

Odessa National Medical University
Faculty Medical, International
Department of Medical Biology and Chemistry

“FUNDAMENTALS OF CLINICAL BIOCHEMISTRY”

Scope of the academic discipline	Total number of hours per discipline: 90 hours, 3 credits. Semesters: IX 5th year of study.
Days, time, place of educational discipline	According to the schedule of classes. Department of Medical Biology and Chemistry Odesa, st. Olhivska, 4. Main building of ONMedU, 2nd floor.
Teacher(s)	H.F. Stepanov, doctor of medical sciences, Associate Professor, head of the department. Associate Professor candidate of biological sciences Storchylo O.V. Senior teachers: candidate of biological sciences Vasylieva A.G., Kostina A.A.
Contact information	Reference by phone: Kostina Alina Anatolyivna, head teacher of the department 712-31-05, responsible for organizational and educational work of the department Buryachkivska Oksana Leonidivna, laboratory technician of the department 728-54-78 E-mail: medchem@ukr.net Face-to-face consultations: from 2:00 p.m. to 5:00 p.m. every Thursday, from 9:00 a.m. to 2:00 p.m. every Saturday Online consultations: from 2:00 p.m. to 5:00 p.m. every Thursday, from 9:00 a.m. to 2:00 p.m. every Saturday. The link to the online consultation is provided to each group during classes separately.

COMMUNICATION

Communication with applicants will be conducted in the classroom (face-to-face).

During distance learning, communication is carried out through the Microsoft Teams platform, as well as through e-mail correspondence, Viber messengers (through groups created in Viber for each group, separately through the head of the group).

ABSTRACT OF THE ACADEMIC DISCIPLINE

Subject of study of the discipline is biochemical processes in the body in normal conditions and in various diseases, molecular mechanisms of the formation of pathological conditions, which are based on the principles and methods of their laboratory diagnosis, forecasting and control of the course of diseases, the latest achievements in the field of clinical biochemistry.

Prerequisites and post-requisites of the discipline (place of the discipline in the educational program):

Prerequisites: to study the course, applicants must have knowledge of biological chemistry,

physiology, pathological physiology, pharmacology, morphological disciplines, which are a source of methodological techniques for identifying and quantifying the components of biological fluids; close interaction with clinical medicine makes it possible to verify in practice the real diagnostic and prognostic value of theoretical ideas and the analytical quality of laboratory research methods.

Post-requisites: mastering the educational material of the discipline allows you to acquire knowledge and skills in the study of related disciplines during the following years of study and apply them in further scientific and professional activities.

Purpose of the discipline: acquisition of knowledge and skills of practical work in the field of clinical biochemistry; substantiation of biochemical mechanisms of disease prevention and treatment and biochemical methods of disease diagnosis and control of treatment effectiveness.

Tasks of the discipline: To expand the understanding of the biochemical aspects of the normal course of metabolic processes in the human body. To provide basic information about changes and disorders that occur during diseases, in the biochemical composition of tissues, organs, systems and regulatory and functional mechanisms of the human body. To describe the normal biochemical status of a person, comparing possible pathochemical disorders with the norm. To learn and master methods of laboratory diagnostics used in clinical and biochemical practice.

Expected results:

As a result of studying the academic discipline, the applicant must:

Know:

- general concepts of biochemical processes in the human body;
- to understand the role of biochemical analyzes in the diagnosis of critical conditions and monitoring of critical conditions;
- modern diagnostic capabilities of laboratory research;
- features of the pre-analytical stage of laboratory research;
- principles of laboratory research methods;
- rules for preparing patients for laboratory examination.

Be able to:

- analyze the state of the human body as a whole, using knowledge of biochemical processes underlying their activity;
- predict the possibilities of the development of pathology, using knowledge about the biochemical mechanisms of their development;
- conduct basic biochemical research;
- interpret the results of the obtained biochemical studies, if it is necessary;
- select a range of adequate additional laboratory tests and compile diagnostic algorithms.

DESCRIPTION OF THE ACADEMIC DISCIPLINE

Forms and methods of education

The course will be taught in the form of practical classes (30 hours), organization of independent work of applicants (60 hours).

Teaching methods: explanations, conversations, multimedia presentations, laboratory work, problem solving, oral survey, testing, etc.

Content of the academic discipline

Content module 1.

Basics of clinical biochemistry

Topic 1. Introduction to clinical biochemistry. Pre-analytical stage of laboratory research.

Topic 2. Fundamentals of clinical enzymology (enzymodiagnosis, enzymopathies, enzymotherapy).

