Federal State Autonomous Educational Institution of Higher Education
"Peoples' Friendship University of Russia named after Patrice Lumumba"

Academy of Engineering

(name of the main educational unit (MEU) that developed the educational program of higher education)

WORKING PROGRAM OF THE DISCIPLINE

HISTORY AND METHODOLOGY OF SCIENCE

(name of discipline/module)

Recommended for the field of study/specialty:

27.04.04 CONTROL IN TECHNICAL SYSTEMS

(code and name of the training area/specialty)

The discipline is mastered within the framework of the implementation of the main professional educational program of higher education (EP HE):

AIML and Space Sciences / Artificial Intelligence, Machine Learning and Space Sciences

(name (profile/specialization) of the educational institution of higher education)

2025

1. THE GOAL OF MASTERING THE DISCIPLINE

The discipline "History and Methodology of Science" is part of the master's program "Artificial Intelligence, Machine Learning and Space Sciences" in the direction 27.04.04 "Control in Technical Systems" and is studied in the 1st semester of the 1st year. The discipline is implemented by the Department of Mechanics and Control Processes. The discipline consists of 3 sections and 19 topics and is aimed at studying the foundations of modern technogenic civilization and global trends in the change of the scientific picture of the world, types of scientific rationality, value systems that scientists are guided by, analysis of the main ideological and methodological problems arising in science at the present stage of its development; analysis of the main methods for solving typical problems and acquaintance with the area of their application in professional activities.

The purpose of mastering the discipline is to form fundamental knowledge and skills in applying methods for solving problems necessary for professional activity, to increase the general level of literacy of students in the discipline of history and methodology of science, to form an understanding of the trends in the historical development of science, as well as a modern understanding of the organization of research activities in the chosen field.

2. REQUIREMENTS TO THE RESULTS OF MASTERING THE DISCIPLINE

Mastering the discipline "History and Methodology of Science" is aimed at developing the following competencies (parts of competencies) in students:

Table 2.1. List of competencies developed in students while mastering the discipline (results of mastering the discipline)

Cipher	**Competence**	**Indicators of Competence Achievement** (within the framework of this discipline)
UC-1	Capable of carrying out a critical analysis of problematic situations based on a systems approach and developing an action strategy	UC-1.1 Analyzes the task, identifying its basic components; UC-1.2 Defines and ranks the information required to solve the given problem; UC-1.3 Searches for information to solve the assigned task using various types of requests; UC-1.4 Suggests options for solving the problem, analyzes the possible consequences of their use; UC-1.5 Analyzes ways of solving problems of ideological, moral and personal nature based on the use of basic philosophical ideas and categories in their historical development and socio-cultural context.;
UC-2	Able to manage a project at all stages of its life cycle	UC-2.1 Formulates a problem, the solution of which is directly related to the achievement of the project goal; UC-2.2 Defines the connections between the tasks set and the expected results of their solution; UC-2.3 Within the framework of the set tasks, determines the available resources and limitations, current legal norms; UC-2.4 Analyzes the project implementation schedule as a whole and selects the optimal way to solve the tasks set, based on current legal regulations and available resources and limitations; UC-2.5 Monitors the progress of the project, adjusts the schedule in accordance with the monitoring results.
UC-3	Able to organize and manage the work of a team, developing a team strategy to achieve the set goal	UC-3.1 Defines his role in the team based on the strategy of cooperation to achieve the set goal; UC-3.2 Formulates and takes into account in its activities the behavioral characteristics of groups of people, identified depending on the set goal; UC-3.3 Analyzes the possible consequences of personal actions and plans his actions to achieve a given result;

