PHILOSOPHY AND METHODOLOGY OF SCIENCE
The textbook for Post-graduate students and Masters

Ed. by A.I. Zelenkov

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INTRODUCTION

Modern tendencies in the development of education focus the mastering of specialized educational programs at post-graduate level. According to the native traditions such programs are being done in the process of training of scientific and pedagogic stuff. The necessity to adapt the educational experience and progressive innovational technologies accumulated in the leading universities poses a number of challenges modern post-graduate courses face today. First of all it is the problem of unification of the profound professional training and the ways of its social and cultural adaptation. The point is to form and to develop in post-graduates the need to gain skills in scientific and pedagogic work, to solve actual scientific and research problems effectively, as well adequately evaluate the role and significance of new scientific ideas for the social development, to determine their value and anthropological dimension. This strategy in the development of specialized education meets with the main tendencies of the modern science dynamics; integrate which intensively instrumental, technological, social and cultural parameters of the scientific cognition.

With the above in mind, it is in principle to organize the study and research process at post-graduate level in such a manner, that they can organically combine specific scientific problems with general methodological training, which assume adequate perception and reflexive evaluation of ones own professional priorities.

Because of this it is necessary to positively evaluate the tradition existing in the national Universities, according to which the successful training of scientific and pedagogic stuff presupposes a systematic study of philosophy and the shaping on this background skills of reflexive and methodological thinking.

In present-day situation the role and meaning of philosophical and methodological training of post-graduates and young scientists increases greatly. It is determined by the complex of objective factors which takes place in the society and forms the social dynamics problematic at the turn of the XX-XXI centuries. The frontal implantation of the science and modern information technologies in the most important spheres of the social activities, the globalization of the worlds development, permanent worsening of the ecological problems, rise of the multiply centers of regional tension connected with the processes of transformation and modernization of post-socialistic and developing states, phenomenon of the culture popularization and formation of nonlinear and virtual models of the life of consciousness – these and many other phenomena rise the problems of philosophical, world outlook, logical and methodological level. Their professional and creative comprehension requires serious and accentuated trainings of future scientists and teachers.

The course “Philosophy and methodology of science” is summoned to contribute to the solving of this cardinal problem and according to the resolution of the High Certificating Committee it is recommended for studying in post-graduate courses and is oriented, in the first place, on the problems of philosophical and methodological ensuring of scientific and professional work of post-graduates and competitors, their creative understanding of appropriate philosophical problems, directly connected to the problems of logics, methodology, sociology of science and education.

The change to the multilevel system of education realized today in the high educational establishments of Belarus determined the orientation of the board of philosophy and methodology of science to the following model of philosophy teaching.

The first level. The course “Philosophy” given at this level has to lay the foundation of students grounding in philosophy and provides him with the possibility of the worlds classical philosophical tradition systematic mastering.

The second level – training of the professionally qualified specialists. The course “Philosophy in the modern World”. A distinctive feature of this course is an accented orientation on
a problem and substantial features of modern philosophical way of thinking. The course main goal consists in getting the students acquainted with the most considerable ideas and concepts of postclassical philosophy on the basic knowledge of philosophy which is already available for them.

The third level is oriented on the problems of post degree education within the limits of magistracy and postgraduate studies; it supposes the studying of the course «Philosophy and science methodology». This course is developed according to «the Program-minimum of the candidate examination in philosophy and methodology of science, adopted by the HAC order of the 30th of December 2004 № 179. First of all it is focused on philosophical and methodological maintenance of the future professional pedagogical and research activity of holders of master’s degrees, post-graduate students and competitors. The prior attention in it is given to the problems of creative understanding of the corresponding philosophical problems directly related to the questions of logics and methodology of science. Because of this, the conceptual and theoretical basis of a course offered in the given manual is interpreted by authors, first of all, as a philosophy and methodology of scientific knowledge. However, as the modern understanding of a science assumes obligatory disclosing of its various measurements and implications (social and ecological, anthropological, social and cultural, etc.) so far the epistemological problem area is closely connected with questions of social philosophy, philosophical anthropology and other parts of philosophical knowledge. As a result the course gets complete and systematic character, but in its substantial and thematic accents distinctly dominates the logical, methodological and scientific range of problems.

