



SYLLABUS OF THE EDUCATIONAL COMPONENT MODERN ISSUES OF MOLECULAR BIOLOGY

for applicants for higher education of 2 year of study
full-time form of education
of educational program "Pharmacy",
in specialty "226 Pharmacy, Industrial Pharmacy",
field of knowledge "22 Public Health"
training for Master`s (second) level of higher education

TEACHERS

Information about the teacher

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- The name of higher education establishment and department:** National University of Pharmacy, Department of Clinical Laboratory Diagnostics, Microbiology and Biological Chemistry.
- Address of the department:** Kharkiv, Kulikovska str., 12, ground floor, т. 057-706-30-99.
- Web site of the department:** <https://biochem.nuph.edu.ua/?lang=en>
- Consultations:** Every day you can send your questions to the forum. The given day for discipline.
- Summary of the educational component:** the educational component Modern issues of molecular biology is a branch of biology that studies biological processes at the level of biopolymers: nucleic acids and proteins and their supramolecular structures. The fundamental tasks of molecular biology are to establish the molecular mechanisms of basic biological processes, such as the reproduction and implementation of genetic information, protein biosynthesis and other processes caused by the structural and functional properties and interaction of nucleic acids and proteins, as well as to study the regulatory mechanisms of these processes. Main research areas: organisation of macromolecules and supramolecular entities that determine such specific features of living matter as self-regulation of systems, heredity, variability, growth and development; molecular mechanisms of processes in the cell: DNA biosynthesis, RNA synthesis on matrix DNA, protein biosynthesis on ribosomes, membrane transport, enzymatic catalysis, etc.; principles of regulation of macromolecular functions and processes in the cell; development of new methods and biotechnologies for practical use.
- The purpose statement of studying the educational component:** The **purpose** of teaching the educational component is to provide students with systematic knowledge of the general laws of structural organisation of biological macromolecules and molecular mechanisms of preservation and implementation of genetic information, as well as to master modern problems and achievements in the field of molecular diagnosis of human diseases.
- Competences in accordance with the educational program:** conducting lectures and practical classes for a better understanding of topics.
Hard-skills / Professional (special) competences (PC):
PC 2. Ability to collect and verify data, receive and process samples according to protocols.
PC 3. Ability to analyse samples and validate results according to existing protocols.
PC 4. Ability to apply modern methods and technologies for the study of tissues and samples of various origins in laboratories of various profiles and understanding of the principles of these methods.

8. The program learning outcomes: (PLO):

PLO 2. Determine the qualitative and quantitative composition of substances and their mixtures. Demonstrate the use of knowledge of morphological changes in tissues and organs to diagnose pathological conditions, identify false results and take measures to correct them.

PLO 10. Verify the results of laboratory tests for the diagnosis of infectious diseases (normal / pathology).

PLO 12. Perform general clinical, haematological studies, interpret the results taking into account normal and critical values, limitations of the research method, clinical and other laboratory parameters, identification of implausible results.

9. Status of the educational component: selective.**10. Prerequisites of the educational component: biology, chemistry.****11. The volume of the educational component:** The educational component takes 90 hours, 3 ECTS credits. This includes 20 hours of lectures, 20 hours of seminars, and 40 hours of independent work.**12. Organization of training**

Organisation of training:

Teaching methods:

- *Explanatory (information and reproductive) method: Lecture-based learning lectures, video materials;*
- *reproductive method: traditional practical classes;*
- *problem-based teaching: Brainstorming brainstorming method;*
- *research method: Research-based learning - participation in research work, preparation of abstracts at conferences, scientific articles.*

Content of the educational component:**Content module 1: Molecular basis of heredity.**

Topic 1: Subject and object of molecular biology. Molecular mechanisms of intercellular signalling and transmembrane transport.

Topic 2. Macromolecules as objects of study in molecular biology. DNA replication and repair.

Topic 3. Gene expression and its regulation.

Topic 4. Structural organisation of genomes of viruses and cellular organisms.

Topic 5. Molecular mechanisms of ontogeny.

Control of content module 1.**Content module 2. Molecular basis of hereditary diseases. The current state of gene technology.**

Topic 6. Problems of mutagenesis and molecular mechanisms of hereditary diseases.

Topic 7. Regulation of the cell cycle. Apoptosis. Fundamentals of oncogenetics.

Topic 8. Methods of genetic engineering. Research of nucleic acids.

Topic 9. Transgenic organisms. Gene therapy.

Topic 10. Cloning of organisms.

Control over the content module 2.**Semester Control.****13. Forms and types of academic achievements supervision:**

- *Current control:* oral questioning, written tasks, solving situational tasks, computer testing.
- *Control of content modules:* this is the control of the assimilation of the amount of knowledge that was obtained by the applicant for higher education during the content module. It is conducted in the form of written work and computer testing.
- *Semester control:* this is conducted in the form of computer testing.

