

## SYLLABUS OF THE EDUCATIONAL COMPONENT



### LABORATORY DSAGNOSTICS

for third-year higher education students full-time education

Educational program 'Pharmacy'

Specialty 226 «Pharmacy, industrial pharmacy»

Field of knowledge 22 «Healthcare»

Second (master's) level of higher education

#### Instructor Information

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1. **Name of the higher education institution and department:** National University of Pharmacy, Department of Clinical Laboratory Diagnostics, Microbiology, and Biological Chemistry
2. **Address:** Kharkiv, st. Valentynivska, 4, 3rd floor, tel. 057-706-47-87.
3. **Website:** <https://biochem.nuph.edu.ua/>
4. **Consultations** take place at the Department of Clinical Laboratory Diagnostics according to the consultation schedule.
5. **Brief summary of the educational component:** The disciplines the discipline of free choice for the specialty Pharmacy of the educational program "Pharmacy". Final control is an credit.
6. **The purpose statement of studying the educational component: educational component «Laboratory Diagnostics»** is introduce in to the knowledge about systemic normal laboratory parameters and their changes due to pathology; learn the basic principles of technology information search about laboratory medicine in professional journals and to use it in practice, provide a knowledge about the occurrence and development of typical pathological processes; give systematic knowledge about the influence of drugs on laboratory parameters; create a base that defines professional competence and general erudition of pharmacist.
7. **Competences in accordance with the educational program: «Pharmacy» Soft- skills / General competences (CG):**  
CG 11. Ability to evaluate and ensure the quality of performed works.  
CG 12. Ability to conduct research at the appropriate level.  
**Hard-skills / Professional (special) competences (PC):**  
PC 5. The ability to monitor the effectiveness and safety of the use of medicinal products by the population according to the data on their clinical and pharmaceutical characteristics, as well as taking into account subjective signs and objective clinical, laboratory and instrumental criteria for the examination of the patient.
8. **The program learning outcomes: (PLO):** PLO 4. Demonstrate the ability to independently search, analyze and synthesize information from various sources and use these results to solve typical and complex specialized tasks of professional activity.  
PLO 17. To use the data of clinical, laboratory and instrumental studies to monitor the effectiveness and safety of the use of medicinal products.
9. **Status of the educational component:** *selective*
10. **Prerequisites of the educational component:** medical biology, pharmacology, medical and biological physics, medical chemistry, biological and bioorganic chemistry, morphological

disciplines, human anatomy and physiology, microbiology, therapy and integrates with these disciplines.

- 11. The volume of the educational component:** 3 ECTS credit 90 hours are assigned to the study of the educational component: *8 - lectures, 24 - practical classes, 58 - individual work.*
- 12. Organization of training:** the material of the educational component is presented in the form of lectures and practical classes.

### **The format of teaching the educational component**

#### **Content of the educational component:**

#### **Content module 1. Introduction into laboratory diagnostics. Laboratory research methods of blood, urine. The influence of drugs on laboratory parameters.**

**Topic 1.** The organization workplace for laboratory conduct research of blood. The composition and functions of blood. Erythrocytopoiesis, morphology of red blood cells, white blood cells, neutrophils, platelets. Determination of blood groups. Rules blood sampling for general clinical analysis. The method of determining the number of erythrocytes, concentration of hemoglobin, color index, leukocyte formula, erythrocyte sedimentation rate. Technology puncture the skin of a finger. Scheme of blood maturation. Embryonic and postembryonic hematopoiesis. Leukocytopoiesis. Age-related changes in blood composition. The functions of leukocytes. Quantitative changes of white blood cells, leukocytosis and leukopenia. Leukemoid reaction. Neutrocytosis. Neutropenia. Neutrophilic shift of leukogramme. Trombosytopoesis.

**Topic 2.** The anemia classification. Laboratory indexes. Differential diagnosis. Side effects of medications that affect the blood system. Drugs and pathology of blood. Etiology, pathogenesis. Clinical manifestations. Characteristics. Laboratory indexes. Differential diagnosis. Basic mechanisms of druginduced anemia. Drugs used to stimulate erythropoiesis. Purpose iron preparations. Vitamin B<sub>12</sub> and folic acid. Drugs that often cause inhibition of leucopoiesis. Medications recommended to stimulate leucopoiesis. Medications which often inhibit platelet function. Anticoagulants, antiplatelet agents, fibrinolytics. Hemostatic drugs. Adverse hematologic effects different groups of drugs.

