

**SYLLABUS OF THE EDUCATIONAL COMPONENT
MODERN PROBLEMS 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**

TEACHER



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1. **The name of higher education establishment and department:** National University of Pharmacy, Department of Biological chemistry and Veterinary medicine.
2. **Address of the department:** Kharkiv, Kulikovska str., 12, ground floor, т. 057-706-30-99.
3. **Web site of the department:** <https://biochem.nuph.edu.ua/?lang=en>
4. **Information about teachers:**
Galuzinska Liubov
PhD, Associate Professor of the Department of Biological Chemistry and Veterinary Medicine of the National University of Pharmacy. Experience of scientific and pedagogical work – 23 years. She teaches courses: "Biological Chemistry", "General Biochemistry and Molecular Biology", "Biochemistry", "Functional Biochemistry", "Environmental Biochemistry". Research interests: biochemistry, pharmacology, clinical biochemistry.
5. **Consultations:** every Thursday 13:00-14:00.
6. **Brief summary of the educational component:** the educational component 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.
7. 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.
8. **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.

9. 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.

10. Status of the educational component: selective.

11. Prerequisites of the educational component: biology, chemistry.

12. 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.

13. Organization of training:

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 credit.****14. Forms and types of academic achievements supervision:**

Current control: oral questioning, test tasks, solving situational (calculation) problems.

Control of content modules: oral examination, test tasks, solving situational (calculation) problems.

Form of semester control: semester credit / semester differentiated credit.

Conditions for admission to the control of content modules: to be admitted to the control of content modules, a minimum number of points for the topics (classes) of the previous content module is required.

Conditions for admission to the semester control: current rating of more than 60 points, no unexcused absences from practical classes, fulfilment of all requirements provided for in the work programme of the educational component.

15. Evaluation system of the educational component:

The results of semester supervision in the form of a semester exam are evaluated according to the ECTS scale, a 100-point scale and a four-point scale ("excellent", "good", "satisfactory", "unsatisfactory").

Points from the educational component are calculated according to this ratio:

Types of evaluation	Maximum number of points (% of the number of points per module – for content modules)
Module 1	

Content module 1: Molecular basis of heredity. - evaluation of topics (1-5) - (work in the classroom: oral questioning, test tasks, solving situational (calculation) problems; - control of the content module 1 (test tasks, solving situational (calculation) tasks)	50 (50 %)
Content module 2. Molecular basis of hereditary diseases. Current state of gene technology. - evaluation of topics (6-10) - (classroom work: oral questioning, test tasks, solving situational (calculation) problems; - control of content module 2 (test tasks, solving situational (calculation) tasks)	50 (50 %)
Semester control	100%

The individual work of applicants for higher education is evaluated during the progress supervision and during the content module supervision

16. Academic policies of the educational component:

Academic Integrity Policy. It is based on the principles of academic integrity stated in the POL "On measures to prevent cases of academic plagiarism at the National University of Pharmacy". Cheating during the evaluation of an applicant for higher education during supervision activities in practical (seminar, laboratory) classes, supervision of content modules and the semester exam is prohibited (including the use of mobile devices). Abstracts must have correct text references to the used literature. The detection of signs of academic dishonesty in the student's written work is a reason for the teacher notto credit it.

Class attendance policy. An applicant for higher education is obliged to attend classes (POL "On the organization of the educational process of the National University of Pharmacy") according to the schedule (<https://nuph.edu.ua/rozklad-zanyat/>), to observe ethical norms of behavior.

Policy regarding deadlines, working out, rating increase, liquidation of academic debts. The completion of missed classes by an applicant for higher education is carried out in accordance with the POL "Regulations on the completion of missed classes by applicants and the procedure for eliminating academic differences in the curricula of the National University of Pharmacy" in accordance with the schedule for working out missed classes established by the department. Increasing the rating and liquidating academic debts from the educational component is carried out by the applicants in accordance with the procedure specified in the POL "On the procedure for evaluating the results of training of applicants for higher education at the National University of Pharmacy ". Applicants of higher education are obliged to comply with all deadlines set by the department for the completion of written works from the educational component. Works that are submitted late without valid reasons are assessed at a lower grade - up to 20% of the maximum number of points for this type of work.

Policy on appeals of evaluation of the educational component (appeals). Applicants for higher education have the right to contest (appeal) the evaluation of the educational component obtained during control measures. The appeal is carried out in accordance with the POL "Regulations on appealing the results of the final supervision of knowledge by applicants of higher education at the National University of Pharmacy".

17. 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

18. 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.