

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

*Faculty of Education of foreign students, residents and postgraduates*

CONFIRM

Supervisor  
educational program  
\_\_\_\_\_/ E.S. Belousova /  
(signature) (FULL NAME.)  
" \_\_\_\_ " \_\_\_\_\_ 20\_\_

**DISCIPLINE WORKING PROGRAM**

**PHYSICS, MATHEMATICS**

Speciality 31.05.01 General medicine

Form of education full-time

**Rostov-on-Don  
2023**

## **I. GOALS AND OBJECTIVES OF MASTERING THE DISCIPLINE**

**1.1 Purpose** mastering the discipline: to form students' knowledge about physical processes occurring in the human body; study the physical foundations of diagnostic and therapeutic methods, master the methods of mathematical statistics used in medicine and healthcare.

### **1.2. Objectives of studying the discipline:**

- teaching students the most important methods of biophysics, allowing study physical phenomena in biological systems, the physical properties of these systems, the physicochemical foundations of life processes;
- development of methodological orientation among students, essential for solving problems of evidence-based medicine;
- formation in students of logical thinking, the ability to accurately formulate a task, the ability to isolate the main and secondary, the ability to draw conclusions based on the obtained measurement results;
- education of a high mathematical culture; skills development modern types of mathematical thinking; instilling skills in using mathematical methods in practical activities;
- teaching students methods of mathematical statistics, used in medicine and allowing to extract the necessary information from the results of observations and measurements, to assess the degree of reliability of the data obtained;
- developing skills in studying scientific literature.

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

The study of the discipline is aimed at developing competence in accordance with the Federal State Educational Standard of Higher Education and the EP of Higher Education in this specialty:

**General professional: OPK-4**

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

**3.1.** The academic discipline "Physics, Mathematics" belongs to the basic part RUP in specialty 05/31/01 General Medicine.

**IV. CONTENT AND STRUCTURE OF DISCIPLINE Labor**  
**intensity of the discipline in 3\_\_2\_\_ hour \_72\_\_\_\_\_**

**4.1. Sections of the discipline studied in the \_1\_ semester**

No. section	Section name	Number of hours					
		Total	Contact Job			SRO	
			L	WITHETC	LR		
Semester 1							
1	Basics of mathematics statistics	44	6	20			18
2	Mechanical vibrations and waves. Elements biorheology. Biomembranology.	15	4	6			5
3	Bioelectrogenesis.	13	2	6			5
Total for the semester		72	12	32			28
Interim certification form (test/test with assessment/exam)		TEST					

**SRO**- independent work of students;**L**- lectures;**WITH** -seminar classes.

**4.2. Contact work**

**Lectures**

No. section	No. lectures	Lecture topics	Qty hours
Semester 1			
1	1	Leading to discipline. Basics of probability theory	2
1	2	Basics of mathematical statistics	2
1	3	Basics of correlation and regression analysis	2
2	4	Mechanical vibrations and waves. Acoustics	2
2	5	Elements of biorheology, hemodynamics. Biological membranes	2
3	6	Bioelectrogenesis	2
Total hours			12

## Seminar classes

No. section	No. classes	Seminar topics	Qty hours	Forms of current control
Semester 1				
1	1	Probability theory. Random Events	2	Oral questioning, decision situational tasks
1	2	Probability theory. Random variables	2	Oral questioning, decision situational tasks
1	3	Basics of mathematics statistics. Selective characteristics	2	Oral questioning, decision situational tasks
1	4	Estimation of population parameters from sample data	2	Oral questioning, decision situational tasks
1	5	Frontier control I	2	Testing
1	6	Fundamentals of probability theory and mathematical statistics	2	Oral questioning, decision situational tasks
1	7	Testing statistical hypotheses. Student's t test	2	Oral questioning, decision situational tasks
1	8	Testing statistical hypotheses. Fisher criterion.	2	Oral questioning, decision situational tasks
1	9	Correlation and regression analysis	2	Oral questioning, decision situational tasks
1	10	<b>Frontier control II</b>	2	Testing
2	eleven	Testing statistical hypotheses. Correlation and regression analysis	2	Oral questioning, decision situational tasks
2	12	Mechanical waves. Acoustics	2	Oral questioning, decision situational tasks
2	13	Hemodynamics	2	Oral questioning, decision situational tasks
3	14	Biomembranology	2	Oral questioning, decision situational tasks

No. section	No. classes	Seminar topics	Qty hours	Forms of current control
3	15	Biophysical basis electrography	2	Oral questioning, decision situational tasks
3	16	<b>Frontier control III</b>	2	Testing
Total hours			32	

### 4.3. Independent work of students

No. section	Type of independent work students	Number in hours	Shapes of the current control
Semester 1			
1	Studying theory, preparing for current classes, preparing for a test lesson	18	Survey, testing
2	Studying theory, preparing for current classes, preparing for a test lesson	5	Survey, testing
3	Studying theory, preparing for current classes, preparing for a test lesson	5	Survey, testing
Total hours per semester		28	

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

The fund of assessment tools for determining the level of development of competencies as a result of mastering the discipline is an appendix to the work program.

### VI. DISCIPLINES

EDUCATIONAL AND METHODOLOGICAL

SECURITY

#### 6.1. Literature

1. Remizov A. N. Medical and biological physics: textbook: [rec. Ministry of Defense of the Russian Federation: for medical students and teachers. universities] / A.N. Remizov. - 4th ed., rev. and additional –M.: GEOTAR-Media, 2016. - 647 p.
2. Remizov A.N. Textbook on medical and biological physics: for students of medical universities / A.N. Remizov, A.G. Maksina, A.Ya. Potapenko. - ed. 8th, erased. - M.: Bustard, 2008. - 558 p.

