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M.Auezov South Kazakhstan University

« APPROVED BY»

The Rector\_\_\_\_\_\_\_\_\_\_\_\_

d.h.s., academician Kozhamzharova D.P.

«\_\_\_»\_\_\_\_\_\_\_\_\_\_2021y.

[**Education Programme**](https://context.reverso.net/%D0%BF%D0%B5%D1%80%D0%B5%D0%B2%D0%BE%D0%B4/%D0%B0%D0%BD%D0%B3%D0%BB%D0%B8%D0%B9%D1%81%D0%BA%D0%B8%D0%B9-%D1%80%D1%83%D1%81%D1%81%D0%BA%D0%B8%D0%B9/Education%2BProgramme)

7М07110 – «Automation and control»

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| [Registrationnumber](https://context.reverso.net/%D0%BF%D0%B5%D1%80%D0%B5%D0%B2%D0%BE%D0%B4/%D0%B0%D0%BD%D0%B3%D0%BB%D0%B8%D0%B9%D1%81%D0%BA%D0%B8%D0%B9-%D1%80%D1%83%D1%81%D1%81%D0%BA%D0%B8%D0%B9/Registration%2Bnumber) | - |
| Code and classification of the field of education | 7М07 - Engineering, proccessing and contruction branches |
| Code and classification of training areas | 7М071 - "Engineering and engineering business" |
| Group of educational programs | M100 – “Automation and control |
| Typeof EP | *current* |
| ISCE level | 7 |
| NQF level | 7 |
| SQF of education level | 7 |
| Language of learning | Kazakh, Russian, English |
| Typical duration of study | 2 years |
| Form of study | scientific and pedagogical |
| The complexity of the EP, not less | 120 credits |
| Distinctive features of EP | - |
| University Partner ( JEP ) | - |
| University Partner ( TDEP ) | - |
| Social Partner ( DE ) | - |

Shymkent, 2021

Drafters:

|  |  |  |
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EP was considered by the Methodological Commission of the High School “Informational technologies and power engineering” / Considered by the Committee on Innovative Learning Technologies and Methodological Support.

Chairman of MC (Committee) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Makhanova Z.A.

 Sign

Protocol №\_\_\_\_\_ from «\_\_\_\_» \_\_\_\_\_\_\_\_\_\_2021.

Considered and recommended for approval at the meeting of Educational and Methodical Council of M. Auezov SKSU.

protocol № \_\_\_ from \_\_\_\_\_\_\_\_\_\_\_\_.

Approved by the decision of the Academic Council of the University

protocol№ \_\_\_\_\_ from \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ 2021.

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**Introduction**

1. **Scope**

Designed for the implementation of bachelors training by educational program (hereinafter - EP) 7М07110 "Automation and control" in RSE on right of economic management "M.AuezovSouth Kazakhstan State University" of RK MES.

1. **Regulatory documents**

Education Act of the Republic of Kazakhstan (as amended and supplemented on 07/04/2018);

Standard rules for the operation of educational organizations implementing educational programs of higher and (or) postgraduate education, approved by order of the Minister of Education and Science of the Republic of Kazakhstan from October 30, 2018 No. 595 (registered with the Ministry of Justice of the Republic of Kazakhstan on October 31, 2018 No. 17657);

State obligatory standards of higher and postgraduate education, approved by order of the Minister of Education and Science of the Republic of Kazakhstan, October 31, 2018 No. 604;

The rules for the organization of educational process on credit technology education, approved by order of the Minister of Education and Science of the Republic of Kazakhstan on April 20, 2011 No. 152 as amended and supplemented of October 12, 2018 No. 563

1. **Educational programs concept**

The goal of the educational program is coordinated with the mission of university and is aimed at preparing the intellectual elite of the country with advanced entrepreneurial skills, fluent in three languages, demonstrating conceptual, analytical and logical thinking skills, creative approach in professional activities, being able to work in national and international teams obtaining the lifelong strategy.

The educational program is harmonized with the 6th level of the National Qualifications Framework of the Republic of Kazakhstan, with Dublin descriptors, 1 cycle of the Framework for Qualification of the European Higher Education Area, also with Level 6 of the European Qualification Framework for Lifelong Learning.

The educational program is focused on professional and social order through the formation of professional competencies associated with the necessary types of research, practical and business activities, adjusted to meet the requirements of stakeholders.

Theuniqueness of EP7М07110 "Automation and control" in the preparation of masters of technical Sciences. EP is focused on training of professional managers and specialists for the branches of technological production’s automation, teachers in the field of automation and control; provides graduates with the acquisition of master of technical Sciences, the ability to think outside the box and bold original solutions.

The educational program aims to achieve learning outcomes through the organization of educational process using the principles of Bologna process, student-centered learning, accessibility and inclusion.

Program learning outcomes are achieved through the following training events:

- classroom training: lectures, seminars, practical and laboratory classes - held in view of innovative teaching technologies, the use of the latest achievements of science, technology and information systems;

- extracurriculartraining: the independent work of the student, including under the guidance of a teacher, individual counseling;

- conducting professional practices, implementation of course and diploma works (projects).

