



MINISTRY OF SCIENCE AND HIGHER EDUCATION OF THE RUSSIAN FEDERATION  
Federal State Autonomous Educational Institution of Higher Education

**Far Eastern Federal University**

(FEFU)

INSTITUTE OF LIFE SCIENCES AND BIOMEDICINE (SCHOOL)

AGREED  
Head of the EP

(Signed)

December 6, 2022

Y.S. Khotimchenko  
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Director of the Department of Pharmacy and Pharmacology

(Signed)

December 6, 2022

E.V. Khozhaenko

(Surname)

### WORK PROGRAM OF THE DISCIPLINE

Systems analysis and management in healthcare

Area of study 32.04.01 "Public Health"

Educational program "Leadership and governance in public health (program in English for foreign citizens)"

Form of training: full-time

Course 1 semester 1

Practical training 36 hours

total hours of classroom load 36 hours,

Self-study 36 hours.

Credit 1 semester

The work program of the discipline is drawn up in accordance with the requirements of the Federal State Educational Standards of Higher Education in the direction of training 32.04.01 Public Health, approved by the order of the Ministry of Education and Science of the Russian Federation dated May 31, 2017 No. 485.

The work programme was discussed at the meeting of the Department of Pharmacy and Pharmacology, Minutes No. 4 dated December 6, 2022.

Director of the Department of Pharmacy and Pharmacology, Ph.D., E.V. Khozhaenko

Compiled by: Doctor of Medical Sciences, Professor G.N. Bondar

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1. The work program was revised at a meeting of the Department/Department/Division (implementing the discipline) and approved at a meeting of the Department/Department/Division (Graduating Structural Unit), minutes dated " \_\_\_\_ " \_\_\_\_\_ 2022. № \_\_\_\_\_
2. The work program was revised at the meeting of the Department/Department/Division (implementing the discipline) and approved at the meeting of the Department/Department/Division (Graduating Structural Unit), Minutes dated " \_\_\_\_ " \_\_\_\_\_ 2022. № \_\_\_\_\_
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Goals and objectives of mastering the discipline:

Purpose:

- formation of a system of competencies in the field of theoretical foundations and patterns of construction and functioning of systems in relation to public health and health care organization.

Tasks:

- Comprehension of the worldview and cultural significance of the theory of system analysis as a necessary result of the development of science, taking into account the needs of the study of increasingly complex objects of cognition.
- Creation of a basic theoretical framework and elementary skills necessary for the formation of a systemic worldview and mastering the systems approach.
- Mastering the initial skills of applied system analysis in order to further develop them in the disciplines of the management cycle.
- Training in methodology and techniques for assessing and managing public health;
- Training in a systematic approach to public health analysis;
- Building preparedness to address public health challenges.

As a result of studying this discipline, students form the following universal, general professional and professional competencies (elements of competencies).

Professional competencies of graduates and indicators of their achievement:

Professional competencies of graduates and indicators of their achievement:

Task type	Code and name of professional competence (result of mastering)	Code and name of the competency indicator
Organizational and managerial	PC-5 Ability to assess the effectiveness of a medical organization, develop and select optimal management solutions, develop a business plan for the development of a medical organization, use a process approach in the management of a medical organization, use technological maps of the processes of a medical organization	PC-5.1 Knows the methods of planning a medical organization PC-5.2 Is able to draw up a plan for a medical organization, develop business planning and investment projects PC-5.3 Proficient in planning, development of business planning and investment projects

Task type	Code and name of professional competence (result of mastering)	Code and name of the competency indicator
Organizational and managerial	PC-6 Ability to develop plans and programs, form a system of indicators for the activities of a medical organization, assess the effectiveness of the activities of a medical organization, develop options for management decisions and assess the risks associated with their implementation	PC-6.1 Knows the peculiarities of the formation of the system of indicators of a medical organization PC-6.2 Is able to assess the effectiveness of the activities of a medical organization, taking into account the formed system of indicators PC-6.3 Proficient in the formation of performance indicators, assessment

Code and Competency Statement	Stages of competence formation
PC-5.1 Knows the methods of planning a medical organization	Knows the methods of planning a medical organization Able to plan the work of a medical organization
PC-5.2 Is able to draw up a plan for a medical organization, develop business planning and investment projects	Knows the rules for drawing up a plan for a medical organization, developing a business plan, an investment project Is able to draw up a plan for a medical organization, develop business planning and investment projects Possesses the skill of drawing up a plan for a medical organization, developing business and investment projects
PC-5.3 Proficient in planning, development of business planning and investment projects	Knows the principles of goal-setting, types and methods of organizational planning and fundamental concepts of financial management, as well as the method of process approach to the management of a medical organization Able to develop corporate, competitive and functional strategies for the development of the organization, develop investment projects and conduct their verification He is proficient in the methods of formulating and implementing strategies at the level of a business unit, developing and implementing marketing programs, as well as methods of investment analysis and analysis of financial markets, a process approach in the management of a medical organization and the possibility of using technological maps of the processes of a medical organization.
PC-6.1 Knows the peculiarities of the formation of the system of indicators of a medical organization	Knows the specifics of the formation of the system of indicators of a medical organization Able to form and fulfill the indicators of a medical organization Possesses the skill of forming and fulfilling the indicators of a medical organization

PC-6.2 Is able to assess the effectiveness of the activities of a medical organization, taking into account the formed system of indicators	Knows the main performance indicators of a medical organization Is able to assess the effectiveness of a medical organization, taking into account the formed system of indicators Possesses the skill of assessing the effectiveness of the activities of a medical organization, taking into account the formed system of indicators
PC-6.3 Possesses the skills of forming performance indicators, assessing their effectiveness, as well as the ability to develop management decisions with an assessment of the risks associated with their implementation	Knows the main performance indicators of a medical organization Is able to generate performance indicators, assess their effectiveness, and assess the risks associated with their implementation Possesses the skills of forming performance indicators, assessing their effectiveness, as well as the ability to develop management decisions with an assessment of the risks associated with their implementation

For the formation of the above competencies within the framework of the discipline "Systems analysis and management in healthcare", the following methods of active/interactive learning are used: practical classes - dispute, round table (preparation and discussion of abstracts).

I. Labor intensity of the discipline and types of training in the discipline  
The total labor intensity of the discipline is 2 credits (72 academic hours).

Designation	Types of Study Sessions and Student Work
Ave	Practical exercises
Pr electr.	
WED:	Student's independent work during the period of theoretical training
Including control	Independent work of the student and contact work of the student with the teacher during the period of intermediate certification
	And other types of work

I. Structure of the discipline:

Form of study – full-time

№	Section Name Discipline	Se me ster	Number of hours by type of training and work of the student						Forms of intermediate attestation
			Lek	Lab	Ave	OK	WE D	Cont rol	
1	Class 1. Subject and Methods of Systems Theory. Types and properties of systems	1			2			2	

2	Class 2. The Concept of Structure in Systems Theory			2		2		
3	Class 3. Basic Methods of Systems Theory			2		2		
4	Class 4. Cybernetic systems. The Concept of Structure in Theory			2		2		
5	Class 5. Freedom and expediency of systems.			2		2		
6	Class 6. Synthetic Method in Systems Theory. Tasks of System Analysis			2		2		
7	Class 7. Methods of Systems Research			2		2		
8	Class 8. Methods of System Analysis in Relation to Solving the Problems of Organizing Medical Care for the Population.			2		2		
9	Class 9. Stages of systems research. Characteristics and classification of scientific research			2		2		
10	Class 10. System Regularities as a Basis for Constructing Mechanisms for Managing Complex Socio-Medical Systems			2		2		
11	Class 11. Particular Methods of System Analysis in Relation to Solving Problems in the Field of Medical Services			2		2		
12	Class 12. Quantitative Methods of Describing Systems in Healthcare.			2		2		

13	Class 13. Qualitative Methods of System Analysis				2		2		
14	Class 14. Methods of Formalized Representation of Systems				2		2		
15	Class 15. System Modeling				2		2		
16	Class 16. Biotechnical Systems				2		2		
17	Class 17. Simulation				2		2		
18	Class 18. Decision-making models for managing complex systems. Automated control systems for medical and biological purposes				2		2		
	Total:	1	-	-	36	-	36		Credit

### III. STRUCTURE AND CONTENT OF THE THEORETICAL PART OF THE COURSE

Lectures are not included in the curriculum

### IV. STRUCTURE AND CONTENT OF THE PRACTICAL PART OF THE COURSE AND INDEPENDENT WORK

**Practical exercises (36 hours, including 10 hours with the use of MAO)**

**Class 1. Subject and Methods of Systems Theory. Types and Properties of Systems (2 hours)**

The subject of systems theory.

Methods of Systems Theory.

Types of systems.

Properties of systems: integrity, complexity, coherence, structure, organization, diversity. Nonlinear dynamical systems.

