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

**Academy of Engineering**

(name of the main educational unit (MEU) – developer of the educational program of higher education)

# INTERNSHIP PROGRAM

## Undergraduate practice
(name of practice)

## Industrial
(type of practice: educational, industrial)

**Recommended for the field of study/specialty:**

**27.04.04 Control in Technical Systems**
(code and name of the training area/specialty)

**Practical training of students is carried out 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. PURPOSE OF THE INTERNSHIP

The purpose of conducting pre-graduation practice is industrial practice and deepening, systematization and consolidation of theoretical knowledge in the studied disciplines, collection, processing and analysis of material necessary for the development of the final qualifying work, as well as the formation and development of practical skills and competencies of the master, acquisition of experience in independent professional activity.

**The main task s**pre-graduation practice are:
-        clarification of the composition and volume of the final qualifying work;
-        collection of initial data on the topic of the final qualifying workand necessary technical literature.

## 2. REQUIREMENTS FOR THE RESULTS OF TRAINING BASED ON THE RESULTS OF THE INTERNSHIP

The pre-graduation practice is aimed at developing the following competencies (parts of competencies) in students:

*Table 2.1. List of competencies developed in students during internship (learning outcomes based on internship results)*

| Cipher | Competence | Indicators of Competence Achievement (within the framework of this discipline) |
|---|---|---|
| UC-1 | Ability to carry out critical analysis of problem situations based on a systems approach, develop 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 assigned task; |
| | | UC-1.3. Conducts a search 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 | Ability 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 achieving 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 | Ability to organize and manage the work of a team, developing a team strategy to achieve the set goal. | UC-3.1. Defines his/her role in the team based on the strategy of cooperation to achieve |
| | | 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 the 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-4 | Ability to apply modern communication technologies in the state language of the Russian Federation and foreign language(s) for academic and professional interaction. | UC-4.1. Selects a style of business communication, depending on the language of communication, purpose and conditions of partnership; |
| | | UC-4.2. Adapts speech, communication style and sign language to interaction situations; |
| | | UC-4.3. Searches for the necessary information to solve standard communication tasks in Russian and foreign languages; |
| | | UC-4.4. Conducts business correspondence in Russian and foreign languages, taking into account the stylistic features of official and unofficial letters and socio-cultural differences in the format of correspondence; |
| | | UC-4.5. Uses dialogue for cooperation in academic communication, taking into account the personality of the interlocutors, their communicative speech strategy and tactics, and the degree of formality of the situation; |
| | | UC-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 the joint activity. |
| UC-5 | Ability 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 the cultural characteristics and traditions of various social groups in social and professional communication; |
| | | UC-5.3. Takes into account, during 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. Substantiates 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 perform professional tasks and strengthen social integration |
| UC-6 | Ability to identify and implement priorities of one's own activities and ways to improve them based on self-assessment | UC-6.1. Controls the amount of time spent on specific types of activities; |
| | | UC-6.2. Develops tools and methods for time management when performing 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; |

| Cipher | Competence | Indicators of Competence Achievement (within the framework of this discipline) |
|---|---|---|
| | | UC-6.4. Distributes tasks into long-, medium- and short-term ones with justification of relevance and analysis of resources for their implementation. |
| UC-7 | The ability 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 of data with the aim of effectively using 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. |
| GPC-1 | Ability to analyze and identify the natural scientific essence of control problems in technical systems based on provisions, laws and methods in the field of natural sciences and mathematics | OPC-1.1. Knows the basic laws, provisions and methods in the field of natural sciences and mathematics |
| | | GPC-1.2. Able to identify the natural scientific essence of control problems in technical systems guided by the laws and methods of natural sciences and mathematics |
| | | GPC-1.3. Has knowledge of tools for analyzing control problems in technical systems |
| GPC-2 | Ability to formulate control problems in technical systems and justify methods for solving them. | GPC-2.1. Knows the basic methods for solving control problems in technical systems |
| | | GPC-2.2. Able to justify methods for solving control problems in technical systems |
| | | GPC-2.3. Has mastered methods of setting control tasks in technical systems |
| GPC-3 | The ability to independently acquire new knowledge, skills and abilities to solve management problems in technical systems. | GPC-3.1. Knows the basic approaches to solving control problems in technical systems |
| | | GPC-3.2. Able to apply basic approaches based on the latest achievements of science and technology to solving control problems in technical systems |
| | | GPC-3.3. Has mastered methods for solving control problems in technical systems based on the latest achievements of science and technology |
| GPC-4 | Ability to evaluate the effectiveness of control systems developed on the basis of modern mathematical methods. | GPC-4.1. Knows the basic mathematical methods used to evaluate the effectiveness of the results of control systems |
| | | GPC-4.2. Can apply mathematical methods to evaluate the effectiveness of the results of management systems |
| | | GPC-4.3. Has mastered mathematical methods for assessing the effectiveness of the results of management systems |
| GPC-5 | Ability to conduct patent research, determine forms and methods of legal protection and defense of rights to the results | GPC-5.1. Knows the methods and approaches to conducting patent research, forms and methods of legal protection and protection of rights to the results of intellectual activity |

