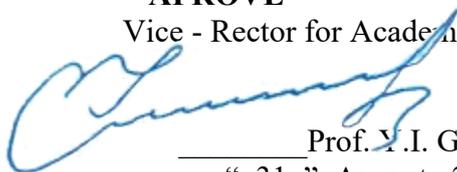


National Pirogov Memorial Medical University, Vinnytsya

“APROVE ”

Vice - Rector for Academic Affairs

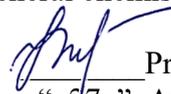


Prof. Y.I. Guminskiy

“ 31 ” August 2020 year

“ AGREED ”

Head of the Department of biological and
general chemistry



Prof. N.V. Zaichko

“ 27 ” August 2020 year

**SYLLABUS
of academic discipline
"BIOLOGICAL AND BIOORGANIC CHEMISTRY"**

Specialty	222 Medicine
Educational level	the second (master`s) level
Educational programme	EPP Medicine, 2020
Academic year	2020-2021
Department	biological and general chemistry
Lecturer (if lectures are given)	Associated professor, PhD, MD D.O. Filchukov
Contact information	biochem@vnmue.edu.ua Pirogova street 56, (0432) 661224
Syllabus compiler	Associated professor, PhD, MD D.O. Filchukov

1. Status and structure of the discipline

Discipline status	Compulsory
Discipline code in EPP/ discipline place in EPP	CC 14 //discipline of general training
Course / semester	1st and 2nd year (II-IV semesters)
The amount of discipline (the total number of hours / number of credits ECTS)	285 hours / 9,5 credits ECTS
Number of content modules	5 modules
The structure of the discipline	Lectures – 40 hours Practical classes - 104 hours Intermediate controls - 10 hours Independent work - 131 hours
Language of study	Ukrainian/English
Form of study	Full - time (at introduction of quarantine measures – online full-time)

2. Description of the discipline

Short annotation of the course, relevance. The subject area of the discipline is biological and bioorganic chemistry. The course focuses on gaining basic knowledge about the chemical composition of living organisms, structural organization and properties of bioorganic compounds - components of cells, tissues and organs of the human body, patterns of metabolism and energy at the molecular level in healthy and diseased organisms.

Prerequisites. For successful mastering of discipline, the student needs the knowledge received in the course of studying of the following disciplines of the general preparation:

Latin language and medical terminology; medical biology; medical and biological physics; microbiology; human anatomy; histology, cytology and embryology; normal physiology.

The purpose of the course and its significance for professional activities. The purpose of the discipline is to form a basic knowledge of biochemical processes and their regulation at different stages of metabolism and energy; formation of understanding of their significance in ensuring the functioning of organs and systems of the human body; formation of practical skills and abilities: conducting biochemical research to identify normal and pathological components in biological fluids (blood, saliva, urine); interpretation of the results of biochemical studies for the diagnosis of the most common human diseases, congenital and acquired disorders of metabolic processes (enzymopathies, dysvitaminosis, dyslipidemia, etc.).

Postrequisites. In the process of studying the discipline, knowledge is acquired necessary for successful mastering of training disciplines, namely: pharmacology, pathological physiology, pathological anatomy, clinical immunology, immunopathology and allergology, oncology, internal medicine, surgery, pediatrics and other clinical disciplines, which involves integration. with these disciplines and the application of acquired knowledge, skills and abilities in the process of further study and in professional activities.

3. **Learning outcomes.** After successfully studying the discipline, the applicant will be able to:

1. Analyze the compliance of the structure of bioorganic compounds with the biological functions they perform in the human body
 2. Interpret the peculiarities of the body's metabolism and the development of pathological processes based on laboratory tests
 3. Analyze the contribution of carbohydrates, lipids, amino acids in ensuring metabolic transformations in different functional states in the body
 4. Interpret the peculiarities of the structure and transformations in the body of bioorganic compounds as the basis of their pharmacological action as drugs
 5. Interpret the biochemical mechanisms of pathological processes in the human body and the principles of their correction
 6. Explain the basic mechanisms of biochemical action and the principles of targeted use of different classes of pharmacological agents
 7. Explain the biochemical and molecular basis of physiological functions of cells, organs and systems of the human body
 8. Analyze the functioning of enzymatic processes occurring in membranes and organelles to integrate metabolism in individual cells
 9. Classify the results of biochemical studies and changes in biochemical and enzymatic parameters used to diagnose the most common human diseases
 10. Interpret the importance of biochemical processes of metabolism and its regulation in ensuring the functioning of organs, systems and the whole human body.
4. *Must be correlated with the PLO, which are formulated in EPP of the specialty, but particularly specified, according to the contents of the discipline. Must be concise. It is desirable to provide 5-7, not less)*

