

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

Medical Institute

Recommended by ISSC

THE WORKING PROGRAM OF THE DISCIPLINE

Name of the discipline: Methodology of scientific research

Recommended for the direction of training / specialty: 31.06.01 Clinical medicine

Focus of the program (profile): 14.01.04 Internal disease: heart failure

Qualification (degree) of the graduate: Researcher. Research teacher.

Form of study: full-time (3 years)

1. Goals and objectives of the discipline:

Discipline objectives:

training of a specialist who possesses the fundamental theoretical knowledge and practical skills necessary for carrying out scientific work, who is able to successfully and timely complete a dissertation research for the degree of candidate of medical sciences.

Discipline objectives:

- study of the basic principles of scientific research and scientific knowledge, its place in social organization, its functions and features in modern conditions
- studying the ways of writing the main types of scientific research: a scientific report for a seminar, conference, international seminar, Ph.D. thesis.

2. Place of discipline in the structure of EP:

The discipline "Methodology of scientific research" refers to the variable part of Block 1, is a compulsory discipline, read in 1 semester (3 EC, 108 hours).

In the process of mastering the discipline, the following universal competencies (UC) are formed:

- the ability to critically analyze and evaluate modern scientific achievements, generate new ideas when solving research and practical problems, including in interdisciplinary areas (UC-1);
- willingness to participate in the work of Russian and international research teams to solve scientific and scientific and educational problems (UC-3);
- the ability to follow ethical standards in professional activity (UC-5);

In the process of mastering the discipline, the following general professional competencies (GPC) are formed:

- the ability and readiness to organize applied scientific research in the field of biology and medicine (GPC-1);
- the ability and readiness to conduct applied scientific research in the field of biology and medicine (GPC-2);
- the ability and willingness to analyze, generalize and publicly present the results of completed scientific research (GPC-3);
- readiness to implement the developed methods and techniques aimed at protecting the health of citizens (GPC-4);

In the process of mastering the discipline, the following professional competencies (PC) are formed:

- ability and readiness to organize and conduct applied research in the field of clinical medicine (PC-1);
- the ability and readiness to analyze, generalize and publicly present the results of completed scientific research (PC-2);
- readiness to introduce the developed methods and techniques in the field of clinical medicine into practical activities aimed at protecting the health of citizens (PC-3);

Table 1 shows the previous and subsequent disciplines aimed at the formation of discipline competencies in accordance with the competence matrix of EP HE.

Table No. 1

Prior and subsequent disciplines aimed at the formation of competencies

P / p No.	Code and name of competence	Preceding disciplines	Subsequent disciplines (groups of disciplines)
General cultural competences			

1	UC-1	History and phylosophy of science	Practice
2	UC-3	Foreign language	Internal medicine, Heart failure, Lab and functional diagnostics Clinical pharmacology, Practice
3	UC-5	Pedagogics of higher education	Practice
General professional competencies			
4	GPC-1	-	Practice
5	GPC-2	-	Internal medicine, Heart failure, Lab and functional diagnostics Clinical pharmacology, Practice
6	GPC-3	-	Internal medicine, Heart failure, Lab and functional diagnostics Clinical pharmacology, Practice
7	GPC-4	-	Practice
Professional competence			
8	PC-1	-	Practice
9	PC-2	-	Internal medicine, Heart failure, Lab and functional diagnostics Clinical pharmacology, Practice
10	PC-3	-	Practice

3. Requirements for the results of mastering the discipline:

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

Know:

- modern computer technologies as applied to solving problems of medicine and health care;
- methodological approaches to the formalization and structuring of various types of medical data for the formation of decisions in healthcare;
- the structure of medical diagnostic and therapeutic knowledge, the main models for the formation of decisions in health care;
- types, structure, characteristics of medical information systems; principles of control automation in biomedical systems using modern computer technologies.
- definitions and concepts of medical statistics; the value of the statistical method in the conduct of medico-social and medico-biological research;
- stages of organizing a statistical study and their content;
- descriptive statistics (types of statistical quantities, methods of their calculation, characteristics of the distribution of a feature in a statistical population, representativeness, average level and variability of data).
- basic parametric and nonparametric methods for assessing the reliability of differences in statistical values;
- basic parametric and nonparametric methods for assessing the relationship between features;
- methods for assessing the dynamics of phenomena and forecasting;
- method of graphical presentation of statistical data;
- rules for the presentation of statistical data for scientific publication.

