

MINISTRY OF SCIENCE AND HIGHER EDUCATION OF THE RUSSIAN
FEDERATION
FEDERAL STATE AUTONOMOUS EDUCATIONAL
INSTITUTION OF HIGHER EDUCATION
NORTH CAUCASIAN FEDERAL UNIVERSITY

Methodological guidelines

for the completion of practical work
in the discipline

" HISTORY AND PHILOSOPHY OF SCIENCE / ИСТОРИЯ И ФИЛОСОФИЯ
НАУКИ"

for students majoring in 02.04.01 Mathematics and Computer Science
profile "Artificial Intelligence in Cybersecurity"

Stavropol
202 6

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INTRODUCTION

The purpose and objectives of mastering the discipline

The purpose of mastering the discipline "History and Philosophy of Science / История и философия науки" is to develop in future specialists in the field of training 02.04.01 Mathematics and Computer Science, profile "Artificial Intelligence in Cybersecurity" an understanding of the basic methods, means and technologies of effective interaction and the implementation of successful teamwork.

Objectives of the course:

- study of the theoretical foundations of the formation and development of teamwork skills;
- development of skills in managing group projects;
- mastering the skills of effective social interaction, creating a favorable and constructive atmosphere in a team using available information technologies.

List of competencies to be mastered:

Code	Formulation
UK-1	Able to carry out a critical analysis of problematic situations based on a systems approach and develop an action strategy
OPK-1	Capable of conducting methodological and expert work in the field of mathematics and computer science

A list of planned learning outcomes for the discipline, correlated with the planned learning outcomes of the higher education program

Code, formulation of competence	Code, indicator formulation	Planned learning outcomes for the discipline, characterizing the stages of formation of competencies, indicators
UK-1 Able to carry out a critical analysis of problematic situations based on a systems approach and develop an action strategy	ID-1 selects information resources for searching for information in accordance with the assigned educational task	Uses information about the main directions modern science, its problems and theories
UK-1 Able to carry out a critical analysis of problematic situations based on a systems approach and develop an	ID-2 Systematizes information obtained from various sources in accordance with the requirements of the educational task	Capable of analysis scientific texts, justify your

action strategy		attitude to the facts, conclusions and estimates
UK-1 Able to carry out a critical analysis of problematic situations based on a systems approach and develop an action strategy	ID-3 Formulates and argues conclusions and judgments, including using philosophical conceptual apparatus	Uses the skills of analyzing scientific phenomena and processes in accordance with the Modern Methodology of Scientific Research; skills of self-development, self-realization, and the use of creative potential
OPK-1 Capable of conducting methodological and expert work in the field of mathematics and computer science	ID-1 Conducts expert work in mathematics	Conducting analysis and discussion of expert assessments in the field of mathematics
OPK-1 Capable of conducting methodological and expert work in the field of mathematics and computer science	ID-2 Conducts expert work in the field of computer science	Development and discussion of expert assessments in the field of computer science Creation and presentation of teaching materials

STRUCTURE AND CONTENT OF PRACTICAL CLASSES

Practical lesson 1. Science, its specifics and functions.

Objective of the lesson : to systematize knowledge and ideas about the specifics of science and the diversity of forms of knowledge as a human cognitive activity; to be able to distinguish scientific knowledge from non-scientific; to have an understanding of the functioning of science in society; to examine the basic principles of the scientific worldview; to analyze the arguments of anti-scientism and establish its relationship with the values of humanitarian culture

To know: the main directions of modern science, its problems and theories; the content of modern discussions on the problems of scientific development; ethical and social problems of modern science; the basics of logic and methodology of scientific research; the main directions of self-development, self-realization, use of creative potential; significant problems of applied and computer mathematics; existing methods of scientific research in a specific area of professional activity; conduct scientific research based on modern information technologies; methods and examination of scientific research work in the field of mathematics and computer science; legal documents on the protection and defense of rights to the results of intellectual activity.

To be able to: analyze scientific texts, justify one's attitude to the facts, conclusions, and assessments presented therein; acquire new knowledge by applying modern information technologies to develop a strategy for achieving a set goal; identify, formulate, and solve current problems in applied and computer mathematics; conduct an expert examination of scientific research results; and draft documents for an application for a proposed invention.

Possess: skills in analyzing scientific phenomena and processes in accordance with modern scientific research methodology; skills in self-development, self-realization, and utilization of creative potential; skills in collective research and project activities; skills in solving problems in applied and computer mathematics; skills in processing scientific results and ongoing research; methods for conducting scientific research; skills in drafting an application for a proposed invention.

Relevance of the topic: is determined by the philosophical, ideological and logical methodological preparation of future masters for professional and scientific research activities.

Theoretical part

Science is the human activity of generating, systematizing, and verifying knowledge. Only well-verified and substantiated knowledge can be considered scientific. Knowledge becomes scientific when it reaches a certain, sufficiently advanced level, the threshold of scientific validity.

Science begins with the observation of events and facts, and their recording in verifiable statements. The discovery of regularity is an important fact for science, as it allows us to explain and predict phenomena.

The continuity between common knowledge and science, common sense and critical, rational thinking, lies in the fact that scientific thinking arises from common sense assumptions, which are subsequently refined, corrected, or replaced by other propositions. Thus, the common understanding of the sun's motion around the earth, incorporated into the Ptolemaic system ,

and many other assumptions were subjected to criticism and replaced by scientific propositions. In turn, common sense also does not remain static, for over time it incorporates established scientific truths.

Although science begins with an analysis of common sense assumptions that are not particularly well-founded or reliable, in the process of its development it subjects them to rational criticism, using specific empirical and theoretical research methods for this purpose, and thereby achieves progress in understanding and explaining the phenomena under study.

Since science in general and scientific research in particular represent a unique, purposeful activity for the production of new, reliably substantiated knowledge, they must possess their own specific methods, means, and criteria of cognition. These very characteristics distinguish science from both everyday knowledge and its non-scientific forms.

The social functions of science change and develop historically, just like science itself. The development of social functions is an important aspect of science itself. Modern science is fundamentally different from the science that existed half a century ago. The nature of its interaction with society has changed.

In modern science and its interaction with various spheres of society, the following social functions are distinguished:

- Cultural and ideological (the period of the feudal crisis, the emergence of bourgeois social relations, and the formation of capitalism). The influence at this stage was manifested in the sphere of worldview, during the struggle between theology and science;
- as a directly productive force (Middle Ages). Theology gained a place as the supreme authority. In the sphere of nascent science, problems of a private, "earthly" nature remained;
- As a social force—scientific knowledge and methods are increasingly used to solve various problems arising in the course of social development. With the Copernican revolution, science challenged theology's monopoly on determining the formation of worldviews. This marked the first act in the process of scientific knowledge and scientific thinking penetrating the structure of human and social activity; it was here that the first signs of science's emergence into social issues emerged. Within this historical order, functions emerged and expanded.

As for the functions of science as a direct productive force, today they seem not only the most obvious, but also the primary, original ones, taking into account the unprecedented scale and pace of modern scientific and technological progress.

Questions for discussion

Basic level

1. Science as a type of cognitive activity, a social institution and a special sphere of culture.
2. The structure of science.
3. Diversity of forms of knowledge and criteria of scientificity.
4. Science and philosophy.
5. Science and art.
6. Science and the Everyday World.

Elevated level

1. Functions of science in modern culture.
2. Scientism and anti-scientism are ideological positions of the 20th century and their influence on the development of culture.
3. Philosophical foundations of scientism.
4. The role of scientific research in economic knowledge

List of key literature

1. Рузавин Г.И. Методология научного познания [Электронный ресурс]: учебное пособие для вузов / Г.И. Рузавин. – Электрон. текстовые данные. – М.: ЮНИТИ ДАНА, 2015. – 287 с. – 978- 5- 238- 00920- 9. Режим доступа: <http://www.iprbookshop.ru/52507.html>
2. History and philosophy of science [Electronic resource]: textbook / D. E. Abramenzov, E. A. Abramenzov, V. A. Gvozdev, V. V. Gruzin. — Electronic text data. — Novosibirsk: Novosibirsk State University of Architecture and Civil Engineering (Sibstrin), EBS ASV, 2015. - 317 p. - 978-5-7795-0722-6. - Access mode: <http://www.iprbookshop.ru/68787.html>
3. Pustynnikova , E. V. Methodology of scientific research [Electronic resource]: educational manual / E. V. Pustynnikova . - Electronic text data. - Saratov: IP R Media, 2018. — 126 p. — 978-5-4486-0185-9. — Access mode: <http://www.iprbookshop.ru/71569.html>

List of additional literature

1. Peshcheroz, G. I. Methodology of scientific research [Electronic resource]: a tutorial / G. I. Peshcheroz, O. N. Slobotchikov . - Electronic text data . - М.: Institute of World Civilizations, 2017. - 312 p. - 978-5-9500469- 0-2. — Access mode: <http://www.iprbookshop.ru/77633.html>
2. Философия, логика и методология научного познания [Электронный ресурс]: учебник для магистрантов нефилологических специальностей / В.Д. Бакулов [и др.]. – Электрон. текстовые данные. – Ростов- на- Дону: Южный федеральный университет, 2011. – 496 с. – 978- 5- 9275- 0840- 2. Режим доступа: <http://www.iprbookshop.ru/47184.html>
3. Novikov, A. M. Methodology of scientific research [Electronic resource]: a tutorial / A. M. Novikov, D. A. Novikov. - Electronic text data. - М.: Librokorm , 2010. - 280 p. - 978-5-397- 00849-5. - Access mode: <http://www.iprbookshop.ru/8500.html>

Internet resources

1. [Electronic library of philosophy](http://www.filosof.historic.ru/) . – Access mode: <http://www.filosof.historic.ru/>
2. Library of the information and educational portal "Humanities". – Access mode : <http://auditorium.ru/aud/about/index.php>
3. History, literature, articles. – Access mode: <http://clarino2.narod.ru/>
4. [Sciences](http://www.philosophy.ru/library) . – Access mode: <http://www.philosophy.ru/library>
5. Russian State Library. – Access mode: [http://www. rsl.ru](http://www.rsl.ru) – Access mode: <http://www.philosophy.ru/lib/>

Practical lesson 2. Concepts of the philosophy of science.