| Cipher | Competence | Indicators of Competence Achievement (within the framework of this discipline) |
|---|---|---|
|  | of intellectual activity, manage rights to them to solve problems in the field of development of science, engineering and technology. | GPC-5.2. Able to manage rights to the results of intellectual activity to solve problems in the field of development of science, engineering and technology |
|  |  | GPC-5.3. Has knowledge of methods and approaches to conducting patent research, knows methods of legal protection and defense of rights to the results of intellectual activity |
| GPC-6 | Ability to collect and analyze scientific and technical information, generalize domestic and foreign experience in the field of automation and control equipment. | GPC-6.1. Knows the basic methods of collecting and analyzing scientific and technical information |
|  |  | GPC-6.2. Able to analyze and generalize domestic and foreign experience in the field of automation and control equipment |
|  |  | GPC-6.3. Has knowledge of methods for collecting and analyzing scientific and technical information, and can also generalize domestic and foreign experience in the professional field |
| GPC-7 | Ability to make informed choices, develop and implement in practice circuit, system engineering and hardware-software solutions for automation and control systems. | GPC-7.1. Able to develop and implement in practice circuit and system engineering solutions for automation and control systems |
|  |  | GPC-7.2. Can develop hardware and software solutions for automation and control systems |
|  |  | GPC-7.3. Has knowledge of approaches for making a well-founded choice and implementing in practice circuit, system engineering and hardware-software solutions for automation and control systems |
| GPC-8 | Ability 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 skills in selecting methods and developing control systems for complex technical objects and technological processes |
| GPC-9 | Ability to develop methods and perform experiments at existing facilities with processing of results based on modern information technologies and technical means. | GPC-9.1. Possesses modern information technologies and technical means for conducting experiments at existing facilities |
|  |  | GPC-9.2. Has skills in developing methods and conducting experiments at existing facilities |
|  |  | GPC-9.3. Has the skills to develop methods and perform experiments at existing facilities with processing of results using information technology |
| GPC-10 | Ability 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. 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 |

| Cipher | Competence | Indicators of Competence Achievement (within the framework of this discipline) |
|---|---|---|
| PC-1 | Ability to formulate goals and objectives of scientific research in the field of artificial intelligence, and to select methods and means for solving problems. | PC-1.1. Knows methods and means of solving problems of scientific research in the field of artificial intelligence systems and robotic systems |
| | | PC-1.2. Able to formulate the goal and objectives of scientific research in the professional field |
| | | PC-1.3. Has mastered the techniques for formulating the goals and objectives of scientific research, and is able to select methods and means for solving problems of professional activity |
| PC-2 | Ability to apply modern theoretical and experimental methods for developing mathematical models of objects and processes under study related to professional activities in the field of study. | 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 training |
| PC-3 | Ability to analyze the results of theoretical and experimental research, make recommendations for improving devices and systems, prepare scientific publications and applications for inventions | PC-3.1. Able to analyze the results of theoretical and experimental research |
| | | PC-3.2. Able to formulate recommendations for improving devices and systems, prepare scientific research results for publication and generate documents for filing an application for an invention |
| | | PC-3.3. Participates in the analysis of research results, has the skills to formulate recommendations for improving devices and systems, as well as writing articles and submitting documents for registration of inventions |
| PC-4 | Ability to solve applied problems in the field of artificial intelligence and robotic systems | PC-4.1. Familiar with the main 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 in conducting scientific research |
| PC-5 | Ability to collect and analyze initial information data for the development of scientific and technical projects on civilian topics, including for organizations in the rocket and space industry | PC-5.1. Knows the basic principles, methods and tools for developing mathematical and information support for scientific and technical projects of civil subjects, knows the methodology for creating models describing the functioning of components, products, complexes and (or) systems of civil subjects; knows the means of automated design |
| | | PC-5.2. Able to carry out timely collection and analysis of information on advanced technological solutions to identify the best parameters with their subsequent application in the development of thematic products |
| | | PC-5.3. Able to apply general and special purpose software for intelligent processing of received data for digital modeling and ways of their application |