Be able to:

- use computer medical technology systems in the process of professional activity;
- to develop structures and form databases and knowledge for biomedical systems;

- use statistical and heuristic algorithms for biomedical diagnostics and management of disease treatment, assess their effectiveness;
- carry out text and graphic processing of documents using standard software tools;
- use a set of Internet tools for professional and scientific activities.
- prepare a plan and program of statistical research;
- to form an electronic database for storing and subsequent development of data;
- calculate descriptive statistics;
- build frequency tables and contingency tables;
- assess the reliability of differences in statistical values using parametric and nonparametric methods;
- carry out factor analysis;
- analyze time series and forecast further trends;
- present statistical data in the form of a graphical image;
- submit statistical data for scientific publication.

Own:

- database formation skills;
- methods of statistical processing of the obtained material;
- descriptive statistics methods;
- the ability to build frequency tables and contingency tables;
- assessment of the reliability of differences in statistical values using parametric and nonparametric methods;
- the ability to present statistical data in the form of a graphic image;
- the ability to present statistical data for scientific publication.

4. Scope of discipline and types of educational work

The total workload of the course is 3 credit points.

No.	Type of study load	Total hours
1.	Auditory lessons	36
	Including:	
1.1	Lectures	24
1.2	Other occupations	
	<i>Including</i>	
1.2.1	Practical lessons (PZ)	12
1.2.2	Seminars (C)	
1.2.3	Laboratory exercises (LZ)	
	Of these, in an interactive form (IF)	2
2.	Independent work of graduate students (academic hours)	72
	<i>Including:</i>	
2.1	Course project (work)	
2.2	Calculation and graphic works	
2.3	abstract	
2.4	Preparation and passing of interim / final certification	9
	<i>Other types of independent work</i>	
3.	Total labor intensity (academic hours)	108
	Total labor intensity (credit units)	3

5. Content of the discipline

5.1 Content of discipline sections

No. p / p	The name of the discipline section	Section Contents
1	Methodological foundations of scientific knowledge	<p>Activity as a form of active attitude to the surrounding world. Science as a specific form of activity. Scientific knowledge concept. Cognition is the process of movement of human thought from ignorance to knowledge. Practice as a reflection of objective reality in the consciousness of a person in the process of his social, industrial and scientific activities. Dialectics of the cognition process. Absolute and relative knowledge. Levels, forms and methods of scientific knowledge. Interaction of theoretical, speculative and empirical levels of science development. The concept of the method and methodology of science. Methodology - teaching about the methods, principles and methods of scientific knowledge. General methodological principles of scientific research: the unity of theory and practice; principles of objectivity, comprehensiveness and complexity of research; systematic approach to research.</p>
2	Methods of scientific knowledge	<p>The method of scientific knowledge: essence, content, main characteristics. The main function of the method. Theory and method. Classification of methods of scientific knowledge: philosophical, general scientific approaches and methods, special scientific, disciplinary, interdisciplinary research. Three levels of general scientific research methods: methods of empirical research, methods of theoretical knowledge, general logical methods. Empirical research methods: observation, comparison, description, measurement, experiment. Methods of theoretical knowledge: formalization, axiomatic method, hypothetical - deductive method, ascent from the abstract to the concrete. General scientific logical methods and techniques of cognition: analysis, synthesis, abstraction, idealization, induction and deduction, analogy, modeling, systems approach, etc. Research methods for various cardiac diseases. Research capabilities of various methods.</p>
3	Methodology of science as a social - technological process.	<p>The concept of scientific research. Types of research. Classification of scientific research: according to the composition of the investigated properties of the research object, according to the place of their conduct, according to the stages of the research. Research program, general requirements, topic selection and problems. Stages of scientific research: preparatory, theoretical and empirical research, work on the manuscript and its design, implementation of the results of scientific research. Components of research readiness for research activities. Problematic situation. Algorithm for creating a problem situation. Scientific research. Plan - avenue. Levels and structure of scientific research methodology.</p>