The purpose of the lesson: to systematize knowledge and ideas about the specifics of the main directions in the modern philosophy of science, its problems and theories; the content of modern philosophical discussions on the problems of the development of science.

Knowledge: the main directions of modern science, its problems and theories; the content of modern discussions on the problems of scientific development; ethical and social problems of modern science; the fundamentals of logic and methodology of scientific research; the main directions of self-development, self-realization, and the use of creative potential; significant problems of applied and computer mathematics.

To be able to: analyze scientific texts, justify one's attitude to the facts, conclusions, and assessments presented in them; acquire new knowledge by applying modern information technologies to develop a strategy for achieving a set goal; find, formulate and solve current

problems in applied and computer mathematics.

Possess: skills in analyzing scientific phenomena and processes in accordance with modern scientific research methodology; skills in self-development, self-realization, and use of creative potential; skills in collective research and project activities; skills in solving problems in applied and computer mathematics.

Relevance of the topic: determined by the philosophical-ideological and logical-methodological preparation of future masters for professional and scientific research activities.

Theoretical part

Philosophy of science as a discipline, along with the philosophy of history, logic, and methodology, represents a reflection on the existence of science. It emerged relatively recently—in the second half of the 20th century—and was prompted by the need to understand the place and function of science in the context of the modern scientific and technological revolution. It is appropriate to cite the definition of the philosophy of science set forth in the collective work "Philosophy of Science and Technology": "...the subject matter of the philosophy of science is the general patterns and tendencies of scientific cognition as a specific activity for the production of scientific knowledge, taken in its historical development and considered in a historically changing cultural context."

Philosophy of science, therefore, can be conceptualized as a specific body of knowledge about science as a whole, its place in culture, how scientific inquiry is conducted, the dynamics of scientific knowledge, and the methods and methodology of research. The philosopher of science's interests include questions about the criteria for the scientific validity of knowledge, the methods for its justification, how one theory differs from another, the logic of scientific knowledge, its development models, and more. All these questions stem from the specific nature of philosophy itself, which is characterized by a highly general approach to understanding diverse phenomena. In this context, philosophy of science engages in reflecting on science in its most profound depths and its true origins.

But within science itself, specific problems arise, the solution of which also requires a philosophical approach and critical reflection.

Furthermore, the philosophy of science also encompasses reflection on the relationship between philosophy and science. How do they interact, and what influence does philosophy have on science, and what influence does science have on philosophy? Here, the philosophy of science includes the methodology and sociology of scientific knowledge, as well as epistemology.

Philosophy of science should be distinguished from other disciplines that study various aspects of science. These include the history of science, science studies, sociology of science, and psychology of science. Let's outline their differences.

The history of science is descriptive, focusing on individual discoveries and inventions in various fields of science and across historical periods. The study of science examines the interactions between science and society, while the sociology of science analyzes the structure of scientific communities and the interactions between them. The psychology of science examines the most important components of scientific creativity: imagination, intuition, fantasy, insight, and so on. In contrast, the philosophy of science examines the process of cognition itself, encompassing all its elements and aspects, the general nature of the interaction between science and society, and the growth and development of scientific knowledge as a whole.

Philosophy of science as a discipline should also not be equated with the philosophy of science as a branch of modern Western European philosophy, whose goal is to identify the

characteristics of scientific knowledge and its specificity in various areas of reality, as well as the dynamics and patterns of scientific knowledge. Philosophy of science in this guise exists in a variety of philosophical schools: neo-Kantianism, positivism and neopositivism, critical rationalism, "philosophy and methodology of scientific knowledge," and others.

As can be seen, the goals of both of these "philosophies" are similar; the difference lies in the fact that philosophy of science as a discipline views science in the broad context of the development of history, culture, and the value aspects of human existence in the modern world. Philosophy of science as a discipline emerged later, in the mid- 20th century , and it seeks to bring

The analysis of science extends to ideological issues. This distinguishes this discipline from, for example, the study of science, or the history of science, or the sociology of science. Its specificity stems from the very nature of philosophy—to be the "self-awareness of culture." At all times, since its inception, philosophy has analyzed the fundamental forms of human spiritual activity and responded to the demands of culture and the era. For example, in antiquity, the problems of natural philosophy (the Milesians , Heraclitus, Democritus), man (the Sophists, Socrates, Plato), and politics (Aristotle) came to the forefront of understanding the world. In the Middle Ages, philosophers analyzed the dominant form of social consciousness—religion; in the Age of Enlightenment—law. In the Modern Age, philosophers' attention has focused on the problems of the scientific method. It can be said that the foundations of scientific methodology were laid by the 17th-century thinkers Francis Bacon and Robert Descartes . Immanuel Kant's work "Critique of Pure Reason" can also be considered a philosophy of science, in its aspect of the relationship between science and scientific methodology. Immanuel Kant posed the question of how science could be objective, universally valid knowledge. His answer boiled down to recognizing the importance of experience, fact, and criticism as the basis for universally valid propositions in science.

In our time, the dominant form of social consciousness is science, and therefore, as one of the Russian philosophers, A.D. Panin, states, today without the philosophy of science there can be no philosophy (although this can be argued).

Philosophy of science, as a trend in Western European philosophy, arose from an understanding of the relationship and interaction between philosophy and science. It draws on the positivist call for philosophers to abandon metaphysical abstractions and turn to the study of positive (scientific) knowledge. It is positivism that claims the role of philosophy of science (as defined by A. Comte).

Philosophy of science as a discipline is undoubtedly greatly influenced by the Western European school of thought in the philosophy of science. This is primarily due to the fact that the conceptual foundations and core issues of the philosophy of science as a discipline are examined from the perspective of the conclusions and developments of specific authors from specific schools within the Western European school of thought.

In Russian philosophy, issues of the philosophy of science became most actively discussed in the 1960s. These included issues of dialectics, logic, and the methodology of scientific knowledge, social philosophy, and reflection theory. Philosophers prioritized theory as a form of scientific knowledge, the justification of the truth of scientific knowledge, the relationship between various scientific methods (induction, deduction, analysis, synthesis, modeling, etc.), and the logic of the formation of theoretical concepts.

The most outstanding Russian specialists in the field of philosophy of science, who made a significant contribution to the development of the listed problems, are scientists and philosophers: B.M. Kedrov, P.V. Kopnin , V.S. Stepin, G.I. Ruzavin, M.V. Mostepanenko, L.B. Bazhenov, P.N. Fedoseeva, L.A. Mikesheva, V.A. Lektorsky, P.P. Gaidenko and others.

During this same period, a large number of works appeared on the philosophy of physics, the philosophy of biology, the philosophy of history, the philosophy of psychology, the

philosophy of mathematics, and medicine. Philosophical problems of social and humanitarian knowledge occupy a special place.

Prepare a report on the topic

Basic level

1. Science and its role in modern culture.
2. Scientific and non-scientific knowledge in the system of spiritual culture.
3. Humanistic dimension and social-ethical principles of scientific knowledge.
4. Differentiation and integration of scientific knowledge.

Elevated level

1. Changing styles of thinking in the history of classical natural science. 2. Ideals and norms of non-classical natural science.
2. The relationship between determinism and indeterminism in the modern scientific picture of the world.
3. Environmental ethics is an imperative for the survival of humanity.
4. Principles and ideals of modern science.

List of key literature

1. Рузавин Г.И. Методология научного познания [Электронный ресурс]: учебное пособие для вузов / Г.И. Рузавин. – Электрон. текстовые данные. – М.: ЮНИТИ ДАНА, 2015. – 287 с. – 978- 5- 238- 00920- 9. Режим доступа: <http://www.iprbookshop.ru/52507.html>
2. History and Philosophy of Science [Electronic resource]: textbook / D. E. Abramnikov, E. A. Abramnikov, V. A. Gvozdev, V. V. Gruzin. — Electronic text data. — Novosibirsk: Novosibirsk State University of Architecture and Civil Engineering (Sibstrin), EBS ASV, 2015. - 317 p. - 978-5-7795-0722-6. - Access mode: <http://www.iprbookshop.ru/68787.html>
3. Pustynnikova , E. V. Methodology of scientific research [Electronic resource]: educational manual / E. V. Pustynnikova . - Electronic text data. - Saratov: IP R Media, 2018. — 126 p. — 978-5-4486-0185-9. — Access mode: <http://www.iprbookshop.ru/71569.html>

List of additional literature

1. Peshcherov, G. I. Methodology of scientific research [Electronic resource]: textbook / G. I. Peshcherov, O. N. Slobotnikov . - Electronic text data. - М.: Institute of World Civilizations, 2017. - 312 p. - 978-5-9500469- 0-2. — Access mode: <http://www.iprbookshop.ru/77633.html>
2. Философия, логика и методология научного познания [Электронный ресурс]: учебник для магистрантов нефилологических специальностей / В.Д. Бакулов [и др.]. – Электрон. текстовые данные. – Ростов- на- Дону: Южный федеральный университет, 2011. – 496 с. – 978- 5- 9275- 0840- 2. Режим доступа: <http://www.iprbookshop.ru/47184.html>
3. Novikov, A. M. Methodology of scientific research [Electronic resource]: Textbook / A. M. Novikov, D. A. Novikov. — Electronic text data. — Moscow: Librokom , 2010. — 280 p. — 978-5-397-00849-5. — Access mode: <http://www.iprbookshop.ru/8500.html>

Internet resources

1. [Electronic library of philosophy](http://www.filosof.historic.ru/) . – Access mode: <http://www.filosof.historic.ru/>
2. Library of the information and educational portal "Humanities". – Access mode : <http://auditorium.ru/aud/about/index.php>
3. History, literature, articles. – Access mode: <http://clarino2.narod.ru/> 9. [Electronic library](http://www.filosof.historic.ru/)

of the Institute of Philosophy of the Russian Academy of Sciences. – Access mode: <http://www.philosophy.ru/library>
4. Russian State Library. – Access mode: <http://www.rsl.ru> – Access mode: <http://www.philosophy.ru/lib/>

Practical lesson 3. Philosophical reconstruction of the history of science.

