Odessa National Medical University
Microbiology, Virology and Immunology Department

Syllabus of course
MICROBIOLOGICAL BIOTECHNOLOGY

Volum:	4 credits /120 hours
Semester, Year	IV semester, 2 year
Days, Time, Place:	According to the Schedule in the classroom of the Department of Microbiology, Virology and Immunology. 1 Knyazivska str.
Teacher(s)	Hruzesvkyi O.A., Head of Department of Microbiology, Virology and Immunology, MD, Ph.D., D. sci. associate professor; Golovatiuk O.L., MD, PhD, associate professor; Hrydina T.L., PhD, associate professor
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Workplace	Microbiology, Virology and Immunology Department, 1 Knyazivska str., classrooms.
Consultations	*Offline consultations:* Thursday – 14.00-16.00; Saturday – 9.00 до 13.00; *Online consultations:* Thursday – 14.00-16.00; Saturday – 9.00 до 13.00; *Microsoft Teams* або через *Telegram/Viber*

COMMUNICATION

Communication with applicants (postgraduate students) is carried out through face-to-face meetings. In case of transition to online studyng, communication with graduate students will be carried out using e-mail and the following programs: Microsoft Teams, Moodle, Telegram and Viber.

ANNOTATION OF THE COURSE

The subject of study of the discipline

The subject of study of the selective educational discipline "Microbiological Biotechnology" is the search for lactobacilli strains that have an antagonistic effect on the growth of antibiotic-resistant strains of staphylococci, determining the level of inhibition and the possibility of obtaining a producer strain that can be used for the production of lactic acid products.

Course prerequisites and post-requisites (Place of the discipline in the educational program):

The basis for mastering the discipline "Microbiological Biotechnology" is the knowledge, skills and abilities acquired during the second (master's) level of education in the specialty "Medicine". At the same time, it lays the foundation for studying some

aspects of staphylococcal bacteriocarrier and preventing the persistence of staphylococci on mucous membranes with the help of competitive microorganisms, the search for candidate strains from various econiches, and the study of the characteristics of the obtained isolates.

The aim of the course.

The aim of the selective academic discipline "Microbiological Biotechnology" is to master the complex of knowledge, skills to determine the level of antibiotic resistance of staphylococcal strains, the selection of adequate media for the joint cultivation of these strains with lactobacilli. research to solve significant problems in the field of professional activity, science, performance of functional duties related to the rational choice of drugs.

***Discipline objectives*:**

- providing of knowledge on determining the level of antibiotic resistance of staphylococcal strains to those obtaining the degree of Doctor of Philosophy;
- providing of knowledge to the candidates of the degree of Doctor of Philosophy regarding the selection of adequate environments for the simultaneous cultivation of antibiotic-resistant strains of staphylococci with lactobacilli;
- obtaining strains of lactobacilli that will suppress the growth of staphylococci.development of molecular genetic diagnostics techniques for the detection of polymorphic regions of plasmid genes**.**

Expected results

According to the results of studying the discipline, graduate students should

know:

- methods of preparation of culture media;
- - principles of cultivation of pure cultures of microorganisms;
- - methods for determining the resistance to antibiotics of the studied strains of microorganisms.

be able to:

- to analyze the experimental results obtained;
- to change the conditions of simultaneous cultivation of lactobacilli and staphylococci;
- to evaluate the level of antagonistic influence of lactobacilli on the growth of staphylococci.

DESCRIPTION OF THE COURSE

Forms and methods of teaching

The course will be presented in the form of practical lessons (60 hours), organization of independent work of students (60 hours)в (60 год.); total – 120 hours. (4 credits).

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

The content of the discipline

Topic 1. Selection of optimal conditions for cultivation of staphylococci. Preparation of nutrient media.

Topic 2. Determination of optimal conditions for the cultivation of lactobacilli. Selection and preparation of nutrient media.

Topic 3. Methods of preparing dense nutrient media and selection of optimal conditions for co-cultivation of staphylococci and lactobacilli.

Topic 4. Methods of preparation of liquid nutrient media and selection of optimal conditions for co-cultivation of staphylococci and lactobacilli.