| Cipher | Competence | Indicators of Competence Achievement (within the framework of this discipline) |
|---|---|---|
| PC-6 | Ability to develop working design and technical documentation, prepare completed design and engineering work with verification of compliance of developed projects and technical documentation with standards, specifications and other regulatory documents, including for organizations in the rocket and space industry. | PC-6.1. Knows the scientific basis for developing standards and regulatory documentation; the procedure for developing, approving and implementing standards, technical specifications and other regulatory documentation |
| | | PC-6.2. Able to develop new and revise current standards and regulatory documents; conduct standard control of technical documentation |
| | | PC-6.3. Has the skills to develop standards and regulatory documentation; process experimental data and assess the accuracy of measurements; prepare measurement results and regulatory and technical documentation |

## 3. PLACE OF PRACTICE IN THE STRUCTURE OF THE EDUCATIONAL PROGRAM OH HIGHER EDUCATION

Pre-graduation practice refers to the part formed by the participants of educational programs.

As part of the EP HE, students also master disciplines and/or other practices that contribute to the achievement of planned learning outcomes following the completion of pre-graduation practice.

*Table 3.1. List of components of the educational program of higher education that contribute to the achievement of planned learning outcomes following the completion of the internship*

| Cipher | Name of competence | Previous courses/modules, practices* | Subsequent disciplines/modules, practices* |
|---|---|---|---|
| UC-1 | Ability to carry out critical analysis of problem situations based on a systems approach, develop an action strategy | History and Methodology of Science / History and methodology of science Artificial Neural Networks (Deep Learning) Artificial Neural Networks (Deep Learning) Artificial Neural Networks (Reinforcement Learning) Artificial Neural Networks (Reinforcement Learning) Research work / Research work | State final certification |
| UC-2 | Ability to manage a project at all stages of its life cycle | History and Methodology of Science / History and methodology of science Research work / Research work | State final certification |
| UC-3 | Ability to organize and manage the work of a team, developing a team strategy to achieve the set goal. | History and Methodology of Science / History and methodology of science | State final certification |
| UC-4 | Ability to apply modern communication | Professional Russian (as a Foreign Language) / | State final certification |

| Cipher | Name of competence | Previous courses/modules, practices* | Subsequent disciplines/modules, practices* |
|---|---|---|---|
| | technologies in the state language of the Russian Federation and foreign language(s) for academic and professional interaction. | Russian language (as a foreign language) in professional activities | |
| UC-5 | Ability to analyze and take into account cultural diversity in the process of intercultural interaction | History and Methodology of Science / History and methodology of science | State final certification |
| UC-6 | Ability to identify and implement priorities of one's own activities and ways to improve them based on self-assessment | History and Methodology of Science / History and methodology of science | State final certification |
| UC-7 | The ability 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 | History and Methodology of Science / History and methodology of science Information Technology in Mathematical Modelling / Information Technology in Mathematical Modelling Artificial Neural Networks (Reinforcement Learning) Artificial Neural Networks (Reinforcement Learning) Research work / Research work | State final certification |
| GPC-1 | Ability to analyze and identify the natural scientific essence of control problems in technical systems based on provisions, laws and methods in the field of natural sciences and mathematics | Information Technology in Mathematical Modelling / Information Technology in Mathematical Modelling Numerical Methods for Solving Mathematical Modeling Problems Programming Technology / Programming Technologies Virtual Reality and Computer Vision / Virtual Reality and Computer Vision Advanced Methods of Space Flight Mechanics / Modern Methods of Space Flight Mechanics | State final certification |

