

FEDERAL STATE BUDGET EDUCATIONAL INSTITUTION  
OF HIGHER EDUCATION  
"ROSTOV STATE MEDICAL UNIVERSITY"  
MINISTRY OF HEALTH OF THE RUSSIAN FEDERATION

THERAPEUTIC AND PROPHYLACTIC  
Department

Supervisor  
educational program

E. S. Belousova /  
(signature) (FULL NAME.)



" 28 августа 2020\_

DISCIPLINE WORKING PROGRAM  
Chemistry

Speciality 31.05.01 General medicine

Form of education full-time

## I. GOALS AND OBJECTIVES OF MASTERING THE DISCIPLINE

The goal is to develop knowledge about the basic patterns of metabolic processes that determine the state of human health and adaptation at the molecular, cellular and organ level of the whole organism and the ability to apply the acquired basic knowledge to master clinical disciplines.

Tasks:

- students study and acquire knowledge about the chemical nature of the substances included in the composition of living organisms, their transformations, the connection of these transformations with the activity of organs and tissues, the regulation of metabolic processes and the consequences of their violation;
- developing students' skills in using laboratory equipment and reagents in compliance with safety regulations, analyze the obtained data from the results of biochemical studies and use the acquired knowledge to solve situational problems that simulate the functioning of the human body in normal conditions and in pathology;
- developing skills in analytical work with information (educational, scientific, normative reference literature and other sources), with information technology, diagnostic research methods.

## II. REQUIREMENTS FOR THE RESULTS OF MASTERING THE DISCIPLINE

The process of studying the discipline is aimed at developing the following competencies in accordance with the Federal State Educational Standard of Higher Education and the EP of Higher Education in this specialty:

**A) general cultural (OK) OK-1** ability for abstract thinking, analysis, synthesis.

**b) general professional (OPK): OPK-7** readiness to use basic physical, chemical, mathematical and other natural science concepts and methods in solving professional problems.

## III. THE PLACE OF DISCIPLINE IN THE STRUCTURE OF EP VO

2.1. The academic discipline is **basic**

2.2. A list of subsequent academic disciplines that require knowledge, skills and knowledge formed by this academic discipline: biochemistry, physiology, pathological physiology, clinical pharmacology, anatomy, pathological anatomy.

## IV. CONTENT AND STRUCTURE OF THE DISCIPLINE Labor intensity of the discipline in 3 4 hours 144

### 4.1. Sections of the discipline studied in the 1st semester

No. section	Name section	Number of hours				
		Total	Contact Job			SRO*
			L	LR	ETC	
Semester 1						
1	General elements chemistry	47	6	3	18	20
2	Fundamentals of bioorganic chemical chemistry	61	10	3	24	24
	<i>Total:</i>	108	16	6	42	44

Interim certification form (exam)	36
<i>Total</i>	144

## 4.2. Contact work

### Lectures

No. chapter <b>A</b>	No. lectures	Lecture topics	Qty hours
Semester 1			
<b>1</b>	1	Fundamentals of chemical thermodynamics and kinetics.	2
	2	Protolytic equilibria in aqueous solutions. Buffer systems. Buffer systems.	2
	3	Complex connections. Redox processes.	2
<b>2</b>	4	Natural lipids: structure, properties and biological role	2
	5	Carbohydrates: monosaccharides, disaccharides and polysaccharides.	2
	6	Heterocyclic compounds and their derivatives: structure, properties, biological role	2
	7	Amino acids: structure, functions, biologically important reactions.	2
	8	Peptides and proteins: structure, classification and physicochemical properties.	2
<b>Total hours discipline:</b>			<b>16</b>

### Topics of laboratory/practical classes

No. section	No. classes	Topics of laboratory/practical classes	Qty hours		Forms control
			LR	ETC	
Semester 1					
<b>1</b>	1	Technique security at work V laboratories. Methods expressions concentrations of substances in solution.	3		survey
	2	Fundamentals of chemical thermodynamics.		3	survey and testing
	3	Basics chemical kinetics. Heterogeneous equilibria.		3	survey and testing
	4	Protolytic equilibria in aqueous solutions. Buffer systems.		3	survey and testing
	5	Physical chemistry of disperse systems and surface phenomena.		3	survey and testing

