Federal State Autonomous Educational Institution of Higher Education
PEOPLES' FRIENDSHIP UNIVERSITY OF RUSSIA
NAMED AFTER PATRICE LUMUMBA
RUDN University

Academy of Engineering

educational division (faculty/institute/academy) as higher education programme developer

Approved at the meeting of the Academic Council of RUDN University	Opened by order of the Rector of RUDN University
Protocol No. 19	No. 693
October 31, 2022	November 23, 2022
(date, month, year)	(date, month, year)

PROFESSIONAL EDUCATION PROGRAMME OF HIGHER EDUCATION

Field of Studies/ Speciality:

27.04.04 Control in Technical Systems

(field of studies / speciality code and title)

Profile/Specialisation:

Data Science and Space Engineering

(higher education programme title)

The Educational Programme is developed in compliance with:
Educational Standard of RUDN University, approved by Order of the Rector No. 371 dated May 21, 2021

Level of education:

master's

(bachelor's / specialist's / master's – to fill in the required)

Graduate's Qualification:

Master

(graduate's qualification in compliance with the order of the Ministry of Education and Science of Russian Federation dated September 12, 2013, No. 1061)

Length of Educational Programme:

2 years

(full-time education)	(part-time education)	(correspondence education)

AGREED by:

Head of Educational Programme	Chairperson of Didactic Council	Head of Educational Department
Yu.N. Razoumny	**Yu.N. Razoumny**	**Yu.N. Razoumny**
(signature)	(signature)	(signature)
(day, month, year)	(day, month, year)	(day, month, year)

2024

1. Goal (mission) of the Educational Program

The double degree program "Data Science and Space Engineering" is implemented on the basis of the Patrice Lumumba Peoples' Friendship University of Russia (Russia) and is focused on training highly qualified specialists in the field of data processing, their analysis and identification of hidden patterns, as well as in the field of digitalization of production processes; in the fields of science and technology related to control in technical systems that are used in the space industry. Specialists studying under this program will learn how to apply modern technologies of programming, space engineering, applied informatics, mechanics and mathematics, computer technology and modern technologies of control theory, programming, to develop special software and mathematics to solve problems of working with big data in the interests of general mechanical engineering, aerospace and other high-tech industries. The curriculum is designed in such a way that it allows students to form the most popular professional competencies in the field of mathematical and computer modeling of the processes of design and application of space systems.

In the process of training, students undergo theoretical and practical training in order to form universal, general professional and professional competencies. Students gain research and scientific skills that allow them to carry out professional activities in Russian and international companies, in industrial companies, including companies in such high-tech industries as rocket and space and information technology, as well as in research organizations.

2. *Relevance, specificity, uniqueness of the educational program*

Digitalization and working with big data are among the most popular areas of development in today's conditions of expanding requirements for the digitalization of production processes. In this regard, the relevance of this program is an indisputable fact. The educational program is unique for training specialists in the most popular industry.

The main professional educational program in the direction 27.04.04 Control in Technical Systems (master's level), direction (profile) "Data Science and Space Engineering" is implemented in full-time education in accordance with the license for the right to carry out educational activities.

The period of education under the program is 2 years.

The volume of the program is 120 credits. The volume of the Master's program implemented in one academic year is 60 EC.

3. The need of the labor market for graduates of this EP HE

Graduates acquire theoretical and practical skills in the field of big data processing, mathematical modeling and the development of applied computer programs, and gain skills in solving complex technical problems. They are also specialists in the field of space engineering and

control of complex technical systems and are focused on working in Russian and international companies in various industries: industrial companies, research centers, and higher educational institutions. In addition, graduates have great advantages, having engineering skills in the development and research of algorithmic, software and technical support of modern automation tools, control systems and information processing in various fields of engineering and production.

In the professional sphere, the main consumers of the educational program are research and production enterprises (specializing in data analysis and research, the development of artificial intelligence and work with large databases, space engineering and management of complex technical systems), as well as space agencies of Russia. Among such enterprises are: FSUE "State Research Institute of Aviation Systems" (GosNIIAS), Federal State Autonomous Educational Institution of Higher Education "Peoples' Friendship University of Russia named after Patrice Lumumba", LLC "Yandex", etc.