| Cipher | Name of competence | Previous courses/modules, practices* | Subsequent disciplines/modules, practices* |
|---|---|---|---|
|  |  | Advanced Methods of Earth Remote Sensing / Modern Methods of Earth Remote Sensing Geoinformation Systems and Applications / Geoinformation systems and their applications |  |
| GPC-2 | Ability to formulate control problems in technical systems and justify methods for solving them. | Name Information Technology in Mathematical Modelling / Information Technology in Mathematical Modelling Numerical Methods for Solving Mathematical Modeling Problems Programming Technology / Programming Technologies Virtual Reality and Computer Vision / Virtual Reality and Computer Vision Name Dynamics and Control of Space Systems / Dynamics and Control of Space Systems | State final certification |
| GPC-3 | The ability to independently acquire new knowledge, skills and abilities to solve management problems in technical systems. | Programming Technology / Programming Technologies Virtual Reality and Computer Vision / Virtual Reality and Computer Vision Advanced Methods of Space Flight Mechanics / Modern Methods of Space Flight Mechanics Dynamics and Control of Space Systems / Dynamics and Control of Space Systems Research work / Research work | State final certification |
| GPC-4 | Ability to evaluate the effectiveness of control systems developed on the basis of modern mathematical methods. | History and Methodology of Science / History and methodology of science Advanced Methods of Earth Remote Sensing / Modern Methods of Earth Remote Sensing Dynamics and Control of Space Systems / Dynamics | State final certification |

| Cipher | Name of competence | Previous courses/modules, practices* | Subsequent disciplines/modules, practices* |
|---|---|---|---|
| | | and Control of Space Systems | |
| GPC-5 | Ability to conduct patent research, determine forms and methods of legal protection and defense of rights to the results of intellectual activity, manage rights to them to solve problems in the field of development of science, engineering and technology. | Machine Learning and Big Data Mining / Machine Learning and Big Data Analysis<br>Dynamics and Control of Space Systems / Dynamics and Control of Space Systems<br>Research work / Research work | State final certification |
| GPC-6 | Ability to collect and analyze scientific and technical information, generalize domestic and foreign experience in the field of automation and control equipment. | Machine Learning and Big Data Mining / Machine Learning and Big Data Analysis<br>Advanced Methods of Earth Remote Sensing / Modern Methods of Earth Remote Sensing<br>Research work / Research work | State final certification |
| GPC-7 | Ability to make informed choices, develop and implement in practice circuit, system engineering and hardware-software solutions for automation and control systems. | Advanced Methods of Space Flight Mechanics / Modern Methods of Space Flight Mechanics<br>Dynamics and Control of Space Systems / Dynamics and Control of Space Systems<br>Research work / Research work | State final certification |
| GPC-8 | Ability to select methods and develop control systems for complex technical objects and technological processes. | History and Methodology of Science / History and methodology of science<br>Numerical Methods for Solving Mathematical Modeling Problems | State final certification |
| GPC-9 | Ability to develop methods and perform experiments at existing facilities with processing of results based on modern information technologies and technical means. | Virtual Reality and Computer Vision / Virtual Reality and Computer Vision<br>Geoinformation Systems and Applications / Geoinformation systems and their applications<br>Dynamics and Control of Space Systems / Dynamics and Control of Space Systems | State final certification |

