



MINISTRY OF EDUCATION AND SCIENCE OF THE RUSSIAN FEDERATION  
Federal state autonomous educational institution  
of higher education  
«Far Eastern Federal University»  
(FEFU)

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**SCHOOL OF BIOMEDICINE**

«AGREED»

Head of education program  
«General medicine»

  
\_\_\_\_\_  
(signature) Khotimchenko Yu.S.  
(Full name)  
«09» of July 2019

«APPROVED»

Director of the Department of Clinical  
Medicine



  
\_\_\_\_\_  
(signature) Geltser B.I.  
(Full name)  
«09» of July 2019

**WORKING PROGRAM OF ACADEMIC DISCIPLINE (WPAD)**

«Medical Research Methodology»

Education program

Specialty 31.05.01 «General medicine»

**Form of study: full time**

year 6, semester B  
lectures 18 hours  
practical classes 36 hours  
laboratory works not provided  
total amount of in-classroom works 54 hours  
independent self-work 18 hours  
control works ()  
pass-fail exam year 6, semester B  
exam not provided

The working program is drawn up in accordance with the requirements of the Federal state educational standard of higher education (level of training), approved by the order of the Ministry of education and science of the Russian Federation from 09.02.2016 № 95.

The working program of the discipline was discussed at the meeting of the Department of fundamental and clinical medicine. Protocol No. 8, 09 of July 2019

Author: c.m.sc. docent Rasskazova V.N.

## ANNOTATION

Discipline " Medical Research Methodology" is designed for students enrolled in the educational program 31.05.01 "General medicine" is included in the variable part of the curriculum. Discipline is implemented on a 6 year 11<sup>th</sup> semester.

Development of the working program of the discipline is made in accordance with the Federal state educational standard of higher education in the specialty 31.05.01 "General medicine" and the curriculum of training in the specialty 31.05.01 "General medicine".

The total complexity of the development of the discipline is 2 credits, 72 hours. The curriculum provides 18 hours of lectures, 36 hours of practical training and independent work of the student (18 hours), the credit is in the 11th semester.

The successful development of the discipline is provided by the "income" knowledge and skills that students get in the study of the following disciplines:

Philosophy (knowing of the forms and methods of scientific knowledge, their evolution);

Bioethics (knowledge of moral and ethical norms, rules and principles of professional medical behavior, ethical foundations of modern medical legislation, knowledge of basic ethical documents of domestic and international professional medical associations);

Economics (ability to analyze economic problems);

History of medicine (knowledge of the history of formation and development of medical science);

Physics, mathematics (knowledge of mathematical methods of solving intellectual problems and their application in medicine, the ability to make calculations on the results of the experiment, to carry out basic statistical processing of experimental data);

Informatics, medical Informatics (knowledge of the theoretical foundations of Informatics, collection, storage, search, processing, conversion, dissemination of information in medical and biological systems, the use of information computer

systems in medicine and health care, the ability to use educational, scientific, popular literature, internet, possession of basic information conversion technologies).

In turn, the knowledge, skills acquired by students in the course of studying the discipline " Medical Research Methodology " may become a basis for successful development of the following disciplines:

Epidemiology

Public health and health care

Evidence medicine

In addition, the study of the discipline creates the basis for the student subsequent execution of research work (R&D).

**The purpose of the discipline** " Medical Research Methodology " is the formation of the students basic knowledge, basic practical skills necessary for the implementation of research activities in the field of public health.

**Objectives of the discipline:**

1. Formation of knowledge about the principles of research activities and features of its implementation in medicine and health care.
2. Formation of knowledge about modern technologies, ways and methods of organization (design) of scientific research in medicine and health care.
3. Formation of knowledge about the types of scientific literature, the principles of research of scientific information, the main types of library catalogs and electronic databases of scientific literature (including foreign ones), teaching students the methods of searching and analyzing scientific literature with the resources of specialized (university) libraries, local electronic databases, internet and official statistical reviews.
4. Formation of knowledge about bibliographic description of scientific sources, including electronic, formation of skills of bibliographic description of different types of scientific literature.
5. Formation of knowledge about the types of abstracts, their structure, features of the abstract review, methods of compression of the source text, stable speed,

used in abstracting, fixing the algorithm of action in the preparation of monographic and review essay.

6. Formation of knowledge about the features of the scientific text on samples of scientific articles, formal requirements for the design of the scientific text, the main ways of presenting numerical information (tables, diagrams), the principles of optimal choice of one of the ways.

As a result of the study of this discipline in students the following general professional and professional competences (elements of competences) are formed:

<b>Competence and its code</b>	<b>Stages of competence formation</b>	
the ability and willingness to analyze the results of his own activity to prevent professional errors (GPC-5)	Knows	Methods of analysis, finding the problem, designing the optimal sequence of actions to achieve the goal, methods of planning scientific activities, evaluation and control of it. Principles of independent decision-making in the field of management of research organization
	Able to	Use educational, scientific, popular science literature, internet for professional activities. Analyze the results of their own activities to prevent professional errors and critically evaluate modern theoretical concepts and trends in medicine. To implement the principles of personal responsibility for decisions made in the organization of scientific research.
	Masters	Methods of analysis of the outcomes of their own activities to prevent professional mistakes: possession of various managing functions: planning, organization, regulation, monitoring and controlling, having the ability to consciously choose the optimal strategy, etc
the readiness to analysis and public presentation of medical information based on evidence-based medicine (PC – 20)	Knows	The essence of the evidence based medicine; types of scientific sources of information; methods of evaluation of scientific sources of information; algorithm of monographic and review essay; features of the scientific text and its design requirements; ways of presenting numerical information
	Able to	To analyze and evaluate the information of scientific sources; to make a monographic and review essay on the topic of research; to analyze ways of presenting numerical data in terms of speed of perception, data volume, logic; to use text and graphic editors to present the results of the study; to create a presentation

		to the report on the results of the study.
	Masters	Skills of scientific text design; skills of determining the type of numerical data; skills of choosing the optimal way to represent numerical data using different types of tables and charts
the ability to participate in researches (PC – 21)	Knows	The essence of research activities in medicine and health care; stages of scientific medical research and their content; design options for scientific medical research; the nature of errors in the results of scientific medical research and the causes of their occurrence.
	Able to	Plan scientific medical research; anticipate errors in the results of scientific medical research and take measures to minimize them.
	Masters	Skills of sample formation using various methods; skills of using the simplest methods of randomization in the formation of comparison groups; skills of forming comparison groups by means of paired selection; skills of calculating and evaluating a set of indicators based on the results of the observational (cohort) study; skills of calculating and evaluating a set of indicators based on the results of the experimental study; skills of calculating and evaluating a set of indicators characterizing the validity of the diagnostic test.
the willingness to participate in implementation of new methods and techniques aimed at protection of public health. (PC – 22)	Knows	Norms of international law, the main provisions of the legal documents of the Russian Federation regulating research activities in medicine and health care, as well as work on the practical use and implementation of the results of scientific medical research; the nature and classification of costs associated with medical intervention; types of effectiveness of medical activities, their essence and content; features of clinical and economic research
	Able to	Evaluate medical interventions in terms of cost-benefit ratio
	Masters	Skills of clinical and economic analysis

**I. THE STRUCTURE AND CONTENT OF THE THEORETICAL PART  
OF THE COURSE  
(18 hours)**

## **11<sup>th</sup> semester (18 hours)**

### **MODULE 1. Work with sources of scientific information (4 hours)**

#### **Theme 1. Search for scientific information. Bibliographic description according to GOST 7.1.-2003 (2 hours)**

Types of scientific sources, methods of their evaluation by different criteria (scientific/non-scientific, authority, amount of information, its novelty, etc.). System of methods of information retrieval (continuous, selective, intuitive, typological, inductive, deductive methods, etc., their advantages and disadvantages). General search algorithm: a) analysis of the topic and selection of keywords, including using reference literature, b) determining the required number, type and age of sources, c) actual search using different methods and resources, d) checking the results (compliance with the topic, age, availability, scientific, authority, etc.) and their analysis (grouping of sources by microthemes, expanding the list of keywords, reformulation, expansion, narrowing of topics, etc.). Types of library catalogues (card and electronic, alphabetical, systematic, subject). Codes UDC, BBK.