	6	Complex connections. Oxidation-reduction processes.		3	survey and testing
	7	<b>Colloquium 1</b>		3	Survey
2	8	Basic concepts of bioorganic chemistry. Structure, functions, properties of biologically important alcohols, aldehydes, amines.		3	survey and testing
	9	Classification and properties of carboxylic acids, thioesters of carboxylic acids.		3	survey and testing
	10	Natural lipids: structure, properties and biological role.		3	survey and testing
	eleven	Monosaccharides and their derivatives: structure, functions, biologically important reactions		3	survey and testing
	12	Oligos and polysaccharides: structure, functions and biologically important reactions		3	survey and testing
	13	Heterocyclic connections And their derivatives: structure, properties, biological role		3	survey and testing
	14	Structure and functions of amino acids and their biologically important reactions.	3		survey
	15	Peptides and proteins: structure, classification and physicochemical properties.		3	survey and testing
	16	<b>Colloquium 2</b>		3	Survey
<b>Total:</b>			<b>6</b>	<b>42</b>	

#### 4.3. Independent work of students

No. chapter A	Type of independent work of students	Qty hours	Forms current control
Semester 1			
1	Preparation for current control.	20	Survey, testing
2	Preparation for current control.	18	Survey, testing
	Preparation for intermediate certification.	6	Interview
<b>Total:</b>		<b>44</b>	

#### V. ASSESSMENT FUND FOR CURRENT CONTROL, INTERMEDIATE CERTIFICATION

Fund of assessment tools to determine the level of formation

competencies in

As a result of mastering the discipline, it is an appendix to the work program.

## VI. EDUCATIONAL AND METHODOLOGICAL SUPPORT OF DISCIPLINE

### 6.1. Main literature.

1. Babkov A.V., General, inorganic and organic chemistry [Electronic resource] / Babkov A.V., Popkov V.A. - M.: GEOTAR-Media, 2014. - 576 p. - ISBN 978-5-9704-2978-5 - Access mode: <http://www.studmedlib.ru/book/ISBN9785970429785.html>
2. Tyukavkina N.A., Organic chemistry [Electronic resource]: textbook / N.A. Tyukavkina [etc.]; edited by N. A. Tyukavkina. - M.: GEOTAR-Media, 2019. - 640 p. : ill. - 640 s. - ISBN 978-5-9704-4922-6 - Access mode: <http://www.studmedlib.ru/book/ISBN9785970449226.html>
3. Popkov V.A., General chemistry [Electronic resource] / Popkov V.A., Puzakov S.A. - M.: GEOTAR-Media, 2010. - 976 p. - ISBN 978-5-9704-1570-2 - Access mode: <http://www.studmedlib.ru/book/ISBN9785970415702.html>

### 6.2. Additional literature.

1. Zholnin A.V., General chemistry [Electronic resource]: textbook / A.V. Zholnin; edited by V. A. Popkova, A. V. Zholnina. - M.: GEOTAR-Media, 2014. - 400 p. - ISBN 978-5-9704-2956-3 - Access mode: <http://www.studmedlib.ru/book/ISBN9785970429563.html>
2. Yakovlev I.P., Organic chemistry. Typical tasks. Algorithm of solutions [Electronic resource] / Yakovlev I.P. - M.: GEOTAR-Media, 2018. - 640 p. - ISBN 978-5-9704-4429-0 - Access mode: <http://www.studmedlib.ru/book/ISBN9785970444290.html>
3. Tyukavkina N.A., Bioorganic chemistry: a guide to practical classes [Electronic resource]: textbook manual / ed. ON THE. Tyukavkina - M.: GEOTAR-Media, 2017. - 168 p. - ISBN 978-5-9704-4209-8 - Access mode: <http://www.studmedlib.ru/book/ISBN9785970442098.html>