4. Basic requirements for potential applicants

For admission to the program, the Admission Rules are in force, approved by the relevant local regulatory act and posted in the public domain on the official website of RUDN University.

5. Features of the implementation of the EP HE

5.1 The educational program is implemented using a network form, using distance learning technologies, using elements of e-learning through the Telecommunication Educational and Information System of RUDN University (TUIS).

5.2 Educational activities under the Master's program are carried out in English.

5.3 The program does not provide for the education of disabled people and persons with disabilities.

5.4. Information on the planned bases for training/industrial practices and (or) research

Practice	Base of the internship (name of the organization, location)
Pre-graduation practice	JSC "Astronomical Research Center", Moscow
Research work	Department of Mechanics and Control Processes of the Engineering Academy of the Peoples' Friendship University of Russia (Moscow) RUDN IA Mission Control Training Center (Moscow)

6. Characteristics of the professional activity of a graduate of the EP

6.1. Field(s) and/or sphere(s) of professional activity of a graduate who has mastered the EP HE, in which he/she can carry out his/her professional activities:

development and implementation of new methods and technologies for big data research

research and development of design solutions in the field of ballistics, dynamics and control of spacecraft flights

6.2. Type(s) of professional activity tasks for which the graduate is prepared to solve as part of the development of the EP HE:

Research type of tasks

6.3. Types of tasks of professional activity

List of generalized labor functions and labor functions related to the professional activities of a graduate of the EP HE, in accordance with which the program has been developed

Code and name of the professional standard	Generalized labor functions			Labor functions		
	code	name	Skill level	Name	code	qualificatio n level (sub-level)
06.042"BIG DATA SPECIALIST"	D	Development and implementatio n of new methods and technologies for big data research	8	Improvement and development of new methods, models, algorithms, technologies and tools for working with big data	D/01. 8	8
25.051"RESEARC H ENGINEER FOR DYNAMICS, BALLISTICS, SPACECRAFT MOTION CONTROL"	B/01. 7	Conducting research and developing design solutions in the field of ballistics, dynamics and spacecraft flight control	7	Development of Methods for Studying Ballistic and Dynamic Characteristic s in Modeling Spacecraft Flight Trajectories	B/01.7	7

7. REQUIREMENTS FOR THE RESULTS OF THE DEVELOPMENT OF THE EP HE

7.1 Upon completion of the EP HE, the graduate must have the following universal competencies (MC):

Code and name of the authorized capital	Code and name of the competency achievement indicator
GC-1 Is able to carry out a critical analysis of problem situations based on a systematic approach, to develop an action strategy	GC-1.1. Analyzes the task, highlighting its basic components; GC-1.2. Determines and ranks the information required to solve the problem; GC-1.3. Searches for information to solve the problem by various types of requests; GC-1.4. Offers options for solving the problem, analyzes the possible consequences of their use; GC-1.5. Analyzes the ways of solving problems of worldview, moral and personal character on the basis of the use of basic philosophical ideas and categories in their historical development and socio-cultural context.
GC-2 Capable of managing a project at all stages of its life cycle	GC-2.1. Formulates a problem, the solution of which is directly related to the achievement of the project goal; GC-2.2. Determines the links between the tasks set and the expected results of their solution; GC-2.3. Within the framework of the tasks set, determines the available resources and limitations, the current legal norms; GC-2.4. Analyzes the schedule for the implementation of the project as a whole and chooses the best way to solve the tasks, based on the current legal norms and available resources and restrictions; GC-2.5. Controls the progress of the project, adjusts the schedule in accordance with the results of control.
GC-3 Able to organize and manage the work of the team, developing a team strategy to achieve the set goal	GC-3.1. Determines his/her role in the team, based on the strategy of cooperation to achieve the goal; GC-3.2. Formulates and takes into account in its activities the features of the behavior of groups of people identified depending on the set goal; GC-3.3. Analyzes the possible consequences of personal actions and plans their actions to achieve a given result; GC-3.4. Exchanges information, knowledge and experience with team members; GC-3.5. Argues his point of view regarding the use of the ideas of other team members to achieve the goal; GC-3.6. Participates in teamwork on the implementation of assignments
GC-4 Able to apply modern communication technologies in the state language of the Russian Federation and a foreign language(s) for academic and professional interaction	GC-4.1. Chooses the style of business communication, depending on the language of communication, the purpose and conditions of partnership; GC-4.2. Adapts speech, communication style and sign language to interaction situations; GC-4.3. Searches for the necessary information to solve standard communicative tasks in Russian and foreign languages; GC-4.4 Conducts business correspondence in Russian and foreign languages, taking into account the peculiarities of the style of official and unofficial letters and socio-cultural differences in the format of correspondence; GC-4.5. Uses dialogue for cooperation in academic communication, taking into account the personality of the interlocutors, their communicative and speech strategy and tactics, the degree of formality of the situation;