Definition, basic elements, prescribed punctuation. Virtual bibliographic reference. Typical mistakes in the bibliographic description. Direct citation and paraphrase. Ethics of citation and the concept of plagiarism. Convenient system of storage of the bibliography.

### **MODULE 2. Scientific text**

#### **Theme 2. Abstracting (2 hours)**

The concept of the abstract and annotations, differences and similarities. Indicative and informative abstract. Monographic and review abstract. The algorithm of actions in abstracting (cursory reading, careful reading, semantic analysis, the allocation of important and secondary, the formulation of key provisions and compression, the use of clichés). Methods of compression of the source text (screening of non-essential, paraphrases). Steady book turnovers (clichés)

#### **Theme 3. Requirements for scientific text and its design (2 hours).**

Scientific and pseudo-scientific. Signs of scientific style (objectivity, logic, accuracy) and their manifestations in speech. Author's "we" in the scientific text. Use of terms. Abbreviations. Types of scientific articles. Structure of the article: relevance, purpose, material and methods, results and discussion, conclusions. Structural relationships of text components (goals and objectives, methods and results, etc.). Requirements for formulas.

### **MODULE 3. Organization of medical scientific research (4 hours)**

#### **Theme 4 Scientific activity and its organization in Russia (2 hours).**

The concept of science and research activities. Tasks of scientific activity. The concept of relevance of the study. Object and subject of research. Theme, purpose and objectives of the study. Scientific novelty of the research and its levels. Scientific directions and specialties. Academic degrees and titles. Forms of scientific personnel training. System of scientific organizations. Financing of scientific research. Types of scientific research (fundamental, applied, search). The practical significance of scientific medical research and the forms of its manifestation. Forms of implementation of research results in health care practice

#### **Theme 5. Ethical aspects and legal framework of research activities in medicine and health care (2 hours).**

Ethical aspects of scientific research in medicine and health care. World medical association. The main documents of international law regulating scientific medical research. Normative legal documents of the Russian Federation, regulation of the research activities in medicine and health care, their main provisions. Rights and obligations of participants of scientific research. The ethics committee and its role.

#### **Theme 6. Basics of medical statistics. Stages of medical research (2 hours).**

The concept of statistics as a science. Medical statistics: concept, objectives, sections. Statistical methods as the basics of research activities in medicine and health care, especially their use. Basic concepts of medical statistics (statistical set,

unit of observation, the amount of research, the considered signs, the accounting document). Types of considered features: similarities and differences, factor and effective, quantitative (discrete, continuous) and qualitative (alternative, nominative, ordinal). The conversion of quantitative traits: goals, methods. General and sample population.

Stages of scientific research in medicine and health care and their content. Preparatory (organizational) stage as a basis for all subsequent work. Methodological and procedural sections of the training. Research program and plan. Methods of collecting material (observation, documentary, survey) and their varieties. Development of material (checking documentation, grouping and summarizing data, coding data). Database creation.

#### **MODULE 4. Design of scientific medical research**

##### **Theme 7. Observational epidemiological studies (2 hours)**

General idea of epidemiology as a science: concept, objectives. Cross-sectional observational studies: construction, capabilities. Longitudinal observational studies. Cohort study: problems, construction, strengths and weaknesses. Matrix (four-field table) for the analysis of cohort study results. Indicators calculated on the basis of cohort study results (incidence, attributive risk, relative risk, etiological share, odds ratio): methods of their calculation and evaluation.

##### **Theme 8. Diagnostic test studies (2 hours).**

The concept of diagnostic test. The concept of the diagnostic test validity. Comparison with the "gold standard" as basis for assessing the validity of diagnostic method. Indicators characterizing the validity of the diagnostic test (sensitivity, specificity, accuracy, predictive value of positive result, predictive value of negative result, the ratio of the likelihood of positive result, the ratio of the likelihood of negative result): methods of their calculation and evaluation. The concept of reproducibility of diagnostic test. The concept of variability of diagnostic test results. Objective and subjective variability.

##### **Theme 9. Experimental studies ( 2 hours)**



General characteristics of experimental studies in medicine and health care. The main ways to improve the evidence of the results obtained through experimental study. Uncontrolled and controlled experiments. Positive and negative control. Parallel and cross-checks: characteristics, conditions of use. "Blind" study: the concept, task, "blind", "blindness", the conclusiveness of the results. Randomization: concept, objectives.

The concept of clinical and economic analysis, its capabilities and limitations. The origin and classification of costs associated with medical intervention. Types of effectiveness of medical activities (medical, social, economic), their nature and content. The main methods of clinical and economic analysis. The method of "cost minimization": the concept, the limitations of its use in medical research. The method of "cost-effectiveness" as the basis of clinical and economic research: calculation and comparison of the ratio. The method of "cost-benefit": concept, general characteristics, application. Quality of life related to health: concept, methodology of study and evaluation. Evaluation of the result of medical intervention by calculating the indicator QALY.

## **THE STRUCTURE AND CONTENT OF THE PRACTICAL PART OF THE COURSE**

**Practical classes (36 hours)**

**11 semester (36 hours)**

### **Theme 1. Search for scientific information (4 hours)**

Types of scientific sources, methods of their evaluation by different criteria (scientific/non-scientific, authority, amount of information, its novelty, etc.). System of methods of information retrieval (continuous, selective, intuitive, typological, inductive, deductive methods, etc., their advantages and disadvantages). General search algorithm: a) analysis of the topic and selection of keywords, including using reference literature, b) determining the required number, type and age of sources, c) actual search using different methods and resources, d) checking the results (compliance with the topic, age, availability,

scientific, authority, etc.) and their analysis (grouping of sources by microtemes, expanding the list of keywords, reformulation, expansion, narrowing of topics, etc.). Types of library catalogues (card and electronic, alphabetical, systematic, subject). Codes UDC, BBK. Types of electronic databases (local and remote access, including closed and open, bibliographic, abstract, full-text). Library resources Yugma (e-catalog, "Consultant of a student", "Medart" and card catalogs). Internet resources (general principles of search queries, NEB eLibrary.ru, PubMed, search using Google Scholar, the concept of the Cochran library, etc.). Typical errors in the search. Definition, basic elements, prescribed punctuation. Virtual bibliographic reference. Typical mistakes in the bibliographic description. Direct citation and paraphrase. Ethics of citation and the concept of plagiarism. Convenient system of storage of the bibliography.