### 6.3. Internet resources

	<b>ELECTRONIC EDUCATIONAL RESOURCES</b>	<b>Access to the resource</b>
1.	<b>Electronic library RostGMU</b> [Electronic resource]. - Mode access: <a href="http://109.195.230.156:9080/opacg/">http://109.195.230.156:9080/opacg/</a>	Access is not limited
2.	<b>Student Advisor</b> [Electronic resource]: EBS. - M.: LLC "IPUZ". - Access mode: <a href="http://www.studmedlib.ru">http://www.studmedlib.ru</a>	Access is not limited
4.	<b>UpToDate</b> [Electronic resource]:DB / Wolters Kluwer Health. - Access mode: <a href="http://www.uptodate.com">www.uptodate.com</a>	Access is not limited
6.	<b>Scientific electronic library eLIBRARY</b> [Electronic resource]. - Access mode: <a href="http://elibrary.ru">http://elibrary.ru</a>	Open access
7.	<b>National Electronic Library</b> [Electronic resource]. - Access mode: <a href="http://neb.rf/">http://neb.rf/</a>	Access from computers libraries
8.	<b>Scopus</b> [Electronic resource] / Elsevier Inc., Reed Elsevier. - Electronic data. - Philadelphia: Elsevier BV, PA, 2015. - Access mode: <a href="http://www.scopus.com/">http://www.scopus.com/</a> (National project)	Access is not limited
10.	<b>Single window of access to information resources</b> [Electronic resource]. - Access mode: <a href="http://window.edu.ru/">http://window.edu.ru/</a> [7.02.2019].	Open access

eieven.	<b>Russian education. Federal educational portal</b> [Electronic resource].- Access mode: <a href="http://www.edu.ru/index.php">http://www.edu.ru/index.php</a> [7.02.2019].	Open access
12.	<b>Federal Electronic Medical Library of the Russian Ministry of Health</b> [Electronic resource]. - Access mode: <a href="http://www.femb.ru/feml/">http://www.femb.ru/feml/</a> , <a href="http://feml.scsmr.rssi.ru">http://feml.scsmr.rssi.ru</a> [7.02.2019].	Open access
13.	<b>Medline</b> (PubMed, USA) [Electronic resource]. - Access mode: <a href="https://www.ncbi.nlm.nih.gov/pubmed/">https://www.ncbi.nlm.nih.gov/pubmed/</a> [7.02.2019].	Open access
14.	<b>Free Medical Journals</b> [Electronic resource]. - Mode access: <a href="http://freemedicaljournals.com">http://freemedicaljournals.com</a> [7.02.2019].	Open access
19.	<b>Open access journals in Russian</b> [Electronic resource]/EIPub NEICON platform. - Access mode: <a href="http://elpub.ru/elpub-journals">http://elpub.ru/elpub-journals</a> [7.02.2019].	Open access

#### 6.4. Guidelines for students on mastering the discipline

An important condition for successful mastery of the Chemistry discipline is the creation of a system of proper organization of work that allows you to distribute the educational load evenly in accordance with the schedule of the educational process. Drawing up a work plan can be of great help in this. Its presence will allow you to subordinate your free time to study purposes and work more successfully and efficiently. It is necessary to exercise self-control, which is a necessary condition for successful study. If something is left undone, time must be found to complete that part of the work. It is recommended to complete all tasks for practical classes, as well as tasks assigned for independent work, immediately after the corresponding topic of the lecture course, which contributes to better assimilation of the material, allows you to promptly identify and eliminate "gaps" in knowledge, systematize previously covered material, and proceed on its basis to mastering new knowledge and skills.

*\* Preparation for lectures.*

Acquaintance with the discipline occurs already at the first lecture, where the student is required not only to pay attention, but also to independently prepare notes. When working with lecture notes, it is necessary to take into account the fact that some lectures provide answers to specific questions on the topic, while others only reveal the relationships between phenomena, helping the student understand the deep processes of development of the subject being studied, both in history and at the present time.

Lecture note-taking is a complex type of university classroom work that involves intense mental activity of the student. A note is useful when the most essential things are written down and done by the student himself. There is no need to try to write down the entire lecture verbatim. This kind of "note-taking" does more harm than good. It is advisable to first understand the main idea presented by the lecturer and then write it down. It is advisable to record on one page of the sheet or leaving fields on which

Later, when working independently with notes, you can make additional notes and mark unclear places.

It is advisable to develop your own system of abbreviations, abbreviations and symbols. However, when further working with notes, it is better to replace the symbols with ordinary words for quick visual perception of the text.