## 6.2. Internet resources

ELECTRONIC EDUCATIONAL RESOURCES	Access to the resource
<b>Electronic library RostSMU.</b> – URL: <a href="http://109.195.230.156:9080/opacq/">http://109.195.230.156:9080/opacq/</a>	Access is not limited
<b>Student Advisor</b> [Kits: "Medicine. Healthcare. IN"; "Medicine. Healthcare. SPO"; "Psychological Sciences"]: Electronic library system. – Moscow: Politekhresurs LLC. - URL: <a href="https://www.studentlibrary.ru">https://www.studentlibrary.ru</a> + opportunities for inclusive education	Access is not limited
<b>Doctor's consultant. Electronic medical library:</b> Electronic library system. – Moscow: LLC "Higher School of Organization and Management of Healthcare. Comprehensive medical consulting." - URL: <a href="http://www.rosmedlib.ru">http://www.rosmedlib.ru</a> + opportunities for inclusive education	Access is not limited
<b>Scientific electronic library eLIBRARY.</b> - URL: <a href="http://elibrary.ru">http://elibrary.ru</a>	Open access
<b>National Electronic Library.</b> - URL: <a href="http://neb.rf/">http://neb.rf/</a>	Access from computers libraries
<b>Springer Nature database.</b> - URL: <a href="https://link.springer.com/">https://link.springer.com/</a> via IP addresses of RostSMU and remotely after registration, remotely via KIAS RFBR <a href="https://kias.rfbr.ru/reg/index.php">https://kias.rfbr.ru/reg/index.php</a> ( <i>National project</i> )	Access is not limited
<b>Wiley Online Library</b> /John Wiley & Sons. - URL: <a href="http://onlinelibrary.wiley.com">http://onlinelibrary.wiley.com</a> via IP addresses of RostSMU and remotely after registration( <i>National project</i> )	Access limited
<b>Wiley. Full-text collection of electronic journals Medical Sciences Journal Backfile:</b> archive. –URL: <a href="https://onlinelibrary.wiley.com/">https://onlinelibrary.wiley.com/</a> via IP addresses of RostSMU and remotely after registration( <i>National project</i> )	Indefinite subscription
<b>Sage Publication:</b> [full text collection of e-books eBook Collections]. – URL: <a href="https://sk.sagepub.com/books/discipline">https://sk.sagepub.com/books/discipline</a> via IP RostSMU addresses( <i>National project</i> )	Indefinite subscription
<b>PubMed:</b> electronic search engine [for biomedical research from the National Center for Biotechnology Information (NCBI, USA)]. - URL: <a href="https://pubmed.ncbi.nlm.nih.gov/">https://pubmed.ncbi.nlm.nih.gov/</a>	Open access
<b>Other</b> Open resources can be found at: <a href="http://rostgmu.ru">http://rostgmu.ru</a> → Library → Electronic catalog → Open resources Internet → further by keyword...	

## 6.3. Guidelines for students on mastering disciplines

- **Planning and organizing the time needed to study disciplines**

An important condition for successfully mastering the discipline of Municipal Hygiene 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

learning goals, work more successfully and efficiently. In the evening you should always distribute work for tomorrow. At the end of each day, it is advisable to summarize the work: carefully check whether everything was completed according to the plan, whether there were any deviations, and if there were, for what reason they occurred. 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 leave fields on which later, when working independently with notes, you can make additional notes and mark unclear places.

It is better to divide the lecture notes into points, observing the red line. This will be greatly facilitated by the lecture plan questions proposed to the teachers. You should pay attention to the emphasis and conclusions that the lecturer makes, marking the most important points in the lecture material with the remarks "important", "well remember", etc. You can also do this using colorful markers or pens, emphasizing terms and definitions.

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. This is exactly the kind of serious, painstaking work with lecture material

will allow you to deeply master the theoretical material.

- **Preparation for practical classes**

The student must begin preparing for each practical lesson by familiarizing himself with the practical 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.

- **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.

Work with sources should begin with introductory reading, i.e. view the text, highlighting its structural units. During introductory reading, bookmarks mark those pages that require more careful study.

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 also necessary to analyze which of the author's statements are problematic, hypothetical in nature and to grasp hidden issues. 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 points 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 arguments of the parties and draws a conclusion about the greatest persuasiveness of that one. or other 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. You can make notes on separate sheets of paper, which can then be easily organized into individual topics of the course being studied. Another way is to keep thematic notebooks on one topic. It is advisable to take notes on large specialized works of a monographic nature in separate notebooks. It is important to remember here 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, systematize 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, orally 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 with each other;

- use abstracts and reference materials;
- control your actions and the actions of your comrades, objectively evaluate your actions;
- seek help and additional clarification from the teacher or other students.
  
- use linguistic or contextual guesses, dictionaries of various types, various kinds of hints, supports in the text (keywords, text structure, preliminary information, etc.);
- use periphrases, synonymous means, words that describe general concepts, explanations, examples, interpretations, "word creation" when speaking and writing;
- repeat or paraphrase the interlocutor's remarks to confirm understanding of his statement or question;
- seek help from your interlocutor (clarify the question, ask again, etc.);
  
- use facial expressions and gestures (in general and in cases where linguistic means are not enough to express certain communicative intentions).

- **Preparation for intermediate certification**

When preparing for intermediate certification, it is advisable to:

- carefully study the list of questions and determine which sources contain the information necessary to answer them;
- carefully read the recommended literature;
- make short notes of answers (answer plans).

