

**SYLLABUS OF THE EDUCATIONAL COMPONENT
CLINICAL BIOCHEMISTRY**

Specialty: **221 “Dentistry”**
Educational and Professional Program: **“Dentistry”**
Component code in the educational program: **EC 36**
Level of higher education: **second (Master’s) level**
Form of education: **full-time (daytime)**
Year of study: **3**
Semester: **V (autumn) or VI (spring)**
Type of educational component: **elective**
Academic year: **2026–2027**

Workload: **3.0 ECTS credits (90 hours)**
Classes: **practical classes, consultations**
Final assessment: **pass/fail (credit)**
Prerequisites: **courses in biological chemistry, physiology, histology, and morphological disciplines.**

Department/Unit: **Department of Biological Chemistry**, 4 Nauky Avenue, Main Building, 5th floor
Course coordinator: Associate Professor **Svitlana Andriivna Denysenko.**

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Educational component page in the KNMU Distance Learning System (Moodle):
<https://distance.knmu.edu.ua/course/view.php?id=6211>

DESCRIPTION OF THE EDUCATIONAL COMPONENT

Clinical biochemistry is an applied discipline based on the use of theoretical principles and methods of biological chemistry in clinical medicine and focused on the study of disturbances in biochemical processes of vital activity and the methods for their detection in order to eliminate or correct them. The educational component “Clinical Biochemistry” is taught to fourth-year higher education students during one semester.

COURSE AIM: to enhance clinical reasoning by teaching higher education students the practical application of modern theoretical knowledge of human biochemistry for a deeper justification of the clinical assessment of typical patient conditions during disease diagnosis, the development of a laboratory examination plan, treatment, and monitoring of long-term outcomes.

LEARNING OUTCOMES:

- explain the biochemical basis of the development of pathological processes; the features of metabolism in common diseases; the most informative clinical and biochemical indicators for the diagnosis of pathological processes and monitoring the course of disease; the clinical and biochemical characteristics of metabolism in individual organs and systems of the body in cases of impaired function;
- develop a plan for clinical and biochemical examination of patients with various diseases and provide a clinical and biochemical evaluation of laboratory examination results in cases of dysfunction of organs and body systems.

CONTENT OF THE EDUCATIONAL COMPONENT**List of practical class topics (30 hours):**

1. Introduction to clinical biochemistry. The significance of clinical biochemistry in the diagnosis of diseases and their monitoring. Disorders of the metabolism of the main classes of substances and clinical laboratory investigations used for their diagnosis.
2. Main biochemical parameters used for the diagnosis of diseases.
3. Clinical and biochemical investigations in cardiovascular diseases.
4. Clinical and biochemical investigations in liver diseases.
5. Clinical and biochemical investigations in diseases of the digestive system.
6. Clinical and biochemical investigations in diseases of the kidneys and urinary tract.

List of topics for independent study (60 hours):

1. Typical disorders of carbohydrate, lipid, and protein metabolism. Hypoglycemia and hyperglycemia: types and mechanisms of development. Disorders of carbohydrate metabolism regulation.

2. Clinical and diagnostic significance of determining total protein and protein fractions in biological fluids, as well as specific proteins (haptoglobin, C-reactive protein, ceruloplasmin, α 1-antitrypsin, antistreptolysin, orosomucoid, transferrin); carbohydrate-containing proteins and their components (seroglycoids, glycated hemoglobin, fructosamine, sialic acids), and apolipoproteins. Clinical and laboratory diagnosis and monitoring of diabetes mellitus. Clinical and diagnostic significance of determining blood indicators of acid–base balance, blood gas composition, and certain indicators of mineral metabolism.
3. Classification of biochemical markers in cardiovascular pathology. Disorders of oxidative metabolism in acute myocardial infarction.
4. General characteristics of biochemical indicators that characterize diseases of the hepatobiliary system.
5. Biochemical markers of gastric diseases: gastrin, pepsinogen I and pepsinogen II in blood. Assessment of exocrine pancreatic insufficiency by determining the activity of pancreatic enzymes in blood and feces; certain tumor markers of the pancreas.
6. Functional tests in kidney pathology. Endogenous creatinine clearance. Biochemical tests for assessing kidney pathology. Biochemical markers of acute renal failure. Changes in biochemical parameters of blood and urine in glomerulonephritis and pyelonephritis, their evaluation and diagnostic significance. Changes in biochemical indicators in renal amyloidosis, their evaluation and diagnostic significance.

