LECTURE COMPLEX

Discipline: Basics of scientific research
Discipline code: BSR 5201
Name and code of the OP: 6B10101 "General Medicine"
Amount of study hours/credits: 150/5
Course and semester of study: 5 / 9
The volume of lectures: 10 hours.

2025 y.

The lecture complex was developed in accordance with the working curriculum of the discipline (syllabus) " Basics of scientific research " and discussed at a meeting of departments:

"Social health insurance and public health"

Protocol No. 16 from "26" 06 2025 y.

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LECTURE No. 1

1. Topic: The concept of science. Classification of sciences.

2. Purpose: Review key concepts, stages, and features related to the lecture topic.

3. Lecture abstracts:

The concept of science. The concept of “science” has several basic meanings.

Science is a sphere of human activity aimed at developing and systematizing new knowledge about nature, society, thinking, and cognition of the surrounding world.

Science is the result of such activity—a system of acquired scientific knowledge.

Science is a form of social consciousness, a social institution. In this sense, it represents a system of interrelationships between scientific organizations and members of the scientific community, and also includes systems of scientific information, norms, and values of science, etc.

The immediate goals of science are:

• to obtain knowledge about the objective and subjective world,

• to comprehend objective truth.

The tasks of science are:

• to collect, describe, analyze, generalize, and explain facts;

• to discover the laws of motion of nature, society, thinking, and cognition;

• systematizing the knowledge obtained;

• explaining the essence of phenomena and processes;

• predicting events, phenomena, and processes;

• establishing directions and forms of practical application of the knowledge obtained.

Classification of sciences. The classification of sciences given by F. Engels in Dialectics of Nature is the most well-known. Based on the development of moving matter from lower to higher forms, he distinguished mechanics, physics, chemistry, biology, and social sciences.

B.M. Kedrov's classification of sciences is based on the same principle of subordination of forms of motion of matter. He distinguished six basic forms of motion of matter: subatomic-physical, chemical, molecular-physical, geological, biological, and social.

Currently, depending on the sphere, subject, and method of cognition, sciences are divided into:

• natural sciences – about nature;

• humanities and social sciences – about society;

• logic, gnoseology, epistemology, hermeneutics, etc. – about thinking and cognition.

The list of specialties for which dissertations are defended for the degrees of candidate and doctor of science, the awarding of academic degrees, and the conferral of academic titles includes the following branches of science:

chemical, biological, geological, technical, agricultural, historical, economic, philosophical, philological, geographical, legal, pedagogical, medical, pharmaceutical, veterinary, national security, sociological, public administration, etc.

There are other classifications of sciences. For example, depending on their connection to practice, sciences are divided into fundamental sciences, which explore the basic laws of the objective and subjective world and are not directly oriented toward practice, and

applied sciences, which are aimed at solving technical, industrial, and socio-technical problems.

Statistical compilations usually distinguish the following sectors of science: academic, industrial, university, and factory.

4. Illustrative material: presentation (14 slides are attached)

5. Literature: see Appendix 1.

6. Control questions:

1. Define the concept of "science."
2. How are sciences classified according to the subordination of forms of movement?
3. What is the difference between fundamental and applied scientific research?
4. List the stages of scientific research work.
5. What is a scientific problem?

LECTURE No. 2

1. Topic: Concept of scientific research methods and methodology.

2. Purpose: To familiarize students with the methods and methodology of scientific research.

3. Lecture abstracts:

A scientific research method is a way of understanding objective reality. The method consists of a specific sequence of actions, techniques, and operations.

Depending on the content of the objects being studied, a distinction is made between methods of natural science and methods of social and humanities research.

Research methods are classified by scientific field: mathematical, physical, chemical, biological, medical, socio-economic, etc.

Depending on the level of knowledge, methods are divided into empirical, theoretical, and meta-theoretical levels.

Empirical methods include observation, description, comparison, counting, measurement, questionnaires, interviews, testing, experimentation, modeling, etc.

Theoretical methods include axiomatic, hypothetical, formalization, abstraction, general logical methods (analysis, synthesis, induction, deduction, analogy), etc.

Methods of the metatheoretical level include dialectical, metaphysical, hermeneutic, etc. Some scientists include the method of system analysis at this level, while others include it among general logical methods.