When working on lecture notes, it is always necessary to use not only the textbook, but also the literature that the lecturer additionally recommended. It is this kind of serious, painstaking work with the lecture material that will allow you to deeply master the theoretical material.

*\* Preparation for laboratory/practical classes.*

The student should begin preparing for each lesson by familiarizing himself with the lesson plan, which reflects the content of the proposed topic. Careful thinking through and study of the plan's issues is based on studying the current lecture material, and then studying the required and additional literature recommended for this topic. All new concepts on the topic being studied must be memorized and included in a glossary, which should be kept from the very beginning of the course.

The result of such work should be manifested in the student's ability to freely answer theoretical questions of the workshop, his speech and participation in a collective discussion of issues on the topic being studied, the correct completion of practical assignments and tests.

In the process of preparing for practical classes, students need to pay special attention to independent study of the recommended literature. Despite the completeness of the lecture notes, it is impossible to present all the material in it due to the limit of classroom hours. Therefore, independent work with textbooks, teaching aids, scientific and reference literature, materials from periodicals and the Internet is the most effective method of acquiring additional knowledge, allows you to significantly intensify the process of mastering information, promotes a deeper assimilation of the material being studied, and shapes students' attitude to a specific problem.

*\* Preparation for the colloquium.*

*Colloquium* carried out in order to find out and assess the level of knowledge students. It is carried out after the completion of major thematic sections in the form of a survey. Students are asked to answer a series of questions to test the knowledge acquired during lectures and classes. This form of training allows you to systematize knowledge on the subject and delve into the essence of the issue being studied. Teachers, in turn, receive an additional opportunity to control and assess the level of knowledge of students.

In order to successfully pass the colloquium and receive a high grade based on its results, you need to properly prepare for it. First of all, you need to familiarize yourself in advance with the topics of the colloquium and the issues that will be discussed at it. Then literature on this topic is selected and answers to questions are sought. Each student, working with literature on a specific topic, regardless of what topic is given, should be able to highlight the main points in the material. Also, when searching for information, a student can use one or several sources at once, citing them in his answer.

It is worth noting that a student who regularly refreshes the material covered in his memory usually does not experience problems when preparing and passing the colloquium. Therefore, we can advise all students to re-read their notes when returning from lectures. So knowledge is gradually, and most importantly - reliably, deposited and accumulated in the head. And when the date of the colloquium approaches, it will be enough just to quickly glance at the answers to the questions in order to confidently give an answer in class.

By revealing a given topic during a colloquium, students express their own thoughts, showing how they have mastered the material. This allows the teacher to find out the level of knowledge of students and differentiate them by assigning one point or another.

*\* Recommendations for working with literature.*

It is advisable to start working with literature by studying general works on the topic, as well as textbooks and teaching aids. Next, it is recommended to move on to the analysis of monographs and articles that consider individual aspects of the problems studied in the course, as well as official materials and unpublished documents (research papers, dissertations), which may contain the main issues of the problem being studied.

Depending on the results of the introductory reading, a further method of working with the source is chosen. If solving the problem requires studying certain fragments of the text, then the selective reading method is used. If the book does not have a detailed table of contents, the student should pay attention to the subject and name indexes.

Selected fragments or the entire text (if it is entirely related to the topic) require thoughtful, leisurely reading with "mental elaboration" of the material. Such reading involves highlighting: 1) the main thing in the text; 2) main arguments; 3) conclusions. Particular attention should be paid to whether the thesis follows from the arguments or not.

It is clear that the ability to work with text in this way does not come immediately. The best way to learn to highlight the main thing in a text, to grasp the problematic nature of statements, and to evaluate the author's position is comparative reading, during which the student gets acquainted with different opinions



on the same issue, compares the weight and evidence of the parties' arguments and draws a conclusion about the greatest persuasiveness of a particular position.

If in the literature there are different points of view on a particular issue due to the complexity of past events and legal phenomena, they cannot be rejected without understanding them. If there are discrepancies between the authors, it is necessary to find a rational grain in each of them, which will allow a deeper understanding of the subject of study and a more critical assessment of the issues being studied. Getting acquainted with the special positions of the authors, you need to identify their similar judgments, arguments, conclusions, and then compare them with each other and apply the one that is more convincing.