The purpose of the lesson: to systematize knowledge and ideas about the specifics of the main directions in the modern philosophy of science, its problems and theories; the content of modern philosophical discussions on the problems of the development of science.

To know: the main directions of modern science, its problems and theories; the content of modern discussions on the problems of scientific development; ethical and social problems of modern science; the fundamentals of logic and methodology of scientific research; the main directions of self-development, self-realization, and the use of creative potential; significant problems of applied and computer mathematics.

To be able to: analyze scientific texts, justify one's attitude to the facts, conclusions, and assessments presented therein; acquire new knowledge by applying modern information technologies to develop a strategy for achieving a set goal; identify, formulate, and solve current problems in applied and computer mathematics.

Possess: skills in analyzing scientific phenomena and processes in accordance with modern scientific research methodology; skills in collective research and project activities; skills in solving problems in applied and computer mathematics; skills in self-development, self-realization, and the use of creative potential.

Relevance of the topic: determined by the philosophical, ideological and logical methodological preparation of future masters for professional and scientific research activities.

Theoretical part

According to Lakatos, the philosophy of science can help to carry out a rational reconstruction of a certain period in the history of science, and present the actors and goals of the movement of scientific research in a more or less understandable form. Such an understanding Lakatos called the history of science through the philosophy of science the internal history of science, and it differs from the history of science that did not fit into the framework of rational reconstruction – the external history of science.

The most striking example of the internal history of science was demonstrated by B.M. Kedrov, who carried out a rational reconstruction of the history of chemistry with the help of Hegel's philosophy. For example, Hegel's triad: quantity-quality-measure, was interpreted in the history of chemistry as follows. Quantity – chemistry of the 18th century centuries, when chemists were engaged in qualitative research. Quality is the chemistry of the 19th century, and the then-popular field of research—gas chemistry—which was based precisely on quantitative studies. The measure is 20th-century chemistry and its main focus, atomic theory, which linked the two previous periods. To reconstruct the history of 19th-century chemistry, Kedrov used a different triad: composition – property – structure. That is, chemists first studied the composition of chemical elements, then the properties they exhibit in chemical reactions. Finally, they faced The question of why chemical elements with the same composition react differently in the same reactions prompted chemists to study the structure of elements—the set of

bonds in the molecules of elements—which led to the discovery of polymers.

Questions for the round table

Basic level

1. The problem of the beginning of science.
2. Eurocentrism and anti-historicism in understanding the genesis of science.
3. The problem of periodization of the history of science and its types.
4. Internalism and externalism in historical scientific research.
5. The problem of the genesis of science.

Elevated level

1. The culture of the ancient polis and the formation of the first forms of theoretical science.
2. Knowledge of nature in the Middle Ages and its main traditions.
3. Social and ideological prerequisites for the emergence of the experimental method and its connection with the mathematical description of nature.
4. Correspondence between the types of scientific rationality and the stages of scientific development: classical, non-classical and post-non-classical scientific rationality.

List of key literature

1. Рузавин Г.И. Методология научного познания [Электронный ресурс]: учебное пособие для вузов / Г.И. Рузавин. – Электрон. текстовые данные. – М.: ЮНИТИ ДАНА, 2015. – 287 с. – 978- 5- 238- 00920- 9. Режим доступа: <http://www.iprbookshop.ru/52507.html>
2. History and philosophy of science [Electronic resource]: textbook / D. E. Abramenzov, E. A. Abramenzov, V. A. Gvozdev, V. V. Gruzin. — Electronic text data. — Novosibirsk: Novosibirsk State University of Architecture and Civil Engineering (Sibstrin), Electronic Library System ASV, 2015. — 317 p. — 978-5-7795-0722-6. — Access mode: <http://www.iprbookshop.ru/68787.html>
3. Pustynnikova , E. V. Methodology of scientific research [Electronic resource]: educational manual / E. V. Pustynnikova . - Electronic text data. - Saratov: IP R Media, 2018. — 126 p. — 978-5-4486-0185-9. — Access mode: <http://www.iprbookshop.ru/71569.html>

List of additional literature

1. Peshcheroz, G. I. Methodology of scientific research [Electronic resource]: textbook / G. I. Peshcheroz, O. N. Slobotchikov . - Electronic text data . - М.: Institute of World Civilizations, 2017. - 312 p. - 978-5-9500469- 0-2. — Access mode: <http://www.iprbookshop.ru/77633.html>
2. Философия, логика и методология научного познания [Электронный ресурс]: учебник для магистрантов нефилозофских специальностей / В.Д. Бакулов [и др.]. – Электрон. текстовые данные. – Ростов- на- Дону: Южный федеральный университет, 2011. – 496 с. – 978- 5- 9275- 0840- 2. Режим доступа: <http://www.iprbookshop.ru/47184.html>
3. Novikov, A. M. Methodology of scientific research [Electronic resource]: Textbook / A. M. Novikov, D. A. Novikov. — Electronic text data. — М.: Librokom , 2010. — 280 p. — 978-5-397-00849-5. — Access mode: <http://www.iprbookshop.ru/8500.html>

Internet resources

1. [Electronic library of philosophy](http://www.filosof.historic.ru/) . – Access mode: <http://www.filosof.historic.ru/>
2. Library of the information and educational portal "Humanities". – Access mode : <http://auditorium.ru/aud/about/index.php>

3. History, literature, articles. – Access mode: <http://clarino2.narod.ru/> 14. Electronic library of the Institute of Philosophy of the Russian Academy of Sciences. – Access mode : <http://www.philosophy.ru/library>
4. Russian State Library. – Access mode: <http://www.rsl.ru> – Access mode : <http://www.philosophy.ru/lib/>

Practical classes 4-5. Modern science and problems of social development

Objective of the lesson: systematization of knowledge and ideas about the specifics of historical and cultural development and science, about the qualitative specifics of each stage in the history of the development of scientific knowledge and the forms of continuity between them.

To know: the main directions of modern science, its problems and theories; the content of modern discussions on the problems of scientific development; the fundamentals of logic and methodology of scientific research; the main directions of self-development, self-realization, and the use of creative potential; significant problems of applied and computer mathematics; ethical and social problems of modern science.

To be able to: analyze scientific texts, justify one's attitude to the facts, conclusions, and assessments presented therein; acquire new knowledge by applying modern information technologies to develop a strategy for achieving a set goal; identify, formulate, and solve current problems in applied and computer mathematics.

Possess: skills in analyzing scientific phenomena and processes in accordance with modern scientific research methodology; skills in collective research and project activities; skills in solving problems in applied and computer mathematics; skills in self-development, self-realization, and the use of creative potential.

Relevance of the topic: is determined by the philosophical-ideological and logical-methodological preparation of future masters for professional and scientific research activities.

Theoretical part

Despite ongoing processes leading to the differentiation of science, the leading process in the development of science has been the unification and integration of all scientific fields into a single body of knowledge. This is most clearly evident in the development of the natural sciences, particularly mathematics, physics, chemistry, and biology. Both objects and methods of research are becoming increasingly universal. Under the influence of these integrative processes, concepts of the fundamental spheres of existence—the inanimate, the living, and the social—which previously seemed opposed, are losing their incompatibility. The outstanding Russian naturalist V.V. Dokuchaev characterized this growing commonality in the development of various fields of knowledge as follows: "There are relationships, a genetic connection, age-old, and lawful between inanimate and living nature, on the one hand, and man, his way of life, and even the spiritual world, on the other. It is these relationships, these lawful interactions, that constitute the essence of the knowledge of nature, the core of true natural philosophy." Physical methods and physical concepts are increasingly being used in the study of biological phenomena at the molecular level. A living organism is characterized by the physical concept of an open system. Physical, chemical, and biological processes are evaluated in terms of self-organization and the process of integration—synergetics, the foundations of which were laid at the end of the 20th century by I. Prigogine. Based on these integration processes, a new picture of the world—a

non-classical one—is emerging. While this picture contains many contradictions ("blank spots," "black holes"), it nevertheless possesses a certain degree of certainty and integrity. The main characteristics (features) of the modern picture of the world are:

1) The world is characterized as a kind of integrity, a kind of unity—that is, the world is one, representing something systemic, holistic, and continuous. The founders of modern natural science agree that unity is the most important characteristic of the world, but it is described differently by different scientists. For example, A. Einstein expressed the unity of matter, energy, and time with the formula $E = mv^2$, where E is energy, m is mass, and v is velocity. I. Prigogine presented this picture differently, characterizing the world as a unity of order (organization) and chaos (disorganization). The American microphysicist R. Feynman asserted that, from the standpoint of quantum physics, it turns out that "frogs are made of the same stuff as rocks."