It is necessary to admit, that not only in Belarus, but also in a number of other post-soviet republics, similar processes of search and grounding of the differentiated technologies of the philosophical education development take place. So, in the Russian Federation, there is a decision to teach the course «History and philosophy of science» at the level of post-degree educational programs. In the Ukraine this course is positioned as «Philosophy and methodology of science». In other words, availability and urgency of such orientation in the development of world outlook, philosophical and methodological training of master’s degree holders, post-graduate students and competitors find their convincing confirmation.

The purpose of the given edition is the publication of the teaching and methodical complex, called for optimization of the studying of the new course «Philosophy and methodology of science» at the level of post-degree education, and also to render the scientific and methodical assistance for master’s degree holders, post-graduate students and competitors in the process of preparation to and passing the candidate minimum examination in the given discipline.

While working out of the given manual the group of authors was guided by the considerable experience in teaching of philosophy and philosophical disciplines at post-degree educational level which was accumulated for many years on the sub-faculty of philosophy and methodology of science BSU. It is natural, that this experience is comprehended through the prism of its adaptation to a modern level of the development of philosophy and its forms of interrelation with a modern science and culture.

One of the distinctive features of the given teaching and methodical textbook is its complex character assuming the presence of concrete substantial and methodical recommendations for students at all the stages of training for postgraduate study entrance examinations in philosophical disciplines, and then to examinations of a candidate minimum as well. Proceeding from the reasons of expediency of the unified conceptually proved schedule of a lecture course on philosophy for post-graduate students of humanitarian and natural-science specialities, authors of the textbook consider essentially important to specify seminars, discussions and practical works on actual problems of philosophy taking into consideration the type and features of the humanitarian and natural-science knowledge. This approach has its full reflection in the given textbook. One can find in it the elaborated scenarios of philosophical practical work on various topics and trends of modern philosophy and methodology of science; besides the extensive philosophical literature is given and carefully classified.

The special attention is given to scientific and methodical recommendations for writing
projects in philosophy in order to direct post-graduate students towards the creative and innovative attitude to the choice of the philosophical project topic, and to the forms of its substantial disclosing.

In the textbook structure seven basic substantial and functional blocks are represented. The first of them contains the course curriculum of «Philosophy and methodology of science», adopted by HAC of Belarus, and also some necessary methodical recommendations and explanations, made to emphasize the most important and debatable aspects of the given program.

The second part represents structural and substantial reconstruction of a lecture course on the given discipline which shows the author's version of interpretation of its major problems and positions.

The third part contains methodically and thematically grounded complexes of questions and problems that are offered to post-graduate students and competitors to think them over at seminars, colloquia, while discussions. Thus, concrete recommendations are given and necessary materials are picked up for the organization of practical works at the post-graduate students of natural-science and humanitarian specialties option.

The fourth part of the edition proposes topics for projects and analytical reviews of the major and most actual problems of the course «Philosophy and methodology of science», and is made with taking into consideration a profile of scientific and professional work of post-graduate students of various faculties and specialties.

The fifth part contains the materials, which allow to organize the practical works and seminars on studying and analyzing of carefully selected sources and original texts, presenting the most considerable achievements in the field of native and foreign philosophy and methodology of science.

In the sixth part of the edition one can find the referential list of control questions for the course «Philosophy and methodology of science», made to optimized the preparation of post-graduate students and competitors for examination of a candidate minimum in the given discipline.

In the seventh part there is a representative selection of the educational, I&R, basic and additional literature which is recommended for those who study the given course in order to understand the offered material on philosophy and methodology of science at various substantial levels and with various teaching and methodical purposes.

1. The program requirements for post-graduate students and competitors from the humanitarian and natural-science specialties, who are going to pass the candidate examination on philosophy and methodology of science

Those who are passing the candidate examination in philosophy and methodology of science is to show high level of philosophical and methodological culture, a profound knowledge at a specialized course "Philosophy and methodology of science", skills in research thinking and ability of philosophical understanding of actual problems natural sciences and humanities.

The examination card includes 3 questions. Formulas of two questions correspond to a problem area considered on lectures and seminars at the course of philosophy and methodology of a science, studied at magistracy and post-graduate courses. The third question will be set on the topic of the presented project and assumes quality check of philosophical and methodological preparation of the post-graduate student and his skills of analytical thinking.