**Class 2. The Concept of Structure in Systems Theory (2 hours)**

Identical structures in nature. The concept of a field. The structure of the field according to B. Russell, its application to the theory of systems. The concepts of "isomorphism" and "homomorphism". Structure Identity as a Classification Feature.

**Class 3. Basic Methods of Systems Theory (2 hours)**

The sequence in which the system analysis is performed. Methods of system analysis: the method of black box, the method of decomposition, the method of analogies, the principle of modeling, the evolutionary method, the expert method, methods of statistical analysis of connections. Methods of System Description and Analysis.

**Class 4. Cybernetic Systems. The Concept of Structure in Systems Theory (2 hours)**

The Concept of Cybernetic Systems.  
Structure in Systems Theory.

**Class 5. Freedom and expediency of systems. (2 hours)**

Measuring the freedom of systems.  
Goal as an objective system category.

**Class 6. Synthetic Method in Systems Theory. System Analysis Tasks (2 hours)**

Synthetic Method in Systems Theory.  
Characteristics of system analysis tasks.  
Features of System Analysis Tasks.

**Class 7. Methods of Systems Research (2 hours)**

Analysis and synthesis are methods of systems research.  
System Analysis Procedures.

**Class 8. Methods of System Analysis in Relation to Solving the Problems of Organizing Medical Care for the Population. (2 hours)**

Methods, technologies, procedures and criteria for the formation of the structure of the health care system for different levels of complexity of the organization of society: at the level of individuals; at the level of different social groups; at the level of social strata; at the level of social institutions and the state as a whole.

**Class 9. Stages of Systems Research. Characteristics and Classification of Scientific Research (2 hours)**

Stages of systems research.

Characteristics and classification of scientific research from the standpoint of the methodology of system analysis.



**Class 10. System Regularities as a Basis for Constructing Mechanisms for Managing Complex Socio-Medical Systems (2 hours)**

System patterns.

Regularities of the system organization of health care.

**Class 11. Particular Methods of System Analysis in Relation to Problem Solving in the Field of Medical Services (2 hours)**

Homeostasis in social structures, as a central concept and law for determining the level, volume, and nature of needs for medical services, in different layers of social organization.

**Class 12. Quantitative Methods of Describing Systems in Healthcare. (2 hours)**

1. Levels of system description.
2. Higher levels of system description.
3. Lower levels of system description.
4. Cybernetic approach to the description of systems.

**Class 13. Qualitative Methods of System Analysis (2 hours)**

1. Morphological methods.
2. Method of expert assessments.
3. Scenario development.
4. Evaluation of systems using the "Delphi" method.
5. Goal tree method.

**Class 14. Methods of Formalized Representation of Systems (2 hours)**

Descriptive

Graphic

Model

Using 3-D technologies.

**Class 15. Systems modeling. (4 hours)**

1. Types of models.
2. Model properties.
3. Model development.
4. Models of Scientific Research in Healthcare.
5. Performance Assessment Models.

**Class 16. Biotechnical Systems (2 hours)**

Analysis and synthesis of biotechnical systems.

Study of a Biological Object from the Standpoint of Systems Theory

**Class 17. Simulation (2 hours)**

The essence of simulation.

Composition of discrete systems.

An example of building a simulation model for analyzing the reliability of a complex system.

**Class 18. Decision-making models in the management of complex systems. Automated control system for medical and biological purposes (2 hours)**

Control systems (ACS, ACS). Stages of management.

The main types of models in management in the system "health care – health of the population".

Principles of building management decision-making systems in healthcare, examples of automated control systems for medical and biological purposes. Examples of Telemetry, Diagnostics, and Condition Management Systems

**Schedule of independent work in the discipline**

<b>№ p/n</b>	<b>Due Date/Deadlines</b>	<b>Type of independent work</b>	<b>Approximate time limits for execution</b>	<b>Form of control</b>
1	Week 1-6	Preparation of abstracts	12 hours	Protection
2	Week 7-12	Preparing a presentation	12 hours	Protection
3	Week 13-18	Preparation for the test	12 hours	Credit

Students' independent work consists of preparing for practical classes, working on recommended literature, writing reports on the topic of the seminar, preparing presentations and essays.

The teacher offers each student individual and differentiated assignments. Some of them can be carried out in a group (for example, the preparation of a report and a presentation on the same topic can be done by several students with a division of their responsibilities - one prepares the scientific and theoretical part, and the second analyzes the practice).

**Recommendations for Student Self-Study**

The purpose of the student's independent work is to work meaningfully and independently, first with educational material, then with scientific information, to lay the foundations of self-organization and self-education in order to instill the ability to continuously improve their professional qualifications in the future.

The process of organizing students' independent work includes the following stages:

- preparatory (definition of goals, drawing up a program, preparation of methodological support);
- the main one (implementation of the program, the use of techniques for searching for information, assimilation, processing, application, transfer of knowledge, recording the results, self-organization of the work process);
- final (assessment of the significance and analysis of the results, their systematization, assessment of the effectiveness of the program and methods of work, conclusions on the directions of labor optimization).

In the process of independent work, the student acquires the skills of self-organization, self-control, self-management, self-reflection and becomes an active independent subject of educational activity. Independent work of students should have an important impact on the formation of the personality of the future specialist, it is planned by the student independently. Each student independently determines the mode of his work and the measure of work spent on mastering the educational content in each discipline. He performs extracurricular work according to a personal individual plan, depending on his preparation, time and other conditions.

#### **Methodical recommendations for students' independent work**

In the course of mastering the material on the subject of the discipline, it is planned to perform independent work of students on the collection and processing of literary material to expand the field of knowledge in the discipline studied. For the study and full mastering of the program material in the discipline, educational, reference and other literature recommended by this program, as well as specialized periodicals, are used.

In self-study, students take notes on the material, independently study questions on the topics covered, using educational literature from the proposed list, periodicals, scientific and methodological information, databases of information networks (Internet, etc.).

Independent work consists of such types of work as studying material from textbooks, reference books, video materials and presentations, as well as other reliable sources of information; Preparation for the test.

#### **List of Types of Student's Independent Work**

Preparation for a practical lesson, preparation of a report on a selected aspect of the topic or selection of practical material for participation in a discussion constitute the content of the student's independent work. Professional literature, educational and methodological support of the discipline can become material for

training. Forms of current control: survey, group discussion, control tasks, presentation of the report.

Assessment of knowledge and skills is carried out at an intermediate control point after passing the relevant section of the discipline. For the methodological support of the development of the discipline, the department develops teaching aids (recommendations and instructions for students and teachers, etc.), where the goals and methods of conducting classes are described in detail.

Independent work of students includes the study of teaching aids, materials, work on the Internet, which makes it possible to form appropriate skills and is the foundation for making rational management decisions in the economic field of healthcare. The active use of computer-based training and control technologies in the educational process contributes to the formation of students' skills to use modern innovative educational programs.

### **Guidelines for writing and formatting an abstract**

An abstract is a creative activity of a master's degree, which reproduces in its structure research activities to solve theoretical and applied problems in a certain branch of scientific knowledge. For this reason, coursework is the most important component of the educational process in higher education.

An essay, being a model of scientific research, is an independent work in which the master solves a problem of a theoretical or practical nature, applying scientific principles and methods of this branch of scientific knowledge. The result of this scientific research can 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 a report at a scientific and practical conference, as well as in the form of a scientific article.

The abstract 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 one's actions, conscientiousness, competence are the personal qualities that characterize the subject of research activities that correspond to the ideals and norms of modern science.

An abstract is an independent educational and research activity of a master's student. The instructor provides advice and evaluates the process and results. He provides an approximate topic of abstract work, clarifies the problem and research topic together with the resident, helps to plan and organize research activities, appoints the time and the minimum number of consultations.

The teacher accepts the text of the essay for review at least ten days before the defense.

Traditionally, there is a certain structure of the abstract, the main elements of which, in the order of their arrangement, are the following:

1. Title page.
2. Task.
3. Table of Contents.
4. List of symbols, symbols and terms (if necessary).
5. Introduction.
6. Main part.
7. Conclusion.
8. References.
9. Applications.

The title page indicates: educational institution, graduating department, author, teacher, research topic, place and year of the abstract.

The title of the abstract should be as brief as possible and fully correspond to its content.

The table of contents (contents) reflects the names of the structural parts of the abstract and the pages on which they are located. It is advisable to place the table of contents at the beginning of the work on one page.

The presence of a detailed introduction is a mandatory requirement for the abstract. Despite the small volume of this structural part, its writing causes significant difficulties. However, it is the high-quality introduction that is the key to understanding the entire work, testifying to the professionalism of the author.

Thus, the introduction is a very important part of the abstract. The introduction should begin with a justification of the relevance of the chosen topic. When applied to an abstract, the concept of "relevance" has one peculiarity. How the author of the essay is able to 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 training.