Topic 3. Disorders of carbohydrate metabolism. Pathobiochemistry of diabetes.

Topic 4. Disorders of lipid metabolism: atherosclerosis, dyslipoproteinemia, metabolic syndrome.

Topic 5. Violations of protein and nitrogen metabolism. Nitrogen balance in various pathological conditions.

Topic 6. Clinical biochemistry of the endocrine system.

Topic 7. Clinical biochemistry of vitamins.

Topic 8. Hormonal regulation of water-salt and phosphorus-calcium metabolism. Violation of water-salt balance.

Topic 9. Clinical biochemistry of blood. Biochemistry of the system of hemostasis and fibrinolysis.

Topic 10. Biochemical investigation of blood plasma proteins and residual nitrogen. Clinical value of biochemical blood analysis.

Topic 11. Metabolism of porphyrins under normal and pathological conditions.

Topic 12. The role of the liver in metabolism. Destruction of xenobiotics and biotransformation of medicinal substances. Pigment metabolism under normal and pathological conditions.

Topic 13. Clinical value of biochemical analysis of urine. Collagenosis.

Topic 14. Clinical biochemistry of inflammation and carcinogenesis.

Final control of knowledge: credit.

List of recommended literature:

1. Gubsky Yu.I., I.V. Nizhenkovska, Korda M.M. Biological and Bioorganic Chemistry: in 2 books. Book 2. Biological Chemistry: textbook. 2021. 544 p.
2. Satyanarayana U. Biochemistry. 5th edition. India 2020. 777 p.
3. Lehninger. Principles of Biochemistry. 7th edition. NY, United States. 2017.
4. Jeremy M. Berg, John L. Tymoczko, Gregory J. Gatto. Biochemistry. 8th Revised edition. 2015.
5. Lippincott Illustrated Reviews: Biochemistry. Philadelphia :Wolters Kluwer, 2017. 560 p.
6. Baynes J., Dominiczak M. Medical Biochemistry. 5th Edition. Elsevier, 2018. 712 p.
7. William Marshall, Marta Lapsley, Andrew Day, Kate Shipman. Clinical Chemistry. – Elsevier, 2020, - 432 p.
8. Carol Byrd-Bredbenner. Wardlaw's Perspectives in Nutrition 11 Edition. McGraw-Hill Education. 2019.

EVALUATION

Current control: oral survey, testing, control of learning practical skills, solving situational clinical tasks, assessment of activity in class.

Final control: credit

Credit is carried out in the last class after the end of the practical classes before the beginning of the examination session

The structure of the current assessment in the practical session:

1. Evaluation of theoretical knowledge on the subject of the lesson:
 - methods: survey, written work, solving a situational problem, solving test problems;
 - the maximum score is 5, the minimum score is 3, the unsatisfactory score is 2.
2. Assessment of the acquisition of practical skills:
 - methods: methods: survey, solving a situational problem, solving test problems.

Current assessment criteria for practical training:

"5"	The acquirer is fluent in the material, takes an active part in discussing and solving the situational problem, knows how to determine the main biochemical indicators in biological objects and give them a medical (medical-biological) assessment.
"4"	The acquirer has a good command of the material, takes part in the discussion and solution of the situational problem, knows how to determine the main biochemical indicators in biological objects and give them a medical and biological assessment, but allows some insignificant mistakes (inaccuracies) in answering questions.
"3"	The acquirer does not have sufficient knowledge of the material, takes part in the discussion and solution of the situational problem without confidence, makes mistakes when explaining the laws of human metabolism.
"2"	The acquirer does not know the material, does not take part in the discussion and solution of the situational clinical problem, has significant gaps in the knowledge of the program material, makes fundamental mistakes when explaining the laws of human metabolism, does not have the necessary practical skills.

Credit is given to the applicant who completed all tasks of the work program of the academic discipline, took an active part in practical classes, completed and defended an individual assignment and has an average current grade of at least 3.0 and has no academic debt.

Test is carried out: at the last lesson before the beginning of the examination session - with the tape system of learning, at the last lesson - with the cyclical system of learning. The credit score is the arithmetic mean of all components on a traditional four-point scale and has a value that is rounded using the statistical method with two decimal places after the decimal point.

