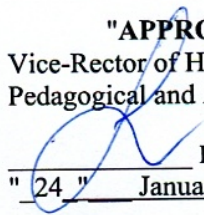


National Pirogov Memorial Medical University, Vinnytsya

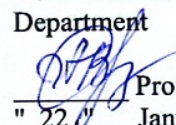
"APPROVE"

Vice-Rector of HEI for Scientific,
Pedagogical and Academic Affairs


Inna ANDRUSHKO
" 24 " January 2025

"AGREED"

Head of Medical and Biological chemistry
Department


Prof. of HEI Andrii MELNYK
" 22 " January 2025

SYLLABUS
of academic discipline
"CLINICAL BIOCHEMISTRY"
(elective course)

Specialty	226 Pharmacy, industrial pharmacy
Educational level	Master
Educational programme	EPP Pharmacy, industrial pharmacy, 2023
Academic year	2024-2025
Department	Medical and biological chemistry
Lecturers	Prof. of HEI Andrii MELNYK Assoc. prof. of HEI Vitaliy NECHIPORUK
Contact information	medchemistry@vnmnu.edu.ua Pirogov street 56, (0432) 57-02-71
Syllabus compilers	Assoc. prof. of HEI Vitaliy NECHIPORUK

1. Status and structure of the discipline

Discipline status	Elective Discipline
Discipline code in EPP/ discipline place in EPP	EIC 31 // elective discipline of professional training
Course / semester	3rd year (VI semesters)
The amount of discipline (the total number of hours / number of credits ECTS)	90 hours / 3,0 credits ECTS
Number of Thematic modules	3
The structure of the discipline	Lectures – 10 hours Practical classes - 30 hours Independent work - 50 hours
Language of study	English
Form of study	Full - time

2. Description of the discipline

Short annotation of the course relevance: Clinical Biochemistry is focused on gaining knowledge of the pathobiochemical basis of development and principles of clinical and biochemical diagnosis of enzymopathies, endocrinopathies, diseases of internal organs; methods of assessing the level of biomolecules and physiologically active substances for the diagnosis of pathological processes.

Prerequisite: Clinical biochemistry is based on students' knowledge of the basic natural science disciplines: medical biology, cytology and embryology, medical, biological and bioorganic chemistry, physiology and is integrated with these disciplines.

The purpose of the course and its significance for professional activities. The purpose of teaching the discipline “Clinical Biochemistry” is to form a system of knowledge and practical skills of higher education students on the basic laws of chemical composition and metabolism in humans in normal and pathological conditions, the principles of clinical and biochemical diagnosis of various pathological conditions; knowledge of pathobiochemical aspects of enzymopathies, endocrinopathies, vitamin deficiency; familiarization with the theoretical foundations of clinical biochemistry and laboratory diagnosis of the most common pathological conditions: diseases of the liver, kidneys, cardiovascular system, gastrointestinal tract, etc.; mastering practical skills in assessing the level of biomolecules and physiologically active substances for the diagnosis of pathological processes.

Postrequisites. “Clinical Biochemistry” forms the basis for in-depth study of the disciplines from the cycle of professional training - pathophysiology, clinical pharmacology, pharmacology, etc.

3. Learning outcomes. After successful study of the discipline the applicant will be able to:

Know:

- modern principles of organization of clinical diagnostic laboratories, unification of biochemical research, basics of quality control of clinical and biochemical research;
- molecular bases of development and biochemical signs of enzymopathies, methods of enzyme diagnostics and enzyme therapy;
- modern biochemical methods of studying metabolic disorders of the main classes of biomolecules (carbohydrates, lipids, proteins) and physiologically active substances;
- pathobiochemical aspects of the development and diagnosis of the most common pathological conditions (diseases of the liver, kidneys, cardiovascular system, gastrointestinal tract).