2) Despite the fact that the world is one, it is by no means uniform. While recognizing the unity of the world, modern science does not deny its structure and discreteness. The world is extremely diverse. Three main worlds are distinguished: the large (megaworld), the middle (midworld), commensurate with human size, and the small (microworld). When comparing the midworld , it turns out that the basic parameters of this and other worlds are practically incommensurable. Therefore, human concepts of time, space, and motion, as Einstein established, are relative.

3) Despite the differences between various structures, all levels of the world have a common property: formation, development, movement. Modern science understands movement differently than classical science: classical science saw in movement processes that are completely open to natural science and exclude chance. This, for example, was the view of Laplace, who believed that everything can be calculated and predicted using mathematical calculations – classical determinism in the understanding of movement. Although modern science does not deny the laws of motion, it does not deny the role of chance. In particular, attention is drawn to the fact that the beginning of the process of the development of the Universe was a consequence of the Big Bang, which was a chance event, therefore chance will also play a role in development. However, chance is also subject to

Probability theory emerges when certain patterns are observed. Modern science represents a synthesis of the ideas of determination and probability theory, with an emphasis on randomness. These conclusions arose from the latest modern scientific complexes—computer science, synergetics, and general systems theory—and introduced crucial new concepts into the modern worldview:

1) The world is a unity of order and chaos (based on the findings of synergetics) - the world is a constant change of its two inherent states: the state of chaos and order, and, according to Prigogine, the transition from chaos to order is probabilistic in nature (redistribution of matter), therefore, from the point of view of synergetics, chance and necessity are equal partners.

2) The processes are characterized not only by the material side of existence, but also by the movement of the informational side – the transition from chaos to order occurs in the form of certain messages, data, communications, etc. The movement of information is considered an integral component of the general development of the Universe.

3) From the perspective of modern science, the fundamental forms of behavior previously thought to be characteristic only of living organisms (described by Darwin) have their analogues in pre-biological systems. Therefore, modern science believes that not only living but also non-living matter evolves. Thus, there is a close relationship between Darwin's law of evolution and Mendeleev's periodic table of elements, reflecting the concept of a single, universal evolution of nature, i.e., it reflects the evolutionary process of pre-biological and biological natural systems. The most significant contributions were made by physics, biology, and synergetics.

Prepare reports on the topics

Basic level

1. Bringing together the ideals and norms of natural science and social and humanitarian knowledge.
2. The relationship between social and intra-scientific values in modern science.

Elevated level

1. New ethical problems of science at the end of the 20th century.

List of key literature

1. Рузавин Г.И. Методология научного познания [Электронный ресурс]: учебное пособие для вузов / Г.И. Рузавин. – Электрон. текстовые данные. – М.: ЮНИТИ ДАНА, 2015. – 287 с. – 978- 5- 238- 00920- 9. Режим доступа: <http://www.iprbookshop.ru/52507.html>
2. History and philosophy of science [Electronic resource]: textbook / D. E. Abramenzon, E. A. Abramenzon, V. A. Gvozdev, V. V. Gruzin. — Electron. text data. - Novosibirsk: Novosibirsk State University of Architecture and Civil Engineering (Sibstrin), EBS ASV, 2015. - 317 p. - 978-5-7795-0722-6. — Access mode: <http://www.iprbookshop.ru/68787.html>
3. Pustynnikova, E. V. Methodology of scientific research [Electronic resource]: a tutorial / E. V. Pustynnikova . - Electronic text data. - Saratov: IP R Media, 2018. - 126 p. - 978-5-4486- 0185-9. - Access mode: <http://www.iprbookshop.ru/71569.html>

List of additional literature

1. Peshcherov, G. I. Methodology of scientific research [Electronic resource]: textbook / G. I. Peshcherov, O. N. Slobotnikov . - Electronic text data. - М.: Institute of World Civilizations, 2017. - 312 p. - 978-5-9500469- 0-2. — Access mode: <http://www.iprbookshop.ru/77633.html>
2. Философия, логика и методология научного познания [Электронный ресурс]: учебник для магистрантов нефилологических специальностей / В.Д. Бакулов [и др.]. – Электрон. текстовые данные. – Ростов- на- Дону: Южный федеральный университет, 2011. – 496 с. – 978- 5- 9275- 0840- 2. Режим доступа: <http://www.iprbookshop.ru/47184.html>
3. Novikov, A. M. Methodology of scientific research [Electronic resource]: a tutorial / A. M. Novikov, D. A. Novikov. - Electronic text data. - М.: Librokom , 2010. - 280 p. - 978-5-397- 00849-5. - Access mode: <http://www.iprbookshop.ru/8500.html>

Internet resources

1. [Electronic library of philosophy](http://www.filosof.historic.ru/). – Access mode: <http://www.filosof.historic.ru/>
2. Library of the information and educational portal "Humanities." – Access mode: <http://auditorium.ru/aud/about/index.php>
3. History, literature, articles. – Access mode: <http://clarino2.narod.ru/>
4. Electronic Library of the Institute of Philosophy of the Russian Academy of Sciences. – Access mode : <http://www.philosophy.ru/library>
5. [Library](http://www.philosophy.ru/lib/). – Access mode: <http://www.rsl.ru> – Access mode: <http://www.philosophy.ru/lib/>

Practical lesson 6. The structure of scientific knowledge, its forms

Objective of the lesson: systematization of knowledge and ideas about the specifics of historical and cultural development and science, about the qualitative specifics of each stage in the history of the development of scientific knowledge and the forms of continuity between them.

To know: the main directions of modern science, its problems and theories; the content of modern discussions on the problems of scientific development; the fundamentals of logic and methodology of scientific research; the main directions of self-development, self-realization, and the use of creative potential; significant problems of applied and computer mathematics; ethical and social problems of modern science.

To be able to: analyze scientific texts, justify one's attitude to the facts, conclusions, and assessments presented therein; acquire new knowledge by applying modern information technologies to develop a strategy for achieving a set goal; identify, formulate, and solve current problems in applied and computer mathematics.

Possess: skills in analyzing scientific phenomena and processes in accordance with modern scientific research methodology; skills in collective research and project activities; skills in solving problems in applied and computer mathematics; skills of self-development, self-realization, and use of creative potential.

Relevance of the topic: is determined by the philosophical-ideological and logical-methodological preparation of future masters for professional and scientific research activities.

Theoretical part

In their understanding of the structure of scientific knowledge, philosophers are divided into two factions: empiricists believe that science is founded on the facts of sensory experience, while rationalists maintain that scientific knowledge rests on axioms and postulates. Thus, for empiricists, scientific knowledge is constructed like a mosaic of numerous individual empirical facts, between which the scientist seeks causal relationships. For rationalists, science is like a tree growing from a few root-axioms, and the facts of experience are like leaves on its branches.

Empiricists prefer inductive methods, while rationalists favor deductive methods. The Latin word *inductio* means "representation, reduction" (here: the presentation of a set of facts in some general form; the reduction of experimental data to a common denominator). Induction is the generalization of empirical data. We think inductively whenever, by comparing different objects, we come to a conclusion about their similarities or differences. Deduction, on the other hand, proceeds from general concepts, based on which thinking makes judgments about particular experimental data. Empiricists consider classical mechanics to be the standard of scientific knowledge; rationalists view mathematics as the epitome of scientificity.

The section of philosophy that examines the problems of scientific knowledge, its methods and forms, is called methodology, which adopts a classification of non-general methods, which include: methods of empirical research (observation, comparison, measurement, experiment, etc.), theoretical research (ascent from the abstract to the concrete, etc.), empirical and theoretical research (idealization, formalization, analysis, synthesis, etc.) and special ones, determined by each science in accordance with its subject of knowledge.

The following are considered forms of scientific knowledge: a question is a situation requiring a solution; a problem revealing contradictions between existing, outdated knowledge and the inadequacy of new knowledge; a hypothesis contained in a demonstrable assumption for resolving a set of questions and problems; a theory systematizing knowledge obtained in the course of solving a question, problem, and proving the truth of the hypothesis.

Prepare reports on the topics

Basic level

1. Scientism and its methodological principles.
2. Arguments of antiscentism .
3. Theory as a form of scientific knowledge.
4. Mathematics as a universal language of science.
5. Basic concepts of the origin of science.

Elevated level

1. Science and existential questions of human life.
2. Science and pseudoscience in modern culture.
3. Experiment as the main empirical method of scientific research.
4. Hypothetico-deductive theory and methods of substantiating its truth.
5. Modeling methods in modern scientific research.
6. Systems approach and self-organization theory

List of key literature

1. Рузавин Г.И. Методология научного познания [Электронный ресурс]: учебное пособие для вузов / Г.И. Рузавин. – Электрон. текстовые данные. – М.: ЮНИТИ ДАНА, 2015. – 287 с. – 978- 5- 238-00920- 9. Режим доступа: <http://www.iprbookshop.ru/52507.html>
2. History and philosophy of science [Electronic resource]: textbook / D. E. Abramnikov, E. A. Abramnikov, V. A. Gvozdev, V. V. Gruzin. — Electronic text data. — Novosibirsk: Novosibirsk State University of Architecture and Civil Engineering (Sibstrin), EBS ASV, 2015. - 317 p. - 978-5-7795-0722-6. - Access mode: <http://www.iprbookshop.ru/68787.html>
3. Pustynnikova , E. V. Methodology of scientific research [Electronic resource]: educational manual / E. V. Pustynnikova . - Electronic text data. - Saratov: IP R Media, 2018. — 126 p. — 978-5-4486-0185-9. — Access mode: <http://www.iprbookshop.ru/71569.html>