Topic 5. Methods of determining antibiotic resistance of studied microorganisms on dense nutrient media.

Topic 6. Methods of determining antibiotic resistance of studied microorganisms on liquid nutrient media.

Topic 7 Selection of strains of staphylococci with maximum and minimum antibiotic resistance.

Topic 8. Determination of antagonistic relationships of microorganisms.

Topic 9. Methodological approaches to the determination of lactobacilli strains that have an antagonistic effect on the growth of staphylococcal strains.

Topic 10. Approaches to determining the number of bacteria.

Topic 11. Determination of the number of lactobacilli that can completely inhibit the growth of antibiotic-resistant strains of staphylococci.

Topic 12. Characteristics of lactobacillus producer strains.

Topic 13. Selection of optimal cultivation conditions of producer strains for the purpose of further production of sour milk product.

Topic 14. Analysis and protection of forms 137/o. Credit class. Final control of mastering the discipline.

List of recommended literature:

Main:

1. Review of Medical Microbiology and Immunology, 12 edition/ Warren E. Levinson. McGraw-Hill Prof Med.-Tech., 2012. 688 p.
2. Jawetz, Melnick, & Adelberg's Medical Microbiology, 26th Edition, 2012, English. 880 p.

Additional:

1. Anantharyan R. Jayaram Paniker C. K. Textbook of Microbiology. 12-th Edition.- Orient Longman, 2022.
2. 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).
3. 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.
4. Louten, J. & Reynolds, N. Essential Human Virology. (2016).
5. Rich, R. R. & Fleisher, T. A. Clinical Immunology (Fifth Edition) Principles and Practice. Clinical Immunology (2018).
6. Abbas, A., Litchman, A. H. & Pillai, S. Basic Immunology - 6th Edition. (Elsevier Ltd, 2019).
7. Male, D., Peebles, S. & Male, V. Immunology. (2020).

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).

Informational resources:

1. Centers for diseases control and prevention www.cdc.gov
2. European Molecular Genetics Laboratory www.embl.de
3. Microbiology and immunology on-line http://www.microbiologybook.org/
4. National center of biotechnological information https://www.ncbi.nlm.nih.gov
5. On-line microbiology note http://www.microbiologyinfo.com

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 involves an oral assessment.

Selfwork of students.

The work of graduate students consists of independent study of a certain list of topics or topics that require in-depth study. Questions on topics assigned to independent study are included in the control measures.

COURSE POLICY («rules of the game»)

Deadline and retake policy

Tasks must be completed on time according to the deadline. For untimely completion of the assignment, the graduate student receives an unsatisfactory grade. If the student of higher education was absent from classes for any reason, then the practice is carried out within the deadlines set by the teacher in accordance with the "Regulations on the organization of the educational process at ONMedU" (link to the regulations on the university's https://onmedu.edu.ua/wp-content/uploads/2020/01/osvitnij-proces.pdf. Reworks is carried out in accordance with the approved schedule .

Academic Integrity Policy

The policy of the educational component is based on the principles of academic integrity (link to the regulations on the university's website https://onmedu.edu.ua/wp-content/uploads/2020/07/polozhennja-prodobrochesnist.pdf) and is determined by the system of requirements that the teacher presents to the applicant when studying the educational component:

- independent performance of educational tasks, tasks of current and final control of learning outcomes (for persons with special educational needs this requirement is applied taking into account their individual needs and opportunities);
- references to sources of information in the case of the use of ideas, developments, statements, information.

Attendance and lateness policy

To obtain a satisfactory assessment, attendance and work in the classroom (practical exercises) is mandatory. Postgraduate students are allowed to be late no more than 10 minutes.

Mobile devices

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

Behavior in the auditory

While in the classroom, the following values should be cultivated: respect for colleagues; tolerance for others; receptivity and impartiality; argumentation of agreement or disagreement with the opinion of other participants in the discussion, as well as their own opinion; respect for the dignity of the personality of the opponent/s during communication; observance of the academic interrelations' ethics.

Head of Department
of Microbiology, Virology and Immunology
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