In addition, in the introduction, it is necessary to identify the methodological base of the abstract, name the authors whose works formed the theoretical basis of the study. A review of the literature on the topic should show the author's thorough familiarity with specialized literature, his ability to systematize sources, critically consider them, highlight the essential, and determine the main thing in the current state of study of the topic.

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

The introduction concludes with a statement of general conclusions about the scientific and practical significance of the topic, the degree of its study and provision with sources, and the formulation of a hypothesis.

In the main part, the essence of the problem is stated, the topic is revealed, the author's position is determined, factual material is provided as an argument and to illustrate the proposed provisions. The author needs to demonstrate the ability to consistently present the material while simultaneously analyzing it. Preference is given to the main facts rather than small details.

The abstract ends with the final part, which is called the "conclusion". Like any conclusion, this part of the abstract plays the role of a conclusion conditioned by the logic of the research, which is in the form of a synthesis of the scientific information accumulated in the main part. This synthesis is a consistent, logically harmonious presentation of the results obtained and their correlation with the general goal and specific tasks set and formulated in the introduction. It is here that the so-called "inferential" knowledge is contained, which is new in relation to the original knowledge. The conclusion may include suggestions of a practical nature, thereby increasing the value of the theoretical materials.

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

After the conclusion, it is customary to place a bibliographic list of the references. This list is one of the essential parts of the abstract and reflects the independent creative work of the author of the abstract.

A list of the sources used is placed at the end of the work. It is drawn up either in alphabetical order (by the author's surname or the title of the book), or in the order in which references appear in the text of the written work. In all cases, the full title of the work, the names of the authors or the editor of the publication, if a team of authors participated in the writing of the book, data on the number of volumes, the name of the city and publishing house in which the work was published, the year of publication, the number of pages are indicated.

### **Guidelines for Preparing Presentations**

To prepare a presentation, it is recommended to use: PowerPoint, MS Word, Acrobat Reader, LaTeX beamer package. The simplest program for creating

presentations is Microsoft PowerPoint. To prepare a presentation, it is necessary to process the information collected when writing an abstract.

Sequence of presentation preparation:

1. Clearly state the purpose of the presentation.
2. Determine what the format of the presentation will be: live performance (how long it will be) or e-mailing (what will be the context of the presentation).
3. Select all the content for the presentation and build a logical chain of presentation.
4. Identify the key points in the content of the text and highlight them.
5. Determine the types of visualization (pictures) to be displayed on slides in accordance with the logic, purpose and specifics 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.

Types of visualization include illustrations, images, diagrams, tables. An illustration is a representation of a real-life visual series. Images, as opposed to illustrations, are metaphors. Their purpose is to evoke an emotion and create an attitude towards it, to influence the audience. With the help of well-thought-out and presented images, information can stay in a person's memory for a long time. Diagram – visualization of quantitative and qualitative relationships. They are used for convincing demonstration of data, for spatial thinking in addition to logical thinking. A table is a concrete, visual and accurate display of data. Its main purpose is to structure information, which sometimes makes it easier for the audience to perceive the data.

*Practical tips for preparing a presentation*

- printed text + slides + handouts are prepared separately;
- Slides – visual presentation of information, which should contain a minimum of text, a maximum of images that carry a semantic load, look clear and simple;
  - 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: topic, surname and initials of the speaker; Communication plan brief conclusions from all that has been said; list of references;
  - Handouts – should provide the same depth and reach as a live performance: people trust what they can take with them more than fading images, words and slides

are forgotten, and the handouts remain a constant tangible reminder; It is important to hand out handouts at the end of the presentation; Handouts should be different from slides, they should be more informative.

### **Criteria for evaluating the abstract**

The stated understanding of the abstract as an integral author's text determines the criteria for its evaluation: novelty of the text; the reasonableness of the choice of source; the degree of disclosure of the essence of the issue; compliance with the design requirements.

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

**Degree of disclosure of the essence of the issue:** a) correspondence of the plan to the topic of the abstract; b) correspondence of the content to the topic and outline of the abstract; c) completeness and depth of knowledge on the topic; d) the validity of the ways and methods of working with the material; f) the ability to generalize, draw conclusions, compare different points of view on one issue (problem).

**Validity of the choice of sources:** a) assessment of the literature used: whether the most famous works on the topic of research (including journal publications of recent years, the latest statistical data, summaries, references, etc.) are involved.

**Compliance with formatting requirements:** a) how correctly the references to the literature used, the list of references; b) assessment of literacy and culture of presentation (including spelling, punctuation, stylistic culture), knowledge of terminology; c) compliance with the requirements for the length of the abstract.

**The reviewer should clearly formulate** a comment and questions, preferably with references to the work (it is possible to specific pages of the work), to research and factual data that the author did not take into account.

**The reviewer can also indicate:** whether the Master's student has addressed the topic before (essays, written works, creative works, Olympiad works, etc.) and whether there are any preliminary results; how the graduate conducted the work (plan, intermediate stages, consultation, revision and revision of what was written or the absence of a clear plan, rejection of the recommendations of the supervisor).



The Master's student submits an abstract for review no later than a week before the defense. The reviewer is the teacher. Experience shows that it is advisable to familiarize the Master's student with the review a few days before the defense. Opponents are appointed by a teacher from among the masters. 10-20 minutes is enough for an oral presentation (this is about the time it takes to answer the exam tickets).

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

**Grade 4** – the main requirements for the abstract and its defense have been met, but at the same time there are shortcomings. In particular, there are inaccuracies in the presentation of the material; there is no logical consistency in judgments; the volume of the abstract is not maintained; there are omissions in the design; Incomplete answers were given to additional questions during the defense.

**Grade 3** – there are significant deviations from the requirements for abstracting. In particular: the topic is covered only partially; factual errors were made in the content of the abstract or when answering additional questions; There is no conclusion during the defense.

**Grade 2** – the topic of the abstract is not disclosed, a significant misunderstanding of the problem is revealed.

**Grade 1** – abstract not submitted

### **Topics of abstracts and presentations**

1. Structure of the Cybernetic System.
2. The Law of Necessary Diversity as Formulated by W. Ashby. The Applied Significance of the Law of Necessary Diversity.
3. Control Functions in a Cybernetic System.
4. The concept of homeostasis, its significance for the practice of health management.
5. Control characteristics: controllability, achievability, stability.
6. B. Russell's contribution to the development of the conceptual apparatus of systems theory.
7. The Concept of Field Structure and Its Application in Systems Theory.
8. Isomorphism: Definition, Examples, Application. Homomorphism: definition, examples.

9. The essence of classification from the standpoint of systems theory. Concepts of Relation and Field in Systems Theory.

10. The same and different structures in nature, in the economy, in public health.

11. Theoretical analysis of the content of the category "freedom of the system". Correlation of the concepts of freedom and entropy of systems.

12. Scientific definitions of the category of freedom of the system, peculiarities of their application. Absolute Indicators of System Freedom: Calculation Algorithm, Application Features. Relative Indicators of System Freedom: Calculation Algorithm, Features of Application in Medicine.

13. The concept of an adaptive system. The Meaning of Freedom for Adaptive Systems. Theoretical and Applied Significance of the Scientific Category of "System Freedom" for Public Health Purposes.

14. Application of System Analysis Methods in Program Development in health care.

### **Criteria for Evaluating the Performance of Independent Work**

*Evaluation of independent works* is carried out according to the following criteria:

- completeness and quality of completed tasks;
- • Mastery of methods and techniques of computer modeling in the issues under study, the use of software tools;
- the quality of the report, the use of rules and standards for the preparation of text and electronic documents;
- use of data from domestic and foreign literature, Internet sources, regulatory and legal information and best practices;
- No factual errors related to understanding the problem.

When assessing the knowledge of **masters**, not only the amount of knowledge is taken into account, but, first of all, the quality of assimilation of the material, understanding of the logic of the academic discipline, the ability to freely, competently, logically coherently present what has been studied, the ability to defend one's own point of view with arguments.

The answer to independent tasks, in which the material is presented systematically, logically and consistently, is graded as "excellent".

A "good" assessment presupposes knowledge of the material and the ability to draw independent conclusions, comment on the material presented; A response with minor flaws.

"Satisfactory" is the assessment of the assimilation of the material when the student has not studied some sections deeply enough, allows unclear formulations, gives incomplete answers.

"Unsatisfactory" is given in the case when the student does not know a significant part of the educational material, makes significant mistakes; Knowledge is haphazard.

### **Criteria for evaluating the abstract**

- 100-86 points are given to the student if the student expressed his opinion on the formulated problem, argued it, accurately determining its content and components. The data of domestic and foreign literature, statistical data, information of a regulatory and legal nature are given. The student knows and possesses the skill of independent research work on the research topic; methods and techniques of analysis of theoretical and/or practical aspects of the field under study.