Cipher	Competence	Indicators of Competence Achievement (within the framework of this discipline)
		UC-3.4 Carries out exchange of information, knowledge and experience with team members; UC-3.5 Argues his point of view regarding the use of ideas of other team members to achieve the set goal; UC-3.6 Participates in teamwork to carry out assignments.;
UC-5	Able to analyze and take into account cultural diversity in the process of intercultural interaction	UC-5.1 Interprets the history of Russia in the context of world historical development; UC-5.2 Finds and uses information about cultural characteristics and traditions of various social groups in social and professional communication; UC-5.3 Takes into account, in social and professional communication on a given topic, the historical heritage and socio-cultural traditions of various social groups, ethnic groups and faiths, including world religions, philosophical and ethical teachings; UC-5.4 Collects information on a given topic, taking into account the ethnic groups and religions most widely represented at the research sites; UC-5.5 Justifies the specifics of project and team activities with representatives of other ethnic groups and (or) faiths; UC-5.6 Adheres to the principles of non-discriminatory interaction in personal and mass communication in order to fulfill professional tasks and strengthen social integration.;
UC-6	Able to define and implement priorities of own activities and ways of its improvement based on self-assessment	UC-6.1 Controls the amount of time spent on specific activities; UC-6.2 Develops tools and methods for time management when completing specific tasks, projects, and goals; UC-6.3 Analyzes his resources and their limits (personal, situational, temporary, etc.) for the successful completion of the assigned task; UC-6.4 Distributes tasks into long-, medium- and short-term ones with justification of their relevance and analysis of resources for their implementation.;
UC-7	Able to search for the necessary sources of information and data, perceive, analyze, remember and transmit information using digital means, as well as using algorithms when working with data obtained from various sources in order to effectively use the information received to solve problems; evaluate information, its reliability, build logical conclusions based on incoming information and data	UC-7.1 Searches for the necessary sources of information and data, perceives, analyzes, remembers and transmits information using digital means, as well as using algorithms when working with data obtained from various sources in order to effectively use the information obtained to solve problems; UC-7.2 Conducts an assessment of information, its reliability, builds logical conclusions based on incoming information and data; UC-7.3 Has mastered modern digital technologies, methods of searching, processing, analyzing, storing and presenting information (in the field of management in technical systems) in the context of the digital economy and modern corporate information culture.;
GPC-10	Capable of managing the development of methodological and regulatory documents, technical documentation in the field of automation of technological processes and production, including on the life cycle of products and their quality	GPC-10.1 Familiar with the main approaches to the development of methodological and regulatory documents, technical documentation in the field of automation of technological processes and production; GPC-10.2 Has knowledge of approaches to managing the development of technical documentation and regulatory documents in the field of automation of technological processes and production, including the life cycle of products and their quality.;
GPC-4	Capable of assessing the effectiveness of the results of developing control systems using mathematical methods	GPC-4.1 Knows the basic mathematical methods used to evaluate the effectiveness of the results of control systems; GPC-4.2 Able to apply mathematical methods to evaluate the effectiveness of the results of control systems; GPC-4.3 Proficient in methods for assessing the effectiveness of management systems.

Cipher	Competence	Indicators of Competence Achievement (within the framework of this discipline)
GPC-8	Able to select methods and develop control systems for complex technical objects and technological processes	GPC-8.1 Knows the basic methods used to develop control systems for complex technical objects and technological processes; GPC-8.2 Can develop control systems for complex technical objects and technological processes; GPC-8.3 Has the skills to select methods and develop control systems for complex technical objects and technological processes.;
PC-2	Able to apply modern theoretical and experimental methods for developing mathematical models of objects and processes under study in the field of aerospace systems management	PC-2.1 Knows modern theoretical and experimental methods used to develop mathematical models of the objects under study and processes of professional activity; PC-2.2 Able to determine the effectiveness of the methods used to develop mathematical models of the objects and processes under study; PC-2.3 Has mastered modern theoretical and experimental methods for developing mathematical models of objects and processes of professional activity in the field of study.;
PC-4	Capable of participating in scientific research and development of design solutions in the field of ballistics, dynamics and flight control of spacecraft	PC-4.1 Familiar with the basic methods and approaches used to solve problems in the field of artificial intelligence and robotic systems; PC-4.2 Has knowledge of methods for solving professional problems in the field of artificial intelligence and robotic systems; PC-4.3 Able to apply mathematical methods and modern information technologies when conducting scientific research.;

3. PLACE OF THE DISCIPLINE IN THE STRUCTURE OF THE EDUCATIONAL PROGRAM OF HIGHER EDUCATION

Discipline "History and methodology of science" refers to the mandatory part of block 1 “Disciplines (modules)” of the educational program of higher education.