		The methodological concept of the research and its main stages. Characteristic features of the implementation of the research stages. The main components of the research methodology. Literary design of research materials. General scheme of scientific research. The main methods of finding information for research.
4	Methodology of dissertation research.	Methodological strategies for dissertation research. The structure and logic of scientific dissertation research. Research dissertation program. Selection of a topic, work plan, bibliographic search, selection of literature and factual material. Thesis architecture. Distribution and structure of the material. The problem of dissertation research. Disclosure of tasks, interpretation of data, synthesis of the main results. Rules and scientific ethics of citation. The practical significance of the dissertation and the relevance of its topic. Academic style and peculiarities of the dissertation language. Justification in the introduction of the choice of methodology is the methodological basis of the research program of the dissertation work. Development of the problematic field of the dissertation. Basic requirements for the content and design of the thesis. Methodology for working on a research manuscript, features of preparation and design. Registration of dissertation work, compliance with state standards. Submission for defense, public defense procedure. Requirements for the speech of applicants at the public defense of the dissertation.
5	Experiment.	Classification of experiments. Experiment plan. Types, methods and measurement errors. Measuring instruments: classification, main characteristics, verification. Carrying out an experiment.
6	Processing of experimental results	Fundamentals of the theory of random errors and mathematical statistics: the concept of a random variable, distribution function of random variables, probability density, a set of random variables, laws of distribution of random variables. Testing experiments for uniformity. Planning an experiment. Graphical representation of the results of the experiment. Empirical formulas
7	Registration of scientific research.	Scientific and technical report, publication, dissertation. GOST 7.32-2001. Bibliography design in accordance with GOST.

5.2. Section of disciplines and types of classes

No. p / p	Name section	Lectures	Practical exercises and laboratory work			CPC	Total
			PZ	LR	Including in IF		
I semester							
1	Methodological foundations of scientific knowledge	3	1			10	14

2	Methods of scientific knowledge	3	2			10	15
3	Methodology of science as a social - technological process.	3	1		1	10	15
4	Methodology of dissertation research.	4	1		1	12	18
5	Experiment.	4	2			10	16
6	Processing of experimental results	4	2			10	16
7	Registration of scientific research.	3	1			10	14
TOTAL		24	10		2	72	108

6. Practical lessons (seminars)

No. p / p	Discipline section	Practical training topics (seminars)	Labor intensity (hours)
1	Methodological foundations of scientific knowledge	1. Science as a specific form of activity. The main functions of science. The structure and organization of scientific institutions. The role of scientific personnel, their training.	1
2	Methods of scientific knowledge	1. Method of scientific knowledge: essence, content, main characteristics. 2. Classification of methods of scientific knowledge: philosophical, general scientific approaches and methods, special scientific, disciplinary, interdisciplinary research. 3. Theoretical research methods: induction, deduction, analysis, synthesis, abstraction, formalization. 4. Methods of empirical research: observation, comparison, description, measurement, experiment.	2
3	Methodology of science as a social - technological process.	1. The concept of scientific research. Types of research. Classification of scientific research: according to the composition of the investigated properties of the research object, according to the place of their conduct, according to the stages of the research. 2. Research program, general requirements, topic selection and problems. 3. Stages of scientific research: preparatory, theoretical and empirical research, work on the manuscript and its design, implementation of the results of scientific research.	2
4	Methodology of dissertation research.	1. Methodological strategies of dissertation research. The structure and logic of scientific dissertation research. Research dissertation program. 2. Choice of topic, work plan, bibliographic search, selection of literature and factual material. 3. Thesis architecture. Distribution and structure of the material.	2

		<p>3. Disclosure of tasks, interpretation of data, synthesis of the main results. Rules and scientific ethics of citation.</p> <p>4. The practical significance of the dissertation and the relevance of its topic.</p> <p>5. Methods of work on the research manuscript, especially the preparation and design. Registration of dissertation work, compliance with state standards.</p> <p>6. Submission for defense, public defense procedure. Requirements for the speech of applicants at the public defense of the dissertation.</p>	
5	Experiment.	<p>1. Classification of experiments. Experiment plan.</p> <p>2. Types, methods and errors of measurements. Measuring instruments: classification, main characteristics, verification. Carrying out an experiment.</p>	2
6	Processing of experimental results	<p>1. Fundamentals of the theory of random errors and mathematical statistics: the concept of a random variable, distribution function of random variables, probability density, a set of random variables, laws of distribution of random variables.</p> <p>2. Planning the experiment.</p> <p>3. Graphic representation of the results of the experiment.</p>	2
7	Registration of scientific research.	<p>1. Scientific and technical report,</p> <p>2. Publication,</p> <p>3. Dissertation.</p> <p>4. Bibliography design in accordance with GOST</p>	1