- 85-76 points - the work is characterized by semantic integrity, coherence and consistency of presentation; No more than 1 mistake was made in explaining the meaning or content of the problem. For argumentation, the data of domestic and foreign authors are given. Research skills and abilities have been demonstrated. There are no factual errors related to understanding the problem.

- 75-61 points - the student conducts a fairly independent analysis of the main stages and semantic components of the problem; understands the basic foundations and theoretical justification of the chosen topic. The main sources on the topic under consideration are involved. No more than 2 errors were made in the meaning or content of the problem.

- 60-50 points - if the work is a paraphrase or a completely rewritten source text without any comments or analysis. The structure and theoretical component of the topic are not disclosed. Three or more than three mistakes have been made in the semantic content of the problem being disclosed.

## **V. EDUCATIONAL AND METHODOLOGICAL SUPPORT OF STUDENTS' INDEPENDENT WORK**

Independent work is defined as individual or collective learning activities carried out without the direct supervision of the teacher, but according to his tasks and under his supervision. Independent work is a cognitive learning activity, when the sequence of the student's thinking, his mental and practical operations and actions depends and is determined by the student himself.

Independent work of students contributes to the development of independence, responsibility and organization, a creative approach to solving

problems at the educational and professional levels, which ultimately leads to the development of the skill of independent planning and implementation of activities.

The purpose of students' independent work is to acquire the necessary competencies in their field of training, experience in creative and research activities.

Forms of independent work of students:

- work with basic and additional literature, Internet resources;
- independent acquaintance with the lecture material presented on electronic media in the library of the educational institution;
- preparation of abstract reviews of periodical sources, reference notes predetermined by the teacher;
- search for information on the topic with its subsequent presentation to the audience in the form of a report, presentations;
- preparation for classroom tests;
- doing home tests;
- performing test tasks, solving problems;
- compilation of crosswords, schemes;
- preparation of reports for presentation at a seminar or conference;
- filling out a workbook;
- writing essays, term papers;
- preparation for business and role-playing games;
- resume writing;
- preparation for tests and exams;
- other Views Activities Organized and carried out by the educational institution and student self-government bodies.

## VI. MONITORING THE ACHIEVEMENT OF THE COURSE OBJECTIVES

Item No	Supervised modules/sections/topics of the discipline	Codes and Stages of Competency Formation		Valuation Tools – Name	
				Current control	Intermediate Attestation
1	Subject and Methods of Systems Theory. Types and properties	PP-5.1; PC-5.2; PC-5.3; PP-6.1; PC-6.2; PP-6.3	Knows	Interview UO-1, abstract PR-4	Credit Questions 1-3
			Can	Tests PR-1, essay PR-3, case problems PR-11, presentation	
			Owens	Small Group Work, UO-3	
2		PP-5.1; PC-5.2;	Knows	Interview UO-1, abstract PR-4	Credit Questions 4-6

	The Concept of Structure in Systems Theory	PC-5.3; PP-6.1; PC-6.2; PP-6.3	Can	Tests PR-1, essay PR-3, case problems PR-11, presentation	
			Owns	Small Group Work, UO-3	
3	Basic Methods of Systems Theory	PP-5.1; PC-5.2; PC-5.3; PP-6.1; PC-6.2; PP-6.3	Knows	Interview UO-1, abstract PR-4	Credit Questions 7-9
			Can	Tests PR-1, essay PR-3, case problems PR-11, presentation	
			Owns	Small Group Work, UO-3	
4	Cybernetic systems. The Concept of Structure in Systems Theory	PP-5.1; PC-5.2; PC-5.3; PP-6.1; PC-6.2; PP-6.3	Knows	Interview UO-1, abstract PR-4	Credit Questions 10-12
			Can	Tests PR-1, essay PR-3, case problems PR-11, presentation	
			Owns	Small Group Work, UO-3	
5	Freedom and Expediency of Systems	PP-5.1; PC-5.2; PC-5.3; PP-6.1; PC-6.2; PP-6.3	Knows	Interview UO-1, abstract PR-4	Credit Questions 13-15
			Can	Tests PR-1, essay PR-3, case problems PR-11, presentation	
			Owns	Small Group Work, UO-3	
6	Synthetic Method in Systems Theory. Tasks of System Analysis	PP-5.1; PC-5.2; PC-5.3; PP-6.1; PC-6.2; PP-6.3	Knows	Interview UO-1, abstract PR-4	Credit Questions 16-18
			Can	Tests PR-1, essay PR-3, case problems PR-11, presentation	
			Owns	Small Group Work, UO-3	
7	Methods of Systems Research	PP-5.1; PC-5.2; PC-5.3; PP-6.1; PC-6.2; PP-6.3	Knows	Interview UO-1, abstract PR-4	Credit Questions 19-21
			Can	Tests PR-1, essay PR-3, case problems PR-11, presentation	
			Owns	Small Group Work, UO-3	
8	Methods of System Analysis in Relation to Solving the Problems of Organizing Medical Care for the Population	PP-5.1; PC-5.2; PC-5.3; PP-6.1; PC-6.2; PP-6.3	Knows	Interview UO-1, abstract PR-4	Credit Questions 22-24
			Can	Tests PR-1, essay PR-3, case problems PR-11, presentation	
			Owns	Small Group Work, UO-3	
9	Stages of systems research. Characteristics and classification of scientific research	PP-5.1; PC-5.2; PC-5.3; PP-6.1; PC-6.2; PP-6.3	Knows	Interview UO-1, abstract PR-4	Credit Questions 25-27
			Can	Tests PR-1, essay PR-3, case problems PR-11, presentation	
			Owns	Small Group Work, UO-3	

10	System Regularities as a Basis for Constructing Mechanisms for Managing Complex Socio-Medical Systems	PP-5.1; PC-5.2; PC-5.3; PP-6.1; PC-6.2; PP-6.3	Knows	Interview UO-1, abstract PR-4	Credit Questions 28-30
			Can	Tests PR-1, essay PR-3, case problems PR-11, presentation	
			Owns	Small Group Work, UO-3	
11	Particular Methods of System Analysis in Relation to Solving Problems in the Field of Medical Services	PP-5.1; PC-5.2; PC-5.3; PP-6.1; PC-6.2; PP-6.3	Knows	Interview UO-1, abstract PR-4	Credit Questions 31-33
			Can	Tests PR-1, essay PR-3, case problems PR-11, presentation	
			Owns	Small Group Work, UO-3	
12	Quantitative Methods for Describing Systems in Healthcare	PP-5.1; PC-5.2; PC-5.3; PP-6.1; PC-6.2; PP-6.3	Knows	Interview UO-1, abstract PR-4	Credit Questions 34-36
			Can	Tests PR-1, essay PR-3, case problems PR-11, presentation	
			Owns	Small Group Work, UO-3	
13	Qualitative Methods of System Analysis	PP-5.1; PC-5.2; PC-5.3; PP-6.1; PC-6.2; PP-6.3	Knows	Interview UO-1, abstract PR-4	Credit Questions 37-39
			Can	Tests PR-1, essay PR-3, case problems PR-11, presentation	
			Owns	Small Group Work, UO-3	
14	Methods of Formalized Representation of Systems	PP-5.1; PC-5.2; PC-5.3; PP-6.1; PC-6.2; PP-6.3	Knows	Interview UO-1, abstract PR-4	Credit Questions 40-42
			Can	Tests PR-1, essay PR-3, case problems PR-11, presentation	
			Owns	Small Group Work, UO-3	
15	System Modeling	PP-5.1; PC-5.2; PC-5.3; PP-6.1; PC-6.2; PP-6.3	Knows	Interview UO-1, abstract PR-4	Credit Questions 43-45
			Can	Tests PR-1, essay PR-3, case problems PR-11, presentation	
			Owns	Small Group Work, UO-3	
16	Biotechnical Systems	PP-5.1; PC-5.2; PC-5.3; PP-6.1; PC-6.2; PP-6.3	Knows	Interview UO-1, abstract PR-4	Credit Questions 46-48
			Can	Tests PR-1, essay PR-3, case problems PR-11, presentation	
			Owns	Small Group Work, UO-3	
17	Simulation	PP-5.1; PC-5.2;	Knows	Interview UO-1, abstract PR-4	Credit Questions 49-50

		PC-5.3; PP-6.1; PC-6.2; PP-6.3	Can	Tests PR-1, essay PR-3, case problems PR-11, presentation	
			Owns	Small Group Work, UO-3	
18	Decision-making models for managing complex systems. Automated control systems for medical and biological purposes	PP-5.1; PC-5.2; PC-5.3; PP-6.1; PC-6.2; PP-6.3	Knows	Interview UO-1, abstract PR-4	Credit Questions 51-52
			Can	Tests PR-1, essay PR-3, case problems PR-11, presentation	
			Owns	Small Group Work, UO-3	