Code and name of the authorized capital	Code and name of the competency achievement indicator
	GC-4.6. Forms and argues his/her own assessment of the main ideas of the participants in the dialogue (discussion) in accordance with the needs of joint activity.
GC-5 Able to analyze and take into account the diversity of cultures in the process of intercultural interaction	GC-5.1. Interprets the history of Russia in the context of world historical development; GC-5.2. Finds and uses information about the cultural characteristics and traditions of various social groups in social and professional communication; GC-5.3. Takes into account the historical heritage and socio-cultural traditions of various social groups, ethnicities and confessions, including world religions, philosophical and ethical teachings, in social and professional communication on a given topic; GC-5.4. Collects information on a given topic, taking into account the ethnic groups and confessions that are most widely represented in the points of the study; GC-5.5. Substantiates the features of project and team activities with representatives of other ethnic groups and (or) faiths; GC-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
GC-6 Is able to determine and implement the priorities of their own activities and ways to improve them on the basis of self-assessment	GC-6.1. Controls the amount of time spent on specific types of activities; GC-6.2. Develops tools and methods for time management when performing specific tasks, projects, goals; GC-6.3. Analyzes his/her resources and their limits (personal, situational, temporal, etc.) for the successful completion of the task; GC-6.4. Distributes tasks into long-, medium- and short-term with justification of relevance and analysis of resources for their implementation.
GC-7 is able to search for the necessary sources of information and data, perceive, analyze, remember and transmit information using digital means, as well as with the help of 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	GC-7.1. Searches for the necessary sources of information and data, perceives, analyzes, remembers and transmits information using digital means, as well as with the help of algorithms when working with the data obtained from the various data sources in order to effectively use the information obtained to solve problems; GC-7.2. Evaluates information, its reliability, builds logical conclusions on the basis of incoming information and data; GC-7.3. Possesses modern digital technologies, methods of search, processing, analysis, storage and presentation of information (in the field of management in technical systems) in the digital economy and modern corporate information culture

7.2. Upon completion of the EP HE, the graduate must have the following general professional competencies (GPC):

Code and name of the defense industry	Code and name of the competency achievement indicator
GPC -1 Capable of solving actual problems of fundamental and applied mathematics	GPC-1.1. Knows the basic laws, provisions and methods in the field of solving urgent problems of fundamental and applied mathematics GPC -1.2. Is able to identify the essence of problems of fundamental and applied mathematics GPC-1.3. Possesses tools for solving problems of fundamental and applied mathematics
GPC -2 Able to formulate management tasks in technical systems and substantiate methods for solving them	GPC -2.1. Knows the basic methods of solving control problems in technical systems; GPC -2.2. Is able to substantiate methods for solving control problems in technical systems; GPC -2.3. Knows the methods of setting control tasks in technical systems
GPC -3. Able to independently solve control problems in technical systems based on the latest achievements of science and technology	GPC -3.1 Knows the basic approaches to solving management problems in technical systems; GPC -3.2. Is able to apply the main approaches based on the latest achievements of science and technology to solving control problems in technical systems; GPC -3.3. Possesses methods of solving control problems in technical systems based on the latest achievements of science and technology
GPC -4. Is able to assess the effectiveness of the results of the development of control systems by mathematical methods	GPC -4.1 Knows the basic mathematical methods used to assess the effectiveness of the results of management systems; GPC -4.2. Is able to apply mathematical methods to assess the effectiveness of management system results; GPC -4.3. Owns methods for assessing the effectiveness of management system results
GPC -5. Able to conduct patent research, determine the forms and methods of legal protection and protection of rights to the results of intellectual activity, dispose of rights to them to solve problems in the development of science, engineering and technology	GPC -5.1. Knows the methods and approaches to patent research, forms and methods of legal protection and protection of rights to the results of intellectual activity; GPC -5.2. Is able to dispose of the rights to the results of intellectual activity to solve problems in the field of development of science, engineering and technology; GPC -5.3. Owns methods and approaches to patent research, knows the methods of legal protection and protection of rights to the results of intellectual activity
GPC -6. Able to collect and analyze scientific and technical information, generalize domestic and foreign experience in the field of automation and control	GPC -6.1. Knows the basic methods of collecting and conducting analysis of scientific and technical information; GPC -6.2. Is able to analyze and summarize domestic and foreign experience in the field of automation and control facilities; GPC -6.3. Possesses methods of collecting and analyzing scientific and technical information, and can also summarize domestic and foreign experience in the professional field
GPC -7. Is able to make an informed choice, develop and implement in practice circuitry, system engineering and hardware and software solutions for automation and	GPC -7.1. Is able to develop and implement in practice circuitry and system engineering solutions for automation and control systems; GPC -7.2. Is able to develop hardware and software solutions for automation and control systems; GPC -7.3. Owns approaches for the implementation of a reasonable choice and implementation in practice of circuitry, system