9. Distribution of points received by applicants of higher education

The obtained average score for the academic discipline for applicants who have successfully mastered the work program of the academic discipline is converted from a traditional four-point scale to points on a 200-point scale, as shown in the table:

Conversion table of a traditional assessment into a multi-point scale

Traditional four-point scale	Multipoint 200-point scale
Excellent ("5")	185 - 200
Good ("4")	151 - 184
Satisfactory ("3")	120-150
Unsatisfactory ("2")	Below 120

A multi-point scale (200-point scale) characterizes the actual success of each applicant in learning the educational component. The conversion of the traditional grade (average score for the academic discipline) into a 200-point grade is performed by the information and technical department of the University.

According to the obtained points on a 200-point scale, the achievements of the applicants are evaluated according to the ECTS rating scale. Further ranking according to the ECTS rating scale allows you to evaluate the achievements of applicants from the educational component who are studying in the same course of the same specialty, according to the points they received.

The ECTS scale is a relative-comparative rating, which establishes the applicant's belonging to the group of better or worse among the reference group of fellow applicants (faculty, specialty). An "A" grade on the ECTS scale cannot be equal to an "excellent" grade, a "B" grade to a "good" grade, etc. When converting from a multi-point scale, the limits of grades "A", "B", "C", "D", "E" according to the ECTS scale do not coincide with the limits of grades "5", "4", "3"

according to the traditional scale. Acquirers who have received grades of "FX" and "F" ("2") are not included in the list of ranked acquirers. The grade "FX" is awarded to applicants who have obtained the minimum number of points for the current learning activity, but who have not passed the final examination. A grade of "F" is assigned to applicants who have attended all classes in the discipline, but have not achieved a grade point average (3.00) for the current academic activity and are not admitted to the final examination.

Applicants who study in one course (one specialty), based on the number of points scored in the discipline, are ranked on the ECTS scale as follows:

Conversion of the traditional grade from the discipline and the sum of points on the ECTS scale

Evaluation on the ECTS scale	Statistical indicator
A	Top 10% achievers
B	The next 25% of earners
C	The next 30% of earners
D	The next 25% of earners
E	The next 10% of earners

The possibility and conditions of obtaining additional (bonus) points:

The recipient can receive additional (bonus) points for completing individual tasks:

- participation and presentation at a scientific conference;
- a report at a scientific group;
- preparation of multimedia slides and design of tests;
- translations of scientific articles from foreign languages; abstract work on a certain topic.

INDEPENDENT WORK OF APPLICANTS OF HIGHER EDUCATION

Independent work involves preparation for each practical session.

POLICY OF EDUCATIONAL DISCIPLINE

Deadlines and Rescheduling Policy:

- Absences of classes for non-respectable reasons will be worked out according to the schedule of the teacher on duty.
- Absences for valid reasons are worked out according to an individual schedule with the permission of the dean's office.

Academic Integrity Policy:

Applicants must observe academic integrity, namely:

- independent performance of all types of work, tasks, forms of control provided for by the work program of this educational discipline;
- references to sources of information in case of use of ideas, developments, statements, information;
- compliance with the legislation on copyright and related rights;
- provision of reliable information about the results of one's own educational (scientific) activity, used research methods and sources of information.

Unacceptable in educational activities for participants of the educational process are:

- the use of family or official ties to obtain a positive or higher grade during any form of control of academic performance or academic merit;

- use of prohibited auxiliary materials or technical means (cheat sheets, notes, micro-earphones, telephones, smartphones, tablets, etc.) during control measures;
- going through procedures for monitoring the results of training by fake persons.

For violation of academic integrity, applicants may be held to the following academic responsibility:

- a decrease in the results of assessment of the control work, assessment in class, credit, etc.;
- retaking the assessment (test, credit, etc.);
- assignment of additional control measures (additional individual tasks, control works, tests, etc.);
- conducting an additional inspection of other works authored by the violator.

Attendance and Tardiness Policy:

Uniform: medical gown that completely covers outer clothing, cap, mask.

Equipment: notebook, pen.

State of health: applicants suffering from acute infectious diseases, including respiratory diseases, are not allowed to attend classes.

An applicant who is late for class can attend it, but if the teacher has put "ab" in the journal, he must complete it in the general order.

Use of mobile devices:

Mobile devices may be used by applicants with the permission of the instructor if they are needed for the assignment.

Behavior in the audience:

The behavior of applicants and teachers in the classrooms should be working and calm, strictly comply with the rules established Regulations on academic integrity and ethics of academic relations at Odessa National Medical University, in accordance with Code of Academic Ethics and Relations of the University Community of Odessa National Medical University, Regulation on prevention and detection of academic plagiarism in research and educational work of higher education applicants, scientists and teachers of Odesa National Medical University.