## VII. EDUCATIONAL AND METHODOLOGICAL SUPPORT OF THE DISCIPLINE

### Reference citations

1. Theory of Systems and System Analysis. Textbook / A.M. Korikov, S.N. Pavlov. — M. : INFRA-M, 2019. - 288 p. Access mode: <http://znanium.com/catalog/product/994445>

2. System Analysis: Textbook / A.V. Antonov. — 4th ed., revised and supplemented — M. : INFRA-M, 2018. — 366 p. + Additional materials [Electronic resource; Mode of [access http://www.znanium.com](http://www.znanium.com)]. Mode of access: <http://znanium.com/catalog/product/973927>

3. System Analysis in Management. Textbook / O.V. Bulygina, A.A. Emelyanov, N.Z. Emelyanova, A.A. Kukushkin; Edited by Dr. Econ. Doctor of Science, Prof. A.A. Emelyanova. — 2nd ed., revised and supplemented — M. : FORUM : INFRA-M, 2018. - 450 p. Mode of access: <http://znanium.com/catalog/product/939889>

4. System Theory and System Analysis. Textbook / A.M. Korikov, S.N. Pavlov. Moscow: INFRA-M, 2018. - 288 p.  
Access mode: <http://znanium.com/catalog/product/935445>

5. System Analysis: Textbook / Kornev G.N., Yakovlev V.B. - M.: IC RIOR, NITS INFRA-M, 2016. - 308 p. (in Russian). Mode of access: <http://znanium.com/catalog/product/538715>

6. Kasyanov V.S., Popov V.N., Savchenko I.P. System Analysis in Management: Textbook. Moscow: KnoRus, 2016. — 298 p. — ISBN 978-5-406-05085-9. <https://www.book.ru/book/921600>

### Further reading

1. Introduction to the Theory of Dynamic Systems: Textbook for Higher Educational Institutions / M. G. Yumagulov. St. Petersburg, Lan. - 2016. - 272 p. <http://lib.dvfu.ru:8080/lib/item?id=chamo:777259&theme=FEFU>
2. System Analysis of Medical and Biological Research: Textbook for Higher Educational Institutions. Sary Oskol, TNT. - 2014. - 418 p. (in Russian). <http://lib.dvfu.ru:8080/lib/item?id=chamo:777135&theme=FEFU>
3. Qualimetry and System Analysis: Textbook / V.I. Kirillov. - 2nd ed., ster. - Moscow: NIC Infra-M; МН.: Nov. Knowledge, 2013. - 440 p. (in Russian). <http://lib.dvfu.ru:8080/lib/item?id=Znanium:Znanium-390550&theme=FEFU>
4. Starodubov V. I. Public Health and Public Health. National leadership. GEOTAR-MED. - 2013. - 624 p. Mode of access: <http://www.studentlibrary.ru/book/ISBN9785970426784.html>

### List of resources of the information and telecommunication network "Internet" necessary for mastering the discipline

1. Patent Database and Patent Search <http://www.freepatent.ru/>
2. Internet portal on health care <http://bio.ru/go.mail.ru/search?rf=e.mail.ru&fm=1&us=15&usln=3&usstr=healthcare&usqid=7d41348ea69338f3&hasnavig=1&SBMT=1509229987234&Q=Healthcare>
3. The site of scientific research <https://infopedia.su/4x3e87.html>; <https://dic.academic.ru/dic.nsf/ruwiki/663252>
4. SSAU Electronic Library - <http://library.sgau.ru>
5. NEB - <http://elibrary.ru>  
<http://edu.znate.ru/docs/3997/index-94535-6.html>
6. Student Library <http://www.studmedlib.ru>
7. <http://www.medliter.ru/?page=list&id=09>
8. <http://www.rmj.ru/medjurnrus.htm>
9. Legal reference system Consultant Plus.
10. <http://vladmedicina.ru> Medical portal of Primorsky Krai
11. <http://www.rosminzdrav.ru> Official website of the Ministry of Health of the Russian Federation
12. <http://meduniver.com> Medical website about various fields of medicine

### List of information technologies and software



- Microsoft Office Professional Plus 2010;
- an office suite that includes software for working with various types of documents (texts, spreadsheets, databases, etc.);
- 7Zip 9.20 - free file archiver with high data compression ratio;
- ABBYY FineReader 11 is a software for optical character recognition;
- Adobe Acrobat XI Pro is a software package for creating and viewing electronic publications in PDF format;
- ESET Endpoint Security is a comprehensive protection for Windows-based workstations. Virtualization support + new technologies;
- WinDjView 2.0.2 is a program for recognizing and viewing files with the DJV and DjVu formats of the same name.

## **VIII. METHODOICAL INSTRUCTIONS FOR MASTERING THE DISCIPLINE**

The practical part of the discipline "Systems analysis and management in healthcare" is revealed in practical classes, where the teacher gives the basic concepts of the discipline and the implementation of independent work in the discipline.

Practical exercises of the course are conducted in all sections of the curriculum. Practical work is aimed at developing students' skills of independent research work. In the course of practical classes, the master performs a set of tasks that allow you to consolidate the material on the topic under study.

Active consolidation of theoretical knowledge, carried out as a result of independent study of the material, is facilitated by the discussion of problematic aspects of the discipline in the form of a seminar and classes using active learning methods. At the same time, there is the development of skills of independent research in the process of working with scientific literature, periodicals, the formation of the ability to defend one's point of view with arguments, listen to others, answer questions, and conduct discussions.

**Practical classes** are focused on the most fundamental and problematic issues and are designed to stimulate the development of one's own position on these topics.

In working with students, a variety of means, forms and methods of teaching (information-developing, problem-searching) are used: the method of scientific discussion, conference or round table, analysis of specific educational situations (case study).

### **Conference or Round Table**

When using this method, it is possible to invite various specialists who are engaged in the study of the problem under consideration or work on the topic studied by students. These can be scientists, economists, artists, representatives of public organizations, government agencies, etc.

Before such a meeting, the teacher invites students to put forward a problem of interest to them on this topic and formulate questions for their discussion. If students find it difficult, the teacher can suggest a number of problems and, together with the students, choose the one that is more interesting for them. The selected questions are passed on to the invited specialist of the "round table" to prepare for the presentation and answers. At the same time, several specialists engaged in the study of this problem may be invited to the round table. In order for the round table to be active and engaged, it is necessary to encourage the audience to exchange views and maintain an atmosphere of free discussion.

With the use of all these forms of classes, students get real practice of formulating their point of view, comprehending the system of argumentation, i.e. turning information into knowledge, and knowledge into beliefs and views.

The collective form of interaction and communication teaches students to formulate thoughts in a professional language, to master oral speech, to listen, hear and understand others, and to conduct an argument correctly and reasonably. Teamwork requires not only individual responsibility and independence, but also self-organization of the team's work, demandingness, mutual responsibility and discipline. At such seminars, the subject and social qualities of a professional are formed, the goals of training and educating the personality of a future specialist are achieved.

The peculiarities of collective mental activity are that there is a rigid dependence of the activity of a particular student on a fellow student; it helps to solve the psychological problems of the team; there is a "transfer" of an action from one participant to another; Self-management skills are developed.

There are various forms of organizing and conducting this type of training, such as **a press conference**.

In the previous lesson, the teacher instructs students to individually answer the questions of the practical lesson and collectively discuss options for solving the same situation, which significantly deepens the experience of the trainees. Faced with a specific situation, the trainee must determine whether there is a problem in it, what it is, and determine his attitude to the situation. At the same time, each student should analyze the causes, course and results of the activities carried out by getting

used to the role of specific historical figures. The practical lesson begins with an introductory speech by the teacher, in which the problems for discussion are voiced. In the course of the discussion, each of the students has the opportunity to get acquainted with the options for the solution, listen to and weigh the many of their assessments, additions, changes, enter into a dialogue and discussion.

In the course of discussing the issues of the practical lesson, the analytical skills of the trainers develop, contribute to the correct use of the information at their disposal, develop independence and initiative in decisions.

At the final stage of the lesson, the teacher, correcting the conclusions based on the students' performances, makes general conclusions for each practical task and the overall result for the entire lesson.

### **Method of Scientific Discussion**

The academic group is divided into two subgroups - generators and critics of ideas. There are three more people - expert analysts.

The practical lesson is implemented in four stages:

The first is preparatory (carried out 1-2 weeks before the practical lesson). The teacher instructs about the purpose, content, nature, and rules of participation in the game. Student training includes:

- determination of the purpose of the lesson, specification of the educational task;
- planning the general course of the lesson, determining the time of each stage of the lesson;
- development of criteria for evaluating the received proposals and ideas, which will allow you to purposefully and meaningfully analyze and summarize the results of the lesson.