Examinee in philosophy and methodology of science must show the sufficient knowledge of original philosophical texts and the monographic works which are listed as the literature recommended for preparation for practical works in each part of the educational course.
PHILOSOPHY AND VALUES OF THE MODERN CIVILIZATION


Cultural traditions of the East and the West and types of philosophical thinking. Philosophy and national consciousness.

The basic research strategies in post-classical West European philosophy.

Multidimensionality of a philosophy phenomenon. Social and cultural status and functions of philosophy in the modern world of cultural variety. The role of philosophy in forming of person’s valuable orientations and principles of biosphere thinking.

Philosophical understanding of the problem of being. The search of the metaphysical bases being in various philosophical systems.

Ontology as the teaching of being and its interpretation in philosophy. The basic forms of being and their interrelation. Ontology of human subjectivity and culture in non-classical philosophy.


The topological and temporal organization of a material world. Substantial and relational concepts of space and time. Specificity of biological space and time. Being of man and the Time.


Philosophy of global evolutionism. Dynamism of being and the concept of development. Dynamics and development.

Understanding of dialectics in the history of philosophy: ontological, gnoseological and logical aspects of dialectics. Dialectics as the philosophical theory of development. Modern discussions about the value of dialectics. Features of social dialectics.

Dialectics and synergetics. A role of synergetic in understanding of evolutionary processes.

Heuristic potential of global evolutionism and problems of the development in modern scientific picture of the world.

The problem of Man in philosophy. Man as a subject of the philosophical and scientific analysis. Multidimensionality of Man phenomenon. The basic approaches to its understanding. Images of Man in the history of philosophy and culture.

Origin of Man. The basic concepts of anthroposociogenesis. Man as a biosocial phenomenon. Corporality and spirituality of Man. The basic qualities of Man as a biosocial being. The problem of essence and existence of Man. Individual, individuality, personality.


Axiological parameters of Man’s being in the world. A phenomenon of subjectivity and existential experience of Man. A personal choice and a problem of life meaning of Man. Philosophical understanding of death and immortality phenomena. Freedom and responsibility as existential opposition in Man’s being.

Man in the system of social communications. Man and values of mass culture.

Anthropological crisis as the phenomenon of a modern man-caused civilization.

Specificity of a social reality. A place of social philosophy in the system of philosophical knowledge. Social philosophy and social sciences and humanities in the study of society. The concept of social reality. Society as a system. Concept of social structure of the society. Types of
social structures. Modern concepts of social stratification.


**The basic problems of social dynamics.** Society as a developing system. The problem of sources and motive forces of social dynamics. Base factors of social evolution. The nature of social contradictions, conflicts, revolutions and reforms.

The status and functions of the social subject. Transformation and modernization in the conditions of a transition period.

The basic concepts and stages of the development of philosophy of history. Variability in social development. Historical alternatives and a choice of ways of development of society.

Linear and nonlinear interpretations of historical process. Formational and civilizational paradigms in the philosophy of history.

The basic concepts of social progress and their alternatives. Criteria of progress. Humanism as a measure of spiritual and valuable dimension of a social progress.

**Society development as a civilizational process.** Concept and civilization types in the history of society (pre-industrial, industrial, postindustrial). Deadlocks and contradictions of the man-caused civilization. Prospects and problems of an information-oriented society.

Local civilizations and the problem of preservation of cultural and civilizational identity in the modern world. A polilog of cultural traditions or «clash of civilizations» (S. Huntington). Globalization phenomenon.

East Slavic people between the West and the East. The basic preconditions and factors of consolidation of the East Slavic people. The problem of historical self-identification of Belarus and the basic vectors of the development of modern byelorussian society.

**Philosophy of culture.** Concept of culture. The basic paradigms of the philosophical analysis of culture (axiological, semiotic, functional, game, etc.).

Traditions and innovations in the dynamics of culture. The problem of unity and variety of cultural and historical process. Globalization of the social and cultural space and dialogue of cultures.