The next stage of working with literary sources is the creation of notes that capture the main theses and arguments. It is advisable to take notes on large specialized works of a monographic nature in separate notebooks. Here it is important to remember that notes are written on one side of the sheet, with margins and sufficient line spacing for corrections and remarks (these rules are observed for ease of editing). If quotations are given in the notes, then an indication of the source (author, title, imprint, page number) must certainly be given. Subsequently, this information can be used when writing the text of an essay or other assignment.

*Thus, when working with sources and literature, it is important to be able to:*

- compare, compare, classify, group, organize information in accordance with a specific educational task;
- summarize the information received, evaluate what you listened to and read;
- record the main content of messages; formulate, verbally and in writing, the main idea of the message; draw up a plan, formulate theses;
- prepare and present detailed reports such as a report;
- work in different modes (individually, in pairs, in groups), interacting together;
- use abstracts and reference materials;
- control your actions and the actions of your comrades, objectively evaluate your actions;
- seek help, additional clarifications from the teacher, other students.
- use linguistic or contextual guesses, dictionaries of a different nature, various kinds of hints, supports in the text (keywords, text structure, preliminary information, etc.);



<p><b>344022, Rostov region, Rostov-on-Don, st. Adygei/ Pushkinskaya 12/191. Special premises For independent work - library reading rooms, auditorium of the Department of Physics, Department of Automation and Monitoring of the Quality of Education.</b></p>	
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## Educational and laboratory equipment, technical and electronic means

### *Department of General and Clinical Biochemistry No. 1*

Name special premises and premises for training work	Equipment of special rooms and premises for independent work
<p><b>344022, G. Rostov-on-Don, per. Nakhichevan, 38/57-59/212-214 (No. 41, Liter A-Z, 1st floor).</b> Lecture room no. 3. Educational audience For carrying out classes lecture type.</p>	<p>The premises are equipped with specialized educational furniture (100 seats). Technical teaching aids used to present educational information to a large audience: a multimedia presentation complex.</p>
<p><b>lane Nakhichevan, 38/57-59/212-214 (No. 41, Liter A-Z, 4th floor). Auditoriums No. 406, 407, 408, 408, 409, 432</b> room for practical, group and individual consultations, consultations current control, intermediate certification.</p>	<p>Premises staffed specialized furniture. Tables – 11 pcs., chairs – 21 pcs., thermostat – 1 pc. Colorimeter KFK-2 – 1 pc., drying cabinet – 2 pcs., thermostat – 1 pc., spectrophotometer SF-46 – 1 pc. centrifuge – 1. Tstandard sets professional models with the results of laboratory and instrumental research methods, sets of demonstration equipment and educational visual aids, providing thematic illustrations: demonstration material by topic - 8. Visual materials by topic - 4.</p>
<p><b>lane Nakhichevan, 38/57-59/212-214 (No. 41, Liter A-Z, 4th floor). Laboratory No. 401</b></p>	<p>Premises staffed specialized furniture: 5 laboratory tables, 18 chairs, analytical balance ALC-110D2; apparatus for shaking liquids; apparatus for electrophoresis EPAU 20-50; technical scales VA-4M; homogenizer GGIN-302; spectrophotometer LOMO SF-46; colorimeter KFK-2MP; distiller D-25; surgical operating set; stopwatch; fluorimeter HITACHI F-3000; refrigerator "Dnepr"; drying cabinet – 4 pcs., fume hood – 1 pc. pH meter - 1 pc.</p>
<p><b>lane Nakhichevan, 38/57-59/212-214 (No. 41, Liter A-Z, 4th floor) Room No. 434.</b> Room for storage and preventive service educational equipment</p>	<p>Furniture for storing educational equipment: shelving. Technical means for preventive maintenance of educational equipment.</p>