Independent study is aimed at deepening and consolidating the algorithms for solving test tasks based on the theoretical knowledge acquired during classroom learning and contributes to the formation of professional competencies. The results of independent study are subject to assessment and are included in the ongoing knowledge assessment.

Consultations: online, by prior registration on the course page in the Distance Learning System.

Teaching methods: verbal (explanatory narration, conversation, discussion); visual (illustration, presentation); practical (independent work, situational tasks).

ASSESSMENT

Current academic performance (CAP). The assessment of students' academic performance is carried out in accordance with the Instruction for the Assessment of Academic Activities of Higher Education Students at KNMU. (<https://knmu.edu.ua/documents/normatyvni-dokumenty-navchalnogo-proczesu/>). The grade for a practical class ranges from 2 to 5 points. Submission of assignments with unjustified delay results in a reduction of the grade in proportion to the percentage of delay relative to the allotted time for completing the task. Assignments are reviewed within 24 hours. Grades are recorded in the Electronic journal. Unsatisfactory grades must be retaken in accordance with the Regulations on the Procedure for Making Up Missed Classes by Students of KNMU. (https://knmu.edu.ua/wp-content/uploads/2021/05/polog_vidprac_zaniat.pdf).

At the end of the semester, the average semester grade is converted into a multi-point grade (120–200 points) in accordance with Table 2 of the Assessment Instruction (see above). The study of the educational component is completed in the current semester with the form of assessment “pass/fail (credit)”, therefore the current academic performance (CAP) is taken into account with the marks “pass” or “fail.”

Appeals of the results of the final assessment are carried out in accordance with the procedure established at KNMU.

(https://knmu.edu.ua/wp-content/uploads/2021/05/polog_apel_kontrol.pdf).

EDUCATIONAL COMPONENT POLICIES

Recommendations for working in the course: actively participate in all forms of classroom activities; devote 1–2 hours daily to independent study and preparation for classes; ask questions during classes; attend consultations; submit assignments on time and complete all forms of assessment.

Attendance. Attendance at practical classes is mandatory. The required dress code for offline classes is a white medical coat. If you are more than 5 minutes late, you may not be admitted to the class.

Missed classes must be made up in accordance with the Regulations on the Procedure for Making Up Missed Classes by Students of KNMU (https://knmu.edu.ua/wp-content/uploads/2021/05/polog_vidprac_zaniat.pdf).

Academic integrity. KNMU adheres to a policy of zero tolerance for any manifestations of academic dishonesty. Any violations of the principles of academic integrity entail liability in accordance with the procedures established at KNMU. (https://knmu.edu.ua/wp-content/uploads/2021/05/polog_ad-1.pdf).

Use of electronic devices and artificial intelligence tools is permitted only with the teacher's authorization.

Policy for students with special educational needs. Students with special educational needs should contact the teacher to develop an individual educational trajectory.

Teacher response time: 24 hours.

Technical requirements for participation in the course:

- Access to a computer, laptop, tablet, or smartphone
- Corporate Google account with a personal profile photo
- Skills in using Google Workspace (Google Meet, Docs, Sheets, Slides, Forms) and Moodle

Technical support: ASU (ev.shevtsov@knmu.edu.ua), Google (tehotdelknmu@gmail.com), Moodle (al.korol@knmu.edu.ua)

RECOMMENDED SOURCES

1. Lehninger Principles of Biochemistry / Nelson D.L., Cox M.M. - 8th edition. W.H. Freeman and Company, New -York, 2021. - 1328 p.
2. William Marshall, Marta Lapsley, Andrew Day, Kate Shipman. Clinical Chemistry. – Elsevier, 2020. - 432 p.
3. Harper's Illustrated Biochemistry / V.W. Rodwell, D.A. Bender, K.M. Botham et al. – McGraw Hill / Medical; 32nd edition, 2022. – 816 p.

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