Culture and spiritual life of the society. Spirituality and value forms of consciousness. Morality as the form of standard regulation of human behavior. Art and specificity of Man’s aesthetic attitude to the world. Religion as the form of spiritual assimilating of the reality.

Spirituality metamorphoses in a modern society. Social mythology, utopia, ideology as forms of social consciousness. A problem of social and cultural identification of Man in a modern society. Values common to all mankind and universal values of modern humanism.

The newest tendencies in social and cultural development of the world community and the form of their philosophical understanding.

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**Part II. The PHILOSOPHICAL and METHODOLOGICAL ANALYSIS of the SCIENCE**

**Science as the major form of cognition in the modern world.** Concept of science. Science as activity, social institute and system of knowledge. Forms of reflective understanding of scientific knowledge: cognition theory, methodology and logic of a science. Problem area of philosophy of science. Scientific and non-scientific knowledge. Specificity of scientific knowledge. A role of science in the life of modern society and in forming of personality.

**Science in its historical development.** Problem of the beginning of a science. Science and types of civilizational development. Proto-science in the structure of traditional civilizations. An antique ideal of a science. The process of first scientific programs taking shape in ancient culture. Origin of empirical sciences. Registration of the disciplinary-organized science in the culture of Renaissance and Modern time. Concept of scientific rationality. Classical, non-classical and post-nonclassical types of scientific rationality. The basic social, cultural and methodological
preconditions of modern science forming. Science functions in industrial and postindustrial society.

Para-science phenomenon, conditions of origin and formation. Esotherism and deviant science.

**Structure and dynamics of scientific knowledge.** Empirical and theoretical levels of scientific knowledge, their unity and distinction. Structure of the empirical research. Concept of the empirical basis of scientific discipline. The fact as the form of scientific knowledge. Specificity of empirical generalizations and laws.

Concept of the scientific theory. Abstract objects of the theory and their system organization. «Ideal objects» in the structure of the scientific theory. Functions of the scientific theory. A problem and a hypothesis as forms of scientific search and knowledge growth.

The meta-theoretical bases of a science. A scientific picture of the world as the characteristic of subject-ontological structures of scientific research. Ideals and norms of a science. Style of scientific thinking concept. The philosophical bases of science and a problem of integration of scientific knowledge into the culture of an epoch.

Dialectics of a developing science. Cumulative and anti-cumulative theories of scientific progress. Problems of rational reconstruction of scientific knowledge dynamics and the system nature of scientific progress. Science development as unity of processes scientific knowledge differentiation and integration.

Extensive and intensive stages in the development of scientific discipline. The nature of scientific revolution. Types of scientific revolutions. Modern strategy of scientific knowledge development.


Essence of the system approach as general scientific methodological program. Forming of nonlinear methodology of knowledge.


Grounding of the research results. Grounding types (the proof, acknowledgement, interpretation, an explanation, etc.). Methods of scientific knowledge systematization (classification, type research, etc.).

Science language. Definitions and their role in forming of scientific terminology. Objective language and a meta language.


The dialectical logic as methodology of scientific cognition. Methodological sense of basic laws of dialectics. The contradiction – a source of development of scientific knowledge. Categories of the general and especial, whole and parts, essence and the phenomenon, abstract and concrete, necessities and accidents, historical and logic; their methodological meaning.

**Science as social institute.** Evolution of organizational forms of science. Science as a system of fundamental and applied researches. Phenomenon of the social need and strategy of science and research, experimental workings out (SREWO). The academic, branch and high school science: the purposes, problems and development prospects. Science and education. Schools in a science. Problem of continuity and alternation of generations in scientific community. Science in the culture of Belarus.

Scientists in the organizations. Concept of scientific community. Stratification structure of scientific community and a problem of "scientific democracy". Scientific hierarchy and an elite
phenomenon in a science. Social mobility and change of the status of the scientist in a modern society.

Communication and its specificity in a modern science. Forms of scientific communications. A competition in a science. Conflicts in a science and a way of their settling. Problem of a dialogue in scientific community. Polemic and discussion as forms of communication in science. The argument, its structure, kinds and a role in scientific discussion. Culture of conducting scientific discussion.


**Science in the system of social values.** Science as value in modern culture. Tool and world outlook value of a science. Scientism and anti-scientism in an estimation of the presence and future of the science.

