

Документ подписан простой электронной подписью  
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**Federal State Autonomous Educational Institution  
of Higher Education "Peoples' Friendship University of Russia"**

**Medical Institute**

(name of Educational Division developing the postgraduate program)

**Department of Biochemistry named after academician T.T. Berezov**

(name of the Educational Department developing the postgraduate program)

## **WORKING PROGRAM OF THE DISCIPLINE**

Methodology of scientific research

(name of the discipline)

**Scientific specialty:**

1.5.4. Biochemistry

(code and name of the scientific specialty)

**Practical training of students is carried out within the framework of the  
postgraduate education program:**

Biochemistry Molecular mechanisms of cancer

(name of the postgraduate program)

**2023 г.**

## 1. THE PURPOSE OF MASTERING THE DISCIPLINE

Training of a specialist who possesses fundamental theoretical knowledge and practical skills necessary for conducting scientific work, who is able to successfully and timely complete a dissertation research for the degree of Candidate of Medical Sciences.

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

As a result of studying the discipline, a graduate student should:

*Know:*

- methods of analysis and evaluation of modern scientific achievements;
- methods of research activity;
- features of the presentation of the results of scientific activity in writing when working in Russian and international teams;
- principles of analysis and generalization of research results, modern methods of statistical processing of research results, methods of public presentation of scientific data;
- modern methods of collecting and processing information in the field of biochemistry and related fields, corresponding to the tasks of research, forms of public presentation of scientific data.

*Be able to:*

- to carry out research work in the field of clinical medicine (biochemistry), which is important for the practice of healthcare;
- analyze alternative solutions to research and experimental tasks;
- analyze and summarize the results of scientific research, present them in the form of scientific publications and reports;
- to systematize and generalize the experience of scientific research in the field of biology and medicine.

*Possess:*

- skills of critical analysis and evaluation of modern scientific achievements;
- skills and technologies for planning professional activities in the field of scientific research;
- skills of self-conducting applied scientific research in the field of medicine based on the principles of rational clinical practice;
- skills of introducing the results of modern scientific research into clinical medicine, organization and interaction of scientific schools and practical healthcare;
- methods of planning, organizing and conducting scientific research that allow obtaining new scientific facts that are significant for the medical industry;
- skills of analysis, generalization and registration of the results of scientific research, public presentation of the results of the conducted research.

## 3. SCOPE OF DISCIPLINE AND TYPES OF ACADEMIC WORK

The total labor intensity of the discipline "Methodology of scientific research" is 3 credits.

*Table 4.1. Types of academic work by periods of mastering the postgraduate program*

Type of activity	Total, academic hours	Course			
		1	2	3	
<i>In-class learning (total, hours)</i>	36	36			

Type of activity	Total, academic hours	Course			
		1	2	3	
Including:					
<i>Lectures (L)</i>	12	12			
<i>Laboratory tasks (LT)</i>					
<i>Practical classes (PC)/ Seminars (S)</i>	6	6			
<i>Self-study, academic hours</i>	18	18			
<i>Control (exam/pass credit), academic hours</i>	36	36			
<b>Total workload</b>	<i>academic hours</i>	<b>72</b>	<b>72</b>		
	<i>credits</i>	<b>2</b>	<b>2</b>		

## 5. CONTENTS OF THE DISCIPLINE

Table 5.1. The content of the discipline (module) by types of academic work

Name of the discipline section	Contents of the section	Type of study activity*
Section 1. Methodological foundations of scientific knowledge	Topic 1.1. Science as a specific form of activity.	L
	Topic 1.2. Method of scientific cognition: essence, content, main characteristics.	L
Section 2. Ethical aspects of scientific research	Topic 2.1. Biomedical research. Ethical aspects of scientific research.	L
Section 3. Methodology of dissertation research.	Topic 3.1. The structure of scientific dissertation research.	L
	Topic 3.2. Stages of dissertation research.	L
	Topic 3.3. Requirements for the structure, content and design of the dissertation. Thesis defense.	PC
Section 4. Good scientific practice	Topic 4.1. Basic principles of good scientific practice.	PC
Section 5. Processing and analysis of scientific research results	Topic 5.1. Fundamentals of biomedical statistics	PC
Section 6. Registration of scientific research.	Topic 6.1. Presentation of research results.	PC
	Topic 6.2. Principles of writing scientific articles, reports.	PC

## 6. MATERIAL AND TECHNICAL SUPPORT OF THE DISCIPLINE

Table 6.1. Material and technical support of the discipline

Auditorium type	Equipment the audience	Specialized educational/laboratory equipment, software and materials for the development of the discipline (if necessary)