Code and name of the defense industry	Code and name of the competency achievement indicator
control systems	engineering, hardware and software solutions for automation and control systems
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 for the development of control systems for complex technical objects and technological processes; GPC -8.2. Is able to develop control systems for complex technical objects and technological processes; GPC -8.3. Has skills in choosing methods and developing control systems for complex technical objects and technological processes
GPC -9. Able to develop methods and perform experiments at operating facilities with processing of results based on information technology and technical means	GPC -9.1. Possesses modern information technologies and technical means for conducting experiments at operating facilities; GPC -9.2. Has the skills to develop methods and conduct experiments at operating facilities; GPC -9.3. Has the skills to develop a methodology and perform experiments at operating facilities with the processing of results through information technology
GPC -10. Able to manage the development of methodological and regulatory documents, technical documentation in the field of automation of technological processes and production, including the life cycle of products and their quality	GPC -10.1. Is 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. Owns approaches to manage 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

7.3. The list of professional competencies (PC) that a graduate who has fully mastered the EP HE must have:

PC code and name	Code and name of the competency achievement indicator	Code and name of the professional standard, on the basis of which the SC is formulated
PC-1 Able to formulate goals, objectives of scientific research in the field of aerospace systems management, choose methods and means for solving professional problems	PC-1.1. Knows the methods and means of solving the problems of scientific research in the field of artificial intelligence systems and robotic systems; PC-1.2. Is able to formulate the goal and objectives of scientific research in the professional field; PC-1.3. Possesses techniques for formulating the goals and objectives of scientific research, knows how to choose methods and means for solving problems of professional activity	25.051
PC-2 Is able to apply modern theoretical and experimental	PC-2.1. Knows modern theoretical and experimental methods used to develop mathematical models of studied objects and processes of professional activity;	25.051

PC code and name	Code and name of the competency achievement indicator	Code and name of the professional standard, on the basis of which the SC is formulated
methods for the development of mathematical models of objects and processes under study in the field of aerospace systems control	PC-2.2. Is able to determine the effectiveness of the methods used to develop mathematical models of the objects and processes under study; PC-2.3. Owns modern theoretical and experimental methods for the development of mathematical models of objects and processes of professional activity in the field of training	
PC-3 Able to conduct work and research on the processing and analysis of scientific and technical information obtained using geographic information systems and technologies	PC-3.1. Is able to analyze the results of theoretical and experimental research; PC-3.2. Is able to formulate recommendations for the improvement of devices and systems, prepare the results of scientific research for publication and form documents for filing an application for an invention; PC-3.3. Participates in the analysis of research results, has the skills of formulating recommendations for improving devices and systems, as well as writing articles and submitting documents for registration of inventions	06.042
PC-4 Able to participate in scientific research and development of design solutions in the field of ballistics, dynamics and spacecraft flight control	PC-4.1. Is familiar with the main methods and approaches used to solve problems in the field of artificial intelligence and robotic systems; PC-4.2. Owns methods for solving professional problems in the field of artificial intelligence and robotic systems; PC-4.3. Is able to apply mathematical methods and modern information technologies in scientific research	06.042