14. Assessment system for the educational component:**Assessment of mastering the topics of the educational component during classes:**

The topic number of the educational component	Maximum number of points per topic	Distribution of the maximum number of points per topic by type of work	Types of work for which the applicant receives points
<i>Content module 1</i>			

Topic 1.	10	5	oral response
		2	written work
		3	solving situational problems
Topic 2.	10	5	oral response
		2	written work
		3	solving situational problems
Topic 3.		5	oral response
		5	written work
Total points for Content Module 1:		30	
Content module 2			
Topic 4.	10	5	oral response
		2	written work
		3	solving situational problems
Topic 5.	10	5	oral response
		5	written work
Total points for Content Module 1:		20	
Total points per module:		50	

The study of the educational component by higher education students is possible through non-formal education. Instead of performing types of work on any topic of the educational component, the following types of work of a higher education applicant may be credited:

- participation in master classes, forums, conferences, seminars, webinars on the topic of the educational component (with the preparation of essays, abstracts, information messages, etc. confirmed by the programme of the event, or abstracts, or the relevant certificate);
- participation in research and applied studies on the topic of the educational component (in the development of questionnaires, conducting experimental studies, processing research results, preparing a report, presenting results, etc. as evidenced by the demonstration of relevant materials).

Assessment of applicants by type of work during classes:

Types of work for which the applicant receives points	Maximum number of points
answers to theoretical questions	41
solving situational problems	9
Total points:	50

Assessment during the control of content modules:

Types of work for which the applicant receives points	Distribution of the maximum number of points for the control of the content module by type of work	Maximum number of points for the content module control
Content module 1		
testing	10	30
answers to theoretical questions	20	
Content module 2		
testing	5	20
answers to theoretical questions	15	
Total points for the control of content modules:		50

Assessment of the independent work of the student:

During the current control: 21 points: 12 points for answering theoretical questions for independent work (topics 1-4), 9 points for solving tasks for independent work (topics 1, 2, 3).

during the control of content module 1: tickets for content module 1 include theoretical questions and test tasks on topics 1, 2

during the control of content module 2: tickets for content module 2 include theoretical questions and test tasks on topics 3, 4

Scale of assessment of the semester test:

Several grading scales are used in the study of the educational component: 100-point scale, undifferentiated ('pass', 'fail') two-point scale and ECTS rating scale. The results are converted from one scale to another according to the table.

The sum of points on a 100-point scale	ECTS scale	Rating on an undifferentiated scale
90-100	A	credited
82-89	B	
74-81	C	
64-73	D	
60-63	E	
35-59	FX	not credited
1-34	F	

15. Educational component policies:

- *Policy on academic integrity.* It is based on the principles of academic integrity, given in the POL "On measures to prevent cases of academic plagiarism in NUPh". Cheating in assessing the performance of a higher education applicant during control activities in practical (laboratory) classes, control of content modules and semester offset are prohibited (including with the use of mobile devices). Detection of signs of academic dishonesty in the written work of the student is the basis for its non-enrollment by the teacher.
- *Policy on attendance.* The applicant for higher education is obliged to attend classes (POL "On the organization of the educational process of NUPh") according to the schedule (<https://nuph.edu.ua/rozklad-zanyat/>), adhere to ethical standards of conduct.
- *Policy on deadlines, working out, rating increase, elimination of academic debt.* Working out of missed classes by a higher education student is carried out in accordance with the Regulation "Regulations on working out missed classes by students classes and the procedure for eliminating academic differences in curricula at NUPh" according to the established at the department schedule of working out missed classes. Raising rating and elimination of academic debt from the educational component is carried out by applicants for education in accordance with the procedure specified in the Regulations "On the procedure for evaluating results of higher education applicants at NUPh". Applicants for higher education are obliged to comply with all deadlines set by the department for the performance of types of written work on educational component. Works that are submitted in violation of deadlines without good reason, are evaluated at a lower grade - up to 20% of the maximum number of points for this type of work.
- *Policy on appealing the assessment of the educational component (appeals).* Applicants for higher education have the right to appeal (appeal) the assessment of the educational component received during control measures. The appeal is carried out in accordance with the Regulations on Appealing the results of semester control of knowledge of higher education applicants at NUPh". Any form of violation of academic integrity is not tolerated. In case of such events - response in accordance with the provisions of NUPh.

16. Information and educational and methodical support of the educational component:

The main reading suggestions	1. Molecular biology: Book/ David P. Clark, Nanetta J. Razdernik, Michelle R.McGehee. – Academic Cell, 2019. – 1110 p.
Supplementary reading suggestions for in-depth study of the educational component	1. Journal "Biopolymers and Cell" https://www.imbg.org.ua/uk/journals/bpc/ 2. Journal of Biological Chemistry https://elifesciences.org/subjects/biochemistry-chemical-biology?gclid 3. Journal of-molecular-biology https://www.journals.elsevier.com/journal-of-molecular-biology 4. ScienceDirect. https://www.sciencedirect.com/science
Current electronic information resources (magazines, websites) for in-depth study of the educational component	1. Department of Biological chemistry and Veterinary medicine Site: http://biochem.nuph.edu.ua/ . 2. NPhU Library: e-mail library@nuph.edu.ua

Moodle distance learning system	https://pharmel.kharkiv.edu/moodle/course/view.php?id=4047
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17. Material, technical and software support of the educational component: LabAnalyt SP-V1000 spectrophotometer, aqua distiller D1-10, LabAnalyt DM 0412 clinical centrifuge, pH meter pH-305, R-Line personal computer with Intel Core i3-8100 processor, Philips 223V5LSB, R-Line workstation with IntelCore i5-7400 processor, EPSON EB-X05 projector, TC-80 thermostats, Application software and online services: a set of services for organising online and distance learning - Google Workspace for Education Standard, licence type – free licence for education, unlimited; software for organising video conferences ZOOM, licence type - free license for education for 1 year with the possibility of extension; modular object-oriented dynamic learning environment MOODLE 3.9.8, licence type - Open Source.