Depending on the sphere of application and the degree of generality, methods are divided into:

universal (philosophical), applicable in all sciences and at all stages of cognition; general scientific, which can be applied in the humanities,

natural sciences, and technical sciences;

particular – for related sciences;

special – for a specific science or field of scientific knowledge.

A distinction should be made between the concept of "method" and the concepts of "technique," "procedure," and "methodology" in scientific research.

Research technique refers to a set of special techniques for using a particular method.

Research procedure refers to a specific sequence of actions, a way of organizing research.

Methodology is a set of ways and techniques for learning.
Any scientific research is done using certain techniques and methods, following certain rules.
The study of the system of these techniques, methods, and rules is called methodology.
The term “methodology” is used in two senses in literature:
a set of methods used in a particular field of activity (science, politics, etc.); the study of the scientific method of cognition.
Each science has its own methodology. There are the following levels of methodology:
1. General methodology, which is universal in relation to all sciences and includes philosophical and general scientific methods of cognition.
2. Specific methodology of scientific research for a group of related sciences, which consists of philosophical, general scientific, and specific methods of cognition.
Methodology of scientific research in a specific science, which includes philosophical, general scientific, specific, and special methods of cognition. The method of comparison will be fruitful if the following requirements are met:
only phenomena between which there may be a certain objective commonality can be compared;

The comparison should be based on the most important and significant characteristics (in terms of the specific task).
Different objects or phenomena can be compared directly or indirectly by comparing them with a third object (reference).
In the first case, qualitative results are usually obtained (greater than, less than; higher than, lower than). Comparisons of objects with a reference standard make it possible to obtain quantitative characteristics. Such comparisons are called measurements.
By means of comparison, information about an object can be obtained in two ways:
the direct result of the comparison (primary information);
the result of processing the primary data (secondary or derivative information).
Measurement is the determination of the numerical value of a quantity by means of a unit of measurement. Measurement involves the following basic elements: the object being measured, the reference standard, and the measuring instrument.
Measurement is the determination of the numerical value of a quantity by means of a unit of measurement. Measurement requires the following basic elements: the object of measurement, a standard, measuring instruments, and a measurement method.
Measurement evolved from the operation of comparison, but it is a more powerful and universal means of cognition.
An experiment is a method of studying an object in which the researcher actively and purposefully influences it by creating artificial conditions or using natural conditions necessary to reveal the relevant properties.
The advantages of experimental study of an object over observation are as follows: in the course of an experiment, it is possible to study a phenomenon “in its pure form,” eliminating secondary factors that obscure the main process;
Under experimental conditions, the properties of objects can be studied.
Repeatability of the experiment: tests can be conducted as many times as necessary.

Experiments are conducted in the following cases:
When attempting to discover previously unknown properties of an object.
When verifying the correctness of theoretical constructs.
When demonstrating a phenomenon.
In scientific research, experiments and theory are closely interrelated.
Any disregard for experiments inevitably leads to errors, so the comprehensive deployment of experimental research is one of the most important ways to develop modern science as a whole.
4. Illustrative material: slides in the presentation.
5. Literature: see Appendix -1
Main: see Appendix -1
Additional: see Appendix -1
Electronic resources: see Appendix -1
6. Control questions:
1. Define the concept of “scientific research method.”
2. How are scientific methods classified depending on the content of the objects being studied?
3. How are scientific methods classified depending on the level of knowledge?

LECTURE No. 3
1. Topic: Types of scientific research: types, goals, objectives.
2. Purpose: Consider key concepts, types, and objectives of scientific research.
3. Lecture abstracts:
Types of scientific research: types, goals, objectives
Scientific research is an organized process of acquiring new knowledge aimed at solving theoretical and/or practical problems. Research is classified on various grounds, depending on its goals, approaches, methods, and stages of implementation.
Classification of scientific research:
1. By the nature of the knowledge obtained:
• Fundamental — aimed at obtaining new knowledge without a direct practical goal (example: studying the mechanism of gene action).
• Applied — focused on practical application (example: development of a vaccine or new medical technology).
2. By research objective:
• Descriptive — describe phenomena without searching for causes.
• Analytical — identify relationships and dependencies between phenomena.
• Experimental — aimed at testing hypotheses under controlled conditions.
3. By research methods:
• Qualitative — analyze unmeasurable characteristics (interviews, focus groups).
• Quantitative — operate with measurable data, use statistics (surveys, experiments).
4. By temporal orientation:
Prospective — focused on the future.