**Topic 3.** The research of physical and chemical properties of urine. Methods of diagnostics. Number, color, clarity, smell, relative density. The physical properties of urine in norm and changes it due to pathology. Proteinuria, glucosuria, bilirubinemia, causes and types. Microscopic examination of urine sediment. Quantitative methods urine sediment. Organized urine sediment elements: red blood cells, white blood cells, the epithelium, cylinders. The rules and terms of collecting urine, sequence of studies, interpretation of results. Elements unorganized sediment urine: acidic, alkaline, abnormal urine. Method of Nechyporenko.

**Topic 4.** The changes of urine indicators due to infectious and inflammatory process and kidney disease. Side effects of drugs that affect the function of the urinary system. Drugs and pathology of the urinary system. Infectious-inflammatory processes in the bladder, urethra, prostate gland. Diagnostic value methods. Pyelonephritis, glomerulonephritis, acute renal failure, urolithiasis. Diagnostic value, methods of investigations. Basic mechanisms of nephrotoxicity drugs. Nephrotoxicity of some drugs. The principles prevent of nephrotoxicity drugs.

#### **Content module 2. Methods of investigation of sputum and gastrointestinal tract. The influence of drugs on laboratory parameters.**

**Topic 5.** Determination of physical properties of sputum. Side effects of drugs that affect the function of the respiratory system. Medicines that cause destruction of the respiratory system. Number, color, odor, texture, stickiness, foam. Microscopic examination of sputum. Epithelium, leukocytes, erythrocytes, formation of fibrous crystals, foreign bodies. Bacterioscopic sputum. Koch bacillus, fungi, protozoa, helminthes. Changes of sputum due to various diseases. Bronchitis, asthma, bronchiectasis, pneumonia, lung abscess, echinococcosis, tuberculosis. Diagnostic value methods. Medicines that stimulate respiration, antitussives, expectorants. Classification. Comparative characteristics of preparations. The most commonly expected adverse effects of drugs. Combined use of expectorant and antitussive agents. Side

effects of drugs that affect the function of the respiratory system that affect the function of the respiratory system. Medicines that cause destruction of the respiratory system. Medications used to treat asthma.

**Theme 6.** Clinical and laboratory study of the gastrointestinal tract. General information about the structure and function of the gastrointestinal tract. Chemical research of secretory function of the stomach. Volume, color, odor, slime. Physical secretory function of the stomach. Characteristics. Methods of examination (probe, nonprobe). Research of stomach acidity: determination of acidity due to using pH measuring. Diagnostic significance of debit and deficit hydrochloric acid, basal and maximum secretion of alkaline component secretion. Enzymatic activity of the stomach.

**Theme 7.** Clinical and laboratory study of the gastrointestinal tract. General information about the duodenal contents. Physical properties of bile. Quantity (volume), color, clarity, consistency, response, relative density. Microscopic examination of bile: elements of inflammatory origin, crystal formation; parasites and bacteria. Diagnostic significance of biochemical research of bile. Changes of duodenal contents due to diseases of the biliary tract. Dyskinesia, inflammation, cholelithiasis. Diagnostic meaning methods.

**Topic 8.** Macroscopic examination of feces. Microscopic examination of feces. Chemical examination of feces. Coprogram feces in various states of the digestive system. Number, color, texture, smell, shape, reaction remains undigested food, mucus, blood, worms, concernments. Elements of the mucous membrane of the intestines, food, crystals microflora. Diagnostic value of determination blood, protein, mucin and stercobilin. At normal digestion, lack of digestion in the stomach, pancreatic insufficiency, block of bile, insufficiency digestion in the small and large intestine. Features of stool in children.

**Topic 9.** Side effects of drugs that affect the function of the digestive system. Drugs and pathology of the gastrointestinal tract. Stimulants of gastric secretion. Inhibitors of gastric secretion. Recommendations Maastricht Conference (2010) on the eradication of *Helicobacter pilori*. Medicines, which influence on the activity of microsomal liver enzymes. Hepatotoxic drugs. Hepatotoxic medicines. Medicines of hepatoprotective effect that influence on the production of bile flow and its composition.

### 13. Types and forms of control:

#### *Types and forms of control:*

##### *Current control:*

*Knowledge control at each session:* oral questioning, test tasks, solving situational (calculative) problems.

