



SYLLABUS OF THE EDUCATIONAL COMPONENT

FUNCTIONAL BIOCHEMISTRY

**for applicants for higher education of 3 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 second (Master`s) level of higher education**

TEACHERS

Information about the teacher

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- 1. The name of higher education establishment and department:** National University of Pharmacy, Department of Clinical Laboratory Diagnostics, Microbiology and Biological Chemistry.
- 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/en/>
- 4. Consultations:** Every day you can send your questions to the forum. The given day for discipline.

5. Summary of the educational component:

The educational component 'Functional Biochemistry' is elective for the second (master's) level in the specialty 226 Pharmacy, Industrial Pharmacy of the educational programme 'Pharmacy'. It is taught in the 3rd year.

It consists of 1 module and 2 content modules. The final control is a semester control. The main objectives of the educational component 'Functional Biochemistry' are to find out the biochemical basis of the functioning of the hepatobiliary system, biochemical aspects of biliary secretory, detoxification, metabolic functions of the liver, biochemical basis of the study of the functional state of the liver by the syndrome principle; to consider the biochemical composition of blood in normal and pathological conditions, biochemical features of the respiratory function of blood, hemostatic processes, mechanisms of functioning of blood buffer systems; to consider the biochemical mechanisms underlying the processes of urine formation, as well as the biochemical composition of urine in normal and pathological conditions; to develop knowledge about the peculiarities of metabolism in individual organs and tissues; □ to develop knowledge about changes in tissue metabolism in various types of pathologies and the tissue-specific effects of drugs; to provide a theoretical basis for the study of other biomedical educational components: pharmacology, pharmacotherapy with pharmacokinetics, clinical pharmacology, etc.

6. The purpose statement of studying the educational component: The purpose of teaching the discipline "Functional Biochemistry" is to train specialists who have a significant amount of theoretical and

practical knowledge regarding the biochemical basis of life: the chemical structure of organic compounds and the nature of metabolic processes occurring in the human body.

7. Competences in accordance with the study programme:

Ability to solve typical and complex specialized tasks and practical problems in the professional pharmaceutical activity of the industry health care on a socially oriented basis or in the process of training, which involves chemical, biopharmaceutical, biomedical, sociological and other research and/or implementation of innovation and is characterized by uncertainty of conditions and requirements; integrate knowledge, critically comprehend and solve complex issues, make decisions in complex unpredictable conditions, formulate judgments in the presence of incomplete or limited information, taking into account aspects of social and ethical responsibility; clearly and unambiguously communicate their findings and knowledge, reasonably justifying them, to professional and non-specialist audiences.

Soft- skills / General competences (GC):

GC 3. Ability to think abstractly, analyse and synthesise, to learn and to modern professional training.

GC 9. Skills in the use of information and communication technologies.

Hard-skills / Professional (special) competences (PC):

PC 4. Ability to ensure the rational use of prescription and non-prescription drugs and other pharmacy products in accordance with the physicochemical, pharmacological characteristics, biochemical, pathophysiological characteristics of a particular disease and pharmacotherapeutic regimens for its treatment.

PC 12. Ability to use in professional activities knowledge of regulatory and legal acts of Ukraine and recommendations of good pharmaceutical practices.

8. The program learning outcomes: (PLO):

PLO 14. Determine the advantages and disadvantages of medicines of different pharmacological groups, taking into account their chemical, physicochemical, biopharmaceutical, pharmacokinetic and pharmacodynamic features. Recommend over-the-counter medicines and other pharmacy products to consumers with the provision of advisory assistance and pharmaceutical care.

PLO 16. Determine the influence of factors that affect the processes of absorption, distribution, deposition, metabolism and excretion of medicines and are due to the state, characteristics of the human body and physicochemical properties of medicines.

PLO 18. Select biological objects of analysis, determine xenobiotics and their metabolites in biological media and evaluate the results obtained taking into account their distribution in the body.

9. Status of the educational component: selective.

10. Prerequisites of the educational component: "Functional Biochemistry" is to train pharmacists-specialists with a significant amount of theoretical and practical knowledge about the chemical bases of life: the chemical composition of organic compounds and natural metabolic processes in the human body, features of their tissue localization and integration at the whole body. Functional biochemistry is based on the knowledge that students have acquired in the study of such disciplines as human physiology and anatomy, organic chemistry, pathological physiology, biological chemistry and pharmacology, and lays the necessary foundations for the study of clinical biochemistry, laboratory diagnostics, biotechnology, which involves the formation of skills and abilities to apply the acquired knowledge in further professional activities.

11. The volume of the educational component: 3.0 ECTS credits, educational component number of hours per general 90 hours. Lectures - 9 hours, practical classes - 21 hours, independent work - 60 hours.

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:

Module 1. Functional biochemistry

Content module 1. *Functional biochemistry of the gastrointestinal tract and blood.*

Topic 1. Introduction to the Functional biochemistry. Nutrition, digestion and absorption.

Topic 2. Functional biochemistry of blood.

Topic 3. Functional biochemistry of liver. Final test of CM 1 assimilation.

Content module 2. *Functional biochemistry of the excretory system, muscle and connective tissue.*

Topic 4. Functional biochemistry of the kidneys and urine formation.

Topic 5. Functional biochemistry of muscle tissue. Functional biochemistry of connective tissue. Final test of CM 2 assimilation.

Semester credit of the module "Functional Biochemistry "

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:

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
Content module 1			
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 discipline:

The main reading suggestions	1. Functional Biochemistry in Health and Disease: Textbook / Eric Newsholme, Anthony Leech. – Merton College and Department of Biochemistry, University of Oxford, UK. 2017. – 560 p.
Supplementary reading suggestions for in-depth study of the educational component	1. Functional biochemistry: methodical recommendations for organizing self-training work of a higher education student/ V. M. Kravchenko, I. V. Seniuk, V. P. Filimonenko, O. A. Shcherbak. – Kharkiv : NUPh; 2023. – 38 p. 2. Biological chemistry : textbook for the self-training of higher education student / V. M. Kravchenko, G. B. Kravchenko, O. A. Krasilnikova, I. V Seniuk. – Independent electronic edition. – Kharkiv : National University of Pharmacy, 2023. – 392 p. 3. Clinical biochemistry: An illustrated color text / A. Gaw, M.J. Murphy, R.A. Cowan and oth. – ELSEVIER Ltd., 2008.- 179 p. 4. Textbook of biochemistry: with clinical correlations / edited by Thomas M. Devlin.- John Wiley & Sons, Inc., 2011. – 1204 p.
Current electronic information resources (magazines, websites) for in-depth study of the educational component	Educational site http://pharmel.kharkiv.edu . Website of the Department of Biological chemistry and Veterinary medicine http://biochem.nuph.edu . Library of NUPh http://lib.nuph.edu.ua .
Moodle distance learning system	https://pharmel.kharkiv.edu/moodle/course/view.php?id=4509

17. Material, technical and software support of the educational component: LabAnalyt SP-V1000 spectrophotometer, aqua distiller DI-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.