As part of the higher education program, students also master other disciplines and/or practices that contribute to the achievement of the planned results of mastering the discipline "History and Methodology of Science".

Table 3.1. List of components of the educational program of higher education that contribute to the achievement of the planned results of mastering the discipline

Cipher	Name of competence	Previous courses/modules, practices*	Subsequent disciplines/modules, practices*
UC-7	Able to search for the necessary sources of information and data, perceive, analyze, remember and transmit information using digital means, as well as using algorithms when working with data obtained from various sources in order to effectively use the information received to solve problems; evaluate information, its reliability, build logical conclusions based on incoming information and data		*Artificial Neural Networks (Reinforcement Learning)***; *Artificial Neural Networks (Reinforcement Learning)***; Web application development and security; Research work / Scientific research work; Undergraduate Training;

Cipher	Name of competence	Previous courses/modules, practices*	Subsequent disciplines/modules, practices*
UC-3	Able to organize and manage the work of a team, developing a team strategy to achieve the set goal		*Undergraduate Training;*
UC-2	Able to manage a project at all stages of its life cycle		*Research work / Scientific research work;* *Undergraduate Training;*
UC-5	Able to analyze and take into account cultural diversity in the process of intercultural interaction		*History of Religions in Russia;* *Undergraduate Training;*
UC-1	Capable of carrying out a critical analysis of problematic situations based on a systems approach and developing an action strategy		*Artificial Neural Networks (Deep Learning)**;* *Artificial Neural Networks (Reinforcement Learning)**;* *Artificial Neural Networks (Deep Learning)**;* *Artificial Neural Networks (Reinforcement Learning)**;* *Research work / Scientific research work;* *Undergraduate Training;*
UC-6	Able to define and implement priorities of own activities and ways of its improvement based on self-assessment		*Undergraduate Training;*
GPC-4	Capable of assessing the effectiveness of the results of developing control systems using mathematical methods		*Dynamics and Control of Space Systems;* *Advanced Methods of Earth Remote Sensing;* *Undergraduate Training;*
GPC-8	Able to select methods and develop control systems for complex technical objects and technological processes		*Undergraduate Training;*
GPC-10	Capable of managing the development of methodological and regulatory documents, technical documentation in the field of automation of technological processes and production, including on the life cycle of products and their quality		*Research work / Scientific research work;* *Undergraduate Training;* *Advanced Methods of Space Flight Mechanics;*
PC-2	Able to apply modern theoretical and experimental methods for developing mathematical models of objects and processes under study in the field of aerospace systems management		*Research work / Scientific research work;* *Undergraduate Training;* *Artificial Neural Networks (Deep Learning)**;* *Artificial Neural Networks (Reinforcement Learning)**;* *Advanced Methods of Space Flight Mechanics;*

Cipher	Name of competence	Previous courses/modules, practices*	Subsequent disciplines/modules, practices*
			*Artificial Neural Networks (Deep Learning)**;* *Dynamics and Control of Space Systems;* *Geoinformation Systems and Applications;*
PC-4	Capable of participating in scientific research and development of design solutions in the field of ballistics, dynamics and flight control of spacecraft		*Research work / Scientific research work;* *Undergraduate Training;* *Artificial Neural Networks (Reinforcement Learning)**;* *Dynamics and Control of Space Systems;* *Advanced Methods of Earth Remote Sensing;*

* - filled in in accordance with the competency matrix and the SUP EP HE

** - elective disciplines/practices

4. SCOPE OF THE DISCIPLINE AND TYPES OF STUDY WORK

The total workload of the discipline “History and Methodology of Science” is “2” credit units.