Be able:

- explain the methodology of biochemical research used in the clinical and laboratory diagnosis of various pathological conditions;
- explain the biological role and features of the metabolism of the main classes of biopolymers in the human body;

- evaluate biochemical parameters of the main metabolic processes, apply biochemical constellations;
- perform basic clinical and biochemical studies to assess the state of carbohydrate, lipid and protein metabolism in the human body

4. Content and logistics of the discipline

<u>Clinical biochemistry</u> Module 1. Thematic modules - 2.	VI semester 90 hours / 3 credits	Lectures № 1-5 Practical classes №№ 1-15 Topics for self- study №1-3
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The course includes 15 topics, which are divided into 3 thematic modules.

Module 1: Clinical biochemistry

Content module 1. General principles of clinical biochemistry. Pathology of metabolic processes

Topic 1: Clinical biochemistry as a science. Tasks and methods of clinical biochemistry. Principles of organization of clinical and biochemical research. Metabolic pathways and indicators of their state. Interrelation of metabolism. Reference intervals. Biochemical constellations. The latest trends in clinical biochemistry.
Topic 2. Clinical enzymology: enzymes as highly sensitive and highly specific criteria for metabolic disorders, indicator and organ-specific enzymes, methods for determining the level and activity of enzymes. Enzyme diagnostics in the practice of a pharmacist
Topic 3. Clinical biochemistry of enzymopathies: biochemical basis of occurrence, classification, laboratory diagnosis. Enzyme therapy in the practice of a pharmacist. Effect of xenobiotics on enzymes
Topic 4. Clinical biochemistry of protein metabolism and residual nitrogen system. Dysproteinemia, paraproteinemia. Pathology of the urea cycle. Primary and secondary hyperammonemia
Topic 5. Clinical biochemistry of nucleoprotein metabolism: mechanisms of development of primary and secondary hyperuricemia. Gout. Xanthine oxidase inhibitors in pharmacy. Pathology of orotaciduria.
Topic 6. Clinical biochemistry of carbohydrate metabolism: biochemical basis of carbohydrate metabolism disorders, methods of laboratory assessment of carbohydrate metabolism. Pathobiochemistry of glycogen and complex carbohydrates metabolism.
Topic 7. Pathobiochemistry of diabetes mellitus and its complications. Methods of laboratory assessment of insulin resistance. Metabolic syndrome.
Topic 8. Clinical biochemistry of lipid metabolism: biochemical basis of lipid metabolism disorders, methods of laboratory assessment of lipid metabolism. Pathology of obesity, fatty hepatosis and cholelithiasis.
Topic 9: Clinical biochemistry of dyslipoproteinemias and atherosclerosis, biochemical basis of pharmaceutical correction. Laboratory markers of lipid peroxidation. Antioxidants in pharmacy.

Module 2. Clinical biochemistry of major pathological processes, organs and systems

Topic 10. Clinical biochemistry of inflammation: biochemical mediators, laboratory diagnostic methods, regulation, molecular mechanisms of action of anti-inflammatory drugs
Topic 11. Clinical biochemistry of the immune system
Topic 12. Clinical and biochemical criteria and laboratory diagnosis of diseases of the digestive system
Topic 13. Clinical and biochemical criteria and laboratory diagnosis of liver diseases.
Topic 14. Clinical biochemistry of connective tissue. Markers of connective tissue destruction and their application in laboratory diagnostics.
Topic 15. Clinical biochemistry of the hemostasis system.

The topics of the lecture course reveal the problematic issues of the relevant sections of the discipline.

Practical classes involve detailed consideration by students of individual theoretical provisions of the academic discipline with the teacher and the formation of skills and abilities in their practical application through individual performance of formulated tasks and solving situational problems.

The student's independent work involves preparation for practical classes, studying topics for independent extracurricular work, writing abstracts, preparing presentations, tables. Control of mastering the topics of independent extracurricular work is carried out during practical classes and the final control of the discipline.

Individual work includes the study of scientific literature, preparation of reviews on given topics for presentation at meetings of the student scientific circle, performance of scientific and practical research, participation in specialized Olympiads, scientific and practical conferences, competitions of student scientific works.