8. Matrix of Competencies Formed in Students in the Development of EP HE 27.04.04 Management in Technical Systems in the Direction of Training "Data Science and Space Engineering / Data Science and Space Engineering"

	Name of disciplines (modules) in accordance with the curriculum	Universal Competencies						
		GC-1. Is able to carry out a critical analysis of problem situations based on a systematic approach, to develop a strategy of action	GC-2. Able to manage a project at all stages of its life cycle.	GC-3. Is able to organize and lead the work of the team, developing a team strategy to achieve the goal.	GC-4. Is able to apply modern communication technologies in the state language of the Russian Federation and a foreign language(s) for academic and professional interaction.	GC-5. Able to analyse and take into account the diversity of cultures in the process of intercultural interaction	GC-6. Is able to determine and implement the priorities of his/her own activities and ways to improve them on the basis of self-assessment	GC-7. Is able to search for the necessary sources of information and data, perceive, analyze, remember and transmit information using digital means, as well as with the help of 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
	Block 1.Disciplines (modules)							
	Mandatory part							
B1.O.01	Base Part							
B1.O.01.01	Russian for Foreign Students				GC-4.1 GC-4.2 GC-4.3 GC-4.4 GC-4.5 GC-4.6			
B1.O.01.02	History and Methodology of Science	GC-1.1 GC-1.2 GC-1.3 GC-1.4 GC-1.5	GC-2.1 GC-2.2 GC-2.3 GC-2.4 GC-2.5	GC-3.1 GC-3.2 GC-3.3 GC-3.4 GC-3.5 GC-3.6		GC-5.1 GC-5.2 GC-5.3 GC-5.4 GC-5.5 GC-5.6	GC-6.1 GC-6.2 GC-6.3 GC-6.4	GC-7.1 GC-7.2 GC-7.3
B1.O.01.03	Information Systems in Mathemetical Modelling							GC-7.1 GC-7.2 GC-7.3

B1.O.01.04	Numerical Methods for Solving Mathematical Modeling Problems						
B1.O.02	Variable Part						
B1.O.02.01	Programming Technology						
B1.O.02.02	Machine Learning and Big Data Mining						
B1.O.02.03	Virtual Reality and Computer Vision						
B1.O.02.04	Advanced Methods of Space Flight Mechanics						
B1.O.02.05	Advanced Methods of Remote Sensing / Современные методы дистанционного зондирования Земли						
B1.O.02.06	Geoiformaiton Systems and Applications						
B1.O.02.07	Dynamics and Control of Space Systems						
	Part formed by the participants of educational relations						
B1.V.DV.01	One choice from two						
B1.V.DV.01.01	Artificial Neural Networks (Deep Learning)	GC-1.1 GC-1.2 GC-1.3					
B1.V.DV.01.02	Artificial neural networks (deep learning)	GC-1.1 GC-1.2 GC-1.3					
B1.V.DV.02	One choice from two						
B1.V.DV.02.01	Artificial Neural Networks (Reinforcement Learning)	GC-1.1 GC-1.2 GC-1.3						GC-7.1 GC-7.2 GC-7.3
B1.V.DV.02.02	Artificial neural networks (reinforcement learning)	GC-1.1 GC-1.2 GC-1.3						GC-7.1 GC-7.2 GC-7.3
	Block 2.Practice						
	Mandatory part						
B2.O.01	Variable Part						
B2.O.01.01(U)	Research work	GC-1.1 GC-1.2 GC-1.3 GC-1.4 GC-1.5	GC-2.1 GC-2.2 GC-2.3 GC-2.4 GC-2.5					GC-7.1 GC-7.2 GC-7.3
B2.O.01.02(PD)	Undergraduate Training	GC-1.1 GC-1.2 GC-1.3	GC-2.1 GC-2.2 GC-2.3	GC-3.1 GC-3.2 GC-3.3	GC-4.1 GC-4.2 GC-4.3	GC-5.1 GC-5.2 GC-5.3	GC-6.1 GC-6.2 GC-6.3	GC-7.1 GC-7.2 GC-7.3

