the elements of remote learning in National Pirogov Memorial Medical University (https://www.vnmu.edu.ua/en/general-regulations). The main training platforms for studying are Microsoft Team and Google Meets. Practical classes and lectures, exercises and consultations during distance learning is published on the website of the department (https://www.vnmu.edu.ua/en/ Department of Microbiology / Student or https://www.vnmu.edu.ua/en/Department of Microbiology / News).
Feedback from teachers is via messengers (Viber, Telegram, WhatsApp) or e-mail (at the teacher's choice) during working hours.

Educational resources.
Educational and methodological support of the discipline is published on the website of the department (https://www.vnmu.edu.ua/en/ Department of Microbiology/ To students). Consultations are hold twice a week according to the schedule.
Recommended reading:

1. Mandell, Douglas and Bennett`s Infectious Diseases Essentials/ J.E Bennet., R. Dolin, M.J.Blaser. – ELSEIVER, 2017. – 563 p.

2. Medical microbiology, virology and immunology= Медична мікробіологія, вірусологія та імунологія /[Andrianova T.V., Bobyr V.V., Vinograd N.A. and others.] ; Edited by V.P.Shirobokov – Vinnitsya: Nova kniga , 2018. – 744 p.
3. P.R.Murrey, K.S.Rosental, M.A.Pfaller. Medical Microbiology, 8th edition, Elseiver, 2017.- 836 p.
4. Review of Medical Microbiology and Immunology, 12 edition/ Warren E. Levinson / McGraw-Hill Prof Med.-Tech., 2012. – 688 p.
5. 5. Jawetz, Melnick, & Adelberg's Medical Microbiology, 26th Edition, 2012, English. – 880 p.
6. Atlas R. M. Principles of microbiology. 2-nd edition-McGraw-Hill, Boston, Massachusetts, 2015.

8. **Electronic resources:**

Microbiology and immunology on-line http://www.microbiologybook.org/
On-line microbiology note http://www.microbiologyinfo.com/
Dr. Najeeb Lectures https://www.youtube.com/channel/UCPHpx55tgrbm8FrYYCflAHw
Osmosis https://www.youtube.com/c/osmosis/
MEDCRAM- Medical Lectures explained clearly
https://www.youtube.com/user/MEDCRAMvideos
PubMed : https://pubmed.ncbi.nlm.nih.gov/
ESCMID: European Society of Clinical Microbiology and Infectious Diseases
https://www.escmid.org/escmid_publications/manual_of_microbiology/

9. **The timetable and distribution of groups** with assigned teachers are published on the web page of the department ((https://www.vnmu.edu.ua /en/ Department of Microbiology / To students).
10. **Questions to the final control (credit)** of the discipline are published on the web page of the department (https://www.vnmu.edu.ua/en/ Department of Microbiology / To students).

The syllabus of the discipline "Clinical microbiology" was discussed and approved at the meeting of the microbiology department
record № __1__, dated 29th August_____ 2024

Responsible for the academic discipline |"Clinical microbiology" **Ass-prof. of HEI Irina VOVK**

Head of the microbiology department **Professor of HEI Valentin KOVALCHUK**