Mutual criticism and evaluations are strictly forbidden, as they prevent the emergence of new ideas. It is necessary to refrain from actions and gestures that may be misinterpreted by other participants in the session. No matter how fantastic or improbable an idea put forward by any of the participants in the session, it should be met with approval. The more proposals are put forward, the more likely it is that a new and valuable idea will emerge.

Secondly, the lesson begins with the fact that the generators of ideas quickly and clearly characterize the ruler, the situation in the country and express all proposals for solving the named problem;

Third, critics of ideas "attack" - select the most valuable, progressive of them, analyze, evaluate, criticize and include in the list of relevant assumptions that provide a solution to the problem;

Fourth, experts analyze and evaluate the activities of both subgroups, the significance of the ideas put forward.

The goal of the teacher is to organize collective thinking activities to search for non-traditional ways to solve problems, when discussing controversial issues, hypotheses, problem or conflict situations.

When writing essays, it is recommended to find literature for it on your own. The abstract reveals the content of the problem under study. Work on the abstract helps to deepen the understanding of individual issues of the course, to form and defend one's point of view, to acquire and improve the skills of independent creative work, to conduct active cognitive work.

For current control and intermediate certification, an interview and a survey are conducted. To prepare for the test, the list of questions presented in Appendix 2 has been determined.

## **IX. MATERIAL AND TECHNICAL SUPPORT OF DISCIPLINE**

The educational process in the discipline is carried out in lectures, computer classes of the building of the School of Biomedicine of the FEFU campus, equipped with computers and multimedia systems, with connection to the FEFU corporate network and the Internet, the Simulation Center of the FEFU School of Biomedicine.

Material and technical support for the implementation of the discipline includes classrooms for lectures and practical classes, equipped with multimedia support and corresponding to sanitary and contrary rules and regulations.

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

Name of Equipped Premises and Self-Study Rooms	List of Main Equipment
690922, Primorsky Krai, Vladivostok, Russky Island, Saperny Peninsula, Ajax Village, 10, School of Biomedicine, aud. M 419, area 74.9 m <sup>2</sup>	Multimedia audience: Electric Screen 236*147cm Trim Screen Line; DLP projector, 3000 ANSI Lm, WXGA 1280x800, 2000:1 EW330U Mitsubishi; CP355AF Avergence visualizer, MP-HD718 Multipix camcorder; CORSA-2007 Tuarex Specialized Equipment Fastening Subsystem; Video Switching Subsystem: Audio Switching and Sound Reinforcement Subsystem: Power Amplifier, Wireless LAN Based on 802.11a/b/g/n 2x2 MIMO(2SS) Access Points.
690922, Primorsky Krai, Vladivostok, Russky Island, Saperny Peninsula, Ajax Village, 10,	Computer class for 22 workplaces: HP RgoOpe 400 All-in-One 19.5 (1600x900), Core i3-4150T, 4GB DDR3-1600 (1x4GB), 1TB HDD 7200 SATA, DVD+/-RW, GigETh, Wi-Fi, VT, usb kbd/mse, Win7Pro (64-

Oud. M612, area 47.2 m <sup>2</sup>	bit)+Win8.1Pro(64-bit), 1-1-1 Wty (25 pcs.)
Reading rooms of the FEFU Scientific Library with open access to the collection (building A - level 10)	HP RgoOpe 400 All-in-One 19.5 (1600x900), Core i3-4150T, 4GB DDR3-1600 (1x4GB), 1TB HDD 7200 SATA, DVD+/-RW,GigEth,Wi-Fi,VT,usb kbd/mse,Win7Pro (64-bit)+Win8.1Pro(64-bit),1-1-1 Wty Internet access speed 500 Mbps. Workplaces for people with disabilities are equipped with displays and Braille printers; equipped with: portable devices for reading flat-printed texts, scanning and reading machines, a video magnifier with the ability to adjust color spectrums; magnifying electronic magnifiers and ultrasonic markers

## ASSESSMENT FUND

### WOS Passport

Task type	Code and name of professional competence (result of mastering)	Code and name of the competency indicator
Organizational and managerial	PC-5 Ability to assess the effectiveness of a medical organization, develop and select optimal management solutions, develop a business plan for the development of a medical organization, use a process approach in the management of a medical organization, use technological maps of the processes of a medical organization	PC-5.1 Knows the methods of planning a medical organization PC-5.2 Is able to draw up a plan for a medical organization, develop business planning and investment projects PC-5.3 Proficient in planning, development of business planning and investment projects
Organizational and managerial	PC-6 Ability to develop plans and programs, form a system of indicators for the activities of a medical organization, assess the effectiveness of the activities of a medical organization, develop options for management decisions and assess the risks associated with their implementation	PC-6.1 Knows the peculiarities of the formation of the system of indicators of a medical organization PC-6.2 Is able to assess the effectiveness of the activities of a medical organization, taking into account the formed system of indicators PC-6.3 Proficient in the formation of performance indicators, assessment

<b>Code and Competency Statement</b>	<b>Stages of competence formation</b>
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PC-5.1 Knows the methods of planning a medical organization	Knows the methods of planning a medical organization Able to plan the work of a medical organization
PC-5.2 Is able to draw up a plan for a medical organization, develop business planning and investment projects	Knows the rules for drawing up a plan for a medical organization, developing a business plan, an investment project Is able to draw up a plan for a medical organization, develop business planning and investment projects Possesses the skill of drawing up a plan for a medical organization, developing business and investment projects
PC-5.3 Proficient in planning, development of business planning and investment projects	Knows the principles of goal-setting, types and methods of organizational planning and fundamental concepts of financial management, as well as the method of process approach to the management of a medical organization Able to develop corporate, competitive and functional strategies for the development of the organization, develop investment projects and conduct their verification He is proficient in the methods of formulating and implementing strategies at the level of a business unit, developing and implementing marketing programs, as well as methods of investment analysis and analysis of financial markets, a process approach in the management of a medical organization and the possibility of using technological maps of the processes of a medical organization.
PC-6.1 Knows the peculiarities of the formation of the system of indicators of a medical organization	Knows the specifics of the formation of the system of indicators of a medical organization Able to form and fulfill the indicators of a medical organization Possesses the skill of forming and fulfilling the indicators of a medical organization
PC-6.2 Is able to assess the effectiveness of the activities of a medical organization, taking into account the formed system of indicators	Knows the main performance indicators of a medical organization Is able to assess the effectiveness of a medical organization, taking into account the formed system of indicators Possesses the skill of assessing the effectiveness of the activities of a medical organization, taking into account the formed system of indicators
PC-6.3 Possesses the skills of forming performance indicators, assessing their effectiveness, as well as the ability to develop management decisions with an assessment of the risks associated with their implementation	Knows the main performance indicators of a medical organization Is able to generate performance indicators, assess their effectiveness, and assess the risks associated with their implementation Possesses the skills of forming performance indicators, assessing their effectiveness, as well as the ability to develop management decisions with an assessment of the risks associated with their implementation

## VI. MONITORING THE ACHIEVEMENT OF THE COURSE OBJECTIVES

		Valuation Tools – Name
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Item No	Supervised modules/sections/topics of the discipline	Codes and Stages of Competency Formation	Current control	Intermediate Attestation	
1	Subject and Methods of Systems Theory. Types and properties	PP-5.1; PC-5.2; PC-5.3; PP-6.1; PC-6.2; PP-6.3	Knows	Interview UO-1, abstract PR-4	Credit Questions 1-3
			Can	Tests PR-1, essay PR-3, case problems PR-11, presentation	
			Owns	Small Group Work, UO-3	
2	The Concept of Structure in Systems Theory	PP-5.1; PC-5.2; PC-5.3; PP-6.1; PC-6.2; PP-6.3	Knows	Interview UO-1, abstract PR-4	Credit Questions 4-6
			Can	Tests PR-1, essay PR-3, case problems PR-11, presentation	
			Owns	Small Group Work, UO-3	
3	Basic Methods of Systems Theory	PP-5.1; PC-5.2; PC-5.3; PP-6.1; PC-6.2; PP-6.3	Knows	Interview UO-1, abstract PR-4	Credit Questions 7-9
			Can	Tests PR-1, essay PR-3, case problems PR-11, presentation	
			Owns	Small Group Work, UO-3	
4	Cybernetic systems. The Concept of Structure in Systems Theory	PP-5.1; PC-5.2; PC-5.3; PP-6.1; PC-6.2; PP-6.3	Knows	Interview UO-1, abstract PR-4	Credit Questions 10-12
			Can	Tests PR-1, essay PR-3, case problems PR-11, presentation	
			Owns	Small Group Work, UO-3	
5	Freedom and Expediency of Systems	PP-5.1; PC-5.2; PC-5.3; PP-6.1; PC-6.2; PP-6.3	Knows	Interview UO-1, abstract PR-4	Credit Questions 13-15
			Can	Tests PR-1, essay PR-3, case problems PR-11, presentation	
			Owns	Small Group Work, UO-3	
6	Synthetic Method in Systems Theory. Tasks of System Analysis	PP-5.1; PC-5.2; PC-5.3; PP-6.1; PC-6.2; PP-6.3	Knows	Interview UO-1, abstract PR-4	Credit Questions 16-18
			Can	Tests PR-1, essay PR-3, case problems PR-11, presentation	
			Owns	Small Group Work, UO-3	
7	Methods of Systems Research	PP-5.1; PC-5.2; PC-5.3; PP-6.1; PC-6.2; PP-6.3	Knows	Interview UO-1, abstract PR-4	Credit Questions 19-21
			Can	Tests PR-1, essay PR-3, case problems PR-11, presentation	
			Owns	Small Group Work, UO-3	