Thematic plans of lectures, calendar plans of practical classes, thematic plan of independent work outside the classroom, scope and directions of individual work are published on the website of the department.

The route for obtaining materials: department of medical and biological chemistry / for students / Full-time education / (medicine) / 3course / Educational materials / or through the link <https://www.vnmu.edu.ua/> department of medical and biological chemistry. Access to the materials is carried out through the student's corporate account s000XXX@vnmu.edu.ua.

5. Forms and methods of monitoring learning success

Current control in practical studies	Methods: oral or written survey, testing, electronic survey, solving situational problems, conducting laboratory studies, interpreting them and evaluating their results (drawing up a protocol in a workbook)
Final control of the discipline - credit	Methods: oral questioning (according to the Regulation of the Academic process in National Pirogov Memorial Medical University, Vinnytsya (link https://www.vnmu.edu.ua/Generalinformation)).
Learning success diagnostic tools	Theoretical questions, tests, clinically-oriented situational tasks, practical tasks, practical skills, demonstration.

6. Assessment criteria

Knowledge assessment is carried out in accordance with the Regulations of the Academic process in National Pirogov Memorial Medical University, Vinnytsya (link <https://www.vnmu.edu.ua/en/general-regulations>)

Continuous assessment	On a four point system of traditional assessments: 5 «excellent», 4 «good», 3 «satisfactory», 2 «unsatisfactory»
Control of practical skills	According to the four-point system of traditional assessments
Credit (final control)	On a 200-point scale (the arithmetic average grade for the semester is converted into points) Credited: 122 to 200 points Not credited: less than 122 points (See Grading Scale)

Discipline Score Scale: National and ECTS

The sum of grades for all types of educational activities	Score ECTS	Score on a national scale	
		For exam, course project (work), practice	for credit test
180-200	A	excellent	credited
170-179,9	B	good	
160-169,9	C		
141-159,9	D	satisfactory	
122-140,99	E	satisfactory	
0-121,99	FX	unsatisfactory with the possibility of reassembly	is not credited with the possibility of reassembling
0-121,99	F	unsatisfactory with a mandatory reexamination of discipline	is not credited with mandatory reexamination of discipline

7. Policy of discipline/course

The student has the right to receive high-quality educational services, access to modern scientific and educational information, qualified advisory assistance during the study of the discipline and mastery of practical skills. The policy of the department during the provision of educational services is student-centered, based on the regulatory documents of the Ministry of Education and the Ministry of Health of Ukraine, the university charter and the procedure for providing educational services, regulated by the basic provisions of the organization of the educational process at National Pirogov Memorial Medical University, Vinnytsya and the principles of academic integrity.

Adherence to the rules of National Pirogov Memorial Medical University, safety techniques in practical classes and rules of behavior during the signal «Air alarm» and other warning signals.

Observance of the rules of the VNMU regulations, safety precautions at practical classes. Instruction on biosafety, safety of handling chemical reagents and burners is conducted at the first practical lesson by the teacher. The instructed students are registered in the Safety Instruction Journal. A student who has not been instructed is not allowed to perform practical work.

The teacher conducting the class in the event of an alarm (air alarm signal) must stop the class and go to the shelter together with the group. All personnel (including students and teachers) must remain in shelter until the air warning signal is cancelled. The teacher must inform the students about further actions after canceling the signal: to continue classes in the classroom or to study the material independently (in this case, the testing will take place in the next scheduled class).

Requirements for preparation for practical classes. The student must come to the practical session on time, theoretically prepared according to the topic. Tardiness is not allowed (according to the Rules of Internal Procedure for persons studying at National Pirogov Memorial Medical University, Vinnytsya). The student must follow the rules of dress code and look appropriate for the situation. In communication with teachers, employees, comrades and other persons studying and working at National Pirogov Memorial Medical University, be polite, friendly, friendly. While working in the laboratory, students must follow the safety rules (published on the website of the department <https://www.vnmue.edu.ua/> department of medical and biological chemistry).