Table 4.1. Types of educational work by periods of mastering the educational program of higher education for full-time education.

Type of academic work	**TOTAL,**ac.h.		**Semester(s)**
			1
Contact work, academic hours	*34*		*34*
Lectures (LC)	0		0
Laboratory work (LW)	0		0
Practical/seminar classes (SC)	34		34
Independent work of students, academic hours	*38*		*38*
Control (exam/test with assessment), academic hours	*0*		*0*
General complexity of the discipline	**ac.h.**	***72***	*72*
	credit.ed.	***2***	*2*

5. CONTENT OF THE DISCIPLINE

Table 5.1. Contents of the discipline (module) by types of academic work

Section number	Name of the discipline section	Section Contents (Topics)		Type of academic work*
Section 1	Introduction to the theory of scientific research in informatics and computer engineering. Statement of the scientific problem, goals and objectives of the research. Methods of scientific research.	1.1	Theory and the genesis of its development. Conceptual apparatus: theory, scientific research. Thinkers of the Ancient World and their development of basic ideological concepts and approaches to the analysis of the surrounding world.	LC, SC
		1.2	Theoretical sources as a basis for the development of thought. Genesis of theory. Theory and science.	LC, SC
		1.3	Types of scientific research. Theoretical postulates and their representatives. Selection of the main direction of development of the theory. Priority of analysis among and unsolved problem.	LC, SC
		1.4	Possibilities of theoretical forecasting of processes and phenomena. Formation of an evidence base for theoretical forecasting.	LC, SC
		1.5	Comparative analysis of theoretical approaches to science in Western and Eastern cultures.	LC, SC
		1.6	Similarities, differences and uniqueness in the choice of research topic, methods of its consideration and the final goal.	LC, SC
Section 2	Main types of scientific results in research. Approbation of research results. Rules for the design of scientific research papers.	2.1	The main stages of scientific research in physical and mathematical sciences. Observation and its features. Observation as a basis for choosing a research topic.	LC, SC
		2.2	Types of observation. Determining the relevance of the topic in the physical and mathematical sciences. Searching for an innovative niche. Proving the practical significance of the chosen topic. Defining the purpose and objectives of the study. Searching for monographs, materials from scientific conferences, round tables, articles in specialized scientific publications to form a general picture in the area of the proposed scientific research.	LC, SC
		2.3	Working with Internet resources and statistical sources. Methods of collecting theoretical and empirical data. Formation of a database and verification of its reliability. Formatting citations.	LC, SC
		2.4	The role of hypothesis in scientific research in the physical and mathematical sciences. Hypothesis as a form of forecasting in scientific research in the field of physical and mathematical sciences.	LC, SC
		2.5	Evidence and experimental basis for confirming the hypothesis. PEST analysis as a method of studying the scientific environment for the development of new technologies.	LC, SC
		2.6	Types of models. Innovative approaches to the formation of models in physical and mathematical sciences. Formation of graphs, diagrams, tables. Data comparability.	LC, SC
Section 3	Reviewing, opposition and other forms of evaluation of scientific research works.	3.1	Structure of the dissertation.	LC, SC
		3.2	Articles. Reports at regional, national and international conferences.	LC, SC
		3.3	Testing the results of scientific research.	LC, SC

Section number	Name of the discipline section	Section Contents (Topics)		Type of academic work*
	Implementation and effectiveness of scientific research. Dissertation research, its structure and defense.	3.4	Participation in innovative projects in the field of physical and mathematical sciences.	LC, SC
		3.5	Requirements for writing an abstract. Submission deadlines.	LC, SC
		3.6	Requirements for internal and external reviews. Search for reviewers.	LC, SC
		3.7	Requirements for PowerPoint presentations. Diagrams and tables in presentations. Requirements for a dissertation defense speech. PowerPoint presentations.	LC, SC

* - filled in only for FULL-TIME education: LC – lectures; LW – laboratory work; SC– practical/seminar classes.