Auditorium type	Equipment the audience	Specialized educational/laboratory equipment, software and materials for the development of the discipline (if necessary)
Lecture hall	<p>An auditorium for conducting lecture-type classes, equipped with a set of specialized furniture; a board (screen) and technical means of multimedia presentations.</p> <p>Hall No. 1 for 300 seats, Hall No. 2 for 300 seats, Hall No. 3 for 50 seats, RUDN Medical Institute, 117198, Moscow, Miklukho-Maklaya str., 8</p>	<p>A set of specialized furniture; technical means: a multimedia projector, a computer, a white magnetic board, a set of markers for the board, a set of educational presentations, educational posters and tables. Software: Microsoft products (OS, office application package, including MS Office/Office 365, Teams, Skype.</p>
Specialized audience	<p>An auditorium for laboratory work, individual consultations, routine monitoring and interim certification, equipped with a set of specialized furniture and equipment. Auditoriums 329, 334, 336, RUDN Medical Institute, 117198, Moscow, Miklukho-Maklaya str., 8.</p>	<p>Multimedia projectors and motorized screens            NEC V 260X Projector, Motorized Screen for Master Control Projector 203X203. laboratory equipment: Exhaust hood, CENTRIFUGE OPN-8, KFK-3-01 photoelectrocolorimeter, Electric drying cabinet SNOL 67/350, Thermoblock PE-4030 36 gn. d-23*45mm, Spectrophotometer Specord M -40, Computer HP 280 G2 MT V7 Q81E Intel Pentium Dual-Core G4400</p>
Educational and Scientific Laboratory	<p>Laboratory of Molecular Biological and Biochemical Research Methods. Audiences 201, 316, 318, 319, 339, RUDN Medical Institute, 117198, Moscow, Miklukho-Maklaya str., 8</p>	<p>Pestle microbiological homogenizer Vilitex DY89-II, pestles and containers to it for 3, 5, 10, 20 and 50 ml.            NANODROP 2000C Thermo Fisher Microspectrophotometer            Camera for horizontal electrophoresis Sub-Cell GT, 15x15 cm, combs for 15 and 20 holes (1 piece each), with stops for filling Bio-Rad 1704402 - 2 pieces            Camera for vertical electrophoresis Mini-PROTEAN ® Tetra Bio-Rad 165800 - 2 pcs            PowerPack Basic Power Supply            Power supply for 4 electrophoretic chambers with output voltage up to 300 V. Bio-Rad 1645050            SM - 6M desktop centrifuge with 6M rotor (12 x12ml vials) Elmi            Transilluminator TCP-20.MC</p>

Auditorium type	Equipment the audience	Specialized educational/laboratory equipment, software and materials for the development of the discipline (if necessary)
		<p>wavelength 312 and 254 nm, screen size 20 x 20 cm. Vilber Lourmat VL 2161 2017 1</p> <p>Desktop pH Meter Series Starter 5000 Ohaus, Ohaus ST5000, pH meter MettlerToledo</p> <p>Microcentrifuge 5420</p> <p>Microcentrifuge with rotation speed up to 15060 rpm, with the ability to work with standard test tubes on 0,2/0,5/0,6/1,5 and 2 ml and PCR strips. Epp 5420 000.318, Eppendorf</p> <p>Evolution™ 201/220 UV-Visible Spectrophotometer 840-210600, Thermo Fisher</p> <p>Multimodal reader ClarioStar Omega BMG LABTECH 415-10</p> <p>Thermoshaker TS-100C, BS-010143-AAI, BioSan</p> <p>Liebherr GNP 3056 freezer, Biryusa-6 refrigerator, Minsk-17 Freezer.</p> <p>Laboratory medical centrifuge ProfMT, Refrigerator ATLANT XM 6026-031, Freezer Minsk-17, Electronic scales AR0640 Ohaus Europe, Spectrophotometer Hitachi F-2700, Distiller GTL-200, Thermostat, Thermoblock PE-4030 36 gn. d-23*45mm, Bi-beam Spectrophotometer U-2900, Centrifuge L7-55</p> <p>HP 280 G2 MT V7 Q81E Intel Pentium Dual-Core G4400 Computer</p> <p>There is an Internet connection</p> <p>Electrophoretic chamber, 1mm, Analytical scales EP214C, Laboratory washing table 985*610*900 .</p> <p>Microcentrifuge Eppendorf Minispin</p> <p>Vortex V-1 plus</p> <p>Flow cytometer MACSQuant Analyzer 10, Fume hood,</p>

Auditorium type	Equipment the audience	Specialized educational/laboratory equipment, software and materials for the development of the discipline (if necessary)
		Thermoblock PE-4030 36 gn. d-23*45mm, Spectrophotometer Specord M -40, HP 280 G2 MT V7 Q81E Intel Pentium Dual-Core G4400 Computer
For independent work of students	An auditorium for independent work of students (can be used for laboratory classes and consultations), equipped with a set of specialized furniture. Auditorium 203, 339, RUDN Medical Institute, 117198, Moscow, Miklukho-Maklaya str., 8	A set of specialized furniture, Software: Microsoft products (OS, office application package, including MS Office/ Office 365, Teams), Drying cabinet, Specord M-40 spectrophotometer, dry-air thermostat