5. Content and logistic of the discipline

Module 1. Biologically important classes of bioorganic compounds. Biopolymers and their structural components	2 semester 90 hours / 3 credits	Lectures № 1-5 Practical classes №№ 1-9 Topics for self- study №№ 1-12
Module 2. General patterns of metabolism	3 semester 38 hours / 1,2 credits	Lectures № 6-7 Practical classes №№ 10-18 Topics for self- study №№ 13-20
Module 3. Carbohydrate and lipid metabolism	3 semester 98 hours / 3,3 credits	Lectures № 8-10 Practical classes №№ 19-28 Topics for self- study №№ 21-29
Module 4. Metabolism of simple proteins and amino acids. Molecular biology	3, 4 semester 42 hours / 1,4 credits	Lectures № 11-13 Practical classes №№ 29-39 Topics for self- study №№ 30-35
Module 5. Functional biochemistry	4 semester 71 hours / 2,4 credits	Lectures № 14-20 Practical classes №№ 40-57 Topics for self- study №№ 36-46

The course includes 57 topics, which are divided into 5 thematic modules.

Module 1. Biologically important classes of bioorganic compounds. Biopolymers and their structural components

Topic 1. Nomenclature, nature of chemical bonds, isomerism and electronic effects in organic compounds.

Topic 2. Reactivity of alkanes (and their derivatives), alkenes, arenes. Acidity and basicity of organic compounds.

Topic 3. Reactivity of aldehydes and ketones.

Topic 4. Reactivity and biological carboxylic acids, oxy-, oxo-phenolic acids and their derivatives.

Topic 5. HFA. Lipids. Phosphoglycerides.

Topic 6. Structure and chemical properties of amino acids.

Topic 7. Physico - chemical properties of proteins. Protein structures.

Topic 8. Monosaccharides, oligo- and polysaccharides: structure and chemical properties.

Topic 9. Heterocyclic compounds. Nucleic acids.

Final lesson of module 1 "Biologically important classes of organic compounds, biopolymers".

Module 2. General patterns of metabolism.

Topic 1. Introduction to biochemistry. Biomolecules and cellular structures.

Topic 2. Nomenclature, classification and structure of enzymes. Coenzymes.

Topic 3. Properties of enzymes. Kinetics and energy of enzymatic reactions. Principles of determination and units of enzymatic activity.

Topic 4. Regulation of enzymatic activity. Activators and inhibitors of enzymes, their biomedical value.

Topic 5. Isoenzymes. Multi-enzyme complexes. Medical enzymology.

Topic 6. General pathways of metabolism. Oxidative decarboxylation of pyruvate. Krebs tricarboxylic acid cycle.

Topic 7. Biological oxidation. Tissue respiration.

Topic 8. Oxidative phosphorylation. Mitchell's chemo osmotic theory.

Topic 9. Final lesson of the module №2 "Enzymes. General ways of metabolism".

Module 3: Carbohydrate and lipid metabolism

Topic 1. Digestion, absorption and transport of carbohydrates. Anaerobic and aerobic oxidation of glucose.

Topic 2. Glycogen metabolism. Gluconeogenesis.

Topic 3. Pentose phosphate cycle. Fructose and galactose metabolism.

Topic 4. Regulation and pathology of carbohydrate metabolism.

Topic 5. Digestion, absorption and transport of lipids. Lipid peroxidation. Arachidonic acid cascade.

- Topic 6. Lipolysis: catabolism of triglycerides, oxidation of glycerol and fatty acids.
- Topic 7. Lipogenesis: biosynthesis of fatty acids, triglycerides and phosphoglycerides.
- Topic 8. Metabolism of ketone bodies and cholesterol. Determination of ketone bodies in urine.
- Topic 9. Metabolism of sphingolipids. Regulation and pathology of lipid metabolism.
- Topic 10. Final lesson of module 3 "Metabolism of carbohydrates, lipids and their regulation".

Module 4. Metabolism of simple proteins and amino acids. Molecular biology.