		GC-1.4 GC-1.5	GC-2.4 GC-2.5	GC-3.4 GC-3.5 GC-3.6	GC-4.4 GC-4.5 GC-4.6	GC-5.4 GC-5.5 GC-5.6	GC-6.4	
	Block 3.State Final Certification							
B3.01(G)	State Exam	GC-1.1 GC-1.2 GC-1.3 GC-1.4 GC-1.5	GC-2.1 GC-2.2 GC-2.3 GC-2.4 GC-2.5	GC-3.1 GC-3.2 GC-3.3 GC-3.4 GC-3.5 GC-3.6	GC-4.1 GC-4.2 GC-4.3 GC-4.4 GC-4.5 GC-4.6	GC-5.1 GC-5.2 GC-5.3 GC-5.4 GC-5.5 GC-5.6	GC-6.1 GC-6.2 GC-6.3 GC-6.4	GC-7.1 GC-7.2 GC-7.3
B3.02(D)	Graduate Qualification Work	GC-1.1 GC-1.2 GC-1.3 GC-1.4 GC-1.5	GC-2.1 GC-2.2 GC-2.3 GC-2.4 GC-2.5	GC-3.1 GC-3.2 GC-3.3 GC-3.4 GC-3.5 GC-3.6	GC-4.1 GC-4.2 GC-4.3 GC-4.4 GC-4.5 GC-4.6	GC-5.1 GC-5.2 GC-5.3 GC-5.4 GC-5.5 GC-5.6	GC-6.1 GC-6.2 GC-6.3 GC-6.4	GC-7.1 GC-7.2 GC-7.3

	Name of disciplines (modules) in accordance with the curriculum	General professional competencies									
		GPC-1. Able to analyze and identify the natural science essence of control problems in technical systems on the basis of provisions, laws and methods in the field of natural sciences and mathematics	GPC-2. Is able to formulate management tasks in technical systems and substantiate methods for solving them.	GPC-3. Is able to independently acquire new knowledge, skills and abilities to solve management problems in technical systems	GPC-4. Is able to assess the effectiveness of management systems developed on the basis of modern mathematical methods.	GPC-5. Able to conduct patent research, determine the forms and methods of legal protection and protection of rights to the results of intellectual activity, dispose of rights to them to solve problems in the field of development of science, engineering and technology.	GPC-6. Able to collect and analyze scientific and technical information, summarize domestic and foreign experience in the field of automation and control.	GPC-7. Is able to make an informed choice, develop and implement in practice circuitry, system engineering and hardware and software solutions for automation and control systems	GPC-8. Able to choose methods and develop control systems for complex technical objects and technological processes.	GPC-9. He is able to develop methods and perform experiments at existing facilities with the processing of results based on modern information technologies and technical means.	GPC-10. He is able to manage the development of methodological and regulatory documents, technical documentation in the field of automation of technological processes and production, including the life cycle of products and their quality.
	Block 1.Disciplines (modules)										
	Mandatory part										
B1.O.01	Base Part										
B1.O.01.01	Russian for Foreign Students										
B1.O.01.02	History and Methodology of Science				GPC-4.1 GPC-4.2 GPC-4.3				GPC-8.1 GPC-8.2 GPC-8.3		GPC-10.1 GPC-10.2 GPC-10.3
B1.O.01.03	Information Systems in Mathemetical Modelling	GPC-1.1 GPC-1.2 GPC-1.3	GPC-2.1 GPC-2.2 GPC-2.3								
B1.O.01.04	Numerical Methods for Solving Mathematical Modeling Problems	GPC-1.1 GPC-1.2 GPC-1.3	GPC-2.1 GPC-2.2 GPC-2.3						GPC-8.1 GPC-8.2 GPC-8.3		
B1.O.02	Variable Part										
B1.O.02.01	Programming Technology	GPC-1.1 GPC-1.2 GPC-1.3	GPC-2.1 GPC-2.2 GPC-2.3	GPC-3.1 GPC-3.2 GPC-3.3							
B1.O.02.02	Machine Learning and Big Data Mining					GPC-5.1 GPC-5.2 GPC-5.3	GPC-6.1 GPC-6.2 GPC-6.3				

