**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

ARTIFICIAL INTELLIGENCE

(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 "Artificial Intelligence" is included in 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 2nd semester of the 1st year. The discipline is implemented by the Department of the Partner University. The discipline consists of 8 sections and 19 topics and is aimed at studying modern information technologies and software in solving professional problems, acquiring the skills to select and use modern information technologies and use modern general and specialized packages of application programs in solving professional problems.

The purpose of mastering the discipline is to develop in students a set of knowledge, skills and abilities in the use of modern information technologies and software in solving professional problems.

2. REQUIREMENTS TO THE RESULTS OF MASTERING THE DISCIPLINE

Mastering the discipline "Artificial Intelligence" 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)
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 EDUCATIONAL EDUCATION

Discipline "Artificial Intelligence" 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 "Artificial Intelligence".

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*
PC-4	Capable of participating in scientific research and development of design solutions in the field of ballistics, dynamics and flight control of spacecraft		Dynamics and Control of Space Systems; *Artificial Neural Networks (Reinforcement Learning)***; Undergraduate practice / Pre-graduation practice; Research Work;

* - 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 "Artificial Intelligence" discipline is 5 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)
			2
Contact work, academic hours	*34*		*34*
Lectures (LC)	17		17
Laboratory work (LW)	17		17
Practical/seminar classes (SC)	0		0
Independent work of students, academic hours	*110*		*110*
Control (exam/test with assessment), academic hours	*36*		*36*
General complexity of the discipline	**ac.h.**	*180*	*180*
	credit.ed.	*5*	*5*

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 Artificial Intelligence	1.1	Introduction to artificial intelligence systems. The concept of artificial intelligence. The history of the development of the idea of artificial neural networks, machine learning and the place of these disciplines in science.	LC, LW
		1.2	Functional structure of the artificial intelligence system. Directions of development of artificial intelligence. Modern applications of AI and the main current trends in the field of psychology.	LC, LW
		1.3	Data and knowledge. Knowledge representation in intelligent systems.	LC, LW
Section 2	General concept of information technology	2.1	The concept of information technology. Definition of basic concepts, Information technology in professional activities.	LC, LW
		2.2	Classification model of activity: nature of transformations in social relations, form of expression of the result, scale of implementation of activity, features of procedural forms of activity	LC, LW
Section 3	Information technology and information systems	3.1	Providing access to information. Concepts defining the informatization strategy.	LC, LW
		3.2	List of main information technologies and systems. Tasks of development of information support system.	LC, LW
Section 4	Machine learning terminology	4.1	Key AI terms. Main problem statements: regression, classification, clustering, visualization. Learning from precedents and training sample. Quality metrics. Data types. Terminology: object, target variable, feature, quality metric, model, learning method. Analysis of specific statements, features, quality metrics for these problems.	LC, LW
		4.2	Machine learning as a tool for automatic search for patterns. Review of the main types of models and principles of their training (using simple examples).	LC, LW
		4.3	Linear models and text analysis, examples of analysis of bank reviews and job posting texts. Decision trees, decision forests and Internet search engines. Principles of search engine operation	LC, LW
Section 5	Information processes	5.1	The concept of information processes. Generalized structure of the information circulation process in the information system.	LC, LW
		5.2	Information processes of information circulation: creation, collection, transmission, processing,	LC, LW
Section 6	Information security	6.1	The concept of information protection and information security. Fundamentals of information protection from threats.	LC, LW
		6.2	Protection of interests of the individual, society, state from threats of exposure to poor-quality information, from violation of the procedure for dissemination of information. Protection of information, information resources and information systems from threats of unauthorized and illegal influence of third parties.	LC, LW
		6.3	Protection of rights and freedoms in the information sphere in the conditions of	LC, LW

Section number	Name of the discipline section		Section Contents (Topics)	Type of academic work*
			informatization. Restricted access information and its protection.	
Section 7	Data visualization	7.1	Culture of presenting data and conclusions in graphical form.	LC, LW
		7.2	Data visualization approaches and ideas, demonstration of visualization examples	LC, LW
Section 8	Problems and technologies of expert systems.	8.1	The concept of an expert system (ES). General characteristics of ES. Types of ES and types of tasks to be solved. Structure and modes of use of ES.	LC, LW
		8.2	Classification of ES tools and knowledge organization in ES. Knowledge engineering. Main tasks of a knowledge engineer. Intelligent information ES.	LC, LW

* - 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.	
Computer class	A computer room for conducting classes, group and individual consultations, ongoing monitoring and midterm assessment, equipped with personal computers (15 units), a board (screen) 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. Hunt EB Artificial intelligence. – Academic Press, 2014.
   2. Ertel W. Introduction to artificial intelligence. – Springer Nature, 2024.
Further reading:
   1. McCarthy J. et al. What is artificial intelligence. – 2007.

2. Jackson PC Introduction to artificial intelligence. – Courier Dover Publications, 2019.

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 RUDN https://mega.rudn.ru/MegaPro/Web

- Electronic library system "University library online"http://www.biblioclub.ru

- EBS "Yurait"http://www.biblio-online.ru

- Electronic Library System "Student Consultant" www.studentlibrary.ru

- EBS "Znanium"https://znanium.ru/

2. Databases and search engines

- Sage https://journals.sagepub.com/

- Springer Nature Link https://link.springer.com/

- Wiley Journal Database https://onlinelibrary.wiley.com/

- Scientometric database Lens.org https://www.lens.org

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

1. Lecture course on the subject "Artificial Intelligence".

* - 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:

Associate Professor		Saltykova Olga Alexandrovna
Position, Department	*Signature*	*Surname I.O.*

HEAD OF THE DEPARTMENT:

Position of the Department	*Signature*	*Surname I.O.*

HEAD OF THE EP HE:

Head of Department		Razumny Yuri Nikolaevich
Position, Department	*Signature*	*Surname I.O.*