- Topic 1 Digestion, absorption and putrefaction of proteins. Nutritional value of proteins.
- Topic 2. Decarboxylation and transamination of amino acids.
- Topic 3. Deamination of amino acids. Ammonia neutralization.
- Topic 4. Specialized ways of acyclic amino acid metabolism.
- Topic 5. Specialized ways of metabolism of cyclic amino acids.
- Topic 6. Solving test tasks for the licensing exam.
- Topic 7. Nucleotide metabolism. Qualitative analysis of nucleoprotein hydrolyzate.
- Topic 8. Molecular biology. Genetic code. Replication. DNA repair. Mutations.
- Topic 9. Transcription. Broadcasting. Inhibitors of matrix processes.
- Content module 13. Fundamentals of molecular genetics.
- Topic 10. Regulation of gene expression. Polymerase chain reaction. Genetic engineering.
- Topic 11. Final lesson of module 4 "Metabolism of simple proteins. Molecular biology".

Module 5. Functional biochemistry

- Topic 1. Chemical nature and mechanism of action of hormones and hormone-like substances.
- Topic 2. Hormones of central and peripheral endocrine glands.
- Topic 3. Hormones of mixed secretion glands. Regulation of calcium and phosphorus homeostasis.
- Topic 4. Vitaminology. Vitamin-like substances. Vitamins C and R.
- Topic 5. Water-soluble vitamins of group B Qualitative reactions to water-soluble vitamins.
- Topic 6. Fat-soluble vitamins.
- Topic 7. Blood biochemistry. Chemical composition and physicochemical constants of blood.
- Topic 8. Blood proteins and enzymes. Kinin blood system, its significance.

- Topic 9. Biochemistry of erythrocytes and hemoglobin.
- Topic 10. Biochemistry of the liver. Pigment metabolism. Jaundice. Quantitative
- Topic 11. Detoxification function of the liver. Xenobiotic metabolism.
- Topic 12. Biochemistry of kidneys and urine.
- Topic 13. Biochemistry of water-mineral metabolism.
- Topic 14. Biochemistry of nervous tissue.
- Topic 15. Biochemistry of muscle tissue.
- Topic 16. Biochemistry of connective tissue.
- Topic 17. Final lesson of module 5 "Functional biochemistry".
- Topic 18. Practical skills.

The topics of the lecture course reveal the problematic issues of the relevant sections of the discipline. Practical classes provide a theoretical justification of the main issues of the topic and the acquisition of the following practical skills:

- 1) conducting qualitative and quantitative biochemical studies of biological fluids and their evaluation for diagnostic purposes independently or on the basis of experiments recorded in videos, movies, presented in computer programs and other educational technologies;
- 2) solving situational problems in laboratory diagnosis of congenital and acquired diseases, assessment of carbohydrate, protein and lipid metabolism; having clinical-diagnostic, experimental or sanitary-hygienic direction.

In practical classes, students draw up protocols of research in workbooks, formulate conclusions on the topic, solve clinically oriented situational problems, and test tasks.

The student's independent work provides preparation for practical classes and intermediate tests, study of topics for independent extracurricular work, writing essays, preparation of presentations, tables. The control of mastering the topics of independent extracurricular work is carried out at the intermediate control classes and the final control of the discipline.

Individual work includes the study of scientific literature, preparation of reviews on the topics provided for presentation at the meetings of the student scientific circle, the implementation of scientific and practical researches, participation in specialized competitions, scientific and practical conferences and organization of students' research works.

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

The route for obtaining materials: Department biological and general chemistry / for students / Full-time education / (medicine) / 1-2course / Educational materials / or through the link <https://www.vnm.edu.ua/> department biological and general chemistry. Access to the materials is carried out through the student's corporate account s000XXX@vnm.edu.ua.

5. Forms and methods of monitoring academic performance

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)
Control of mastering the thematic section of the discipline at	Methods: oral or written survey, electronic testing, situational problem solving, control of practical skills

intermediate control lessons	
Final semester control (credit) at the end of the 2-3 semester	According to the Regulation of the Academic process in National Pirogov Memorial Medical University, Vinnytsya (link https://www.vnmu.edu.ua/General information)
Final control of the discipline - exam	Methods: pre-examination testing, oral questioning (according to the Regulation of the Academic process in National Pirogov Memorial Medical University, Vinnytsya (link https://www.vnmu.edu.ua/General information))
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/General information>)