7. Material and technical support of the discipline:

P / p No.	Department name	Name of special * rooms and rooms for independent work	Name of benefits, equipment
1.	Department of Internal Medicine with a course of cardiology and functional diagnostics named after V.S. Moiseeva	Moscow, st. Vavilova, 61, GBUZ GKB im. V.V. Vinogradov DZ Moscow " 10 classrooms for 30, a conference hall for 200 training and seating places.	Lecture rooms are equipped with multimedia equipment. The offices are equipped with computers and Internet access, there is a scientific laboratory for genetic research. 1 lecture hall (multimedia projector, screen), 1 lecture room (laptop, LCD plasma screen). ECG rooms, ECHO-cardiography, functional diagnostics laboratory, general clinical laboratory, wards with patients of various therapeutic and cardiological profiles. Sets of specialized furniture, technical means: a dummy for practicing physical examination skills (2 pcs.), A multimedia projector (4 pcs.), A plasma panel (3 pcs.), A laptop (8 pcs.), A tablet (11 pcs.), A personal computer (7 pcs), magnetic board. A set of dummies, a set of educational videos and presentations, a set of analog and digital radiographs, tomograms, sonograms, angiograms, educational posters and tables.

8. Educational-methodical and informational support of the discipline

a) main literature

1. D. Zipes, P. Libby et al. Braunwald's Heart Disease: A Textbook of Cardiovascular Medicine, 2-Volume Set, 11th Edition. Elsevier, 2018 .-- 2128.
2. Hurst's The Heart, 14th Edition. V. Fuster, RA Harrington, J. Narula, ZJ Eapen. McGraw-Hill Education, 2017 .-- 2208
3. Heart Failure: A Companion to Braunwald's Heart Disease, 3th Edition. D. Mann, GM Felker. Saunders, 2015 .-- 784
4. Harrison's Principles of Internal Medicine, 20th Edition. D. Kasper, AS Fauci, SL Hauser, DL Longo, JL Jameson, J. Loscalzo. McGraw-Hill Education / Medical, 2018.
5. Davidson's Principles and Practice of Medicine, 23th Edition. SH Ralston, ID Penman, M. W. J. Strachan. Elsevier, 2018 .-- 1440
6. Feigenbaum's Echocardiography. 8th Edition. WF Armstrong, T. Ryan. Wolters Kluwer. 2018 .-- 2841.
7. Evidence-Based Medicine - 5th Edition. S. Straus, P. Glasziou, S. Richardson, B. Haynes. Elsevier, 2018 .-- 336.
8. Anufriev, A.F. Scientific research. Course, diploma and dissertation work [Text] / Mosk. state open ped. un-t. - M .: B. and., 2002.
9. Rogozhin, M. How to write a term paper and thesis [Text] / M. Rogozhin. - SPb .: Peter, 2005.

b). additional literature

1. The ESC Textbook of Cardiovascular Medicine. TF Lüscher, JA Camm, G. Maurer, P. Serruys. Oxford University Press, 2018.
2. Oxford Textbook of Advanced Heart Failure and Cardiac Transplantation - Oxford Medicine. MJ Domanski, MR Mehra, MA Pfeffer. Oxford University Press, 2016 .-- 442.
3. The ESC Textbook of Intensive and Acute Cardiovascular Care. M. Tubaro, P. Vranckx, S. Price, C. Vrints. Oxford University Press, 2015 .-- 799.
4. The EHRA book of Pacemaker, ICD, and CRT Troubleshooting. H. Burri, C. Israel, J.-C. Deharo. Oxford, 2015 .-- 310.
5. The EACVI Textbook of Cardiovascular Imaging. JL Zamorano et al. Oxford University Press, 2015 .-- 678.
6. The ESC Handbook on Cardiovascular Pharmacology. JC Kaski, KP Kjeldsen. Oxford University Press, 2019. -960.
7. How to Read a Paper: The Basics of Evidence-based Medicine and Healthcare, 6th Edition | Trisha Greenhalgh. T. Greenhalgh. Blackwell Bmj Books, 2006 .-- 229.
8. Anufriev A.F. Scientific research. Coursework, diploma and dissertation work. - M .: Os-89, 2002 .-- 112 p.
9. V. V. Radaev How to organize and present a research project: 75 simple rules [Text] - M .: GU VShZh: INFRA - M, 2001.