List of additional literature

1. Peshcherov, G. I. Methodology of scientific research [Electronic resource]: textbook / G. I. Peshcherov, O. N. Slobotchikov . - Electronic text data. - М.: Institute of World Civilizations, 2017. - 312 p. - 978-5-9500469- 0-2. — Access mode: <http://www.iprbookshop.ru/77633.html>
2. Философия, логика и методология научного познания [Электронный ресурс]: учебник для магистрантов нефилологических специальностей / В.Д. Бакулов [и др.]. – Электрон. текстовые данные. – Ростов- на- Дону: Южный федеральный университет, 2011. – 496 с. – 978- 5- 9275- 0840- 2. Режим доступа: <http://www.iprbookshop.ru/47184.html>
3. Novikov, A. M. Methodology of scientific research [Electronic resource]: Textbook / A. M. Novikov, D. A. Novikov. — Electronic text data. — М.: Librokom , 2010. — 280 p. — 978-5-397-00849-5. — Access mode: <http://www.iprbookshop.ru/8500.html>

Internet resources

1. [Electronic library of philosophy](http://www.filosof.historic.ru/) . – Access mode: <http://www.filosof.historic.ru/>
2. Library of the information and educational portal "Humanities". – Access mode : <http://auditorium.ru/aud/about/index.php>
3. History, literature, articles. – Access mode: <http://clarino2.narod.ru/>
4. [Sciences](http://www.philosophy.ru/library) . – Access mode: <http://www.philosophy.ru/library>
5. Russian State Library. – Access mode: [http://www. rsl.ru](http://www.rsl.ru) – Access mode: <http://www.philosophy.ru/lib/>

Practical lesson 7. Logic and methodology of scientific knowledge

Objective of the lesson: systematization of knowledge and ideas about the specifics of philosophical and methodological problems of socio-humanitarian knowledge, ethical and social problems of modern science.

To know: the main directions of modern science, its problems and theories; the content of modern discussions on the problems of scientific development; the fundamentals of logic and methodology of scientific research; the main directions of self-development, self-realization, and the use of creative potential; significant problems of applied and computer mathematics; ethical and social problems of modern science.

To be able to: analyze scientific texts, justify one's attitude to the facts, conclusions, and assessments presented therein; acquire new knowledge by applying modern information technologies to develop a strategy for achieving a set goal; identify, formulate, and solve current problems in applied and computer mathematics.

Possess: skills in analyzing scientific phenomena and processes in accordance with modern scientific research methodology; skills in collective research and project activities; skills in solving problems in applied and computer mathematics; skills in self-development, self-realization, and the use of creative potential.

Relevance of the topic: is determined by the philosophical-ideological and logical-methodological preparation of future masters for professional and scientific research activities.

Theoretical part

It's important to distinguish between the concepts of methodology and method. Methodology is the study of the structure, logical organization, methods, and means of activity. The methodology of natural science is the study of the principles of construction, forms, and methods of scientific cognition. For example, conservation laws are of methodological importance in natural science. They must be taken into account in any research or theoretical construction. Method is a set of techniques or operations of practical or theoretical activity. Method can also be characterized as a form of theoretical and practical understanding of reality, based on the behavioral patterns of the object being studied. Francis Bacon compared the correct scientific method to a lamp illuminating the traveler's path in the dark. Methods of scientific cognition include so-called universal methods, i.e., universal human thinking techniques, general scientific methods, and methods of specific sciences. Methods can be classified according to the relationship between empirical knowledge (i.e. knowledge obtained as a result of experience, empirical knowledge) and theoretical knowledge, the essence of which is the understanding of the essence of phenomena and their internal connections.

It should be borne in mind that each branch of natural science, along with general scientific methods, employs its own specific scientific methods, determined by the nature of the object of study. However, methods characteristic of a particular science are often applied in other sciences as well. This occurs because the objects of study of these sciences are also subject to the laws of the given science. For example, physical and chemical research methods are applied in biology on the basis that the objects of biological research include, in one form or another, physical and chemical forms of matter motion and, therefore, are subject to physical and chemical laws (recall the "Kekulé ladder" discussed in the first lecture). There are two general methods in the history of knowledge: dialectical and metaphysical. These are general

philosophical methods. The dialectical method is a method of understanding reality in its contradictions, integrity, and development. The metaphysical method is the opposite of the dialectical method, examining phenomena outside of their mutual connection and development. Since the mid-19th century, the metaphysical method has been increasingly replaced in natural science by the dialectical method.

Questions for the round table

Basic level

1. Concepts of method and methodology of scientific research.
2. Laws of logic and features of scientific thinking.
3. Concept, judgment, inference as logical forms.
4. Basic laws of logic.
5. Method and theory.
6. Criteria for the classification of scientific methods.

Elevated level

1. The concept of scientific culture.
2. Intuition and creativity in scientific research.
3. The role of scientific communication (controversy, discussion) in scientific research.
4. Ethics of science.

List of key literature

1. Рузавин Г.И. Методология научного познания [Электронный ресурс]: учебное пособие для вузов / Г.И. Рузавин. – Электрон. текстовые данные. – М.: ЮНИТИ ДАНА, 2015. – 287 с. – 978-5-238-00920-9. Режим доступа: <http://www.iprbookshop.ru/52507.html>
2. History and philosophy of science [Electronic resource]: textbook / D. E. Abramenzon, E. A. Abramenzon, V. A. Gvozdev, V. V. Gruzin. — Electronic text data. — Novosibirsk: Novosibirsk State University of Architecture and Civil Engineering (Sibstrin), Electronic Library System ASV, 2015. — 317 p. — 978-5-7795-0722-6. — Access mode: <http://www.iprbookshop.ru/68787.html>
3. Pustynnikova , E. V. Methodology of scientific research [Electronic resource]: educational manual / E. V. Pustynnikova . - Electronic text data. - Saratov: IP R Media, 2018. - 126 p. - 978-5-4486-0185-9. - Access mode: <http://www.iprbookshop.ru/71569.html>

List of additional literature

1. Peshcherov, G. I. Methodology of scientific research [Electronic resource]: textbook / G. I. Peshcherov, O. N. Slobotnikov . - Electronic text data. - M.: Institute of World Civilizations, 2017. - 312 p. - 978-5-9500469- 0-2. — Access mode: <http://www.iprbookshop.ru/77633.html>
2. Философия, логика и методология научного познания [Электронный ресурс]: учебник для магистрантов нефилологических специальностей / В.Д. Бакулов [и др.]. – Электрон. текстовые данные. – Ростов-на-Дону: Южный федеральный университет, 2011. – 496 с. – 978-5-9275-0840-2. Режим доступа: <http://www.iprbookshop.ru/47184.html>
3. Novikov, A. M. Methodology of scientific research [Electronic resource]: Textbook / A. M. Novikov, D. A. Novikov. — Electronic text data. — M.: Librokom , 2010. — 280 p. — 978-5-397-00849-5. — Access mode: <http://www.iprbookshop.ru/8500.html>

Internet resources

1. [Electronic library of philosophy](http://www.filosof.historic.ru/) . – Access mode: <http://www.filosof.historic.ru/>
2. Library of the information and educational portal "Humanities". – Access mode : <http://auditorium.ru/aud/about/index.php>
3. History, literature, articles. – Access mode: <http://clarino2.narod.ru/>

4. [Sciences](http://www.philosophy.ru/library). – Access mode: <http://www.philosophy.ru/library>
5. Russian State Library. – Access mode: <http://www.rsl.ru> – Access mode: <http://www.philosophy.ru/lib/>

Practical classes 8-9. General scientific research methods

Objective of the lesson: systematization of knowledge and ideas about the specifics of historical and cultural development and science, about the qualitative specifics of each stage in the history of the development of scientific knowledge and the forms of continuity between them.

To know: the main directions of modern science, its problems and theories; the basics of logic and methodology of scientific research;

The main directions of self-development, self-realization, and the use of creative potential; significant problems of applied and computer mathematics; the content of modern discussions on the problems of scientific development; ethical and social problems of modern science.

To be able to: analyze scientific texts, justify one's attitude to the facts, conclusions, and assessments presented therein; acquire new knowledge by applying modern information technologies to develop a strategy for achieving a set goal; identify, formulate, and solve current problems in applied and computer mathematics.

Possess: skills in analyzing scientific phenomena and processes in accordance with modern scientific research methodology; skills in collective research and project activities; skills in solving problems in applied and computer mathematics; skills of self-development, self-realization, and use of creative potential.

Relevance of the topic: is determined by the philosophical-ideological and logical-methodological preparation of future masters for professional and scientific research activities.

Theoretical part

The universal method of scientific thinking, encompassing all phenomena of the material and spiritual world, is materialistic dialectics. Its universal nature is demonstrated by its adequateness to the requirements of theoretical forms of thought.

Based on the recognition of the objective nature of the universal connection, interconnection and interdependence of objects, phenomena, processes, dialectics requires the researcher to consider the object under study as an obligatory and definite link in an endless chain

connections, to study the relationships and dependence of an object on other objects. Dialectics cautions the researcher against viewing the object of study as something constant and unchangeable, rather than in the process of its development—its emergence, formation, and functioning, with the determination of possible prospects for its future. Only by mastering this universal method will the researcher see the contradictory essence of phenomena, processes, and objects, clearly distinguishing contradictions in thinking that objectively reflect the contradictions of the object of study from subjective contradictions associated with the violation of the laws of logical thought; and understand why the unity and struggle of opposites are the source and driving force behind the development of nature, society, and thought.

mediations must be covered and studied .

Scientific research methods are typically understood as a specific path to achieving set goals, a form of theoretical understanding of reality. Scientific methods are a system of

regulatory principles that guide human cognitive and theoretical activity, knowledge itself, and its reconstruction and transformation. A method is an abstract, theoretical expression of the laws of the object being studied and the process of cognition itself—that is, a path to cognition based on a certain set of previously acquired general knowledge. A method is a set of specialized techniques, norms, rules, and procedures that regulate the process of cognition and ensure the solution of a research problem.