*Content module control:* oral questioning, completion of test tasks, solving situational (calculative) problems.

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

##### *Semester control:*

*Semester control:* answers to theoretical questions, completion of test tasks, solving situational (calculative) problems.

*Conditions for admission to semester control:* current rating more than 60 points, absence of unworked absences of practical classes, fulfillment of all requirements provided by the working program of the educational component.

### 14. Evaluation system of the educational component:

#### *Evaluation of the assimilation of the topics of the educational component during classes:*

<i>Topic number of the educational component</i>	<i>Maximum number of points on the topic</i>	<i>Distribution of the maximum number of points for the topic by types of work</i>	<i>Types of work for which the applicant receives points</i>
<i>Content module 1</i>			
<i>Topic 1.</i>	7	testing	3

		answers to theoretical questions	4
Topic 2.	7	testing	3
		answers to theoretical questions	4
Topic 3.	7	answers to theoretical questions	3
		solving situational tasks	4
Topic 4.	7	answers to theoretical questions	3
		solving situational tasks	4
Content module 2			
Topic 5.	7	testing	3
		answers to theoretical questions	4
Topic 6.	7	testing	3
		answers to theoretical questions	4
Topic 7.	7	testing	3
		answers to theoretical questions	4
Topic 8.	11	writing a report (presentation)	11
Total points for the module:		60	

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

- participation in master classes, forums, conferences, seminars, webinars on the topic of the educational component (with the preparation of essays, theses of reports, informational messages, etc., confirmed by the program of the event, or theses of reports, or the corresponding certificate);
- participation in scientific and applied research on the topic of the educational component (in the development of questionnaire forms, conducting experimental research, processing research results, preparing reports, presenting results, etc., which is confirmed by the demonstration of relevant materials).

**Evaluation of students by types of work during classes:**

<b>Types of work, for which the applicant receives points</b>	<b>Maximum number of points</b>
testing	15
answers to theoretical questions	26
solving situational tasks	8
writing a report (presentation)	11
<b>Total points:</b>	<b>60</b>

**Evaluation during the control of content modules:**

<b>Types of work, for which the applicant receives points</b>	<b>Distribution of the maximum number of points for the control of the content module by types of work</b>	<b>Maximum number of points for the control of the content module</b>
<b>Content module 1</b>		
testing	10	40
answers to theoretical questions	30	
<b>Total points for the control of content modules:</b>		<b>40</b>

**Evaluation of the student's independent work:**

during ongoing assessment: 11 points - writing a report or presentation, 8 points - solving situational tasks

during the content module assessment: tickets for the content module include theoretical questions and test tasks from topics 1-8

**Semester assessment scale:**

When studying the educational component, several grading scales are used: a 100-point scale, a non-differentiated ("passed", "not passed") two-point scale, and the ECTS rating scale. Results are converted from one scale to another according to the table.

Total points on a 100-point scale	ECTS Scale	Grade on a non-differentiated scale
90-100	A	passed
82-89	B	
74-81	C	
64-73	D	
60-63	E	
35-59	FX	not passed
1-34	F	

**15. Policies of the educational component:**

*Policy on academic integrity.* Based on the principles of academic integrity outlined in the POL 'On measures to prevent cases of academic plagiarism at NUPh'. Cheating during the assessment of the academic performance of higher education students during control activities in practical (seminar, laboratory) classes, content module control, and semester exams is prohibited (including the use of mobile devices). Abstracts must have correct textual references to the used literature. Detection of signs of academic dishonesty in the written work of an education seeker is grounds for its non-acceptance by the instructor.

*Policy regarding class attendance.* A higher education seeker is obliged to attend educational classes (POL 'On the organization of the educational process of NUPh') according to the schedule (<https://nuph.edu.ua/rozklad-zanyat/>), and adhere to ethical norms of behavior.

*Policy on deadlines, make-up work, grade improvement, and elimination of academic debt.* Make-up work for missed classes by higher education students is carried out in accordance with the POL 'Regulations on make-up work for missed classes by students and the procedure for eliminating academic differences in the curricula at NUPh' according to the schedule of make-up classes established by the department. Improving the rating and eliminating academic debt in the educational component is carried out by students in accordance with the procedure outlined in the POL 'On the procedure for evaluating the learning outcomes of higher education students at NUPh'. Higher education students are required to adhere to all deadlines set by the department for completing types of written work in the educational component. Works submitted late without valid reasons are graded lower – up to 20% of the maximum score for that type of work.