### **Theme 2. Abstracting (4 hours)**

The concept of the abstract and annotations, differences and similarities. Indicative and informative abstract. Monographic and review abstract. The algorithm of actions in abstracting (cursory reading, careful reading, semantic analysis, the allocation of important and secondary, the formulation of key provisions and compression, the use of clichés). Methods of compression of the source text (screening of non-essential, paraphrases). Stable book turnover (clichés). Algorithm of actions when writing a review essay, systematization of the material on the principles of opposition, chronology, gradation, complementarity, etc., the use of mind maps. Expression of your point of view when referencing. Using quotes in the list of references. Formal requirements for writing authors' surnames and other typical mistakes.

### **Theme 3. Requirements for the scientific text and its design. Presentation of numerical data (4 hours).**

Scientific and pseudo-scientific. Signs of scientific style (objectivity, logic, accuracy) and their manifestations in speech. Author's "we" in scientific text. Use of terms. Abbreviations. Types of scientific articles. Structure of the article: relevance, purpose, material and methods, results and discussion, conclusions.

Structural relationships of text components (goals and objectives, methods and results, etc.). Requirements for formulas. The use of numbered and bulleted lists, their relevance. Graphic selection (bold and italic, akut, discharge, etc.). The use of quantitative and ordinal numerals, abbreviations. Typical error.

The algorithm selection means (formulation of idea of comparison, determining the type of data and type text, select the table or chart). Types of comparison (positional, temporal, component-by-component, frequency, correlation). Result analysis and editing of charts and tables. Requirements for tables and figures in the text.

#### **Theme 4. Scientific activity and its organization in Russia (4 hours).**

The concept of science and research activities. Tasks of scientific activity. The concept of relevance of the study. Object and subject of research. Theme, purpose and objectives of the study. Scientific novelty of the research and its levels. Scientific directions and specialties. Academic degrees and titles. Forms of scientific personnel training. System of scientific organizations. Financing of scientific research. Type of research (fundamental, applied, search). The practical significance of scientific medical research and the forms of its manifestation. Forms of implementation of research results in health care practice.

#### **Theme 5. Ethical aspects and regulatory framework of research activities in medicine and health care (4 hours).**

Ethical aspects of scientific research in medicine and health care. World medical association. The main documents of international law regulating scientific medical research. Normative legal documents of the Russian Federation, regulating research activities in medicine and health care, their main provisions. Rights and obligations of participants of scientific research. The ethics committee and its role.

#### **Theme 6. Fundamentals of medical statistics and stages of medical research (4 hours)**

The concept of statistics as a science. Medical statistics: concept, objectives, sections. Statistical methods as the basis of research activities in medicine and health care, especially their use. Basic concepts of medical statistics (statistical set,

unit of observation, the amount of research, the considered signs, the accounting document). Types of considered features: similarities and differences, factor and effective, quantitative (discrete, continuous) and qualitative (alternative, nominative, ordinal). The conversion of quantitative traits: goals, methods. General and sample population. Law of averages. The concept of sample representativeness. Quantitative and qualitative representativeness. The concept of random error and systematic error (bias), their comparative characteristics. The main causes of bias in medical research. Methods of sampling and technology of their implementation.

Stages of scientific research in medicine and health care and their content. Preparatory (organizational) stage as the basics for all subsequent work. Methodological and procedural sections of the training. Research program and plan. Methods of collecting material (observation, documentary, survey) and their varieties. Development of material (checking documentation, grouping and summarizing data, coding data). Database creation. Data analysis and its main methods. The concept of research design. Types of research tasks, terms, scope and their general characteristics. Evidence of the results obtained in studies of different types.

### **Theme 7. Observational epidemiological studies (4 hours)**

General idea of epidemiology as a science: concept, objectives. Cross-sectional observational studies: construction, capabilities. Longitudinal observational studies. Cohort study: problems, construction, strengths and weaknesses. Matrix (four-field table) for the analysis of cohort study results. Indicators calculated on the basis of cohort study results (incidence, attributive risk, relative risk, etiological share, odds ratio): methods of their calculation and evaluation. Case-control study: challenges, building, strengths and weaknesses.

### **Theme 8. A study of a diagnostic test. Experimental studies (4 hours)**

The concept of diagnostic test. The concept of the diagnostic test validity. Comparison with the "gold standard" as a basis for assessing the validity of the diagnostic method. Indicators characterizing of the diagnostic test validity

(sensitivity, specificity, accuracy, predictive value of a positive result, predictive value of a negative result, the ratio of the likelihood of a positive result, the ratio of the likelihood of a negative result): methods of their calculation and evaluation. The concept of reproducibility of diagnostic test. The concept of variability of diagnostic test results. Objective and subjective variability. The concept and purpose of screening tests. Criteria for selecting tests for use in screening programs.

General characteristics of experimental studies in medicine and health care. The main ways to improve the evidence of the experimental study outcomes. Uncontrolled and controlled experiments. Positive and negative control. Parallel and cross-checks: characteristics, conditions of use. "Blind" study: the concept, task, "blind", "blindness", the conclusiveness of the results. Randomization: concept, objectives. The simplest methods of randomization (random, rank, block, stratification), their characteristics and execution technology. Pair-conjugate selection (copy-pair method): concept, execution technology.

### **Theme 9. Clinical and economic research ( 4 hours)**

The concept of clinical and economic analysis, its capabilities and limitations. The nature and classification of costs associated with medical intervention. Types of effectiveness of medical activities (medical, social, economic), their nature and content. The main methods of clinical and economic analysis. The method of "cost minimization": the concept, the limitations of its use in medical research. The method of "cost-effectiveness" as the basis of clinical and economic research: calculation and comparison of the ratio. The method of "cost-benefit": concept, general characteristics, application. Quality of life related to health: concept, methodology of study and evaluation. Evaluation of the result of medical intervention by calculating the indicator QALY. Method of analysis "cost-utility": concept, General characteristics, application. Features of construction of clinical and economic research (formulation of the economic position of the researcher, the comparative nature, the collection of information about costs, etc.).

### **III. TRAINING AND METHODOLOGICAL SUPPORT INDEPENDENT WORK OF STUDENTS**

Educational and methodological support of independent self-work of students in the discipline "Methodology of scientific research in medicine" is given in Appendix 1 and includes:

schedule of independent self-work on the discipline, including the approximate standards of time to perform for each task;

characteristics of tasks for independent self-work of students and guidelines for their implementation;

requirements for the presentation and execution of the results of independent work;

criteria for evaluating the execution of independent work.

## MONITORING THE ACHIEVEMENT OF THE COURSE OBJECTIVES

No.	Controlled sections / topics of disciplines	Codes and stages of the formation of competencies		Evaluation tools - name	
				Current control	Intermediate certification/exam
1	Module 1. Working with sources of scientific information	the ability and willingness to analyze the results of his own activity to prevent professional errors (GPC-5)	Knows	OA-1 Interview	Credit questions 11 semester -1-6
			Able to	PW-1 Test	PW-1 Test
			Masters	OA-3 Report	OA-2 Colloquium
2	Module 2. Scientific text	the readiness to analysis and public presentation of medical information based on evidence-based medicine (PC – 20)	Knows	OA-1 Interview	Credit questions 11 semester -7-12
			Able to	OA-1 Interview	PW-1 Test
			Masters	PW-1 Test PW-11 Report	OA-2 Colloquium
3	Module 3. Organization of medical scientific research	the ability to participate in researches (PC – 21)	Knows	OA-1 Interview	Credit questions 11 semester -13-18
			Able to	OA-1 Interview	PW-1 Test
			Masters	PW-1 Test PW-11 Report	OA-2 Colloquium
4	Module 4. Design of scientific medical research	the willingness to participate in implementation of new methods and techniques aimed at protection of public health. (PC – 22)	Knows	OA-1 Interview	Credit questions 11 semester -19-23
			Able to	OA-1 Interview	PW-1 Test
			Masters	PW-1 Test PW-11 Report	OA-2 Colloquium

Control and methodological materials as well as criteria and indicators necessary for the assessment of knowledge, skills and characterizing the stages of formation of the competencies in the process of learning of the educational program are presented in Annex 2.