Requirements for the scientific method:

- * The scientific method must be relatively rigorous. It is used to obtain specific knowledge and solve very specific problems. A method of cognition will possess such characteristics when general patterns are reconstructed as a system of categories and laws of the relevant science;

- * unambiguity. The knowledge obtained using a particular method should not be logically contradictory. Unambiguity of the method does not exclude the possibility of different points of view on the same issue;

- * Stability. Methods must be relatively constant and stable. This constancy is preserved in their fundamental features, although the same method may favor one side over the other when achieving truth;

- * effectiveness. The effectiveness of methods is expressed in the ability to achieve a goal with minimal effort and maximum results in a certain number of steps;

- * economy. If a method is economical, then the goal of knowledge is achieved without the introduction of a number of additional auxiliary rules, concepts, and principles;

- "Simplicity. The method of science must be simple, i.e., accessible to understanding and use in cognition. A method is simple if, in itself or without significant changes and additions, it is sufficient for understanding the subject;

- * fruitfulness. Fruitfulness of a method means that it should enable the acquisition of knowledge organized into a system, where each element is clearly defined and can be characterized by its place within the system.

To solve specific problems in various sciences, special research methods are used, which are based on general scientific ones.

General scientific methods encompass only certain aspects of scientific and cognitive activity, serving as one means of solving research problems. General scientific methods include: general techniques (generalization, analysis, synthesis, abstraction, modeling, comparison, analogy, induction, deduction, classification, etc.); empirical research methods (observation, measurement, experiment); and theoretical research methods (idealization, formalization, thought experiment, mathematical methods, etc.).



Рис. 2.1. Методы научного познания

Prepare reports on the topics

Basic level

1. Methods of theoretical knowledge.
2. Laws of logic and laws of thinking.
3. Basic forms of thinking.
4. General logical research procedures: analysis, synthesis, induction, deduction, abstraction, generalization, idealization, formalization, analogy.

Elevated level

1. Axiomatic-deductive and hypothetico-deductive methods of construction theories.
2. Methods of mathematical modeling.
3. Models of theoretical explanation.
4. Verification and falsification as principles for justifying the truth of a theory.

List of key literature

1. Рузавин Г.И. Методология научного познания [Электронный ресурс]: учебное пособие для вузов / Г.И. Рузавин. – Электрон. текстовые данные. – М.: ЮНИТИ ДАНА, 2015. – 287 с. – 978- 5- 238-

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2. History and Philosophy of Science [Electronic resource]: textbook / D. E. Abramnikov, E. A. Abramnikov, V. A. Gvozdev, V. V. Gruzin. — Electronic text data. — Novosibirsk: Novosibirsk State University of Architecture and Civil Engineering (Sibstrin), Electronic Library System ASV, 2015. — 317 p. — 978-5-7795-0722-6. — Access mode: <http://www.iprbookshop.ru/68787.html>

3. Pustynnikova , E. V. Methodology of Scientific Research [Electronic resource]: study guide / E. V. Pustynnikova . - Electronic text data. - Saratov: IP R Media, 2018. - 126 p. - 978-5-4486-0185-9. - Access mode: <http://www.iprbookshop.ru/71569.html>

List of additional literature

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2. Философия, логика и методология научного познания [Электронный ресурс]: учебник для магистрантов нефилологических специальностей / В.Д. Бакулов [и др.]. — Электрон. текстовые данные. — Ростов- на- Дону: Южный федеральный университет, 2011. — 496 с. — 978- 5- 9275- 0840- 2. — Режим доступа: <http://www.iprbookshop.ru/47184.html>

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Internet resources

1. [Electronic library of philosophy](http://www.filosof.historic.ru/) . — Access mode: <http://www.filosof.historic.ru/>

2. Library of the information and educational portal "Humanities." — Access mode: <http://auditorium.ru/aud/about/index.php>

3. History, literature, articles. — Access mode: <http://clarino2.narod.ru/>

4. [Sciences](http://www.philosophy.ru/library) . — Access mode: <http://www.philosophy.ru/library>

5. Russian State Library. — Access mode: [http://www. rsl.ru](http://www.rsl.ru) — Access mode: <http://www.philosophy.ru/lib/>

MINISTRY OF SCIENCE AND HIGHER EDUCATION OF THE RUSSIAN FEDERATION
FEDERAL STATE AUTONOMOUS EDUCATIONAL
INSTITUTION OF HIGHER EDUCATION
NORTH CAUCASIAN FEDERAL UNIVERSITY

Methodological guidelines

for students on organizing and conducting independent work
in the discipline "METHODOLOGY OF SCIENTIFIC RESEARCH"

Stavropol
202 6

CONTENT

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1. General Provisions

Independent work is the planned educational, educational and research, scientific research work of students, carried out outside of class (classroom) time on assignment and with the methodological guidance of the teacher, but without his direct participation (with partial direct participation of the teacher, leaving the leading role to the work of the students).

Student independent work (SIW) at a university is an important form of student learning and research activity. Student independent work plays a significant role in the rating system of learning.

The main types of independent work for students include:

- formation and assimilation of the content of lecture notes based on the educational literature recommended by the lecturer, including information educational resources (electronic textbooks, electronic libraries, etc.);
- writing reports;
- preparation for seminars, practical and laboratory work, their design;
- compilation of an annotated list of articles from relevant journals in the fields of knowledge (pedagogical, psychological, methodological, etc.);
- implementation of educational and research work, project activities;
- preparation of practical developments and recommendations for solving problematic situations;
- completing homework assignments in the form of solving individual problems, performing typical calculations, computer calculations and individual work on individual sections of the content of disciplines, etc.;
- computer-based current self-monitoring and progress monitoring based on electronic training and assessment tests;
- completion of coursework (projects) within the framework of disciplines;
- completion of final qualifying work, etc.

The methodology for organizing students' independent work depends on the structure, nature, and characteristics of the discipline being studied, the number of hours for its study, the type of assignments for students' independent work, the individual qualities of students, and the conditions of educational activities.

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

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

Independent work on the course "Information technologies for teamwork and project

activities" is aimed at developing the following **competencies** :

Code	Formulation
UK-1	Able to carry out a critical analysis of problematic situations based on a systems approach and develop an action strategy
OPK-1	Capable of conducting methodological and expert work in the field of mathematics and computer science

2. The purpose and objectives of independent work

The main goal of organizing and implementing independent work coincides with the goal of student education – the formation of a set of general scientific, professional and universal competencies of the future bachelor.

When organizing independent work, developing the ability to work independently to acquire knowledge, skills, and the ability to organize educational and research activities is an important and essential condition. The goal of students' independent work is to master fundamental knowledge, professional skills, and relevant professional activities, as well as experience in creative and research activities. Students' independent work promotes the development of independence, responsibility, self-discipline, and a creative approach to solving academic and professional problems.

The objectives of the SRS are:

- systematization and consolidation of the acquired theoretical knowledge and practical skills of students;
- deepening and expanding theoretical knowledge;
- development of skills in using regulatory, legal, reference documentation and specialized literature;
- development of students' cognitive abilities and activity: creative initiative, independence, responsibility and organization;
- development of independent thinking, abilities for self-development, self-improvement and self-realization;
- development of research skills;
- use of material collected and obtained during independent work and laboratory classes.

3. Technological map of independent student work

Codes of implemented competencies	Type of student activity	The final product of independent work	Assessment tools and technologies	Volume of hours, including (astr.)		
				SRS	Contact work with the teacher	Total
1st semester						
UK-1 OPK-1	Preparing for the discussion	Discussion	Interview	8.0	4.0	12.0
UK-1	Preparation of	Report in the	Report	8.0	4.0	12.0

OPK-1	the report	form of a presentation				
UK-1 OPK-1	Preparation for the round table	Round table	Interview	8.0	4.0	12.0
UK-1 OPK-1	Preparation of the report	Report in the form of a presentation	Report	16.0	8.0	24.0
UK-1 OPK-1	Preparation of the report	Report in the form of a presentation	Report	8.0	4.0	12.0
UK-1 OPK-1	Preparation for the round table	Round table	Interview	8.0	4.0	12.0
UK-1 OPK-1	Preparation of the report	Report in the form of a presentation	Report	16.0	8.0	24.0
Total for 1 semester				72.0	36.0	108
Total				72.0	36.0	108

4. Control points and types of reporting on them

Quality control and deadlines for independent work are assessed in accordance with the academic schedule and are formatted according to the assignment. The following knowledge rating is provided:

Description of the rating scale

Within the framework of the rating system, students' academic performance in each discipline is assessed during ongoing monitoring and midterm assessment.

Current control

5. Procedure for completing independent work by a student

5.1 . Methodological recommendations for working with educational literature

When working with books, you need to select literature, learn to read it correctly, and keep records. To select literature, the library uses alphabetical and systematic catalogs.

It is important to remember that rational skills in working with a book always mean great savings of time and effort.

The instructor teaching the course recommends the appropriate selection of textbooks. Required literature may also be listed in the course's teaching materials.

When studying the material in a textbook, you should move on to the next question only after correctly understanding the previous one, describing on paper all the calculations and computations (including those that are omitted from the textbook or given in the lecture for independent derivation).

When studying any discipline, independent individual work plays a large and important role.

Particular attention should be paid to defining the course's key concepts. Students should thoroughly analyze examples that illustrate these definitions and be able to construct similar examples independently. It's important to develop a clear understanding of what you're learning. Taking supporting notes is helpful. When studying the material from the textbook, it's helpful to supplement your lecture notes in the designated margins in your notebook. You should also note any questions you've identified for consultation with the instructor.

It is recommended to highlight the conclusions obtained as a result of the study in the notes so that they are better remembered when rereading the notes.