• Retrospective — analyze events that have already occurred.
• Cross-sectional (snapshot) — analyze data at a specific point in time.
5. By level of generalization:
Theoretical — create models and theories.
• Empirical — based on observation and data collection.
• Goals of scientific research:
• Acquiring new scientific knowledge;
• Proving or disproving hypotheses;
• Developing new methods, approaches, and technologies;
• Solving specific medical, social, or organizational problems.
Objectives of scientific research:
• Determine the relevance and purpose of the research;
• Formulate a hypothesis;
• Select methods and tools;
• Collect and analyze data;
• Make conclusions and recommendations.
Scientific research is a systematic activity aimed at obtaining new knowledge or refining existing knowledge. The main components of any scientific research are: defining the problem, formulating a hypothesis, selecting research methods, collecting and analyzing data, drawing conclusions, and implementing the results.
The structure of scientific work usually includes: an introduction (with justification of relevance and setting of goals), a literature review, a methodological section, analysis of results, discussion, conclusion, and a list of references. This logical sequence allows for the construction of scientific reasoning and makes the research understandable to an external reader.
Scientific research methods depend on the object and subject of study. They can be theoretical (analysis, synthesis, induction, deduction), empirical (observation, experiment, questioning), mathematical, and statistical. Qualitative and quantitative data analysis helps to identify patterns, test hypotheses, and formulate sound conclusions.
It is important to consider the principles of scientific ethics: honesty, objectivity, reliability of results, respect for the rights of participants, and compliance with citation standards. Violations of scientific ethics (plagiarism, data falsification, duplicate publications) undermine confidence in research results and damage the scientific community.
The effective implementation of scientific results in practice requires an interdisciplinary approach, cooperation with professional communities, and transparency in research. This is particularly important in the field of healthcare, where science should serve to improve the quality of life and health of the population.
4. Illustrative material: slides in the presentation.
5. Literature: see Appendix -1
Main: see Appendix -1
Additional: see Appendix -1
Electronic resources: see Appendix -1
6. Control questions:

1. What is scientific research and what is its main purpose?
2. What is the difference between basic and applied research?
3. Name the main types of scientific research according to the nature of the tasks.
4. What is the difference between qualitative and quantitative research?
5. Give examples of retrospective and prospective studies in medicine.

LECTURE No. 4

1. Topic: Methods for planning scientific research work.

2. Purpose: Explaining to students the specifics of planning research work.

3. Lecture abstracts:

The topic of the research work will relate to a specific scientific field or scientific problem. The scientific field includes the science, scientific complex, or scientific problems on which this research work is based. For example, scientific research carried out by students majoring in “industrial biotechnology” is covered by the general field of “biotechnology.” Among them, specific areas can be identified that are special sections of basic biotechnology: plant biotechnology, microorganism biotechnology, animal cell biotechnology, molecular biotechnology, pharmaceutical biotechnology, medical biotechnology, etc.

A scientific problem (issue) is a set of complex theoretical and/or practical tasks; a set of topics for scientific research. A problem can be sectoral, cross-sectoral, or global. For example, the issue of combating the HIV epidemic is not only interdisciplinary, but also global, affecting the interests of the world community.

A scientific topic is a complex task that requires a solution. Topics can be theoretical, practical, or mixed. Theoretical topics are developed using literary sources. Examples of such topics

- History of biotechnology, ethics in biotechnology, global climate processes, and biotechnology. Practical topics are developed based on the study, generalization, and analysis of production and laboratory research practices. For example, such topics include: biotechnology for yeast production, biotechnology for fermented milk products, biotechnology for cryopreservation of plant and animal cells. Mixed topics cover both theoretical and practical aspects of research. The topic of research work, in turn, may also include certain questions.