*Policy on appealing the grade of the educational component (appeals).* Higher education students have the right to appeal the grade of the educational component received during control measures. The appeal is carried out in accordance with the POL 'Regulations on the appeal of the results of the semester knowledge control of higher education students at NUPh'.

*Policy on the recognition of learning outcomes obtained through non-formal and/or informal education by higher education students.* Higher education students have the right to recognize learning outcomes obtained in non-formal and informal education in accordance with the POL 'On the procedure for recognizing learning outcomes obtained through non-formal and/or informal education by higher education students at NUPh'.

Within the framework of the academic freedom of the teacher, instead of performing types of work on the topic of the educational component, it is possible to credit the informal education of the higher education applicant.

The results of the semester control in the form of a semester credit are evaluated on a 100-point, non-differentiated scale ('credited', 'not credited') and on the ECTS scale.

The results of the semester control in the form of a semester exam are evaluated on the ECTS scale, a 100-point scale, and a four-point scale ('excellent', 'good', 'satisfactory', 'unsatisfactory').

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

<b>Mandatory literature</b>	<ol style="list-style-type: none"> <li>1. Laboratory diagnostics: manual for students of pharmaceutical higher schools and pharmaceutical faculties of medical higher schools of the IV accreditation level / Kryzhna S. I., Lytvynova O. M., Berezhnyakova M. Ye. - Kharkiv: NUPhGolden Pages, 2016. - p.</li> <li>2. Notebook "Laboratory diagnostics" / S.I. Kryzhna, M.E. Berezhnyakova, O.N. Litvinova et al. – Kharkiv: NUPh, 2016. – 60 p.</li> </ol>
<b>Additional literature for in-depth study of the educational component</b>	<ol style="list-style-type: none"> <li>1. The influence of medicinal products on laboratory indicators: Educational manual for students of medical and pharmaceutical higher educational institutions. – Kh. NUPh Publishing, 2014 – 97 p.</li> <li>2. Electronic manual for studying the course 'Fundamentals of general clinical laboratory diagnostics' / T.M. Shevchenko, P.M. Polushkin – D.: DNU, 2016. – 138 p. – Access mode:  <a href="http://repository.dnu.dp.ua:1100/upload/17ba1fd9082bc67d1a6d5b0828504ea1Osnovi_zagal%27noyi_klinichnoyi_laboratornoyi_.PDF">http://repository.dnu.dp.ua:1100/upload/17ba1fd9082bc67d1a6d5b0828504ea1Osnovi_zagal%27noyi_klinichnoyi_laboratornoyi_.PDF</a> </li> </ol>

<p><b>Current electronic information resources (journals, websites, etc.) for in-depth study of the educational component</b></p>	<p>1. Clinical laboratory diagnostics. – URL: <a href="https://www.ncbi.nlm.nih.gov/pubmed/">https://www.ncbi.nlm.nih.gov/pubmed/</a></p> <p>2. Manual of Laboratory and Diagnostic Tests 7th edition: By Frances T Fischbach RN, BSN, MSN By Lippincott Williams &amp; Wilkins Publishers. – URL: <a href="https://murdercube.com/files/Survival/Medical/Labs">https://murdercube.com/files/Survival/Medical/Labs</a></p> <p>3. Library of Kharkov National University of Pharmacy — <a href="http://www.library@nuph.edu.ua">http://www.library@nuph.edu.ua</a>.</p> <p>4. Kharkiv State Library of Medicine — <a href="http://www.kh.med.bibc@ukr.net">http://www.kh.med.bibc@ukr.net</a>.</p> <p>5. Kharkiv State Scientific Library. VG Korolenko. 6. Specialized medical and biological internet port</p>
<p><b>Moodle distance learning system</b></p>	<p><a href="https://pharmel.kharkiv.edu/moodle/course/view.php?id=4600">https://pharmel.kharkiv.edu/moodle/course/view.php?id=4600</a></p>

**17. Material and technical support of the educational component:**

Technical support – computer, video camera, multimedia projector, screen.

Software: Microsoft Word, Excel, PowerPoint, Acrobat Reader, Google Workspace for Education Standard, ZOOM, MOODLE.