Experience shows that many students find it helpful to create a reference sheet containing the most important and frequently used formulas and concepts. Such a sheet helps students remember formulas and key points of the lecture, and can also serve as a constant reference for them.

Reading scientific text is part of cognitive activity. Its goal is to extract the necessary information from the text. The effectiveness of the action largely depends on how consciously the reader approaches the printed word (finding the necessary information, assimilating it in whole or in part, critically analyzing the material, etc.).

There are **four main attitudes towards reading scientific text** :

information retrieval (the task is to find and highlight the desired information)

assimilative (the reader's efforts are aimed at understanding and remembering as fully as possible both the information presented by the author and the entire logic of his reasoning)

analytical-critical (the reader strives to critically comprehend the material, having analyzed it, and determined his attitude toward it)

creative (creates in the reader a readiness in one form or another - as a starting point for his own reasoning, as an image for action by analogy, etc. - to use the author's judgments, his train of thought, the result of observation, the developed methodology, to supplement them, to subject them to new testing).

The main types of systematic recording of what has been read:

Annotation is an extremely brief, coherent description of a book (article) viewed or read, its content, sources, nature and purpose;

Planning is a brief logical organization of the text, revealing the content and structure of the material being studied;

Thesis is a concise reproduction of the author's main assertions without using factual material;

Quoting is the verbatim copying of excerpts and extracts from the text that most significantly reflect a particular idea of the author;

Note-taking is a brief and sequential presentation of the content of what has been read.

A summary is a complex way of presenting the contents of a book or article in a logical sequence. A summary integrates previous notes and allows for a comprehensive understanding of the book or article's content. Therefore, the ability to create an outline, make notes, take excerpts, and other notes determines the technique of summary writing.

5.2. Methodological recommendations for compiling lecture notes:

1. Read the text carefully. Look up any unfamiliar words in reference books. When taking notes, be sure to include reference information in the margins.
 2. Highlight the main points and make a plan.
 3. Briefly formulate the main points of the text, note the author's argumentation.
 4. Take notes on the material, strictly following the outline. When taking notes, try to express your thoughts in your own words. Keep your notes clear and concise.
 5. Write quotes correctly. When quoting, keep in mind the brevity and significance of the idea.
- In the summary, it is advisable to present not only thesis statements but also their evidence. When formatting the summary, strive for the conciseness of each sentence. The author's thoughts should be presented concisely, with care taken to maintain style and expressiveness. The number of additional elements in the summary should be logically justified, and entries should be arranged in a specific sequence consistent with the logical structure of the work. Leave margins for clarification and addition. Mastering note-taking skills requires a student to be determined and to work independently on a daily basis.

5.3. Methodological recommendations for preparation for practical classes

The success of a practical lesson depends on the quality of preparation by both the instructor and the graduate students. A graduate student's good preparation for the practical lesson will be demonstrated by beginning their presentation with a *report outline*, prepared independently or under the guidance of the instructor. Experience shows that it is not uncommon for a graduate student, while presenting a substantive presentation on the topic as a whole, to be unable to formulate the thoughts he's just expressed at length. In other words, he doesn't have a clear enough understanding of the structure of his own presentation, which suggests superficial preparation and a mechanical rewriting of the material into his notes.

Careful preliminary planning by a graduate student of a report, essay, or speech plan on the main issue will facilitate their understanding of the internal logic of the problem and help them better navigate the recommended literature. This approach will allow them to grasp key points and formulate clear judgments, demonstrate the ability to proportionally arrange the material in accordance with its importance in this context, to promote the development of skills in preparing reports and lectures.

In certain situations, it is recommended that a graduate student focus on only one or two points of their plan, which promotes the development of flexible thinking and the ability to navigate the presentation of the prepared material. For the class leader, this helps prevent repetition, highlight key points, and save time. It's important to note that some master's students, when preparing for their internship, first write their presentations and then, keeping the instructor's requirements in mind, begin drafting their outline. Master's students should avoid this practice from their very first classes.

Compliance with regulations is also a requirement of considerable importance. presentations. This teaches graduate students brevity, economy of thought, the ability to select the most essential points, and disciplined thought.

The content and format of presentations play a significant role in creating a creative atmosphere during a practical lesson. The more interesting and original the presentation, the more it attracts graduate students and makes them want to take part in it. discussion, express your point of view, your opinion. Verbatim reproduction in report (speech) on the content of the textbook, the lecture listened to, monotonous. Reading the notes will inevitably cause boredom and kill interest in the upcoming discussion of the issue.

It is important for the graduate student to maintain constant communication with the audience, respond to comments, questions, and remarks without getting lost. This requires a significant amount of willpower and habit. The speaker should address the audience, not the leader, and maintain eye contact with graduate students, and not look at the ceiling or around, which indicates speaker's lack of confidence and audience phobia. Therefore, it is important to analyze not only the content of the speech, but also its form, diction, the speaker's demeanor at the podium, and skills. communication with the audience.

During the practical session, it's important that not only the presenter seeks contact with the audience, but also that the graduate students strive for such contact and express attention and interest in the presentation. Questions for the graduate student presenting the report

In practice, it should be the graduate students themselves who ask the questions, not the teacher. Questions must be relevant and related to the content of the topic under discussion, precisely formulated. Questions for the speaker, their content and quantity in to a large extent characterize the quality of the performance, the degree of interest in it, the preparedness of the other participants in the lesson, their level of activity.

The speaker's answers fully reflect, firstly, how well the additional material is understood, whether he is fluent in it, how deeply he is conscious of it. The methodological significance of the problem under discussion for cognition and practical activity. Secondly, the graduate student's response to questions reveals certain psychological qualities of their personality: quick thinking, self-control, willpower, endurance, independence, decisiveness, etc.

Discussion (round table) in a practical lesson involves a collision. Opinions are generated during the research and discussion of a problem, and only in this capacity can it be acceptable in a seminar. Sometimes a discussion arises spontaneously, unintentionally, as a result of a speaker formulating a particular idea inaccurately or erroneously, or someone in the audience having a different viewpoint on the issue. Most often, discussions are planned by the instructor in advance, with relevant questions, examples, and statements included in the work plan. The teacher can encourage the graduate students to engage in discussion directly if an error in a graduate student's presentation was not noticed or was insufficient, unconvincing, vulnerable argumentation of a particular issue.

A crucial role in organizing a discussion is played by well-timed and well-posed questions (pre-planned or formulated during the lesson), which the teacher will ask the audience at appropriate moments without pressure, in order to provoke a clash of opinions or, conversely, to calm the passions of the unfolding discussion. Questions can be clarifying, counter, or leading; other categories of questions can be defined as casuistic, it usually contains an apparent or real contradiction.

closing remarks summarize the discussion of the issues raised in the seminar. The content of the closing remarks will depend on the seminar's content, the level of discussion, and the level of activity.

Master's students. It can be delivered either after the discussion of a specific issue or at the end of the seminar as a whole. If the issue has been discussed thoroughly and no mistakes have been made, there's no need to immediately summarize; this can be done at the end of the session.

At the end of the lesson, summing up, the teacher evaluates the level discussion of issues in general, succinctly emphasizes the essence of the problems being discussed, their theoretical and methodological significance, deepens what, in his opinion, not covered in sufficient depth, characterizes and evaluates strengths and weaknesses speeches, not forgetting to note the bright and independent thought of anyone graduate students, advises to familiarize themselves with additional literature. Based on educational objectives of the seminar, when delivering a private or general conclusion, evaluating the thoughts expressed by the graduate students, the teacher displays the necessary tact, subtly adapts to the individual characteristics of the graduate students who took part in the seminar, thus using the conclusion as a means of education .

6. Types of practical classes

The type of practical lesson is determined by the content of the topic, the nature of the recommended literary sources, and the level of training of the graduate students. this group, their specialty, the need to link the teaching of one or another academic discipline with the profile of the university and other factors.

The type of practical training is designed to facilitate the most complete disclosure of the content and structure of the topic discussed, to ensure the greatest activity of graduate students, and to solve cognitive and educational problems. Flexibility of the types of practical training, wide opportunities for their continuous improvement allow the teacher to provide the most complete feedback to students, clarifying for themselves a number of questions that are important for the formulation of the entire educational process.

The most common type of practical training is *Round table and discussion*. This type of discussion involves preparing master's students on all practical issues with a group-wide list of recommended readings; master's students presenting (at their own request or at the instructor's request); discussing the presentations; and introducing and concluding remarks by the instructor on specific topics and the practical as a whole.

The round table and discussion allow to involve in the discussion of the issues raised questions maximum for graduate students, of course, using the entire arsenal of tools their activation; the formulation of well-thought-out, clearly formulated additional questions to the speaker and the entire group; skillful concentration attention of graduate students to the strengths and weaknesses of their colleagues' performances; timely focusing of the interests of graduate students on new aspects, arising during the discussion of a practical topic.

The increasing level of practical training requires that the performance the graduate student's work was, as a rule, of a holistic and comprehensive nature and thus was close in both content and form to the report. To the other participants

During the practical lesson, you are given the opportunity to supplement and correct, if necessary, your comrade's presentation.

A round table and discussion based on the preparation of all graduate students on each point of the internship plan does not exclude the possibility of hearing reports from individual graduate students who have received preliminary assignments from the teacher on certain topics. additional questions. Such messages do not serve as a basis for discussion, but only as an addition to the discussion of the issues in the plan. Otherwise The situation is in the following form of seminars - the system of reports. Here the reports The master's students and their discussions form the core of the entire seminar.