## V. A LIST OF TEXTBOOKS AND METHODOLOGICAL SUPPORT OF THE DISCIPLINE

### Main literature

1. Medical Writing and Research Methodology for the Orthopaedic Surgeon / Springer International Publishing AG 2018  
<https://link.springer.com/book/10.1007/978-3-319-69350-7#editorsandaffiliations>
2. BMC Medical Research Methodology / BioMed Central 2016  
<https://link.springer.com/journal/12874>
3. In Vivo Cryotechnique in Biomedical Research and Application for Bioimaging of Living Animal Organs / Springer Japan 2016  
<https://link.springer.com/book/10.1007/978-4-431-55723-4#editorsandaffiliations>

### Additional literature

1. Second workshop on research methodology / Springer India 2017  
<https://link.springer.com/article/10.1007/s13312-017-1138-7>
2. Patient-Centered Comparative Effectiveness Research / Springer, Boston, MA 2016  
[https://link.springer.com/referenceworkentry/10.1007/978-1-4899-7600-0\\_10](https://link.springer.com/referenceworkentry/10.1007/978-1-4899-7600-0_10)

### List of resources of information and telecommunication network "Internet"

1. Laboratory information system WHONET 5.0  
([www.who.int/drugresistance/whonetsoftware](http://www.who.int/drugresistance/whonetsoftware)).
2. Association for the development of medical laboratory technologies [Electronic resource]. - Mode of access: <http://www.armit.ru> –
3. Clinical laboratory diagnostics. [Electronic journal.] - Mode of access: <http://www.medlit.ru>
4. Russian medical server [Electronic resource]. - Mode of access: <http://www.rusmedserv.com>



5. The use of DNA diagnostics in the clinic [Electronic resource]. - Access mode:  
[http. // www.geneclinics.org](http://www.geneclinics.org)
6. PubMed [Electronic resource]. – Electron. data base. - Mode of access:  
<http://www.ncbi.nlm.nih.gov>
7. HighWire Press [Electronic resource]. – Electron. data base. - Mode of access:  
<http://www.highwire.stanford.edu>

## 8. LIST OF INFORMATION TECHNOLOGIES AND SOFTWARE

The location of the computer equipment on which the software is installed, the number of jobs	List of licensed software
<p>Multimedia auditorium Vladivostok Russian island, Ayaks 10, building 25.1, RM. M723 Area of 80.3 m2 (Room for independent work)</p>	<p>Windows Seven enterprise SP3x64 Operating System Microsoft Office Professional Plus 2010 office suite that includes software for working with various types of documents (texts, spreadsheets, databases, etc.); 7Zip 9.20 - free file archiver with a high degree of data compression; ABBYY FineReader 11 - a program for optical character recognition; Adobe Acrobat XI Pro 11.0.00 - software package for creating and viewing electronic publications in PDF; WinDjView 2.0.2 - a program for recognizing and viewing files with the same format DJV and DjVu.</p>

In order to provide special conditions for the education of persons with disabilities all buildings are equipped with ramps, elevators, lifts, specialized places equipped with toilet rooms, information and navigation support signs.

## VI. GUIDELINES FOR STUDYING OF THE DISCIPLINE

The purpose of practical classes is a consolidation of knowledge gained by graduate students through lectures, modeling of practical situations, as well as checking the effectiveness of independent self-work of students.

The practice lesson usually includes an oral questioning of students on the seminar. At the same time, the degree of the postgraduate student knowledge of the material from the lecture course, basic textbooks, knowledge of actual problems and the current situation in modern scientific activity is revealed. Further, the ability of students to apply the theoretical knowledge to the planning and

organization of scientific research, the ability to make out the knowledge gained in the study of scientific literature, reviews and articles.

The peculiarity of the practical training is the preparation of a resume for the planned scientific research, including the formulation of the theme of scientific work, the rationale for the relevance, the formulation of the goals and objectives of the study, the expected results and the presentation of the plan of work

Preparation for practical classes is advisable to start with a repetition of the material of lectures. In the course of independent self-work, student must at first study the material presented in the educational literature and monographs recommended by the teacher. Students should pay attention to the fact that the library list includes not only basic textbooks, but also more in-depth sources on each topic of the course. Consistent study of the subject allows the student to form a stable theoretical base.

In the course of independent work, the student must first of all independently study the relevant scientific literature presented in monographs, literary reviews, articles, scientific collections in order to determine promising areas of research.

For each lesson, students prepare for discussion the materials necessary for the planning of scientific research and presentation of the results of scientific activity.

## **VII. MATERIAL AND TECHNICAL MAINTENANCE OF DISCIPLINE**

Medical Research Methodology	Monoblock Lenovo C360G-i34164G500UDK; projection Screen Projecta Elpro Electrol, 300x173 cm; Multimedia projector, Mitsubishi FD630U, 4000 ANSI Lumen 1920 x 1080; Flush interface with automatic retracting cables TLS TAM 201 Stan; Avergence CP355AF; lavalier Microphone system UHF band Sennheiser EW 122 G3 composed of a wireless microphone and receiver; Codec of videoconferencing LifeSizeExpress 220 - Codeonly - Non-AES; Network camera Multipix MP-HD718; Two LCD panel, 47", Full HD, LG M4716CCBA; Subsystem of audiocommentary and sound reinforcement; centralized uninterrupted power supply	Multimedia audience
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MINISTRY OF EDUCATION AND SCIENCE OF THE RUSSIAN  
FEDERATION  
Federal state autonomous educational institution  
of higher education  
« Far Eastern Federal University »  
(FEFU)

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**SCHOOL OF BIOMEDICINE**

**TRAINING AND METHODOLOGICAL SUPPORT OF INDEPENDENT  
WORK OF STUDENTS  
on discipline «Methodology of scientific research in medicine»  
Specialty 31.05.01 «General medicine»  
Form of study: full time**

**Vladivostok  
2016**

## Schedule of independent work on the discipline

No.	Date / Deadline	Type of independent work	Estimated norms of time for execution (hour)	Form of control
<b>11 semester</b>				
1	1-2 day	Essay. Individual task	6 hours	OA-3-Report
2	3-4 day	Making a presentation on the essay topic. Presentation of the individual task outcomes	6 hours	POA-3-Report
3	5-6 day	Preparation for test	6 hours	OA-1-Interview PW-1 – Test

Independent self-work includes:

1. library and homework with educational literature and lecture notes,
2. preparation for practical classes,
3. performing an individual task
4. preparation of the essay
5. preparing for the test and control interview (credit)

**Creative problem-oriented independent work (CIW)**, focused on the development of intellectual skills, complex of general professional and professional competencies, increasing the creative potential of students. CIW may include the following types of work on the main issues of the course:

- search, analysis, structuring and presentation of information,
- execution of settlement and graphic works;
- research work and participation in student scientific conferences, seminars and competitions;
- analysis of scientific publications on a topic pre-determined by teacher;
- analysis of statistical and factual materials on a given topic, performing calculations, drawing up schemes and models based on statistical materials.