8	Methods of System Analysis in Relation to Solving the Problems of Organizing Medical Care for the Population	PP-5.1; PC-5.2; PC-5.3; PP-6.1; PC-6.2; PP-6.3	Knows	Interview UO-1, abstract PR-4	Credit Questions 22-24
			Can	Tests PR-1, essay PR-3, case problems PR-11, presentation	
			Owens	Small Group Work, UO-3	
9	Stages of systems research. Characteristics and classification of scientific research	PP-5.1; PC-5.2; PC-5.3; PP-6.1; PC-6.2; PP-6.3	Knows	Interview UO-1, abstract PR-4	Credit Questions 25-27
			Can	Tests PR-1, essay PR-3, case problems PR-11, presentation	
			Owens	Small Group Work, UO-3	
10	System Regularities as a Basis for Constructing Mechanisms for Managing Complex Socio-Medical Systems	PP-5.1; PC-5.2; PC-5.3; PP-6.1; PC-6.2; PP-6.3	Knows	Interview UO-1, abstract PR-4	Credit Questions 28-30
			Can	Tests PR-1, essay PR-3, case problems PR-11, presentation	
			Owens	Small Group Work, UO-3	
11	Particular Methods of System Analysis in Relation to Solving Problems in the Field of Medical Services	PP-5.1; PC-5.2; PC-5.3; PP-6.1; PC-6.2; PP-6.3	Knows	Interview UO-1, abstract PR-4	Credit Questions 31-33
			Can	Tests PR-1, essay PR-3, case problems PR-11, presentation	
			Owens	Small Group Work, UO-3	
12	Quantitative Methods for Describing Systems in Healthcare	PP-5.1; PC-5.2; PC-5.3; PP-6.1; PC-6.2; PP-6.3	Knows	Interview UO-1, abstract PR-4	Credit Questions 34-36
			Can	Tests PR-1, essay PR-3, case problems PR-11, presentation	
			Owens	Small Group Work, UO-3	
13	Qualitative Methods of System Analysis	PP-5.1; PC-5.2; PC-5.3; PP-6.1; PC-6.2; PP-6.3	Knows	Interview UO-1, abstract PR-4	Credit Questions 37-39
			Can	Tests PR-1, essay PR-3, case problems PR-11, presentation	
			Owens	Small Group Work, UO-3	
14	Methods of Formalized Representation of Systems	PP-5.1; PC-5.2; PC-5.3; PP-6.1; PC-6.2; PP-6.3	Knows	Interview UO-1, abstract PR-4	Credit Questions 40-42
			Can	Tests PR-1, essay PR-3, case problems PR-11, presentation	
			Owens	Small Group Work, UO-3	
15	System Modeling	PP-5.1; PC-5.2;	Knows	Interview UO-1, abstract PR-4	Credit Questions 43-45



		PC-5.3; PP-6.1; PC-6.2; PP-6.3	Can	Tests PR-1, essay PR-3, case problems PR-11, presentation	
			Owns	Small Group Work, UO-3	
16	Biotechnical Systems	PP-5.1; PC-5.2; PC-5.3; PP-6.1; PC-6.2; PP-6.3	Knows	Interview UO-1, abstract PR-4	Credit Questions 46-48
			Can	Tests PR-1, essay PR-3, case problems PR-11, presentation	
			Owns	Small Group Work, UO-3	
17	Simulation	PP-5.1; PC-5.2; PC-5.3; PP-6.1; PC-6.2; PP-6.3	Knows	Interview UO-1, abstract PR-4	Credit Questions 49-50
			Can	Tests PR-1, essay PR-3, case problems PR-11, presentation	
			Owns	Small Group Work, UO-3	
18	Decision-making models for managing complex systems. Automated control systems for medical and biological purposes	PP-5.1; PC-5.2; PC-5.3; PP-6.1; PC-6.2; PP-6.3	Knows	Interview UO-1, abstract PR-4	Credit Questions 51-52
			Can	Tests PR-1, essay PR-3, case problems PR-11, presentation	
			Owns	Small Group Work, UO-3	

### Scale for assessing the level of competence formation

Code and Competency Statement	Stages of competence formation		Criteria	Indicators	Points
PC-5 Ability to assess the effectiveness of a medical organization, develop and select optimal management solutions, develop a business plan for the development of a medical organization, use a process approach in the	Knows (Threshold)	Principles of goal-setting, types and methods of organizational planning and fundamental concepts of financial management	Knowledge of the basic concepts of research processes, including business processes in medicine	Ability to explain the main stages of research of a business plan of a medical organization, a process approach in the management of a medical organization	65-71
	Can (Advanced)	develop corporate, competitive and functional strategies for the development of the organization, develop investment projects and conduct their verification	ability to analyze and compare the stages of the process of strategic development of a medical	ability to develop investment projects and conduct their verification based on the use of a process approach in the management of a medical	71-84

management of a medical organization, use technological maps of the processes of a medical organization			organization, business planning and the use of technological maps of the processes of medical activities	organization and the use of technological maps of the processes of medical activities	
	Proficient (High)	methods of formulating and implementing strategies at the level of a business unit, developing and implementing marketing programs, as well as methods of investment analysis and analysis of financial markets.	methods of collecting, processing, analyzing information and their presentation for the implementation of business strategies of a medical organization using technological maps of medical activity processes	Ability to formulate the main stages and explain the tasks for the implementation of marketing programs and analysis of financial markets using the process approach in the management of a medical organization and the use of technological maps of the processes of medical activities	85-100
PC-6 ability to develop plans and programs, form a system of indicators for the activities of a medical organization, assess the effectiveness of the medical organization, develop options for management decisions and assess the risks associated with their	Knows (Threshold)	Fundamentals of planning and principles of organization and implementation of measures to ensure the protection of public health, the main indicators of the activities of a medical organization	the basics of planning measures to ensure the health of the population and is able to assess the effectiveness of the activities of a medical organization	application of the basics of planning measures to ensure the health of the population, the system of indicators of the activities of a medical organization, taking into account management decisions	65-71
	Can (Advanced)	plan measures to ensure the protection of public health; develop plans and programs, form a system of indicators for the activities of a medical organization	properly execute official medical documents, maintain primary medical records, develop options for management	realize measures to ensure the protection of public health, to form a system of indicators for the activities of a medical	71-84

implementation			decisions and assess the risks associated with their implementation	organization, to assess the effectiveness of the activities of a medical organization	
	Proficient (High)	skills in planning, organizing and implementing measures to ensure the protection of public health	skills in preparing the justification of the volume of medical care in accordance with the resources of the medical organization and the needs of the population	substantiation of the scope of medical care in accordance with the resources of the medical organization and the needs of the population, options for management decisions and assessment of risks associated with their implementation	85-100

### **Methodological Recommendations Defining the Procedures for Assessing the Results of Mastering the Discipline**

**Current assessment of students.** It is carried out in accordance with the local regulations of FEFU and is mandatory. It is carried out in the form of control measures: defense of a test work, interviews to assess the actual results of students' learning and is carried out by the leading teacher.

The objects of assessment are:

- academic discipline (activity in classes, timeliness of various types of tasks, attendance of all types of classes in the discipline being certified);
- the degree of assimilation of theoretical knowledge (survey);
- the level of mastery of practical skills and abilities in all types of educational work (colloquium);
- results of independent work.

**Intermediate attestation of students.** It is carried out in accordance with the local regulations of FEFU and is mandatory. It provides for the consideration of the results of all stages of the course. Upon successful completion of the two stages of the current certification, the student is given an intermediate certification (test, exam).

**Test and examination materials.** When assessing students' knowledge, the intermediate control takes into account the amount of knowledge, the quality of their

assimilation, understanding of the logic of the academic discipline, and the place of each topic in the course. The ability to freely, competently, logically coherently present what has been studied, the ability to defend one's own point of view with arguments are evaluated.

*Certification* of students in the discipline "Systems analysis and management in healthcare" is carried out in accordance with the local regulations of FEFU in the form of a test.

### **I. Assessment Tools for Interim Assessment**

Intermediate attestation includes the student's answer to the test questions.