Continuous assessment	On a four point system of traditional assessments: 5 «excellent», 4 «good», 3 «satisfactory», 2 «unsatisfactory»
Midpoint separation assessment	On a four-point system of traditional assessments
Control of practical skills	According to the four-point system of traditional assessments
Pass-fail exam	On a 200-point scale (the arithmetic average grade for the semester is converted into points) Credited: 120 to 200 points Not credited: less than 120 points (See Grading Scale)
Final control of the discipline	Sum of points for pre-examination testing (12-20 points) and oral questioning (38-60 points) (for disciplines included in Step 1,2) Exam grade: 71-80 points - "excellent" 61-70 points - "good" 50-60 points - "satisfactory" Less than 50 points - "unsatisfactory" / did not pass
Discipline assessments:	Current academic assessment - from 72 to 120 points (conversion of the average traditional assessment of practical class on a 120-point scale): 60% of the grade for the discipline Final control - from 50 to 80 points: 40% of the grade for the discipline Individual work - from 1 to 12 points From 122 to 200 points in total.

Discipline Score Scale: National and ECTS

The sum of	Score	Score on a national scale
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grades for all types of educational activities	ECTS	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	-
120-140,99	E	-	credited
119-61	FX	unsatisfactory with the possibility of reassembly	is not credited with the possibility of reassembling
1-60	F	unsatisfactory with a mandatory reexamination of discipline	is not credited with mandatory reexamination of discipline

Criteria for assessing student knowledge

Assessment of oral / written response during the current control

The grade "**excellent**" is given to a student who has deeply and comprehensively mastered the theoretical material, competently and logically teaches it. He is fluent in Latin terminology, clearly answers non-standard questions on the topic of the lesson, is able to link the material of the topic with previously studied sections, which indicates mastery of the recommended literature and the ability to analyze the material studied, and clearly demonstrates the importance of theoretical knowledge for practical medicine.

The grade "**good**" is given to a student who knows and has a good theoretical material, teaches it competently, does not allow inaccuracies in the answer, is able to reveal the topic from the standpoint of its medical significance and practical application, but the answers do not go beyond the textbook, guidelines.

A grade of "**satisfactory**" is given to a student who knows the basic concepts and definitions of the studied topic, but admits significant inaccuracies or has difficulty in formulating the answer, does not understand the medical aspects of the topic, can not relate theoretical material to practice.

The grade "**unsatisfactory**" is given to a student who does not know the theoretical foundations of the topic, makes gross mistakes in answering, does not understand the basic concepts and definitions, can not explain the importance of theoretical material for practical medicine.

Assessment of practical skills during the current control

The grade "**excellent**" is given to a student who knows the course and sequence of independent teaching and research work to perform a practical task, finds the best options for setting up a biochemical experiment, demonstrates the correct implementation of the necessary practical skills, and correctly formulates generalizations and conclusions.

The grade "**good**" is given to a student who admits inaccuracies in the biochemical study, but is able to identify errors and can demonstrate the implementation of practical skills in general, accurately draws up the results of research in the protocol of the practical lesson.

Assessment of "**satisfactory**" is given to a student who knows the basics of the practical task, but has difficulty performing a biochemical study, can not demonstrate the correct sequence of practical skills, can not fully interpret the results of research, sloppy protocol.

The grade "**unsatisfactory**" is given to the student who cannot demonstrate performance of practical skill, experiences considerable difficulties at performance of biochemical researches, breaks the order of performance of practical work, does not register a course of work in the protocol.

Assessment of test items during the current control

The grade "**excellent**" is given to the student who at carrying out test control is allowed no more than 10% of incorrect answers (volume of correct answers 90-100%). Provides correct answers to all test questions when solving clinically-oriented test tasks.

A grade of "**good**" is given to a student who makes no more than 20% of mistakes during the test. (volume of correct answers 80-89%). Provides correct answers to most test questions when solving clinical-oriented test tasks.

A grade of "**satisfactory**" is given to a student who makes mistakes in no more than 40% of test tasks (the amount of correct answers is 60.5-79%). When solving clinically-oriented test tasks, it provides the correct answers to only some questions to the test.

A grade of "**unsatisfactory**" is given to a student who correctly solves less than 60% of the test tasks in a test. When solving clinical-oriented test tasks, he cannot provide the correct answers to the test questions.

Assessment of intermediate control (credit)

Intermediate control is credited if the student has mastered a certain section of the discipline in full, as evidenced by the current assessment of each practical lesson, and attended a lecture course. To assess the intermediate control, the calculation of the arithmetic mean traditional grade for the semester is calculated.