## **List of the essay topic**

1. Methods of scientific knowledge
2. Methods of system analysis in scientific research
3. The process of cognition, its structure and algorithm of cognitive functions
4. Methodology of scientific research organization
5. Research, their types and characteristics
6. Design and organization of scientific research
7. Methodological principles of the choice of scientific problems, research topics, object and subject of research
8. Methodological principles of choice of methods and techniques of scientific research
9. Principles and problems of generalization, registration and presentation of the results of scientific research
10. Methods of the scientific research writing
11. Scientific knowledge, its varieties, models of development of scientific knowledge
12. Knowledge of the scientific and non-scientific. Varieties. Philosophical and methodological basis of science as a technology of knowledge acquisition.

## **Guidelines for writing and design of an essay**

Essay is a creative activity of the student reproducing in its structure the research activities to solve theoretical and applied problems in a particular branch of scientific knowledge. That is why the course certification work is an essential component of the educational process in higher education.

The essay is a model of scientific research, independent self-work in which a student solves a problem of a theoretical or practical nature, applying the scientific principles and methods of a given branch of scientific knowledge. The result of this scientific search may have not only subjective, but also objective scientific novelty, and therefore can be presented for discussion by the scientific community in the form

of a scientific report or presentation at scientific-practical conferences, as well as in a form of research article.

Essay involves the acquisition of skills for building business cooperation, based on ethical standards of scientific activity. Purposefulness, initiative, disinterested cognitive interest, responsibility for the results of their actions, conscientiousness, competence - personality traits that characterize the subject of research activities corresponding to the ideals and norms of modern science.

The essay is an independent educational and research activity of the student. The teacher assists in a consultative manner and assesses the process and the results of the activity. Teacher provides an approximate topic of the essay work, specifies the problem and topic of research with a student or intern, helps to plan and organize research activities, assigns time and a minimum number of consultations.

The teacher receives the text of the essay for verification at least ten days before the defense.

Generally there is a certain structure of the essay, the main elements of which in order of their location are the following:

1. Title page.
2. Goal.
3. Table of Contents
4. List of abbreviations, symbols and terms (if necessary).
5. Introduction.
6. Main part.
7. Conclusion.
8. Reference list.
9. Appendixes.

The title page contains educational institution, graduating department, author, teacher or supervisor, research topic, place and year of the essay.

The title of the essay should be as short as possible and fully consistent with its content.

The table of contents (content) reflects the names of the structural parts of the essay and the pages on which they are located. The table of contents should be placed at the beginning of work on one page.

The presence of a detailed introduction - a mandatory requirement for the abstract. Despite the small volume of this structural part, its preparation causes considerable difficulties. However, this is a qualitatively executed introduction that is the key to understanding the entire work, which testifies to the professionalism of the author.

Thus, the introduction is a very crucial part of the essay. The introduction should start with a justification of the relevance of the chosen topic. As applied to the essay, the concept of "relevance" has one feature. From how the author of the essay can choose a topic and how correctly he understands and evaluates this topic from the point of view of modernity and social significance, characterizes his scientific maturity and professional preparedness.

In addition, in the introduction it is necessary to isolate the methodological basis of the essay, name the authors, whose works constituted the theoretical basis of the study. A review of the literature on the topic should show the author's thorough acquaintance with special literature, his ability to systematize sources, critically examine them, highlight the essential and determine the most important in the up-to-date state of knowledge of the topic.

The introduction reflects the importance and relevance of the chosen topic, defines the object and subject, purpose and objectives, and the chronological framework of the study.

The introduction ends with a statement of the general conclusions about the scientific and practical significance of the topic, the degree of its knowledge and sources, and the hypothesis being put forward.

The main part describes the essence of the problem, reveals the topic, determines the author's position, factual material is given as an argument and for display of further provisions. The author must demonstrate the ability to consistently present the material

while analyzing it simultaneously. Preference is given to the main facts, rather than small details.

The essay ends with the final part called "conclusion". Like any conclusion, this part of the essay serves as a conclusion due to the logic of the study which is a form of synthesis accumulated in the main part of scientific information. This synthesis is a consistent, coherent presentation of the results obtained and their relation to a common goal and specific tasks set and formulated in the introduction. At this place there is a so-called "output" knowledge, which is new in relation to the original knowledge. The conclusion may include suggestions of practical matter, thereby increasing the value of theoretical materials.

So, the conclusion of the essay should contain: a) presents the conclusions of the study; b) theoretical and practical significance, novelty of the essay; c) indicated the possibility of applying the results of the study.

After conclusion it is acceptable to place the reference list of the literature used throughout. This list is one of the essential parts of the essay and reflects the independent creative work of the author of the essay.

The list of sources used is placed at the end of the work. It is made either in alphabetical order (by the name of the author or the name of the book), or in the order in which the references appear in the text of the prepared work. In all cases, the full title of the work, the names of the authors or the editor of publication are indicated if the writing team involved a group of authors, data on the number of volumes, the name of the city and publisher in which the work was published, year of publication, number of pages.

### **Methodical recommendations for the presentation preparation**

For preparation of presentation it is recommended to use: PowerPoint, MS Word, Acrobat Reader, LaTeX-bev package. The simplest program for creation of presentations is Microsoft PowerPoint. To prepare a presentation, it is necessary to process the information collected while writing the essay.

The sequence of preparation of the presentation:



1. Clearly state the purpose of the presentation.
2. Determine what the presentation format will be: live presentation (then how long it will be) or e-mail (what will be the context of the presentation).
3. Select the entire content of the presentation and build a logical chain of presentation.
4. Identify key points in the content of the text and highlight them.
5. Determine the types of visualization (pictures) to display them on slides in accordance with the logic, purpose and specificity of the material.
6. Choose the design and format the slides (the number of pictures and text, their location, color and size).
7. Check the visual perception of the presentation.

The types of visualization include illustrations, images, charts, tables. The illustration is a representation of a real-life visual. The images - as opposed to illustrations - are metaphor. Their purpose is to cause an emotion and create an attitude towards it, to influence the audience. With the help of well-designed and presented images, information can remain permanently in a person's memory. Chart is visualization of quantitative and qualitative relationships. They are used for convincing data demonstration, for spatial thinking in addition to the logical one. Table is a specific, visual and accurate data display. Its main purpose is to structure information, which sometimes facilitates the perception of data by the audience.

*Practical hints on preparing a presentation*

- printed text + slides + handouts are prepared separately;
- slides -visual presentation of information that should contain a minimum of text and maximum of images that bring a meaning, to look visually and simply;
- textual content of the presentation - oral speech or reading, which should include arguments, facts, evidence and emotions;
- recommended number of slides 17-22;

- mandatory information for the presentation: the subject, surname and initials of the speaker; message plan; brief conclusions from all that has been said; list of sources used;

- handouts should be provided with the same depth and coverage as the live performance: people trust more what they can carry with them than disappear images, words and slides are forgotten, and handouts remain a constant tangible reminder; handouts are important to distribute at the end of the presentation; Handouts should be different from slides, should be more informative.