| Cipher | Name of competence | Previous courses/modules, practices* | Subsequent disciplines/modules, practices* |
|---|---|---|---|
| GPC-10 | Ability 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. | History and Methodology of Science / History and methodology of science Advanced Methods of Space Flight Mechanics / Modern Methods of Space Flight Mechanics Research work / Research work | State final certification |
| PC-1 | Ability to formulate goals and objectives of scientific research in the field of application of geographic information systems in territorial development, to select methods and means for solving professional problems | Advanced Methods of Space Flight Mechanics / Modern Methods of Space Flight Mechanics Artificial Neural Networks (Deep Learning) Artificial Neural Networks (Deep Learning) Artificial Neural Networks (Reinforcement Learning) Research work / Research work | State final certification |
| PC-2 | Ability to apply modern theoretical and experimental methods for developing mathematical models of objects and processes under study related to professional activities in the field of study. | History and Methodology of Science / History and methodology of science Information Technology in Mathematical Modelling / Information Technology in Mathematical Modelling Virtual Reality and Computer Vision / Virtual Reality and Computer Vision Advanced Methods of Space Flight Mechanics / Modern Methods of Space Flight Mechanics Geoinformation Systems and Applications / Geoinformation systems and their applications Dynamics and Control of Space Systems / Dynamics and Control of Space Systems Artificial Neural Networks (Deep Learning) Artificial Neural Networks (Deep Learning) Research work / Research work | State final certification |
| PC-3 | Ability to analyze the results of theoretical and | Virtual Reality and Computer Vision / Virtual | State final certification |

| Cipher | Name of competence | Previous courses/modules, practices* | Subsequent disciplines/modules, practices* |
|---|---|---|---|
|  | experimental research, make recommendations for improving devices and systems, prepare scientific publications and applications for inventions | Reality and Computer Vision<br>Advanced Methods of Earth Remote Sensing / Modern Methods of Earth Remote Sensing<br>Research work / Research work |  |
| PC-4 | Ability to apply modern theoretical and experimental methods for developing mathematical models of objects and processes under study related to professional activities in the field of training | History and Methodology of Science / History and methodology of science<br>Advanced Methods of Earth Remote Sensing / Modern Methods of Earth Remote Sensing<br>Dynamics and Control of Space Systems / Dynamics and Control of Space Systems<br>Artificial Neural Networks (Reinforcement Learning)<br>Research work / Research work | State final certification |

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

## 4. SCOPE OF THE INTERSHIP

The total workload of pre-graduation practice is 21 credit units (756 academic hours).

## 5. CONTENT OF THE INTERSHIP

*Table 5.1. Contents of practice\**

| Name of the practice section | Section content (topics, types of practical activities) | Labor intensity,ac.h. |
|---|---|---|
| Section 1. Organizational and preparatory | Receiving an individual assignment for practice from the supervisor | 2 |
|  | Safety training at the workplace (in the laboratory and/or in production) | 4 |
| Section 2. Main | Collection of initial data on the topic of the final qualification work and the necessary technical literature | 600 |
|  | Ongoing monitoring of the internship by the supervisor | 30 |
|  | Keeping a diary of your internship | 35 |
| Preparation of the internship report | | 35 |
| Preparation for defense and defense of the internship report | | 50 |
| | TOTAL: | 756 |

* - the content of the practice by sections and types of practical training is FULLY reflected in the student's practice report.

## 6. MATERIAL AND TECHNICAL SUPPORT FOR THE INTERNSHIP

To conduct scientific research practice, laboratories equipped with modern computer equipment with Matlab 2008, Borland Developer Studio, G2, Wonderware Intouch software and

Internet access are required. Safety requirements are the same as when working with personal computers.

During pre-graduation practice at RUDN, the material and technical base of the graduation department is used, which trains masters and bachelors in the field of "Management in technical systems".

## 7. METHOD OF CONDUCTING PRACTICE

Pre-graduation practice can be conducted both in RUDN structural divisions or in Moscow organizations (stationary), and at bases located outside of Moscow (visiting).

Conducting an internship at an external organization (outside RUDN) is carried out on the basis of a relevant agreement, which specifies the terms, place and conditions for conducting the internship at the base organization.

The internship dates correspond to the period specified in the academic calendar of the EP VO. The internship dates may be adjusted upon agreement with the Educational Policy Department and the Department for the Organization of Internships and Assistance to Graduates' Employment at RUDN.

