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**Federal State Autonomous Educational Institution  
of Higher Education "Peoples' Friendship University of Russia"**

**Medical Institute**

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(name of Educational Division developing the postgraduate program)

**Department of pharmaceutical and toxicological chemistry**

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(name of the Educational Department developing the postgraduate program)

**WORKING PROGRAM OF THE DISCIPLINE**

**Methodology of scientific research**

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(name of the discipline)

**Scientific specialty:**

**3.4.2. Pharmaceutical chemistry: Drug Analysis and Quality Control**

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(code and name of the scientific specialty)

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

**3.4. Pharmaceutical sciences**

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(name of the postgraduate program)

## 1. COURSE GOALS

The purpose of mastering the discipline "Methodology of scientific research" is to prepare for candidate exams, as well as the development of in-depth knowledge and the acquisition of professional competencies of a researcher in the field of cardiology- methodology of scientific research.

Objectives of the discipline:

- the ability to highlight the problem and the relevance of scientific research
- planning a scientific experiment
- information collection and processing
- presentation of the results of the experiment in the form of abstracts and a report
- forecasting of phenomena and events

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

The process of studying the discipline "Methodology of scientific research" in preparation for candidate exams.

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

### *To know:*

- modern concepts of the methodology of science, criteria and conditions for the use of various scientific methods in the study of the properties of medicinal substances, excipients and finished pharmaceutical products;
- the concept of the subject and object, goals and objectives of research, stages of scientific research;
- fundamentals of the compilation of scientific texts and criteria of scientific information, norms and rules of scientific discussion, principles of the formation of new knowledge
- the importance of choosing objects and methods of planning a scientific experiment.

### *Be able to:*

- determine the subject of scientific research, independently choose research methods, correlate the problem, goals, objectives, subject and methods of research;
- formulate the problem of scientific research, substantiate its relevance and novelty, determine the subject and object of scientific research, set goals and objectives;
- apply a multilevel methodology of scientific cognition to your research;
- to present and report the results of scientific research in the study of the properties of medicinal substances, excipients and finished pharmaceutical products

### *Possess:*

- skills of self-study of new research methods, skills of self-study of literature, skills of choosing a scientific method of research in accordance with the problem, goals and objectives;
- the skills of determining the subject and object of research, the formulation of the research

problem, the skills of setting goals and objectives of research, the ability to draw conclusions from the results of the study;

- the skills of searching and processing scientific information in the field of research of the structure, properties and quality control of pharmaceutical products;
- skills in preparing reports on topical issues of their scientific research;
- skills of scientific generalization and reflection;
- skills of forming and argumentation of one's own judgments and scientific position based on the analysis of scientific material.

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

The total labor intensity of the discipline "Methodology of scientific research" is 2 credit unit or 72 academic hours.

Table 3.1. Types of academic work by periods of mastering the postgraduate program

Type of study work	TOTAL,ac.h.	Well			
		1	2	3	
<i>Contact work, acc.</i>	18	18			
including:					
Lectures (LC)	12	12			
Laboratory work (LR)					
Practical/seminar sessions (SZ)	6	6			
<i>Independent work of students, acc.</i>	18	18			
<i>Control (exam), acc.</i>	36	36			
<b>The total complexity of the discipline</b>	ac.h.	<b>72</b>			
	credit	<b>2</b>	<b>2</b>		

### 4. THE CONTENT OF THE DISCIPLINE

Table 4.1. Content of the discipline (module) by type of academic work

Name of the discipline section	Content of the section (topics)	Type of educational work
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Section 1. Introduction	The concept of methodology of science, scientific activity, research. Theory of cognition (epistemology). Levels, forms and methods of scientific cognition. A system of scientific research methods. Methodological culture and competence of a research scientist. Goals and objectives of scientific research in obtaining new biologically active substances and quality control.	L, S
Section 2. Methodology of scientific research in the system of scientific knowledge	Methodology as a system is a complex, interconnected set of principles and approaches of research activity in the course of obtaining and processing results. Levels of scientific knowledge: empirical; theoretical; philosophical	L, S
Section 3. Methods of scientific knowledge	The concept of scientific method, theory, hypothesis, observation, experiment. The main groups of methods of scientific cognition: philosophical; general scientific; private scientific. The concept of scientific research. Classification of scientific research. Research plan: selection and justification of the relevance of the topic; preparatory stage; observation. Statistical processing of the results. Graphic image.	L, S
Section 4. Using the results of scientific research	Theoretical research methods. Research models. Experimental studies. Practical approaches to the implementation of research results in practice. Writing a research report. Preparation of the publication. Registration of literary sources.	L, S

## 5. MATERIAL AND TECHNICAL SUPPORT OF THE DISCIPLINE

As a material and technical support of the discipline (module), means of creating multimedia applications - multimedia projects (for example, a program for creating multimedia presentations "Microsoft Power Point"), sets of slides can be used. Multimedia tools and personal computers with a full package of Microsoft Excel application programs are also used for practical training.