### **Evaluation criteria for essays.**

The stated understanding of the essay as a holistic copyright text defines the criteria for its evaluation: the novelty of the text; the validity of the source choice; the degree of disclosure of the issue essence; compliance with the requirements for registration.

**Essay novelty:** a) the relevance of the research topic; b) novelty and independence in the problem formulation, formulation of a new aspect of the well-known problem in the establishment of new connections (interdisciplinary, intra-subject, integration); c) ability to work with research and critical literature, systematize and structure research material; d) the appearance of the author's position, independence of assessments and judgments; d) stylistic unity of the text, the unity of genre features.

**The degree of disclosure of the question essence:** a) the plan compliance with an essay; b) compliance with the content of topic and plan of an essay; c) completeness and depth of knowledge on the topic; d) the validity of the methods and techniques of work with the material; e) ability to generalize, draw conclusions, compare different points of view on one issue (problem).

**The validity of the source choice:** a) evaluation of the used literature: whether the most famous works on the research topic are involved (including recent journal publications, recent statistics, reports, references, etc.)

**Compliance with the requirements for registration:** a) How true are the references to the used literature, quotes; b) assessment of literacy and presentation culture (including spelling, punctuation, stylistic culture), knowledge of terminology; c) compliance with the requirements for the volume of essay.

**The reviewer should clearly state** the remarks and questions, preferably with references to the work (possible on specific pages of the work), to research and evidence that the author did not take into account.

**The reviewer may also indicate:** whether student has addressed the topic earlier (essays, written works, creative works, olympic works, etc.) and whether there are any preliminary results; how the graduate has conducted the work (plan, intermediate stages, consultation, revision and processing of the written or lack of a clear plan, rejection of the head recommendations).

**The student submits** an essay for review no later than a week before the defense. The reviewer is the teacher. Experience shows that it is advisable to acquaint the student with the review a few days before the defense. Opponents are appointed by the teacher from the students. For an oral presentation a student needs about 10–20 minutes (approximately as long as he answers with tasks for the exam).

**Grade 5** is given if all the requirements for writing and defending an essay are fulfilled: the problem is indicated and its relevance is justified, a brief analysis of different points of view on the problem under consideration is made and one's own position is logically presented, conclusions are formulated, the topic is fully disclosed, the volume is met, external requirements are met design, given the correct answers to additional questions.

**Grade 4** is given if the basic requirements for the essay and its defense are met, but there are some shortcomings. In particular, there are inaccuracies in the presentation of the material; or there is no logical sequence in the judgments; not sufficient volume of the essay; there are omissions in the design; additional questions for the defense are accompanied with incomplete answers.

**Grade 3** is given if there are significant deviations from the requirements for

referencing. In particular: the topic is covered only partially; factual errors in the content of an essay or when answering additional questions; there is no output c.

**Grade 2** - the topic of an essay is not disclosed, a significant misunderstanding of the problem is found.

**Grade 1** - student's essay is not presented.

### **Individual task of the student**

Student performs an individual task in the process of independent self-work:

1. Formulates the topic of scientific research with the help of the supervisor.
2. Formalizes the relevance of his future research, which reveals the scientific problem, degree of its disclosure and resolution in modern scientific literature, contradictions in the judgments of the authors. The student determines direction of his/her scientific research
3. Student with the help of the supervisor formulates the purpose of scientific research and tasks that reveal ways to achieve the goal
4. Student formulates a model of the scientific research design, defines the object, subject and methods of research
  1. Student in general form formulates the results that he/she wants to obtain as a result of the study
  2. Student presents a plan for the implementation of the upcoming study
  3. Student prepares a report for his presentation at the conference students of the university according to the materials of their research.



MINISTRY OF EDUCATION AND SCIENCE OF THE RUSSIAN  
FEDERATION  
Federal state autonomous educational institution  
of higher education  
**« Far Eastern Federal University »**  
(FEFU)

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SCHOOL OF BIOMEDICINE

**ASSESSMENT FUND**  
**on discipline «Medical Research Methodology»**  
**Specialty 31.05.01 «General medicine»**  
**Form of study: full time**

**Vladivostok**  
**2016**

## Passport of assessment fund

Completed in accordance with the Regulations on the Funds of Evaluation Assets of Educational Programs of Higher Education - Bachelor's Programs, Specialties, FEFU Magistrates, approved by order of the Rector No. 12-13-850 of May 12, 2015.

Competence and its code	Stages of competence formation	
the ability and willingness to analyze the results of his own activity to prevent professional errors (GPC-5)	Knows	Methods of analysis, finding the problem, designing the optimal sequence of actions to achieve the goal, methods of planning scientific activities, evaluation and control of it. Principles of independent decision-making in the field of management of research organization
	Able to	Use educational, scientific, popular science literature, internet for professional activities. Analyze the results of their own activities to prevent professional errors and critically evaluate modern theoretical concepts and trends in medicine. To implement the principles of personal responsibility for decisions made in the organization of scientific research.
	Masters	Methods of analysis of the outcomes of their own activities to prevent professional mistakes: possession of various managing functions: planning, organization, regulation, monitoring and controlling, having the ability to consciously choose the optimal strategy, etc
the readiness to analysis and public presentation of medical information based on evidence-based medicine (PC – 20)	Knows	The essence of the evidence based medicine; types of scientific sources of information; methods of evaluation of scientific sources of information; algorithm of monographic and review essay; features of the scientific text and its design requirements; ways of presenting numerical information
	Able to	To analyze and evaluate the information of scientific sources; to make a monographic and review essay on the topic of research; to analyze ways of presenting numerical data in terms of speed of perception, data volume, logic; to use text and graphic editors to present the results of the study; to create a presentation to the report on the results of the study.
	Masters	Skills of scientific text design; skills of determining the type of numerical data; skills of choosing the optimal way to represent numerical data using different types of tables and charts
the ability to participate in	Knows	The essence of research activities in medicine

researches (PC – 21)		and health care; stages of scientific medical research and their content; design options for scientific medical research; the nature of errors in the results of scientific medical research and the causes of their occurrence.
	Able to	Plan scientific medical research; anticipate errors in the results of scientific medical research and take measures to minimize them.
	Masters	Skills of sample formation using various methods; skills of using the simplest methods of randomization in the formation of comparison groups; skills of forming comparison groups by means of paired selection; skills of calculating and evaluating a set of indicators based on the results of the observational (cohort) study; skills of calculating and evaluating a set of indicators based on the results of the experimental study; skills of calculating and evaluating a set of indicators characterizing the validity of the diagnostic test.
the willingness to participate in implementation of new methods and techniques aimed at protection of public health. (PC – 22)	Knows	Norms of international law, the main provisions of the legal documents of the Russian Federation regulating research activities in medicine and health care, as well as work on the practical use and implementation of the results of scientific medical research; the nature and classification of costs associated with medical intervention; types of effectiveness of medical activities, their essence and content; features of clinical and economic research
	Able to	Evaluate medical interventions in terms of cost-benefit ratio
	Masters	Skills of clinical and economic analysis

## MONITORING THE ACHIEVEMENT OF THE COURSE OBJECTIVES

No.	Controlled sections / topics of disciplines	Codes and stages of the formation of competencies	Evaluation tools - name		
			Current control	Intermediate certification/exam	
1	Module 1. Working with sources of scientific information	the ability and willingness to analyze the results of his own activity to prevent professional errors (GPC-5)	Knows	OA-1 Interview	Credit questions 11 semester -1-6
			Able to	PW-1 Test	PW-1 Test
			Masters	OA-3 Report	OA-2 Colloquium