6. LOGISTIC AND TECHNICAL SUPPORT OF DISCIPLINE

Table 6.1. Material and technical support of the discipline

Audience type	Equipping the auditorium	Specialized educational/laboratory equipment, software and materials for mastering the discipline (if necessary)
Lecture	An auditorium for conducting lecture-type classes, equipped with a set of specialized furniture; a board (screen) and technical means for multimedia presentations.	
Seminar	An auditorium for conducting seminar-type classes, group and individual consultations, ongoing monitoring and midterm assessment, equipped with a set of specialized furniture and technical means for multimedia presentations.	
For independent work	A classroom for independent work of students (can be used for conducting seminars and consultations), equipped with a set of specialized furniture and computers with access to the Electronic Information System.	

* - the audience for independent work of students MUST be indicated!

7. EDUCATIONAL, METHODOLOGICAL AND INFORMATIONAL SUPPORT OF THE DISCIPLINE

Main literature:

1. Dreshchinsky, V. A. Methodology of scientific research: textbook for universities / V. A. Dreshchinsky. - 2nd ed., revised. and additional. - Moscow: Publishing house Yurait, 2022. - 274 p. - (Higher education). -ISBN 978-5-534-07187-0.

2. Mokiy, V. S. Methodology of scientific research. Transdisciplinary approaches and methods: a textbook for universities / V. S. Mokiy, T. A. LUCyanova. - 2nd ed., revised. and additional. - Moscow: Publishing house Yurait, 2022. - 229 p. - (Higher education). -ISBN 978-5-534-13916-7.

3. Mokiy M. S., Nikiforov A. L., Mokiy V. S.; Ed. Mokiy M. S. Methodology of scientific research. Textbook for master's degree Scientific school: State University of Management (Moscow).P.255. 2017 Grif UMO VO ISBN:978-5-9916-1036-0.

4. Ushakov, E. V. Philosophy and Methodology of Science: Textbook and Workshop for Universities / E. V. Ushakov. - Moscow: Yurait Publishing House, 2022. - 392 p. - (Higher Education). -ISBN 978-5-534-02637-5.

Further reading:

1. National standard of the Russian Federation GOST R 54869-2011 “Project management.Project Management Requirements"

2. Novikov D.A., SUChanov A.L. Models and mechanisms for managing scientific projects in universities. - M.: Institute of Education Management RAO, 2005. - 80 p.

3. PoLCovnikov, A.V. Project Management. Full MBA Course / A.V. PoLCovnikov, M.F. Dubovik. - M.: Olimp-Business, 2013. - 552c.

4. Newton, R. Project management from A to Z / R. Newton. - M.: Alpina Publisher, 2016. - 180c.

Resources of the information and telecommunications network "Internet":

1. RUDN University EBS and third-party EBSs to which university students have access on the basis of concluded agreements

- Electronic library system of RUDN - ELS RUDNhttp://lib.rudn.ru/MegaPro/Web
- Electronic library system "University library online"http://www.biblioclub.ru
- EBS Yuraithttp://www.biblio-online.ru
- Electronic Library System "Student Consultant" www.studentlibrary.ru
- Electronic library system "Troitsky Bridge"

2. Databases and search engines

- electronic fund of legal and normative-technical documentationhttp://docs.cntd.ru/
- Yandex search enginehttps://www.yandex.ru/
- search engineGoogle https://www.google.ru/
- abstract databaseSCOPUS http://www.elsevierscience.ru/products/scopus/

Educational and methodological materials for independent work of students in mastering a discipline/module:*

1. A course of lectures on the subject “History and Methodology of Science”.

* - all educational and methodological materials for independent work of students are posted in accordance with the current procedure on the discipline page in TUIS!

DEVELOPER:

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