Methodology for conducting practical training with discussion of master's students' *reports* implies a wide variety of options. Sometimes the teacher himself or herself At the discretion of the graduate students, the department appoints speakers, co-speakers, and opponents. Opponents and co-speakers must familiarize themselves with the content of the reports beforehand, otherwise their presentations will be a repetition of what has already been said or will be unrelated to it. Weakness The disadvantage of this option is that a significant portion of the seminar participants, or rather almost everyone except the speakers and co-speakers, will be on the sidelines of the discussion. And the Speakers prepare only one question specifically; the rest of the material often remains unexplored. However, one or two such classes can be held. They generate a certain amount of interest among

graduate students. Speakers They can speak without co-reporters and opponents; moreover, it is desirable that each graduate student be ready to supplement and analyze the report of his or her colleague, After listening to it in class, this format of learning encourages graduate students to analyze what they've heard and summarize the ideas expressed during discussion.

During practical classes the *opponent method is also used* . In this case, the teacher appoints not speakers, but opponents. Condemnation of each The question of the practice plan begins according to the scheme of an extended conversation. Then, before your In conclusion, the teacher gives the floor to the opponent. The latter evaluates all the presentations, notes the stated incorrect positions and inaccuracies, supplements the material, summarizes the results of the discussion that took place. To cope with his task, the opponent is obliged prepare especially carefully for the relevant question of the topic.

It's possible for the instructor to *assign individual master's students to lead the discussion* of a particular issue in class and, summing up the results, draw conclusions about its pros and cons. At the end of the practical course, one of the most skilled master's students can be assigned to lead the entire practical course, after Having prepared it and assisted in drafting the work plan, this experience allows us to particularly effectively develop master's students' teaching skills. free speech, conducting a discussion.

Considering the extended conversation and the system of reports as relatively independent forms of conducting practices, it should be emphasized that they have They have much in common. The key to both forms is the creative discussion of relevant issues. The only difference is the initial stage of the discussion. In the first case, the graduate student does not have a prior assignment from the professor for the initial presentation. The teacher either gives him the floor directly during the lesson, or at his request, or upon request (if this graduate student has not shown any activity on previous seminars).

Regardless of the type of practice, its goal is achieved when each participant is ready to give such a detailed presentation on any issue of the plan that would be closer in content to pre-set reports. Using the advantages of each form, the teacher alternates between them in class, not allowing either to dominate.

The topics of the reports may completely coincide with the wording of the question in the plan of the practical lesson or reflect one of its aspects, in particular, related to

its practical significance. It is not uncommon for reports and presentations to be devoted to some new literary work. Depending on this, the nature of the teacher's preliminary work in preparation for the seminar also changes . If the topic coincides with the question seminar plan, he advises all graduate students, then in the second and third cases , individual work with the speaker is necessary, discussing the report plan and additional literature with him.

Interview questions

by discipline

History and Philosophy of Science / История и философия науки

Basic level

Know

1. Science as a subject of philosophical research
2. Logical-epistemological approach to the study of science.
3. Postpositivist traditions in the philosophy of science
4. Critical rationalism of K. Popper.
5. Methodological anarchism of P. Feyerabend
6. The concept of personal knowledge by M. Polanyi .
7. Prescience . The genesis and main stages of the formation of science
8. The culture of the ancient polis and the formation of the first forms of theoretical science.
9. Global revolutions in science and types of scientific rationality.
10. Classical type of scientific rationality.
11. Non-classical type of scientific rationality.
12. The picture of the world of modern science and new ideological guidelines for civilizational development.
13. The debate about the nature of knowledge: empiricism and rationalism

Be able to

1. Cultural and sociological approaches to the study of scientific knowledge:

knowledge, values and interests

2. The principles of internalism and externalism in historical-scientific explanation
3. Models of development of scientific knowledge.
4. Post-non-classical type of scientific rationality.
5. Ethical problems of modern science.
6. Processes of differentiation and integration in modern science.
7. Social and cognitive reasons for the existence of pseudoscientific knowledge.
8. The structure of scientific knowledge
9. Structure and functions of scientific theory.
10. Ideals and norms of scientific research

To own

1. Methods of scientific knowledge, their classification
2. Scientific research, its types and goals
3. Methodology of scientific research
4. Laws of logic and features of thinking
5. Philosophical and general logical methods of cognition
6. Methods of empirical knowledge
7. Methods of constructing theories

Elevated level

Questions to check your level of training

Know

1. The scientific picture of the world, its historical forms and functions.
2. Global evolutionism in the modern scientific picture of the world
3. Scientism and anti-scientism in modern scientific reflection
4. Convergence of the ideals of natural science and social and humanitarian knowledge in modern science.
5. Post-non-classical science and changing worldviews
6. Scientific community and historical prerequisites of institutional resource.
7. Functions of philosophy in scientific knowledge
8. The evolution of methods for transmitting scientific knowledge

Be able to

1. Scientific revolutions as a transformation of the foundations of science.
2. Discipline and interdisciplinarity .
3. Foundations of Science: Systematicity and Dynamics
4. The role of science in overcoming global crises

To own

1. Hypothetico-deductive method in scientific research
2. A systems approach to scientific research. Scientific revolutions and paradigms in the concept of T. Kuhn
3. Lakatos's research programs

Evaluation criteria:

The grade "excellent" is awarded to a student if he/she selects information resources for searching for information in accordance with the assigned educational task, systematizes information obtained from various sources in accordance with the requirements for completing the educational task, formulates and argues conclusions and judgments, including using the philosophical conceptual apparatus, conducts expert work in mathematics, conducts expert work in the field of computer science, prepares methodological materials in the field of mathematics and computer science.

A grade of "good" is given to a student if he/she, with impairments, is able to select information resources for searching for information in accordance with the assigned educational task; with impairments, is able to systematize information obtained from various sources in accordance with the requirements of completing the educational task; with impairments, formulates and argues conclusions and judgments, including with the use of philosophical conceptual apparatus; conducts expert work in mathematics with errors; conducts expert work in the field of computer science with errors; and prepares methodological materials in the field of mathematics and computer science with errors.

The grade "satisfactory" is given to a student if he/she has difficulty selecting information resources for searching for information in accordance with the assigned learning task, has difficulty systematizing information obtained from various sources in accordance with the requirements of completing the learning task, has difficulty formulating and arguing conclusions and judgments, including with the use of philosophical conceptual apparatus, has difficulty conducting expert work in mathematics, has difficulty conducting expert work in the field of computer science, has difficulty preparing methodological materials in the field of mathematics and computer science.

The grade "unsatisfactory" is given to a student if he/she does not select information resources for searching for information in accordance with the assigned educational task, does not systematize information obtained from various sources in accordance with the requirements of the educational task, does not formulate and justify conclusions and judgments, including with the use of philosophical conceptual apparatus, does not conduct expert work in mathematics, does not conduct expert work in the field of computer science, does not prepare methodological materials in the field of mathematics and computer science.

5.6. Methodological recommendations for preparation for tests

Monitoring students' independent work

Independent work is monitored by the teacher in the classroom.

The following types of control are provided: interview, assessment of the report and its presentation.

Detailed criteria for assessing competencies are provided in the Fund of Assessment Tools for Conducting Current and Interim Assessments.

7. List of literature for completing independent work

List of key literature

1. Рузавин Г.И. Методология научного познания [Электронный ресурс]: учебное пособие для вузов / Г.И. Рузавин. – Электрон. текстовые данные. – М.: ЮНИТИ-ДАНА, 2015. – 287 с. – 978-5-238-00920-9. Режим доступа: <http://www.iprbookshop.ru/52507.html>
2. History and philosophy of science [Electronic resource]: textbook / D. E. Abramnikov, E. A. Abramnikov, V. A. Gvozdev, V. V. Gruzin. — Electronic text data. — Novosibirsk: Novosibirsk State University of Architecture and Civil Engineering University (Sibstrin), EBS ASV, 2015. - 317 p. - 978-5-7795-0722-6. - Access mode: <http://www.iprbookshop.ru/68787.html>
3. Pustynnikova , E. V. Methodology of scientific research [Electronic resource]: educational manual / E. V. Pustynnikova . - Electronic text data. - Saratov: IP R Media, 2018. — 126 p. — 978-5-4486-0185-9. — Access mode: <http://www.iprbookshop.ru/71569.html>

List of additional literature

1. Peshcherov, G. I. Methodology of scientific research [Electronic resource]: textbook / G. I. Peshcherov, O. N. Slobotnikov . - Electronic text data . - М.: Institute of World Civilizations, 2017. - 312 p. - 978-5- 9500469-0-2. — Access mode: <http://www.iprbookshop.ru/77633.html>
2. Философия, логика и методология научного познания [Электронный ресурс]: учебник для магистрантов нефилологических специальностей / В.Д. Бакулов [и др.]. – Электрон. текстовые данные. – Ростов- на- Дону: Южный федеральный университет, 2011. – 496 с. – 978- 5- 9275- 0840- 2. Режим доступа: <http://www.iprbookshop.ru/47184.html>
3. Novikov, A. M. Methodology of scientific research [Electronic resource]: textbook / A. M. Novikov, D. A. Novikov. - Electronic text data . - М.: Librokom , 2010. — 280 p. — 978-5-397-00849-5. — Mode access : <http://www.iprbookshop.ru/8500.html>

List of educational and methodological support for independent work of students in the discipline

1. Methodological guidelines for organizing independent work of students in the discipline " History and Philosophy of Science ". Stavropol: SKFU, 202 5 .
2. Methodological guidelines for practical classes in the discipline " History and Philosophy of Science ". Stavropol: SKFU, 202 5 .

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

1. <http://biblioclub.ru/> – University online library " Biblioclub "
2. <https://4brain.ru/liderstvo/> – Leadership: Lessons from an Effective Manager
3. <https://spravochnick.ru/psihologiya/> – Psychology Handbook