Social values and norms of scientific ethos. Ambivalence of scientific consciousness. Problems of motivation and recognition in science.

Possibilities and borders of the science. Creative freedom and social responsibility of the scientist. Ethics of a science and its role in forming of modern type of scientific rationality. The social control over science.

Prospects of development and new valuable reference points of a modern science.

**Part III. PHILOSOPHICAL and METHODOLOGICAL PROBLEMS of the DISCIPLINARY-ORGANIZED SCIENCE**


Non-classical natural sciences: revolutionary changes in the physics at the end of XIX – first half of XX\textsuperscript{th} century. Philosophical aspects of the special and general theory of relativity, the quantum mechanics and cosmology. Genetic revolution in biology and forming of the synthetic theory of evolution. Cybernetics and the general theory of systems, their role in the change of style of scientific thinking. Functioning approach as a methodological basis of non-classical natural sciences.

Post-nonclassical natural sciences and search of a new type of rationality. Historically developing, anthropo-dimensional objects, complex systems as objects of research in post-nonclassical natural sciences. Possibilities and prospects of interdisciplinary methodology. The interdisciplinary status of synergetics and its place in cultural space of a post-nonclassical science.


**Philosophy of technics and technical rationality.** Technics as object of a philosophical reflection. Historical evolution of technics concept and its modern interpretations.


Man in technosphere. Formation techno-structure of the XXI-st century. Globalization of

Problem of estimation of economic, social and cultural, social and ecological consequences of technics development. Information and computer revolution in a foreshortening of the philosophical and methodological analysis.


Virtual reality as a social and cultural phenomenon of an information-oriented society. Problem of an intellectual property. Computer revolution in a social context. Information, mediatization of modern society and the social control over the person. The information and knowledge.

Philosophical understanding of an artificial intelligence problem. Computer representation of knowledge as a problem of information epistemology. The information and knowledge.

Correlation of science and technics: linear and evolutionary models. Technical sciences and applied natural sciences.

**Philosophy of social and humanitarian knowledge.** Social philosophy and social and humanitarian knowledge. Social and humanitarian, technical and natural-science knowledge: the comparative analysis.

Society as a subject of social and humanitarian knowledge. Specificity of object and the subject of social and humanitarian knowledge. Nominalistic (methodological individualism) and realistic (methodological universalism) traditions in social science. Monologism and dialogism as modi of social and humanitarian cognition. Subject and practical, cognitive and value standard orientations of social and humanitarian cognition.

Research programs in social science. The naturalistic program and its basic versions: methodological reductionism, ethnocentrism, organicism. The cultural and historical research program: the reality as the world of meanings. A phenomenon of historical method. Psychological, social and psychological programs: the general and specific. Sociologism in social science. Materialistic understanding of history.

Problem of synthesis of research programs of social and humanitarian cognition and variants of its decision. Problem of truth in social and humanitarian cognition. Truth and value, truth and plain truth.

Concept of scientific discipline of social and humanitarian cognition. Problem of classification of social sciences and humanities.

Historical sciences as a subject of philosophical and methodological understanding. Political science and jurisprudence in aspect of methodological understanding. Philosophy and economy: methodological regulatives of modern economic cognition.

Problems and prospects of understanding of interdisciplinary methodologies of thinking in social and humanitarian cognition.

Philosophy and futurology. Globalization as a process of formation of a new world order and object of social and philosophical understanding. The basic models and globalization scenarios. Social and cultural globalization parameters.

Communicative paradigm in modern social philosophy. The global market of information technologies and network structures of communications. Ethics of communication and discourse.


Spiritually-ecological civilization as an ideal and the goal of mankind development. “An epoch of globalism” and a problem of development of the Belarus national culture and state system.

Philosophy as methodology of interdisciplinary synthesis of knowledge. Integrative tendencies in science and prospect of the synergetic style of thinking development. A problem of scientific rationality and the form of its evolution in modern philosophy of a science.

**Approximate long-term plan of subjects for “PHILOSOPHY AND METHODOLOGY OF SCIENCE” (120 hours)**

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<th>№</th>
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<td>Part 3</td>
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<td>Philosophy and Science at the turn of the XX and XXI centuries</td>
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