c) journals:

1. Journal of the American College of Cardiology.
2. JACC: Heart Failure.
3. JACC: Cardiovascular Imaging.
4. Circulation.
5. Circulation: Heart Failure.
6. European Heart Journal.
7. European Journal of Heart Failure.
8. European Heart Journal - Cardiovascular Imaging.
9. EP-Europace.
10. Cardiology
11. JAMA: Internal Medicine.

d) software:

- Microsoft Office.
- Statistical software Statistica, SPSS, Stata.

e) databases, information and reference and search systems:

- RUDN educational portal
- Scientific electronic library <http://elibrary.ru/>
- Scientific and educational portal: <http://www.eup.ru>
- Administrative and management portal: <http://www.aup.ru>
- Educational portal: <http://www.informika.ru>
- Portal of the All-Russian Scientific Society of Cardiology and the Association of Pediatric Cardiologists of Russia. <http://www.cardiosite.ru/>
- Portal of the European Association of Cardiology. <http://www.escardio.org/>
- American Heart Association website. <http://www.heart.org/HEARTORG/>
- American Heart Association website. www.acc.org
- Electronic library system of RUDN University;
- RUDN educational portal (<http://web-local.rudn.ru>);
- Scientific electronic library (<http://elibrary.ru/defaultx.asp>);
- ONLINE universal library (<http://biblioclub.ru>);
- Library of electronic journals BENTHAM OPEN (<http://www.benthamscience.com/open/az.htm>);
- Elsevier Electronic Journal Library (<http://www.elsevier.com/about/open-access/open-archives>)
- Medical online library MedLib (<http://med-lib.ru/>);
- Recommendations of the Russian Society of Cardiology www.scardio.ru
- US National Library of Medicine National Institutes of Health: <http://www.ncbi.nlm.nih.gov/pubmed/>
- Scientific electronic library: <http://library.ru/defaultx.asp>

9. Methodical instructions for students on mastering the discipline:

In practical classes and lectures in the classroom, the relevant topics are analyzed using multimedia technology (computer, projector). For classes and lectures, presentations prepared in Microsoft PowerPoint are intended. The main goal of practical exercises is to study the basics of conducting clinical trials and form the design of your own research.

Independent work of a graduate student

Independent work of graduate students during extracurricular hours can take place as in a computer class, where graduate students can study material based on presentations prepared by the teachers of the department.

As one of the forms of independent work, it is planned to prepare abstracts / abstracts by graduate students in various sections of the course and presentations of reports at the meetings of the department.

Extracurricular independent work of a postgraduate student includes:

- The study of material on the textbook, teaching aids on paper and electronic media.
- Preparation of an abstract message / presentation on a selected topic.
- Preparation for the performance of tests and oral interviews.


10. Funds of assessment tools for intermediate certification by discipline

Materials for assessing the level of mastering the educational material of the discipline "Methodology of scientific research" (evaluation materials), including a list of competencies indicating the stages of their formation, a description of indicators and criteria for assessing competencies at different stages of their formation, a description of the assessment scales, standard test assignments or other materials necessary to assess knowledge, skills, skills and (or) experience of activity, characterizing the stages of the formation of competencies in the process of mastering the educational program, methodological materials that determine the procedures for assessing knowledge, skills, skills and (or) experience of activity, characterizing the stages of the formation of competencies, are developed in full and are available for students on the discipline page in the TUIS RUDN University.

The program has been drawn up in accordance with the requirements of the OS of VO RUDN.

Developers:

Associate Professor of Department Internal diseases
with a course of cardiology and functional
diagnostics named after V. S. Moiseev
position, department name


signature

E.O.Kotova.
initials, surname

Head of the Department of Internal diseases
with a course of cardiology and functional
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position, department name


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Program Manager

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Head of the Department

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