## 8. EDUCATIONAL, METHODOLOGICAL AND INFORMATIONAL SUPPORT FOR PRACTICE

*Main literature:*
Classical and modern methods of automatic control theory. Textbook in 5 volumes; 2nd edition, revised and enlarged / Ed. by K.A. Pupkov, N.D. Egupov. – Moscow: Publishing House of Bauman Moscow State Technical University, 2004.
– Pupkov K.A. Modeling and testing of automatic control systems. Tutorial. – M.: RUDN, 2014. – 98s.
– Egoupov N.D., Kolesnikov L.V., Pupkov K.A., Trofimov A.I. / edited by Matveev V.A. Algorithmic theory of control systems based on spectral methods. Monograph in 2 volumes. – Moscow: Publishing house of Bauman Moscow State Technical University, 2014. – 464 pages. Volume 1 and – 464 pages. Volume 2.
Domestic journals: Automation and Telemechanics; Sensors and Systems; News of Higher Educational Institutions. Instrument Making; News of Higher Educational Institutions. Applied Nonlinear Dynamics; News of Higher Educational Institutions. Power Engineering Problems; News of the Russian Academy of Sciences. Control Theory and Systems; Information Measuring and Control Systems; Information Technology; Mathematical Modeling; Mechatronics. Automation. Control; Nonlinear World; Review of Applied and Industrial Mathematics; Devices and Systems: "Control, Monitoring, Diagnostics"; Applied Mathematics and Mechanics; Forecasting Problems; Problems of Control Theory and Practice; Control Problems; Control Systems and Information Technology; Digital Signal Processing; Open Systems;Neurocomputers: development, application.
Foreign journals: CAD/CAM/CAE Observer; Artificial Intelligence; IEEE Transaction on Automation Control; Control; IEEE Mechanical.

*Further reading*
Proceedings of the 16th Congress, 2005: Prague, Czech Republic
Proceedings of the 17th Congress, 2008: Seoul, Republic of Korea
Proceedings of the 18th Congress, 2011: Milan, Italy
http://www.ifac-control.org/publications

*Resources of the information and telecommunications network "Internet":*

1) Electronic library system (ELS) of RUDN and third-party ELS, to which the university students have access on the basis of concluded agreements:
– EBS RUDNhttp://lib.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 "Lan"http://e.lanbook.com/
– EBS "Troitsky Bridge"
2) Databases and search engines:
– electronic fund of legal and normative-technical documentationhttp://docs.cntd.ru/
– Yandex search enginehttps://www.yandex.ru/
– Google search enginehttps://www.google.ru/
– SCOPUS abstract databasehttp://www.elsevierscience.ru/products/scopus/

*Educational-methodological materials for completing the internship, filling out the diary and preparing the internship report\*:*

1) Rules for safe working conditions and fire safety during pre-graduation practice (initial briefing).
2) General structure and operating principle of technological production equipment used by students during their internship; process maps and regulations, etc. (if necessary).
3) Methodological instructions for students to fill out a diary and prepare a practice report.

\* - all educational and methodological materials for completing the internship are posted in accordance with the current procedure on the internship page in TUIS

## 9. EVALUATION MATERIALS AND SCORE-RATING SYSTEM FOR ASSESSING THE LEVEL OF COMPETENCE DEVELOPMENT BASED ON THE RESULTS OF PRACTICE

Assessment materials and a scoring and rating system\* for assessing the level of development of competencies (part of competencies) based on the results of passing_____pre-graduation practice are presented in the Appendix to this Practice Program (module).

\* - OM and BRS are formed on the basis of the requirements of the relevant local regulatory act of RUDN (regulations/procedures).

**DEVELOPERS:**

| **Associate Professor of the Department of Mechanics and Control Processes** | | Saltykova O.A. |
|---|---|---|
| Position, Department | Signature | Surname I.O. |

**HEAD OF THE  DEPARTMENT:**

| **Head of the Department of Mechanics and Control Processes** | | Razumny Yu.N |
|---|---|---|
| Name of the Department | Signature | Surname I.O. |

**HEAD OF EP HE:**

| **Professor of the Department of Mechanics and Control Processes** | | Razumny Yu.N |
|---|---|---|
| Position, Department | Signature | Surname I.O. |