Code	Name	GPC-1	GPC-2	GPC-3	GPC-4	GPC-5	GPC-6	GPC-7	GPC-8	GPC-9	GPC-10
B1.O.02.03	Virtual Reality and Computer Vision	GPC-1.1 GPC-1.2 GPC-1.3	GPC-2.1 GPC-2.2 GPC-2.3	GPC-3.1 GPC-3.2 GPC-3.3						GPC-9.1 GPC-9.2 GPC-9.3	
B1.O.02.04	Advanced Methods of Space Flight Mechanics	GPC-1.1 GPC-1.2 GPC-1.3		GPC-3.1 GPC-3.2 GPC-3.3				GPC-7.1 GPC-7.2 GPC-7.3			GPC-10.1 GPC-10.2
B1.O.02.05	Advanced Methods of Remote Sensing / Современные методы дистанционного зондирования Земли	GPC-1.1 GPC-1.2 GPC-1.3			GPC-4.1 GPC-4.2 GPC-4.3		GPC-6.1 GPC-6.2 GPC-6.3				
B1.O.02.06	Geoiformaiton Systems and Applications	GPC-1.1 GPC-1.2 GPC-1.3								GPC-9.1 GPC-9.2 GPC-9.3	
B1.O.02.07	Dynamics and Control of Space Systems		GPC-2.1 GPC-2.2 GPC-2.3	GPC-3.1 GPC-3.2 GPC-3.3	GPC-4.1 GPC-4.2 GPC-4.3	GPC-5.1 GPC-5.2 GPC-5.3		GPC-7.1 GPC-7.2 GPC-7.3		GPC-9.1 GPC-9.2 GPC-9.3	
	Part formed by the participants of educational relations										
B1.V.DV.01	One choice from two										
B1.V.DV.01.01	Artificial Neural Networks (Deep Learning)										
B1.V.DV.01.02	Artificial neural networks (deep learning)										
B1.V.DV.02	One choice from two										
B1.V.DV.02.01	Artificial Neural Networks (Reinforcement Learning)										
B1.V.DV.02.02	Artificial neural networks (reinforcement learning)										
	Block 2.Practice										
	Mandatory part										
B2.O.01	Variable Part										
B2.O.01.01(U)	Research work			GPC-3.1 GPC-3.2 GPC-3.3		GPC-5.1 GPC-5.2 GPC-5.3	GPC-6.1 GPC-6.2 GPC-6.3	GPC-7.1 GPC-7.2 GPC-7.3			GPC-10.1 GPC-10.2
B2.O.01.02(PD)	Undergraduate Training	GPC-1.1 GPC-1.2 GPC-1.3	GPC-2.1 GPC-2.2 GPC-2.3	GPC-3.1 GPC-3.2 GPC-3.3	GPC-4.1 GPC-4.2 GPC-4.3	GPC-5.1 GPC-5.2 GPC-5.3	GPC-6.1 GPC-6.2 GPC-6.3	GPC-7.1 GPC-7.2 GPC-7.3	GPC-8.1 GPC-8.2 GPC-8.3	GPC-9.1 GPC-9.2 GPC-9.3	GPC-10.1 GPC-10.2
	Block 3.State Final Certification										
B3.01(G)	State Exam	GPC-1.1	GPC-2.1	GPC-3.1	GPC-4.1	GPC-5.1	GPC-6.1	GPC-7.1	GPC-8.1	GPC-9.1	GPC-10.1

		GPC-1.2	GPC-2.2	GPC-3.2	GPC-4.2	GPC-5.2	GPC-6.2	GPC-7.2	GPC-8.2	GPC-9.2	GPC-10.2
		GPC-1.3	GPC-2.3	GPC-3.3	GPC-4.3	GPC-5.3	GPC-6.3	GPC-7.3	GPC-8.3	GPC-9.3	
B3.02(D)	Graduate Qualification Work	GPC-1.1	GPC-2.1	GPC-3.1	GPC-4.1	GPC-5.1	GPC-6.1	GPC-7.1	GPC-8.1	GPC-9.1	GPC-10.1
		GPC-1.2	GPC-2.2	GPC-3.2	GPC-4.2	GPC-5.2	GPC-6.2	GPC-7.2	GPC-8.2	GPC-9.2	GPC-10.2
		GPC-1.3	GPC-2.3	GPC-3.3	GPC-4.3	GPC-5.3	GPC-6.3	GPC-7.3	GPC-8.3	GPC-9.3	