## Educational and laboratory equipment, technical and electronic means

### *Department of General and Clinical Biochemistry No. 2*

Name of special premises and premises for independent work	Equipping special rooms and rooms for independent work
<p><b>344022, Rostovskaya region, city Rostov-on-Don, lane Nakhichevan, 38/57-59/212-214 (No. 29, Letter A-Z, 7th floor)</b> Auditoriums: No. 712, 714, 715, 722, 723</p> <p>- premises for practical classes, group and individual consultations, consultations</p> <p>current control intermediate certifications.</p>	<p>The premises are equipped with:</p> <ul style="list-style-type: none"> <li>- <i>specialized furniture</i>: educational (14 pcs.), table for tables (1 pc.), (29 pcs.), educational board (1 pc.), hanger (1 pc.), chairs Lessar split system (1 pc.),</li> <li>- technical teaching aid: TV (1 pc.),</li> </ul>
<p><b>344022, Rostovskaya region, city Rostov-on-Don, lane Nakhichevan, 38/57-59/212-214 (No. 29, Letter A-Z, 7th floor)</b> Auditorium No. 718 is a room for conducting practical classes, group and individual consultations, and ongoing monitoring of intermediate certification.</p>	<p>The premises are equipped with:</p> <ul style="list-style-type: none"> <li>- <i>specialized furniture</i>: teaching tables (38 pcs.), teacher's table (1 pc.), chairs (76 pcs.), teaching board (1 pc.), hanger (3 pcs.), Oasis split system (1 pc.),</li> <li>- <i>technical training tool</i>: Samsung TV (1 pc.),</li> </ul>
<p><b>344022, Rostovskaya region, city Rostov-on-Don, lane Nakhichevan, 38/57-59/212-214 (No. 29, Letter A-Z, 7th floor)</b> Auditorium No. 719 - room for holding</p> <p>computer testing, access to electronic resources of the university.</p>	<p>The room is equipped with:</p> <ul style="list-style-type: none"> <li>- <i>computer equipment</i>: Lenovo monoblock (14 pcs.), with Internet connection and access to the EIOS RostSMU</li> <li>- <i>specialized furniture</i>: desk (1 piece); oval table (1 pc.), computer chairs (16 pcs.), hanger (1 pc.), bedside table (2 pcs.), Daewoo wall heater (1 pc.), Rovex split system (1 pc.),</li> <li>- <i>technical training tool</i>: Telefunken TV (1 pc.),</li> </ul>
<p><b>344022, Rostovskaya region, city Rostov-on-Don, lane Nakhichevan, 38/57-59/212-214 (No. 29, Letter A-Z, 7th floor)</b> Laboratory No. 717 is a room for conducting laboratory classes.</p>	<p>The premises are equipped with:</p> <ul style="list-style-type: none"> <li>- <i>specialized furniture</i>: table laboratory - (5 pcs.), cabinet, laboratory fume stool (1 PC.), (5 pieces.), cart mobile - (1 pc.), rolling cabinet (7 pcs.), attached cabinet (1 pc.), reagent cabinet (1 piece), sink (1 PC.), hand dryer SARMAT (1 PC.).</li> <li>- <i>laboratory equipment</i>: pH meter MT pcs.), double- (1 distiller Millpore (1 pc.), analytical MT (1 pc.), ice maker scales microscope Biomed 6 (1 PC.), plate heating PL 1818 (1 pc.), Oxygraph Plus system (1 pc.), Bio-Rad gel electrophoresis system (1 pc.), Implen photometer (1 pc.), Pozis refrigerator (1 pc.),</li> <li>Minispin centrifuge (1 pc.).</li> </ul>
<p><b>344022, Rostovskaya region, city Rostov-on-Don, lane Nakhichevan, 38/57-59/212-214 (No. 29, Letter A-Z, 7th floor)</b> Laboratory No. 721 is a room for conducting laboratory classes.</p>	<p>The premises are equipped with:</p> <ul style="list-style-type: none"> <li>- <i>specialized laboratory furniture</i>: titration table (1 pc.), laboratory table (1 pc.), island table (1 pc.), (5 end table metal (2 pcs.), corner table on metal support cabinet (1 pc.), general exhaust (1 closet pc.), closet</li> </ul>

	general laboratory (1 PC.), shelf (1 piece), mezzanine – (4 pcs.), Ariston refrigerator (1 pc.), - <i>laboratory equipment:</i> water distiller Liston (1 piece), dry air thermostat (1 piece), technical scales MT – 1 pc.),
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