Academic integrity. While studying the discipline, the student must be guided by the Code of Academic Integrity of National Pirogov Memorial Medical University, Vinnytsya ([https://www.vnmue.edu.ua/general-information/ Main documents/ Code of academic integrity](https://www.vnmue.edu.ua/general-information/Main-documents/Code-of-academic-integrity)). If the norms of academic integrity are violated during the current and final examinations, the student receives a grade of "2" and must work it out to his teacher in the prescribed manner within two weeks after receiving an unsatisfactory grade.

Missed classes. Missed classes are made up in accordance with the procedure established in the Regulations on the Organization of the Educational Process at National Pirogov Memorial Medical University, Vinnytsya (link <https://www.vnmu.edu.ua/> General information/Main documents) at the time determined by the practice schedule (published on the website of the department <https://www.vnmu.edu.ua/> department of medical and biological chemistry) the next teacher. To make up for a missed class, a student must provide a completed workbook protocol on the relevant topic, pass a test, and answer questions on the topic of the class in writing or orally.

The procedure for admission to the discipline final control is given in the Regulations of the Academic process in National Pirogov Memorial Medical University, Vinnytsya (link <https://www.vnmu.edu.ua/en/general-regulations>). To the final control allowed students who do not have missed practical classes and received an average traditional grade of at least "3".

Additional individual points. Individual points in the discipline (from 6 to 12) a student can receive for individual work, the scope of which is published on the department's website in the teaching and methodical materials of the discipline, the number of points is determined by the results IRS according to the Regulation on the organization of the educational process at National Pirogov Memorial Medical University, Vinnytsya (link <https://www.vnmu.edu.ua/> General information/Basic documents).

Conflict resolution. In the event of misunderstandings and claims against the teacher due to the quality of educational services, assessment of knowledge and other conflict situations, the student must first inform the teacher about his claims. If the conflict issue has not been resolved, the student has the right to appeal to the head of the department in accordance with the Regulation on consideration of appeals by applicants for higher education at National Pirogov Memorial Medical University, Vinnytsya (<https://www.vnmu.edu.ua/> General information/Main documents).

Politics in terms of remote learning. The distance learning procedure is regulated by the Regulation on the introduction of elements of distance learning at National Pirogov Memorial Medical University, Vinnytsya (<https://www.vnmu.edu.ua/> General information/Main documents). The main training platforms for conducting training sessions are Microsoft Team, Google Meets. The procedure for conducting practical classes, exercises and consultations during distance learning is published on the website of the department (<https://www.vnmu.edu.ua/> department of medical and biological chemistry / to the Student).

Feedback with the teacher is carried out through messengers (Viber, Telegram, Whats App) or e-mail (at the choice of the teacher) during working hours.

1. Educational resources

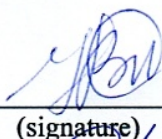
Educational and methodological support of the discipline is published on the website of the department (<https://www.vnmu.edu.ua/> department of medical and biological chemistry to the Student). Consultations are held twice a week according to the consultation schedule.

2. **The schedule and distribution of groups** by teachers is published on the website of the department (<https://www.vnmu.edu.ua/> department of medical and biological chemistry / To the student).

3. **Questions for the final control** of the discipline are published on the website of the department (<https://www.vnmu.edu.ua/> department of medical and biological chemistry to the Student).

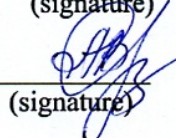
The syllabus of the discipline "**Clinical biochemistry**" was discussed and approved at the meeting of the department of medical and biological chemistry (record № 7, dated "22" January 2025)

Responsible for the academic
discipline


(signature)

Assoc. prof. of HEI Vitaliy NECHIPORUK

Acting head of the department


(signature)

Prof. of HEI Andrii MELNYK