Auditorium type	Equipment the audience	Specialized educational/laboratory equipment, software and materials for the development of the discipline
Lecture hall	Auditorium 448 RUDN	A set of specialized furniture;

	<p>Medical Institute, 117198, Moscow, Miklukho-Maklaya str., 8/2 for conducting lecture-type classes, equipped with a set of specialized furniture; a board (screen) and technical means of multimedia presentations.</p>	<p>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>
<p>Educational and Scientific Laboratory</p>	<p>Auditorium 447 RUDN Medical Institute, 117198, Moscow, Miklukho-Maklaya str., 8/2</p>	<ul style="list-style-type: none"> <li>• A set of specialized furniture</li> <li>• Spectrophotometer Cary-630</li> <li>• pH-meter pH-410 «Aquilon»</li> <li>• pH-meter pB-11 «Sartorius»</li> <li>• refractometer Abbe «KOM3» (4)</li> <li>• The ATP-02 Aquilon titrator</li> <li>• Circular polarimeter CM-3 "ZOMS" (2)</li> <li>• Dry-burning cabinet "BINDER FD-23"</li> <li>• Cabinets with reagents (6)</li> <li>• Cabinets with laboratory equipment (5)</li> <li>• CN-6 dark room for viewing "Vilber Loumat" chromatograms</li> </ul>
<p>For independent work of students</p>	<p>Auditorium 278 RUDN Medical Institute, 117198, Moscow, Miklukho-Maklaya str., 10/2 and Auditorium 451 RUDN Medical Institute, 117198, Moscow, Miklukho-Maklaya str., 8/2 for independent work of</p>	<ul style="list-style-type: none"> <li>• Cary-630 Agilent IR Fourier spectrometer</li> <li>• RF-6000 Spectrofluorimeter, Shimadzu</li> <li>• Dynamic light scattering laser system Zetasizer Nano ZS, Malvern</li> <li>• Atago POL-1/2 polarimeter</li> </ul>

	students (can be used for seminars and consultations)	with Peltier temperature control system <ul style="list-style-type: none"> <li>• Altami BIO 2 + PC Microscope</li> <li>• Mastersizer 2000 Malvern Particle Size Analyzer</li> <li>• pH meter pH-410 "Aquilon"</li> <li>• Abbe "KOM3" refractometer</li> <li>• ATP-02 Aquilon titrator</li> <li>• Water bath Memmert WNB 7-45</li> <li>• Scales Laboratory GR 200</li> <li>• Exhaust cabinet MM 396 01 S</li> </ul>
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## 6. EDUCATIONAL, METHODOLOGICAL AND INFORMATIONAL SUPPORT OF THE DISCIPLINE

*Electronic educational resources, databases, information and reference and search engines:*

- Electronic library system of the RUDN lib.rudn.ru .
- Scientific Electronic Library (<http://elibrary.ru/defaultx.asp> ). Universal Library ONLINE (<http://biblioclub.ru> ).
- Elsevier Electronic Magazine Library (<http://www.elsevier.com/about/open-access/open-access-archives>).
- nlm.nih.gov "bsd/pmresources.html - Medline – bibliographic database of articles on medical sciences
- <http://www.pubmed.gov/> - database of medical and biological publications
- [www.eLibrary.ru](http://www.eLibrary.ru) – scientific electronic library
- [www.pnb.rsl.ru](http://www.pnb.rsl.ru) - Russian State Library (RSL), Moscow
- [www.nlr.ru](http://www.nlr.ru) - Russian National Library (RNB), St. Petersburg
- [www.orel.rsl.ru](http://www.orel.rsl.ru) - Open Russian RSE Electronic Library (OREL)
- <http://www.iqlib.ru> — An online library of educational publications, which contains electronic textbooks, reference and teaching aids. Convenient search by keywords, individual topics and branches of knowledge
- [www.biblioclub.ru](http://www.biblioclub.ru) - Electronic library system "University Library-online"
- <http://toxnet.nlm.nih.gov/index.html> - an integrated database network, a search engine dedicated to toxicology, hazardous substances and environmental studies.

*Basic literature:*

1. Protsenko Vladimir Danilovich. Methodology of scientific research. Direction 060601 "Biological sciences". Profile 03.01.09 [Text] : Educational and methodological manual / V.D. Protsenko, E.A. Lukyanova. - M. : Publishing House of RUDN, 2016. - 29 p. - ISBN 978-5-209-07298-0 : 63.42.

2. Methodology of scientific research [Electronic resource] : Textbook / N.A. Slesarenko [et al.]. - 2nd ed., erased. - St. Petersburg : Publishing House "Lan", 2018. - 268 p. - (Textbooks for universities. Special literature). - ISBN 978-5-8114-2183-1.

*Additional literature:*

Ivanova T.B.

Methodology of scientific research [Text/electronic resource] = Methodology of scientific research : educational and methodical complex / T.B. Ivanova. - Book in English; Electronic text data. - Moscow: RUDN, 2013. - - 117 p. - ISBN at 978-5-209-05048 - 3 : 167.79.

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

Evaluation materials and a score-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:**

Professor of the Department of  
Pharmaceutical and toxicological  
chemistry

Post, Department



Signature

Uspenskaya E.V.

Name

Associate Professor of the Department  
of Pharmaceutical and toxicological  
chemistry

Post, Department



Signature

Maximova T.V.

Name

**HEAD OF THE DEPARTMENT:**

Pharmaceutical and toxicological  
chemistry

Name of the Department



Signature

Syroeshkin A.V.

Name