#### **Questions for the test**

1. The concepts of "complex system", "element of a complex system", "level of analysis of a complex system" and their interrelation. Examples.
2. Manifestations of the Time Factor in Complex Systems. Examples.
3. Time as a System-Forming Factor and Temporal Organization of Complex Systems. Examples.
4. Groups of system characteristics, their difference and purpose. Examples.
5. Concepts of phase space (state space) of a complex system, phase trajectory; phase portrait, bifurcation. Examples.
6. System characteristics that reflect the composition and structure of a complex system. Examples.
7. System characteristics that represent integrative (emergent) properties. Examples.
8. System characteristics that depict how a system interacts with its environment. Examples.
9. Groups of characteristics of elements of complex systems. The relationship between the characteristics of elements and the characteristics of systems. Examples.
10. Functional characteristics of elements of complex systems. Examples.
11. Static and Dynamic Characteristics of Elements of Complex Systems, Their Difference. Examples.
12. The concept of linear elements of systems and their characteristics. Examples.
13. The concept of nonlinear elements of systems and their characteristics. Examples.
14. Structure of complex systems. The relationship between the concepts of "structure" and "system". Examples.

15. The main components of the structure of a complex system, the connection with the concept of "level of analysis". Examples.
16. The concept of a "subsystem" as an element of the structure and an element of the system. Examples.
17. Hierarchical levels in a complex system. Examples.
18. The main generalized characteristics of the structure of a complex system. Examples.
19. The Category of Purpose in the Subject Spaces of Philosophy and Systems Theory.
20. K.E. Tsiolkovsky, A.N. Kolmogorov, N.N. Moiseev on the objective nature of goals.
21. Theoretical analysis of the content of the category "system goal".
22. A form of representation of the purpose of the system.
23. Behavior of systems, its conditionality and expediency.
24. Methods for studying the feasibility of systems. Examples
25. Hierarchy of goals of the economic system. Examples
26. Contradiction of the applied and superficial levels in the hierarchy of goals of a commercial enterprise.
27. Methodology for identifying the causes of interaction effects.
28. The place of system analysis in the family of analytical methods of scientific research. Examples
29. Essence and Applied Value of the System Analysis Method.
30. Purpose and result of system analysis.
31. Sequence of system analysis.
32. Methods of system analysis.
33. Sequence of system analysis using the black box method.
34. The Principle of Modeling in System Analysis. Link between system analysis and operations research.
35. Application of the evolutionary method as a method of system analysis.
36. Systematic description of economic analysis.
37. Tasks solved by means of expertise. Sequence of examination.
38. Organization of collective examinations. Trial and brainstorming techniques.
39. Organization of collective examinations. The Delphi Method.
40. Organization of collective examinations. Scenario method and provocation method.

41. The method of mathematical modeling, its importance for systems theory and for management practice.
42. Concepts of Mathematical Model and Economic-Mathematical Modeling.
43. The Role of Modeling in the Process of Cognition.
44. Scope and limits of modeling.
45. Sequence of mathematical model development.
46. The concept of formalism. Examples of formalisms.
47. The essence and distinguishing features of simulation modeling.
48. Basic assumption of simulation modeling.
49. The Essence and Practical Significance of the Method of System Synthesis.
50. Approaches to the synthesis of organizational management systems with specified characteristics.
51. Indicators of centrality and peripherality of an element of the organizational management system.
52. Methodological approaches to the synthesis of state policy of business regulation, public health.

## **II. Assessment Tools for Ongoing Performance Appraisal**

### **Criteria for evaluating the abstract**

- 100-86 points are given to the student if the student expressed his opinion on the formulated problem, argued it, accurately determining its content and components. The data of domestic and foreign literature, statistical data, information of a regulatory and legal nature are given. The student knows and possesses the skill of independent research work on the research topic; methods and techniques of analysis of theoretical and/or practical aspects of the field under study.

- 85-76 points - the work is characterized by semantic integrity, coherence and consistency of presentation; No more than 1 mistake was made in explaining the meaning or content of the problem. For argumentation, the data of domestic and foreign authors are given. Research skills and abilities have been demonstrated. There are no factual errors related to understanding the problem.

- 75-61 points - the student conducts a fairly independent analysis of the main stages and semantic components of the problem; understands the basic foundations and theoretical justification of the chosen topic. The main sources on the topic under consideration are involved. No more than 2 errors were made in the meaning or content of the problem.

- 60-50 points - if the work is a paraphrase or a completely rewritten source text without any comments or analysis. The structure and theoretical component of the topic are not disclosed. Three or more than three mistakes have been made in the semantic content of the problem being disclosed.

**Criteria for Grading a Student in the Discipline "Systems Analysis and Management in Healthcare"**

<b>Assessment of the test</b>	<b>Requirements for the formed competencies</b>
"Passed"	A grade of "passed" is given to a student if he/she knows the material well, presents it competently and to the point, without making significant inaccuracies in answering the question, correctly applies theoretical provisions in solving practical issues and problems, has the necessary skills and techniques for their implementation
"Not passed"	A "failed" grade is given to a student who does not know a significant part of the program material, makes significant mistakes, answers the questions with great difficulty. As a rule, a "failed" grade is given to students who cannot continue their studies without additional classes in the relevant discipline.

**Assessment Tools for Ongoing Attestation**

**The control tests** are intended for Master's students studying the course "Health of the Region's Population and Health Care Priorities".

When working with tests, you are asked to choose one answer option out of three or four proposed. At the same time, the complexity of the tests is not the same. Among the proposed tests, there are tests that contain several options for correct answers. All correct answers must be provided.

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

The results of the test tasks are evaluated by the teacher on a five-point scale for attestation or according to the "pass" - "fail" system. An "excellent" grade is given if you answer more than 90% of the tests offered by the teacher. A "good" score is given if you answer correctly on more than 70% of the tests. The grade is "satisfactory" – with a correct answer to 50% of the proposed tests.

**Test tasks**

**«Systems analysis and management in healthcare»**

**1. An active participant in the directed activity will be called:**

- 1) the subject;
- 2) an observer;

3) Object.

**2. A model is:**

- 1) simplified similarity of the object;
- 2) the object of influence;
- 3) economic phenomenon.

**3. Mathematical Model:**

- 1) description of material objects;
- 2) a system of relations describing the process under study, or phenomenon;
- (3) A conscientious description of something.

**4. Disturbances are:**

- 1) controlled variables;
- 2) uncontrolled variables;
- 3) Managed variables.

**5. The system is:**

- 1) an orderly view of the object of research from the point of view of the set goal;
- (2) a measure of quantitative description;
- (3) the aspect of the object that makes it different or similar to other objects.

**6. A subsystem is:**

- 1) a system that is an element of this system;
- 2) a set of homogeneous elements of the system;
- 3) an object that performs certain functions.

**7. The structure of the system is:**

- 1) a type of feedback;
- 2) an object influencing the results of functioning;
- 3) stable orderliness in space and time of its elements and connections

between them.

**8. Methods of constructing a mathematical model are:**

- 1) analytical and statistical;
- 2) object and identification;
- 3) structural and graphic.

**9. Extrapolation is:**

- 1) disseminating the results of the observations obtained on one part of the phenomenon to another part of it;
- 2) the question of the causes of the changes that naturally arises;



3) non-stationary system.

**10. A system, the state of which practically does not change during a certain period of its existence, is called:**

- 1) a dynamic system;
- 2) static system;
- 3) internal system.

**11. The process of processing input information into output information is called:**

- 1) the functioning of the system;
- 2) the state of the system;
- 3) the coefficient of the system.

**12. A system in which some element plays the main role in the functioning of the system is called:**

- 1) the leading part of the system;
  - 2) a decentralized system;
- and (3) a centralized system.

**13. If there are non-0 free members of the system, the system is called:**

- 1) homogeneous;
- 2) heterogeneous;
- 3) joint.

**14. A system with at least one solution is called:**

- 1) homogeneous;
- 2) heterogeneous;
- 3) joint.

**15. A homogeneous system will always:**

- 1) joint;
- (2) non-joint;
- 3) indefinite.

**16. If two systems have the same set of solutions, such systems are called:**

- 1) homogeneous;
- 2) joint;
- 3) equivalent.

**17. Consideration of a system from the point of view of its behavior in the environment in order to achieve goals is called:**

- 1) systematic-functional approach;
- 2) systematic-elemental approach;

3) system-structural approach.

**18. Rigorous scientific knowledge of the world of systems and explanation of the origin of the structure and functioning of systems of various nature is called:**

- 1) systems theory;
- 2) system analysis;
- 3) by the system method.

#### **Test Evaluation Criteria**

Assessment is carried out in an e-learning session on a hundred-point scale.

The test includes 100 tasks, with a maximum test score of 100.

Within the framework of the current level of knowledge assimilation in the discipline, a test result of at least 61 points is allowed.