	Name of disciplines (modules) in accordance with the curriculum	Professional competencies			
		PC-1 Able to formulate goals, objectives of scientific research in the field of aerospace systems management, choose methods and means for solving professional problems	PC-2 Is able to apply modern theoretical and experimental methods for the development of mathematical models of objects and processes under study in the field of aerospace systems control	PC-3 Able to conduct work and research on the processing and analysis of scientific and technical information obtained using geographic information systems and technologies	PC-4 Able to participate in scientific research and development of design solutions in the field of ballistics, dynamics and spacecraft flight control
	Block 1.Disciplines (modules)				
	Mandatory part				
B1.O.01	Base Part				
B1.O.01.01	Russian for Foreign Students				
B1.O.01.02	History and Methodology of Science		PC-2.1 PC-2.2 PP-2.3		PP-4.1 PC-4.2 PP-4.3
B1.O.01.03	Information Systems in Mathemetical Modelling		PC-2.1 PC-2.2 PP-2.3		
B1.O.01.04	Numerical Methods for Solving Mathematical Modeling Problems				
B1.O.02	Variable Part				
B1.O.02.01	Programming Technology				
B1.O.02.02	Machine Learning and Big Data Mining				
B1.O.02.03	Virtual Reality and Computer Vision		PC-2.1 PC-2.2 PP-2.3	PC-3.1 PP-3.2 PP-3.3	
B1.O.02.04	Advanced Methods of Space Flight Mechanics	PC-1.1 PC-1.2 PC-1.3	PC-2.1 PC-2.2 PP-2.3		

B1.O.02.05	Advanced Methods of Remote Sensing / Современные методы дистанционного зондирования Земли			PC-3.1 PP-3.2 PP-3.3	PP-4.1 PC-4.2 PP-4.3
B1.O.02.06	Geoiformaiton Systems and Applications		PC-2.1 PC-2.2 PP-2.3		
B1.O.02.07	Dynamics and Control of Space Systems		PC-2.1 PC-2.2 PP-2.3		PP-4.1 PC-4.2 PP-4.3
	Part formed by the participants of educational relations				
B1.V.DV.01	One choice from two				
B1.V.DV.01.01	Artificial Neural Networks (Deep Learning)	PC-1.1 PC-1.2 PC-1.3	PC-2.1 PC-2.2 PP-2.3		
B1.V.DV.01.02	Artificial neural networks (deep learning)	PC-1.1 PC-1.2 PC-1.3	PC-2.1 PC-2.2 PP-2.3		
B1.V.DV.02	One choice from two				
B1.V.DV.02.01	Artificial Neural Networks (Reinforcement Learning)	PC-1.1 PC-1.2 PC-1.3			PP-4.1 PC-4.2 PP-4.3
B1.V.DV.02.02	Artificial neural networks (reinforcement learning)		PC-2.1 PC-2.2 PP-2.3		
	Block 2.Practice				
	Mandatory part				
B2.O.01	Variable Part				
B2.O.01.01(U)	Research work	PC-1.1 PC-1.2 PC-1.3	PC-2.1 PC-2.2 PP-2.3	PC-3.1 PP-3.2 PP-3.3	PP-4.1 PC-4.2 PP-4.3
B2.O.01.02(PD)	Undergraduate Training	PC-1.1 PC-1.2 PC-1.3	PC-2.1 PC-2.2 PP-2.3	PC-3.1 PP-3.2 PP-3.3	PP-4.1 PC-4.2 PP-4.3
	Block 3.State Final Certification				
B3.01(G)	State Exam	PC-1.1 PC-1.2 PC-1.3	PC-2.1 PC-2.2 PP-2.3	PC-3.1 PP-3.2 PP-3.3	PP-4.1 PC-4.2 PP-4.3
B3.02(D)	Graduate Qualification Work	PC-1.1 PC-1.2 PC-1.3	PC-2.1 PC-2.2 PP-2.3	PC-3.1 PP-3.2 PP-3.3	PP-4.1 PC-4.2 PP-4.3