2	Module 2. Scientific text	the readiness to analysis and public presentation of medical information based on evidence-based medicine (PC – 20)	Knows	OA-1 Interview	Credit questions 11 semester -7-12
			Able to	OA-1 Interview	PW-1 Test
			Masters	PW-1 Test PW-11 Report	OA-2 Colloquium
3	Module 3. Organization of medical scientific research	the ability to participate in researches (PC – 21)	Knows	OA-1 Interview	Credit questions 11 semester -13- 18
			Able to	OA-1 Interview	PW-1 Test
			Masters	PW-1 Test PW-11 Report	OA-2 Colloquium
4	Module 4. Design of scientific medical research	the willingness to participate in implementation of new methods and techniques aimed at protection of public health. (PC – 22)	Knows	OA-1 Interview	Credit questions 11 semester -19- 23
			Able to	OA-1 Interview	PW-1 Test
			Masters	PW-1 Test PW-11 Report	OA-2 Colloquium

### Scale of assessment of the level of competence formation

Competence and its code	Stages of competence formation		criteria	indicators	Points
the ability and willingness to analyze the results of his own activity to prevent professional errors (GPC-5)	knows (threshold level)	Methods of analysis, finding the problem, designing the optimal sequence of actions to achieve the goal, methods of planning scientific activities, evaluation and control of it. Principles of independent decision-making in the field of management of research organization	Knowledge of methods of analysis, finding the problem, designing the optimal sequence of actions to achieve the intended objectives of the field of management of the organization of scientific research	knows the main ways of analysis, finding the problem, designing the optimal sequence of actions to achieve the intended goal in the field of management of scientific research	65-71
	able to (advances)	Use educational, scientific, popular science literature, the Internet network for professional activities. Analyze the results of their own activities to prevent professional errors and critically evaluate modern	The ability to teach others how to analyze the results of their own activities to	Able to implement the principles of personal responsibility for decisions to	71-84



		theoretical concepts and trends in medicine. To implement the principles of personal responsibility for decisions made in the organization of scientific research.	prevent professional mistakes and critically evaluate modern theoretical concepts and trends in medicine	prevent professional errors	
	masters (high)	Methods of analysis of the results of their own activities to prevent professional mistakes: possession of various managing functions: planning, organization, regulation, monitoring and controlling, having the ability to consciously choose the optimal strategy, etc	Knowledge of the methodology of analysis of the results of their own activities to prevent professional errors:	Owns various managing functions: planning, organization, regulation, monitoring and controlling, having the ability to consciously choose the optimal strategy, etc	85-100
the readiness to analysis and public presentation of medical information based on evidence-based medicine (PC – 20)	knows (threshold level)	Methods of evaluation, analysis, generalization and public presentation of the results of the research. Ways to determine the goals in the organization of scientific research	Knowledge of methods of processing, analysis, generalization and public presentation of the results of the research	Knows the basics of methods of processing, analysis, generalization and public presentation of the results of the research	65-71
	able to (advances)	To analyze, summarize and publicly present the results of scientific research on the basis of evidence-based medicine, as well as to develop a mechanism for the organization of scientific research	Ability to analyze, summarize and publicly present the results of scientific research on the basis of evidence-based medicine	able to analyze, summarize and publicly present the results of scientific research on the basis of evidence-based medicine	71-84
	masters (high)	Methods of analysis, generalization and public presentation of the results of scientific research. Principles of evidence-based medicine based on the search for solutions using theoretical knowledge and practical skills. Methods of application of professional knowledge in the field of research in the formulation and solution of problems.	Possession of skills of analytical methods, generalization and public presentation of the results of scientific research. Principles of evidence-based medicine based on the search for solutions using theoretical knowledge and practical skills	knows how to apply professional knowledge in the field of research in the formulation and solution of problems on evidence-based medicine	85-100

the ability to participate in researches (PC – 21)	knows (threshold level)	Methods of analysis and evaluation of modern scientific achievements in solving scientific research. Methods of planning the system of organization of scientific research.	Knowledge of methods of analysis and evaluation of modern scientific achievements in solving scientific research.	Knows the basics of methods of analysis and evaluation of modern scientific achievements in solving scientific research	65-71
	able to (advances)	To analyze alternative solutions to research and practical problems, to assess the potential gains / losses of the implementation of these options. Assess risks in management decision-making	ability to analyze, generalize alternative solutions to research and practical problems, to evaluate potential gains/losses of these options.	Able to analyze alternative solutions to research and practical problems in the conduct of scientific research,	71-84
	masters (high)	Skills of analysis and evaluation of modern scientific achievements and results of activities in the conduct of scientific research. The ability to work effectively in a team and individually, as well as the willingness to lead a team created to solve problems.	Possession of skills of methods of analysis and evaluation of modern scientific achievements and results of scientific research, effective teamwork skills	knows the methods of analysis and evaluation of modern scientific achievements and results of scientific research.	85-100
the willingness to participate in implementation of new methods and techniques aimed at protection of public health. (PC – 22)	knows (threshold level)	Principles of participation in introduction of new methods and techniques aimed at protecting the health of citizens. Methods of application of professional knowledge in the field of scientific research in the formulation and solution of problems	Knowledge of the principles of participation in the introduction of new methods and techniques aimed at protecting the health of citizens	Knows the basics of the principles of participation in the introduction of new methods and techniques aimed at protecting the health of citizens	65-71
	able to (advances)	Use in the implementation of new methods and techniques aimed at protecting the health of citizens. To use scientific, scientific and technological results and intellectual potential in order to obtain new products, technology of its production.	Ability to use scientific, scientific and technological results and intellectual potential in order to obtain new products, technology of its production.	Able to use scientific, scientific and technological results and intellectual potential in order to obtain new products, technology of its production.	71-85

	masters (high)	Skills of use and introduction of new methods and techniques aimed at protecting the health of citizens. Methods of application of methods of expert assessments and forecasting of innovative solutions	Skills in the use and implementation of new methods and techniques aimed at protecting the health of citizens.	knows how to apply the methods of expert evaluation and forecasting of innovative solutions	85-100
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### **Questions to assess preliminary competencies**

1. What is scientific research?
2. What is a scientific hypothesis? —
3. What is a scientific concept?
4. What is scientific theory?
5. What is the scientific picture of the world?
6. Length units in the International system of units
7. What is scientific analysis?
8. What is the analogy method?
9. What is modeling in scientific research?

**Control tests** are designed for students studying the course "Methodology of scientific research in medicine".

When working with tests, the student is asked to choose one answer out of three or four proposed. At the same time, the tests vary in their complexity. There are tests among the proposed ones containing several options for correct answers. The student must provide all correct answers.

Tests are designed for both individual and collective solutions. They can be used in the process and classroom, and independent self-work. The selection of tests necessary for the control of knowledge in the process of interim certification is made by each teacher individually.

Results of performance of the test tasks are evaluated by a teacher using a five-grade scale for certification or on system "credit" - "no credit". Grade "excellent" is given if the number of correct answers is more than 90% of the tests offered by the teacher. Grade "good" is given if the number of correct answers is

more than 70% of the tests. Grade "satisfactory" is given if the number of correct answers is more than 50% of the tests offered to the student.