Assessment of independent student work

The student's independent work is assessed during the final classes of mastering the modules of the discipline by oral questioning or solving test tasks on topics that are not included in the classroom plan. Evaluation of prepared messages, presentations on the selected topic is carried out by traditional evaluation

The grade "**excellent**" is given to a student who has deeply and comprehensively revealed the problem, logically stated the main issues, gave examples from modern medical information sources. He is able to connect the material of this topic with the previously studied sections,

which indicates the ability to analyze the studied material, as well as clearly demonstrates the importance of the acquired theoretical knowledge for practical medicine.

The grade "**good**" is given to a student who knows and is well versed in theoretical material, competently revealed the main issues of the topic and its medical significance, but did not go beyond the textbook, guidelines.

A grade of "**satisfactory**" is given to a student who has revealed the basic concepts and definitions of the recommended topic, but has not fully disclosed it, does not understand the medical aspects of the topic, can not relate theoretical material to practice.

Assessment of individual student work

Carried out on the basis of individual tasks, scientific and practical work, reports on the results of research at the student scientific circle, conferences, participation in the competition of student research papers, competitions in the discipline

Assessment of the oral answer during the final control (exam)

The grade "**excellent**" is given to the student who competently and in a logical sequence provides answers to the questions of the examination ticket. During the answer demonstrates the ability to analyze theoretical material, makes thorough conclusions about the importance of theoretical material for practical medicine, provides clear correct answers to additional non-standard questions.

The grade "**good**" is given to a student who has a good command of theoretical material and in a logical sequence provides answers to the questions of the examination ticket, but admits minor inaccuracies, which are quickly corrected when answering clarifying questions of the examiner.

A grade of "**satisfactory**" is given to a student who demonstrates knowledge of basic concepts and definitions when answering an exam ticket, admits significant inaccuracies or has difficulties in answering questions in biochemistry, cannot independently explain the connection between biochemistry and other professionally oriented disciplines. ; not fully mastered the educational literature and lecture course, admits inaccuracies in answering the specific questions of the examiner.

The grade "**unsatisfactory**" is given to a student who made gross mistakes in answering situational problems and theoretical questions or did not give answers to them at all. During the exam, the student demonstrates a lack of systematic knowledge and skills, has no practical skills, makes fundamental mistakes in answering theoretical questions and in solving situational problems, has not mastered the basic literature and lecture course.

Individual points are accrued in accordance with the Regulations of the Academic process in National Pirogov Memorial Medical University, Vinnytsya (link [https://www.vnmu.edu.ua/General information](https://www.vnmu.edu.ua/General%20information))

12 points - added to the assessment of the discipline of a student who won a prize at the interuniversity competitions in the discipline or a prize at the All-Ukrainian competition of student research papers or a prize at the interuniversity / international scientific conference with the availability of printed work.

11 points - are added to the assessment of the discipline of a student who won the first place in the intra-university Olympiad in the discipline or the first place at the student scientific conference with the presence of printed work, or participated in the All-Ukrainian competition of student research papers

10 points - are added to the assessment of the discipline of the student who won a prize (II-III) at the intra-university Olympiad in the discipline or at a student scientific conference with the availability of printed work; or for participation (without a prize place) in interuniversity competitions in the discipline or a prize place in an interuniversity / international scientific conference with the availability of printed work.

9 points - are added to the assessment of the discipline of the student who participated (without a prize) in the intra-university Olympiad in the discipline or student scientific conference with the presence of printed work

8 points - are added to the assessment of the discipline of a student who actively participated in the student scientific group, published a paper on the results of scientific and practical research, but did not personally participate in the student scientific conference, prepared a poster report.

6-7 points - are added to the assessment of the discipline of the student who made 3 tables, or an educational video to supplement the visual support of teaching the discipline (taking into account the volume and importance of the work performed).

3-5 points are added to the assessment of the discipline of a student who has made at least 2 tables, or created a thematic illustrated presentation (at least 2) to supplement the visual support of teaching the discipline (taking into account the volume and importance of work performed)

Policy of discipline / course

The student has the right to receive high-quality educational services, access to contemporary scientific and educational information, qualified advisory assistance during the study of discipline and mastering practical skills. The policy of the department during the providing of educational services is a student-centered, based on normative documents of the Ministry of Education and the Ministry of Health of Ukraine, the Statute of the University and the Procedure for the Providing of Educational Services regulated by the main principles of the organization of the educational process in National Pirogov Memorial Medical University, Vinnytsya and the principles of academic integrity (link <https://www.vnmu.edu.ua/General> information).