## 7. EDUCATIONAL, METHODOLOGICAL AND INFORMATIONAL SUPPORT OF THE DISCIPLINE

### *a) Basic literature*

1. Anufriev, A.F. Scientific research. Term papers, theses and dissertations / Moscow State University. open ped. un-T. – M.: B. I., 2002.
2. Volkov, Yu.G. How to write a diploma, term paper, abstract / Yu.G. Volkov. 2nd ed. – Rostov n/A: Phoenix, 2003.
3. Zagvyazinsky V.I., Atakhanov R. Methodology and methods of psychological and pedagogical research. – M., Academy, 2007, - 208s.
4. Kuznetsov, I.N. Abstracts, term papers and theses: Methods of preparation and registration: Studies. - method. manual. – M.: Dashkov and K, 2002.
5. Kuzmina N.V. Methods of systematic pedagogical research: Textbook. M.: Public education, 2002.
6. Term papers and theses: from the choice of the topic and to the defense: Reference. Manual / Author - comp. I.N. Kuznetsov. – Minsk: Misanta, 2003.
7. Lukash S.N., Epoeva K.V. Independent and research work of students of higher educational institutions: textbook. methodical. a manual for university teachers. – Armavir: RIC AGPA, 2011. – 52s.
8. Obraztsov, P.I. Methods and methodology of psychological and pedagogical research. – St. Petersburg: Peter, 2004. – 268 p
9. Pavlova E.P. From abstract to term paper, from diploma to dissertation: practical guide to preparation, presentation and defense: a scientific manual. - M.: - "Book service", - 2003. - 156 p.
10. Rogozhin, M. How to write a term paper and a thesis/ M. Rogozhin. – St. Petersburg: Peter, 2005.



*b) Additional literature*

1. Allahverdyan A.G., Moshkova G.Yu., Yurievich A.V., Yaroshevsky M.G. Psychology of Science: Textbook. – Moscow: Moscow Psychological and Social Institute, Flint, 1998.
2. Anufriev A.F. Scientific research. Term papers, theses and dissertations. - M.: Os-89, 2002. - 112 p.
3. Borikova L.V., Vinogradova N.A. We are writing an abstract, a report, a final qualifying work: A textbook for students – Moscow: Academy, 2000.
4. Radaev V.V. How to organize and present a research project: 75 simple rules – Moscow: Higher School of Economics: INFRA – M, 2001.
5. Handbook for a student: 1000 tips for all occasions: from the first appearance in the audience to the defense of the diploma / Comp. A.A. Nemirovsky et al. – M.: AST "Astrel", 2000
6. Usmanov, V.V. Preparation and execution of diploma design: Method. stipend / Edited by V.V. Usmanov. – Penza, 2000.

*Resources of the Internet information and telecommunication network:*

1. EBS RUDN and third-party EBS, to which university students have access on the basis of concluded contracts:

- Electronic library system of RUDN – EBS RUDN <http://lib.rudn.ru/MegaPro/Web>
- EBS "University Library online" <http://www.biblioclub.ru>
- ABS Yurayt <http://www.biblio-online.ru>
- EBS "Student Consultant" [www.studentlibrary.ru](http://www.studentlibrary.ru)
- EBS "Doe" <http://e.lanbook.com/>
- EBS "Trinity Bridge"

2. Databases and search engines:

- electronic Fund of legal and normative-technical documentation <http://docs.cntd.ru/>
- search engine Yandex <https://www.yandex.ru/>
- Google search engine <https://www.google.ru/>
- bibliographic database SCOPUS <http://www.elsevierscience.ru/products/scopus/>

*Educational and methodological materials for independent work of students during the development of the discipline/ module\*:*

1. A course of lectures on the discipline "Methodology of scientific research".

2. Methodological guidelines for the implementation of practical tasks in the discipline "Methodology of scientific research".

3. Methodological guidelines for independent work in the discipline "Methodology of scientific research".

\* - all teaching materials for independent work of students are placed in accordance with the current procedure on the discipline page in the TEIS!

## 8. EVALUATION MATERIALS AND A POINT-RATING SYSTEM FOR ASSESSING THE LEVEL OF COMPETENCE FORMATION IN THE DISCIPLINE

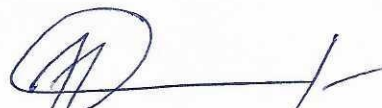
Evaluation materials and a point-rating system for assessing the development of the discipline are presented in the Appendix to this Work Program of the discipline.

\* - OM and BRS are formed on the basis of the requirements of the relevant local regulatory act of the RUDN.

### DEVELOPERS:

Head of the Department of Biochemistry

Post, Department



Signature

V.S. Pokrovsky

Name

Associate Professor of the Department of Biochemistry

Post, Department



Signature

E.V. Neborak

Name

### HEAD OF THE DEPARTMENT:

Department of Biochemistry

Name of the Department



Signature

V.S. Pokrovsky

Name