A scientific question refers to tasks related to a specific topic. For example, the topic of biotechnology for cryopreservation of biological objects may be related to the following questions: biotechnology for cryopreservation of grain crops; technology for cryopreservation of sperm in animal husbandry; biotechnology for cryopreservation of stem cells, etc. The topics of coursework and final qualification works (theses, master's theses (projects)) are approved at a department meeting. The topic must correspond to the programs and curricula of the academic disciplines.

Planning research work is important for its rational organization. Research organizations and educational institutions develop annual work plans for targeted comprehensive programs and long-term scientific and scientific-technical programs based on applications submitted by research customers. The scientific work of departments at

educational institutions is organized and conducted in accordance with the work plan for the academic year. Professors and teachers carry out scientific research work according to individual plans. Scientific research work by students (NIRS) is planned in advance. The work plans of educational institutions and departments may include a corresponding section on NIRS. Student scientific circles and groups work according to the plan. In scientific research and educational institutions, work programs and schedules for their implementation are drawn up according to the topics of scientific research work. When preparing monographs, textbooks, teaching aids, and lectures, a plan is developed for the implementation of these works.

4. Illustrative material: slides in the presentation.

5. Literature: see Appendix -1

Main: see Appendix -1

Additional: see Appendix -1

Electronic resources: see Appendix 1

6. Review questions:

1. How is the topic of research work selected?
2. How many stages are involved in planning research work?
3. What is the object (subject) of research?
4. How are the goals and objectives of research work determined?

LECTURE No. 5

1. Topic: Primary sources of scientific information.

2. Purpose: To familiarize students with the main sources of scientific information.

3. Lecture abstracts:

A source of information is a document containing certain information. Documents include various publications that are the main source of scientific information. A publication is a document intended for the dissemination of the information it contains, which has undergone editorial and publishing processing, has been obtained by printing or printing methods, has been independently designed by a printing company, and contains publication details. Sources of scientific information also include unpublished documents: dissertations, manuscripts transferred for storage, reports on scientific research and experimental design developments, scientific translations, and review and analytical materials. Unlike publications, these documents are extensive and not intended for repeated use, are in manuscript form or are reproduced in small quantities, and are printed by machine. All documentary sources of scientific information are primary and secondary

separated. Primary documents contain primary information, the direct results of scientific research (monographs, collections of scientific works, dissertation abstracts, etc.), while secondary documents are the result of analytical and logical processing of primary documents (reference, informational, bibliographic, and other similar publications). Publications are classified according to various criteria:

- by purpose (official, scientific, educational, reference, etc.);
- by degree of analysis of information (informational, bibliographic, abstract, review);

- by material structure (book, magazine, sheet, newspaper, etc.);
- by known nature (text, musical notation, cartographic);
- by volume (books, brochures, sheets);
- by frequency (non-continuous, serial, periodic, ongoing);
- by composition of the main text (monograph, collection);
- by structure (series, single volume, multi-volume, collected works, selected works, etc.).

In scientific research, publications that contain the necessary information on scientific and research work are of greatest interest. These can be scientific, educational, reference, and informational publications.

4. Illustrative material: slides in the presentation.

5. Literature: see Appendix -1

Main: see Appendix -1

Additional: see Appendix -1

Electronic resources: see Appendix -1

6. Control questions:

1. How do you understand the concept of “source of information”?
2. Name the types of scientific publications.
3. What are reference and informational publications? Give an example.
4. Give examples of Internet sources of scientific information and which ones have you tried working with?
5. How is the study of sources of scientific information carried out?

LECTURE No. 6

1. Topic: Types of scientific information and documents.

2. Purpose: Scientific documents and publications. Mastering types of primary and secondary information.

3. Lecture abstracts:

A scientific document is a material object containing scientific and technical information and intended for its storage. Depending on the method of presenting information, documents are divided into the following types: text (books, magazines), graphic (drawings, diagrams, charts), audiovisual (sound recordings, films, and videos), machine-readable (e.g., databases on microform media). In addition, scientific information can be divided into primary and secondary. Primary information includes the direct results of scientific research and development, new scientific data, or new ideas about known concepts. Secondary information contains the results of analytical and logical processing of one or more primary documents. Primary scientific information (as well as secondary information) is divided into published (books, journals, textbooks) and unpublished (dissertations, scientific translations, design documentation). The following documents can be cited as source scientific information:

- book (pages of a non-periodical text publication with a volume of more than 48);
- brochure (non-periodical text publication with a volume of 4 pages, but not more than 48 pages);

- monograph (comprehensive study of a single problem or topic by one or more authors);
- educational publications (non-periodical publications containing systematic scientific and applied information, written in a form convenient for teaching and learning);
- newspapers, magazines, collections of scientific works of universities and institutes (periodicals published within a certain period of time);
- standards, instructions, etc., regulating the scientific and technical level and quality of manufactured products;
- patent documentation (a set of documents containing information about discoveries, inventions, and other types of industrial property, as well as information about the protection of the rights of their inventors).

The following documents can be cited as examples of secondary scientific information:
- reference publications (containing the results of theoretical generalizations, various values and their meanings, materials of a production nature (definitions, dictionaries));
- review publications (analytical, abstract, bibliographic reviews on a specific topic (analytical, abstract, bibliographic reviews) for a specific period of time); abstract publications (consisting of a summary of the original document or part thereof with the main specific data and conclusions (abstract journals, abstract collections));
- bibliographic publications (containing a bibliographic description of published publications).

Secondary unpublished documents include registration cards, dissertation record cards, etc.

4. Illustrative material: slides in the presentation.

5. Literature: see Appendix -1

Main: see Appendix -1

Additional: see Appendix -1

Electronic resources: see Appendix -1

6. Control questions:

1. What is a scientific document and what types of scientific documents do you know?
2. What types of scientific information do you know?
3. How is the library and bibliographic classification of documents carried out?

LECTURE No. 7

1. Topic: Methods for analyzing scientific articles using the IMRaD structure (introduction, methods, results, discussion).

2. Purpose: Develop students' ability to analyze and critically evaluate the structure and content of primary scientific publications according to the IMRaD standard, with an emphasis on methodological rigor, clinical relevance, and ethical soundness.

3. Lecture abstracts:

The IMRaD structure (Introduction — Methods — Results — Discussion) is the international standard for presenting primary research in biomedical and clinical sciences. For practicing physicians, especially those in internship and residency, the ability to quickly and critically analyze scientific publications is not an auxiliary skill, but a basic

one that ensures the application of evidence-based medicine principles in their daily work.

IMRaD analysis is not a formal “filling in of sections,” but rather a check of the logical integrity of the study: Does the method correspond to the stated goal? Are the results sufficiently transparent? Are the conclusions justified by the data?

Below is a step-by-step breakdown of each component, with an emphasis on clinical relevance and typical errors found in publications.

1. Introduction

The introduction should clearly answer three questions:

— What is the clinical or public health problem?

— What is already known, and where are the gaps in knowledge?

— What is the specific objective of this study — and why is this objective important now?

Typical weaknesses: general phrases without reference to the local context, lack of a clear hypothesis or goal, phrases such as “we wanted to study...”.

2. Methods

This section is the basis for trust in the study. It should allow another researcher to replicate the work. The following are particularly important for clinicians:

— Design: randomized controlled trial (RCT), cohort, case-control, cross-sectional — and justification for the choice;

— Inclusion/exclusion criteria: age, ICD diagnosis, comorbidities, exclusion of polypharmacy;

— Intervention or exposure: dose, duration, route of administration, adherence monitoring (e.g., pill counting, MEMS bottles);

— Outcomes: primary and secondary — measurable, validated (e.g., FEV_1, ACT test, number of hospitalizations);

— Statistics: which tests were used — and why (e.g., nonparametric for normality violations); was intention-to-treat (ITT) analysis used?

3. Results

Only facts are presented here — without interpretation. Qualitative presentation includes:

— Point estimates and confidence intervals (e.g., difference −1.4 exacerbations, 95% CI −2.1; −0.7);

— p-value (but not as the sole criterion);

— Number of participants at each stage (CONSORT scheme for RCTs);

— Baseline characteristics (Table 1) — to assess group balance.

Not acceptable: mixing results and interpretation (e.g., “omalizumab significantly improved prognosis” is a conclusion, not a fact).