### **Samples of test tasks**

#### **1. What is science?**

1. system of principles and methods of organization and construction of theoretical and practical activities;
2. the highest form of human knowledge, the system of developing knowledge;
3. the study and comprehension of the critical review practice;
4. the system of concepts about the phenomena and laws of nature.

#### **2. What is methodology?**

1. method of achieving results, organization of activities, reasonable regulatory techniques;
2. the concrete embodiment of methods, the developed way of organization of interaction between subject and object of researches on the basis of concrete material and procedure;
3. the process of developing new scientific knowledge;
4. the system of principles and methods of organization and construction of theoretical and practical activities, considering the structure of scientific research and forming requirements.

#### **3. What are the requirements of methodology?**

1. analysis, generalization, validity;
2. explanation, analysis;
3. control over all conditions of the studied processes, analysis, reproducibility of the research results;
4. validity, reproducibility of research results, control over all conditions of the studied processes.

#### **4. What is research study?**

1. the system of concepts of phenomena and laws of the outside world;
2. the process of developing the new scientific knowledge;

3. the process of cognition at the empirical level;
4. description of problem situation.

**5. What does the population mean?**

1. this is part of the study population, which researcher intends to study;
2. property of the sample representing the main characteristic of the population;
3. system of specific requirements aimed at analysis and solution of the problem;
4. this is the entire population or part of it that the researcher intends to study.

**6. What are three main functions of a research program?**

1. methodics, diagnostics and projection;
2. methodology, technique and organization;
3. methodology, organization and information;
4. methodics, methodology and projection.

**7. What is not included in the methodological part of the program?**

1. description of a problem situation (relevance);
2. determining the sample size;
3. specifying goals and objectives;
4. definition of object and subject of research.

**8. What is the most important part of the compositional construction and design of scientific work?**

1. title page;
2. content;
3. introduction;
4. chapters of the main part.

**9. A public message, a detailed presentation of any topic, most often designed for specialists in this field-is ...**

1. thesis of reports;
2. scientific report;
3. scientific presentation;
4. scientific article.

**10. What is monograph?**

1. communication, report on the actions carried out by the researcher;
2. summary made by author about his scientific work;
3. provision summarizing any idea or idea of a report;
4. scientific work covering one topic, problem.

**11. What does the questionnaire method imply?**

1. questioning method of survey based on communication of researcher with respondent;
2. data collection using the questionnaire form including a set of questions organized in a certain way and addressed to respondent;
3. data collection using the questionnaire form including a set of verbal questions;
4. the method of survey, which includes a set of questions that allow respondent to speak from the position of the group, the team.

**12. What types of surveys differ in the way they are distributed?**

1. individual and group;
2. indirect and direct;
3. press, mail and transfer case;
4. solid and selective.

**13. The method in which neither the patient nor the doctor watching him do not know which method of treatment was used is called:**

1. double-blind
2. triple blind
3. single blind
4. placebo-controlled

**14. A study in which the patient does not know, and the doctor knows what treatment the patient receives, is called:**

1. placebo-controlled
2. double-blind
3. triple blind
4. single-blind

**15. Descriptive statistics deals with:**

1. comparison of the obtained data
2. set of material
3. description and presentation of data
4. justification of the obtained results

**16. Data collection can be:**

1. optimization
2. static and dynamic
3. constructive and deconstructive
4. passive and active

**17. Experiment is:**

1. the process of empirical knowledge
2. the process of measuring or observing action to collect data
3. study covering the entire population of observation units
4. mathematical modeling of reality processes

**18. Methodology studies:**

1. methods of preparation synthesis;
2. methods of correcting scientific errors;
3. the origin and nature of cognition methods and their characteristics.;
4. the efficiency of the methods.

**19. Scientific observation is characterized by:**

1. focused, planned, proactive;
2. limitation, conceptual, logical;
3. dialectic, metaphysical, natural philosophy.

**20. The experiment includes:**

1. induction and deduction;
2. observation and measurement;
3. analysis and synthesis.

**21. The ability to detect unknown properties of an object gives:**

1. the validation experiment;
2. thought experiment;

3. research experiment;
4. control experiment.

**22. Abstracting and idealizing is:**

1. general scientific methods of theoretical knowledge;
2. methods of measurement of physical quantities;
3. calculation methods in Excel.

**23. Unit of length in the International system of units:**

1. inch;
2. metre;
3. mile.

**24. Formalization is:**

1. language of science;
2. experiment;
3. method of measurement of physical quantities.

**25. Analysis is:**

1. sampling for scientific experiment;
2. the collection of chemicals in a single vessel;
3. division of the object of study into component parts.

**26. Analogy is:**

1. production of two or more experimental units;
2. mirror an object;
3. similarity; similarity of properties, features, or relationships of different objects.

**27. Modeling is:**

1. the study of the original and its replacement in the study of the object;
2. study two or more original objects at the same time;
3. study of two or more original objects in ascending order.

**28. What are you known types of modeling:**

1. chemical, biological, geological, astronomical;
2. mental, physical, symbolic, computer;



3. mechanical, naturalistic, dynamic, stationary

### **Evaluation tools for current certification**

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Results of performance of the test tasks are evaluated by a teacher using a five-grade scale for certification or on system "credit" - "no credit". Grade "excellent" is given if the number of correct answers is more than 90% of the tests offered by the teacher. Grade "good" is given if the number of correct answers is more than 70% of the tests. Grade "satisfactory" is given if the number of correct answers is more than 50% of the tests offered to the student.

### **Test questions for credit:**

1. The concept of scientific knowledge.
2. General characteristics of the process of scientific knowledge.
3. Methodology as a philosophical doctrine of the methods of cognition and transformation of reality, the application of the principles of worldview to the process of cognition, spiritual creativity and practice.
4. Formulate the definition of "Methodology" in the broad and narrow sense of the word, the function of methodology.
5. List and describe the methodological principles.

6. Reveal the specifics of scientific knowledge and its main differences from the spontaneous – empirical.
7. List the main components of the scientific apparatus of the study and give a brief description of each of them.
8. Name and describe the main criteria for evaluating the results of scientific research.
9. Expand the essence of the concept of "method". Give the definition of "scientific method".
10. Give the essential characteristics of such methods as questioning, interviewing, testing, expert survey and sociometry.
11. Describe the features of the methods of scientific literature, archival data.
12. The essence and role of the experimental method in scientific research. Justify the most important conditions for the effectiveness of its implementation. Stages of the experiment.
13. Justify the essence and specificity of theoretical knowledge. List its main forms.
14. Give a definition of such categories of theoretical knowledge as "thinking", "mind", "concept", "judgment", "reasoning", "intuition".
15. What are the basic requirements that must meet any scientific theory?
16. Expand the features of the use of general scientific logical methods in scientific research.
17. What is the essence of quantitative measurements in scientific research?
18. What should be the basis for determining the topic, object, subject, purpose, objectives and hypothesis of the study?
19. Formulate the definition of "research methodology". Justify the position that the methodology of scientific research is always specific and unique.
20. What should be understood as a systematization of the results of study? What are the purposes of testing the results of scientific work?
21. What stages the process of implementation of research results into practice should be considered?

22. List the requirements that apply to the content, logic and methodology of presentation of research material in scientific work. What are the main parts of the scientific work?
23. What are the main requirements of clinical trial?
24. What steps are involved in the implementation of the results of clinical research into practice?