

Odessa National Medical University
Microbiology, Virology and Immunology Department

Syllabus of course
MOLECULAR 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)	Hruzesvkiy 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	<i>Offline consultations:</i> Thursday – 14.00-16.00; Saturday – 9.00 до 13.00; <i>Online consultations:</i> Thursday – 14.00-16.00; Saturday – 9.00 до 13.00; <i>Microsoft Teams</i> або через <i>Telegram/Viber</i>

COMMUNICATION

Communication with applicants (postgraduate students) is carried out through face-to-face meetings. In case of transition to online studying, 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 plasmid gene sequences that determine the bactericidal properties of bacteria, the determination of their translation products, and the study of the effect of polymorphism of these genes on the bactericidal properties of bacteria.

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". Also, the study of the discipline lays the foundations for the identification, analysis and determination of translation products of plasmid genes, which determine the bactericidal properties of bacteria.

The aim of the course.

The aim of the selective educational discipline "Microbiological Biotechnology" is to master a set of knowledge, skills, and abilities to determine the sequences of plasmid genes that determine the bactericidal properties of bacteria, determine their polymorphic and conservative regions, annotate plasmid genes, identify the amino acid sequence, and build models of translation products of the studied genes. detection of the effect of polymorphism of plasmid genes on the products of their translation and for planning and carrying out own research, for solving significant problems in the field of professional activity, science, performance of functional duties related to the use of bacteria with bactericidal properties to inhibit the growth of pathogenic microorganisms.

Discipline objectives:

- providing of knowledge on the identification of plasmid genes that determine the bactericidal properties of bacteria to those obtaining the degree of Doctor of Philosophy;
- providing of knowledge to those obtaining the degree of Doctor of Philosophy regarding the detection of plasmid gene regions, the polymorphism of which affects the bactericidal properties of bacteria;
- 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 ***to know:***

- bactericidal substances and methods of their production;
- classification, structure of bacterial plasmids;
- processes of transcription, translation and accumulation of mutations of plasmid genes.

be able to:

- to analyze the experimental results obtained;
- to identify translation products of nucleotide sequences;
- evaluate the level of error and statistical reliability of bioinformatics research.

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. Bacteriocins. Effect on bacterial cells.
- Topic 2. Bacterial resistance to bacteriocins.
- Topic 3. Evolution, taxonomy, reproduction of plasmids.
- Topic 4. Determination of unique sequences of plasmid genes.
- Topic 5. Methods of alignment of nucleotide sequences.
- Topic 6. Methods of alignment of amino acid sequences.
- Topic 7 Determination of polymorphism of plasmid genes.
- Topic 8. Determination of polymorphism of plasmid proteins.
- Topic 9. Molecular and genetic methods of research in vitro and in silico.
- Topic 10. Determination of polymorphic and conservative parts of the genome.
- Topic 11. Annotation of plasmid genes.
- Topic 12. Determination of the effect of genome polymorphism on the quantitative and qualitative composition of bacteriocins in culture.
- Topic 13. Detection of rank correlation and error. Spearman coefficient.
- 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 academic interrelations' ethics.

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