4. Discussion

Structure:

1. Brief reminder of the main result;
2. Comparison with similar studies (why does it coincide/differ?);
3. Possible mechanisms and clinical significance;

4. Limitations — mandatory, honest, indicating how they could have affected the result (for example: “The open design could have affected subjective outcomes — ACT, quality of life”);

5. Conclusions limited to the scope of the study and specific recommendations for practice/science.

Pay special attention to ethical, gender, and age aspects: for example, if only boys aged 6–8 participated in the study, the conclusions cannot be generalized to girls or adolescents.

Why is this important for you as future doctors?

— You will be making decisions: whether to prescribe a new vaccination schedule, change the screening protocol, or introduce telemedicine monitoring.

— These decisions should be based not on advertising, but on critically evaluated evidence.

— IMRaD analysis is your tool for filtering out “noisy” publications from truly reliable ones.

4. Illustrative material: slides in the presentation.

5. Literature: see Appendix -1.

Main: see Appendix -1

Additional: see Appendix -1

Electronic resources: see Appendix -1

6. Review questions:

1.On a scale of 1 to 5 (1 — not at all sure, 5 — completely sure):

How well can you now distinguish between a correctly formulated research objective in the “Introduction” section and a general, vague formulation? Why did you give this particular rating?

2.Name one element of the “Methods” section that, in your opinion, is most often omitted or insufficiently described in Kazakh/regional publications. Why does this reduce confidence in the results?

3.Give one example where the conclusion in the “Discussion” section goes beyond the data presented in the “Results” section. (You can make one up or recall one from your own experience.)

4. Imagine you are reading an article about a new antibiotic for treating community-acquired pneumonia in children. The “Methods” section does not specify how pneumonia was diagnosed (clinically? X-ray? PCR?). How would this affect your confidence in the results? What would you like to clarify with the authors?

LECTURE No. 8

1. Topic: Fundamentals of scientific ethics.

2. Purpose: Informing students about the basics of scientific ethics.

3. Lecture abstract:

Scientific ethics is a discipline that studies the specifics of moral regulation in the scientific sphere, as well as the set of values, norms, and rules in this sphere. It covers two areas: the first relates to the regulation of relationships within the scientific

community, and the second to the regulation of relationships between society as a whole and science.

The main principles of ethics in the scientific community:

- self-assessment of truth;
- based on the novelty of scientific knowledge;
- freedom of scientific creativity;
- openness of scientific results;
- organized skepticism.

The principle of self-assessment of truth or universality is the orientation of the researcher and scientific activity towards the search for objective knowledge, rather than individual, group, corporate, or national interests. Truth and only truth is the core value of scientific activity. Only one dichotomy has meaning: “true-false”; everything else is outside the realm of science. Whatever truth is obtained in the course of research (whether new or trivial, ‘expected’ or “inconvenient”), it must be published. The truth must be revealed through constantly reproducible research, experiments, or observations and must be consistent with the results of previous research.

The highest authority in determining the validity of the results obtained is the global scientific community, which relies on constantly evolving facts and objective laws of nature, i.e., on accumulated collective scientific knowledge. In science (especially in the exact sciences), the principle of freedom of conscience, which allows each person to believe as they wish, does not apply: science is not a belief, it lives by knowledge. This principle gives rise to one of the mandatory conditions for scientific activity: strict adherence to the rules for obtaining, selecting, processing, and publishing data used in a particular scientific discipline.

The novelty of scientific knowledge. Science advances only through development and develops through continuous education and renewal. Every 10-20 years, the entire body of scientific knowledge is renewed, and materials that are scientific results today become obsolete and are replaced by new scientific results. Thus, the essence and prospects of scientific work are constantly being renewed.

But from a scientific point of view, excellence is not only the common destiny of researchers, but also their common goal. The researcher believes that his followers will continue to develop this work. The need to investigate new facts and develop new hypotheses is based on the researcher's mandatory awareness of previously obtained knowledge in this field of science.

Freedom of scientific creativity is an ideal, but not always achievable, principle of scientific activity. The choice of topics and areas of research that are prohibited for science is not limited; each scientist has their own choice. Any scientific result claiming to be a scientific success must be carefully analyzed and evaluated. In specific cases, the effectiveness of this principle is often limited by both internal factors operating in the scientific environment and external factors—ethical, social, and material factors.