Adherence to the rules of National Pirogov Memorial Medical University, Vinnytsya, safety techniques in practical classes.

Instruction on working with reagents, utensils and devices is carried out on the first practical in practical classes. The briefing is recorded in the Safety Instruction Log. A student who has not been instructed is not allowed to perform practical work.

Requirements for preparation for practical classes. Student should be present at the practical lesson on time, theoretically prepared according to the topic. In practical classes, the student must be dressed in a work uniform (medical gown, hat). Students who do not have a work uniform are not allowed to study. The student must follow the rules of safety in practical classes and during the stay in the department. When discussing theoretical issues, students should demonstrate tolerance, courtesy and respect for their colleagues and the teacher; when performing practical tasks, the workplace should be kept in order and cleaned after the practical work.

Usage of mobile phones and other electronic devices. The usage of mobile phones and other electronic devices in the classroom is allowed only for the purpose of electronic testing or survey.

Academic integrity. When studying the discipline, the student must be guided by the Code of Academic Integrity and Corporate Ethics of National Pirogov Memorial Medical University, Vinnytsya (link : [https://www.vnmu.edu.ua/General information/](https://www.vnmu.edu.ua/General%20information/) Code of Academic Integrity). In case of violation of the norms of academic integrity during the current and final controls 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 assessment.

Missed classes. Missed classes are working out in the manner prescribed by Regulations of the Academic process in **National Pirogov Memorial Medical University, Vinnytsya** (link [https://www.vnmu.edu.ua/General information](https://www.vnmu.edu.ua/General%20information/)) at the time of workout schedule (published on the website of the department <https://www.vnmu.edu.ua/> department of biological and general chemistry) to the teacher on duty. To complete the missed lesson, the student must provide a completed workbook protocol on the relevant topic, take a test and answer questions in writing or orally to the topic of the lesson. The practice of missed lectures is carried out after providing a synopsis of lecture material, or writing an abstract, or preparing your own presentation on the topic of missed lectures.

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/General information](https://www.vnmu.edu.ua/General%20information/)). To the final control allowed students who do not have missed practical classes and lectures and received an average traditional grade of at least "3".

Additional points. Individual points in the discipline (from 1 to 12) that student can receive for individual work, the amount of which is published on the website of the department in the educational methodical materials of the discipline, the number of points is determined by the results of IRS according to Regulation of the Academic process in National Pirogov Memorial Medical University, Vinnytsya (link [https://www.vnmu.edu.ua/General information](https://www.vnmu.edu.ua/General%20information/)).

Conflict resolution. In case of misunderstandings and complaints to the teacher because of the quality of educational services, knowledge assessment and other conflict situations, student should submit his / her claims to the teacher. If the issue is not resolved, the student has the right to apply to the head of the department according to Complaints Consideration Procedure in National Pirogov Memorial Medical University, Vinnytsya (link [https://www.vnmu.edu.ua/General information](https://www.vnmu.edu.ua/General%20information/))

Politics in terms of remote learning. Distance learning regulated by the Regulations of the elements of remote learning in National Pirogov Memorial Medical University, Vinnytsya (<https://www.vnmu.edu.ua/> General information). The main training platforms for studying are Microsoft Team and Google Meets. Practical classes and lectures, exercises and consultations during distance learning is published on the website of the department (<https://www.vnmu.edu.ua/> department of biological and general chemistry).

Feedback from teachers is via messengers (Viber, Telegram, WhatsApp) or e-mail (at the teacher's choice) during working hours.

1. **Educational resources.**

- Educational and methodological support of the discipline is published on the website of the department (<https://www.vnmua.edu.ua/> department of biological and general chemistry / for students). Consultations are held twice a week according to the schedule.
2. **The timetable and distribution of groups** with assigned teachers are published on the web page of the department ((<https://www.vnmua.edu.ua/> / department of biological and general chemistry / for students).
 3. Questions to the intermediate and final semester control (credit) of the discipline are published on the web page of the department (<https://www.vnmua.edu.ua/> / department of biological and general chemistry / for students).

The syllabus of the discipline «Biological and bioorganic chemistry» was discussed and approved at the meeting of the department of biological and general chemistry (record №1, dated " 7 " August 2020 y.)

Responsible for the academic
discipline _____
(signature)

Associated professor, D.O. Filchukov

Head of the department

(signature)

Prof. N.V. Zaichko