The universality or openness of scientific achievements. The results of fundamental scientific research (not to be confused with inventions) do not contain intellectual property rights, as they belong to all of humanity. Even the author or someone else cannot prohibit the use of scientific results or demand any compensation; only the

author's reference is created by the person who used the material. Accordingly, any scientist who has obtained new results must publish them, since new knowledge is only a component of the scientific picture of the world.

4. Illustrative material: slides in the presentation.

5. Literature: see Appendix -1

Main: see Appendix -1

Additional: see Appendix -1

Electronic resources: see Appendix -1

6. Review questions:

1. What are the basic principles of ethics in the scientific community?
2. How do you understand the concept of "scientific ethics"?
3. What is the meaning of freedom of scientific creativity?
4. What are the norms of scientific ethics?

LECTURE No. 9

1. Topic: Regulatory and legal aspects of organizing scientific activities.

2. Purpose: To familiarize students with the process of organizing scientific work in universities.

3. Lecture abstracts:

The level of organization of research institutions depends on the degree of efficiency of their work. For example, according to American scientists, only by improving the organization of science can the productivity of scientists be increased by 30-40 percent without additional capital investments. The system of organizing the management of various types of scientific institutions, although not unique, has many common problems. If research institutes that develop fundamental problems are the leaders in the system of academic research organizations, then design, technological, experimental, and other educational organizations are subordinate to them.

In addition, the organization of long-term planning, financing, material and technical support, training and placement of personnel, stimulation of scientific work, and ensuring the coordinated work of scientific departments is carried out on the basis of common approaches, with the exception of goals and objectives arising from the specifics of approaches to the study of phenomena not recognized by academic and industrial science, legal, etc. The purpose of managing research institutes and laboratories is as follows:

- selection of the most relevant topics;
- effective use of allocated funds;
- rational organization of work and achievement of maximum results based on minimum costs;
-creating a healthy moral and psychological climate within the team, an atmosphere of creativity and goodwill.

A scientific institution includes management tasks within institutes, as well as the creation of favorable conditions for scientific workers. On the one hand conditions that seem "trivial," such as comfortable furniture, places for rest, conversation, and discussion, good workplace organization, and hygiene, are of great importance for

increasing the efficiency of scientists' work. It is also very important to constantly take care of the everyday life of scientists, in particular, improving their living conditions, ensuring their health, and providing scientific workers with vouchers to rest homes and sanatoriums. The organization of management in research institutions, the approval of the organizational structure of institutes and laboratories, the rights and obligations of the heads of research organizations, the heads of structural divisions, the scientific council, etc. are enshrined in legal acts. The same presidium has created organizations that provide all scientific and organizational work. The National Academy of Sciences of the Republic of Kazakhstan oversees a number of research institutes that directly influence the state of scientific and technological progress in various industries and **conduct research in key areas of science.**

4. Illustrative material: slides in the presentation.

5. Literature: see Appendix -1

Main: see Appendix -1

Additional: see Appendix -1

Electronic resources: see Appendix -1

6. Review questions:

1. How is scientific work organized in universities?
2. What is the management structure of research institutes?
3. What is the role of the director of a research institution?

LECTURE No. 10

1. Topic: The system of training scientific personnel in the Republic of Kazakhstan.

2. Purpose: To give students an understanding of the structure, stages, and mechanisms of training scientific personnel in Kazakhstan, as well as opportunities for professional growth through master's and doctoral programs and scientific research activities.

3. Lecture abstract:

The system for training scientific and scientific-pedagogical personnel in the Republic of Kazakhstan is part of the state policy in the field of science and education. It is based on the principles of continuity, academic mobility, integration with the international scientific community, and the development of research competencies.

Structure of the scientific personnel training system:

1. Levels of training:

• Master's degree – the first level of scientific research training. Graduates receive a Master of Science degree (academic or specialized).

• Doctorate (PhD) – the highest level of training for scientific personnel. The main focus is on conducting original scientific research and defending a dissertation.

2. Bodies and institutions providing training:

• Ministry of Science and Higher Education of the Republic of Kazakhstan – determines policy, financing, and regulatory acts.

• National Center for State Scientific and Technical Expertise (NCSSTE) – project expertise.

• National Scientific Council – selection of priority areas and projects.

• Universities and scientific institutes – implement master's and doctoral programs.
3. Forms of state support:
• State grants (targeted and competitive);
• Scholarships for master's and doctoral students;
• The Bolashak program;
• Support for participation in international internships, publications, and conferences.
4. Scientific certification and thesis defense:
• Defense is conducted in dissertation councils;
• Degree awarding — through the National Agency for Quality Assurance in Education (NAOQE);
• Requirements for publications, indexing, and originality of research.
5. Problems and prospects:
• Shortage of scientific personnel in medicine;
• Uneven distribution of scientific personnel across regions;
• Need to develop academic mobility and international exchange.

4. Illustrative material: slides in the presentation.

5. Literature: see Appendix -1

Main: see Appendix -1

Additional: see Appendix -1

Electronic resources: see Appendix -1

6. Review questions:

1. What levels of training for scientific personnel are provided in Kazakhstan?
2. What is the role of master's and doctoral programs in a scientific career?
3. Which organizations are involved in the management and coordination of scientific personnel training?
4. What is a PhD program and what are its characteristics?
5. What requirements must doctoral students meet in order to defend their thesis?
6. What are the functions of the dissertation council?
7. How is scientific training financed?
8. What forms of international support and exchange exist for young scientists?
9. What problems does the system of training scientific personnel in medicine face?
10. What is the National Scientific Council and what is its role?

Appendix 1

Literature:

Electronic resources, including, but not limited to: databases, animation simulators, professional blogs, websites, other electronic reference materials (video, audio, digests)	Электронная библиотека ЮКМА - https://e-lib.skma.edu.kz/genres Республиканская межвузовская электронная библиотека (РМЭБ) – http://rmebrk.kz/ Цифровая библиотека «Aknurpress» - https://www.aknurpress.kz/ Электронная библиотека «Эпиграф» - http://www.elib.kz/ Эпиграф - портал мультимедийных учебников https://mbook.kz/ru/index/ ЭБС IPR SMART https://www.iprbookshop.ru/auth информационно-правовая система «Заң» - https://zan.kz/ru Medline Ultimate EBSCO eBook Medical Collection EBSCO Scopus - https://www.scopus.com/
Electronic textbooks	Ғылыми зерттеулер негіздері: оқу құралы (2-ші басылым). А.С. Кадыров, И.А. Кадырова, Ж.Ж. Жунусбекова. Қарағанды: «АҚНҰР» баспасы, 2023. – 76 бет./ https://aknurpress.kz/reader/web/1315 Основы научных исследований: монография (2-ое изд.). А.С. Кадыров, И.А. Кадырова. Караганда: издательство «АҚНҰР», 2023. – 310 с./ https://aknurpress.kz/reader/web/1316 Баймагамбетов С.З., Альжанова Р.С.Развитие системы здравоохранения Казахстана на рубеже веков (исторический анализ). – Учебное пособие. – Алматы: Эверо, 2020. https://www.elib.kz/ru/search/read_book/68/ Калиева, А.Б. Методы научных исследований : Учебное пособие. / Павлодарский государственный университет имени С. Торайгырова. - Павлодар: Кереку, 2016. - 90 с. / http://rmebrk.kz/book/1164988 Linda Farber Post, Jeffrey Blustein. Handbook for Health Care Ethics Committees. Ed.: Third edition. Baltimore : Johns Hopkins University Press. 2021 // eBook Collection EBSCO Jose Russo. Tools Of Science, The: The Handbook For The Apprentice Of Biomedical Research. Singapore : World Scientific. 2011 // eBook Collection EBSCO Hegde, M.N., Salvatore, Anthony P. Clinical Research in Communication Disorders, Principles and Strategies. Ed.: Fourth edition. San Diego, CA : Plural Publishing, Inc. 2021 // eBook Collection EBSCO John I. Gallin, Frederick P Ognibene, Laura Lee Johnson. Principles and Practice of Clinical Research. Ed.: Fourth edition. London : Academic Press. 2017 // eBook Collection EBSCO
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