-scientificresearch work of a master's degree student (SRWMS): independent scientific work of a student, including the implementation of a master's thesis and scientific training.

The university has taken measures to maintain academic integrity and academic freedom, protection from any kind of intolerance and discrimination against students.

The quality of EP is ensured by the involvement of stakeholders in its development and evaluation, systematic monitoring and review of its content.

**4.Entry Requirements**

Established in accordance with the Standard rules of admission to training in the organization of education, implementing educational programs of postgraduate education.

**1. EDUCATION PROGRAMME PASSPORT**

**1.1The purpose and objectives of education program by specialty**

EP objectives: Training of competent scientific and pedagogical personnel on EP "Automation and control" for the system of higher education and science –automation and control.

EP tasks:

**-**providing conditions for the acquisition of a high intellectual level of development, mastering logical and critical thinking and skills of scientific organization of labor in scientific and pedagogical activity;

- development of the ability to use the acquired knowledge in professional activities to solve scientific, managerial and technological problems, operational decision-making in problem situations;

- development of skills of self-study and continuous training throughout the professional activity, which will allow masters to successfully adapt to changing conditions;

- formation of competitiveness of graduates in the field of automation of technological processes and production, to ensure the possibility of rapid employment in the specialty or continuing education in doctoral studies.

**1.2 List of qualifications and positions**

The graduate of this EP is awardedwith degree of "master of technical sciences"

Masters of technical Sciences by specialty 7М07110 "Automation and control"can hold senior positions of a teacher in higher educational institutions, engineers and technicians; managers - master of the site, head of the shop (site), shift supervisor, head of the workshop; specialists - design engineer, design engineer, engineer for commissioning and operation of equipment and automation systems; the engineer in the organizations and the enterprises where the automated control systems of technological processes and productions are used and developed, the automated information management systems, the automated systems of design of different function(in industrial production, research institutions, design and design organizations)without presentation of requirements to length of service according to qualification requirements of the "Qualification reference book of positions of heads, specialists and other employees», approved by the order of the Minister of labor and social protection of the Republic of Kazakhstan dated may 21, 2012 № 201-o-m.

**1.3 Qualification characteristics of the educational program graduate**

**1.3.1 Scope of professional activity**

The scope of professional activity is the field of automation, information and control in various sectors of the economy, as well as technical systems related to the use of tools and methods of information processing.

**1.3.2Objects of professional activity**

The objects of professional activity of graduates are:

- Automated control systems of technological processes for various industries;

- automated information and control systems for various purposes;

- automated systems for receiving, processing and transmitting data for various purposes;

- automated systems for designing systems, objects, devices;

- educational and methodical documentation;

- technical training facilities;

-research work.………………….

**1.3.3Subjects of professional activity**

Subjects of professional activity of the master of technical sciences by specialty7М07110 "Automation and control"are:

- development, implementation and operation of automated control systems of technological processesin various industries;

- methods of analysis, forecasting and management of technological processes, technical systems and research objects of high technologies

- teaching of specialized disciplines in automation and control.

**1.3.4Types of professional activity**

Master of technical sciences by specialty7М07110 "Automation and control"can do the followingtypes of professional activity:

- organizational and managerial;

- industrial-technological;

- settlement and project;

- research;

- pedagogical.

**2.EP learning outcomes**

**LО 1**Demonstrate knowledge of a foreign language in interpersonal communication, professional activities, writing scientific articles.

**LО2** Analyze the main ideological and methodological problems, including interdisciplinary nature, arising in science at the present stage of its development, to evaluate various facts and phenomena, based on the position and category of philosophy of science.

**LО3** Evaluate the development and effective use of personnel in the organization, to possess social and psychological technologies of mass behavior management.

**LО4** Develop an educational and methodical complex of disciplines, to critically evaluate the scientific organization of work of the teacher of higher school, to analyze the nature of pedagogical phenomena

**LО 5** Have in-depth theoretical knowledge and principles of calculation of automation and control systems based on modern scientific approaches.

**LО6** Analyze and discuss the results of independent experimental and theoretical studies in the design of optimal methods of management of technical scientific objects.

**LО7** Solve problems of mathematical modeling in objects and control devices on the basis of modern theoretical methodologies and scientific approaches

**LО8** Formulate the studied theoretical material in solving problems of computer technology in control systems and objects of increased complexity of control.

**LО9** Classify systems of automatic control and management of standard technological processes and productions for the purpose of the reasonable choice for a specific situation.

**LО10** Develop technical specifications, design documentation of automation and control systems with the help of specialized computer-aided design systems.

**3COMPETENCES OF EP GRADUATE**

**3.1** Successful completion of training in EP contribute to the formation of the following competences of a graduate:

* core competencies (CC)
* professioanalcompetencies(PC).

***Core competencies:***

(CC1) in the field of *native language*

- the ability to express and understand concepts, thoughts, feelings, facts and opinions in the field of music education in written and oral forms (listening, speaking, reading and writing), as well as interact linguistically and creatively in a variety of social and cultural contexts: during study, at work, at home and at leisure;

(CC2)in the field of *foreign languages*

-ability to master basic communication skills in a foreign language - understanding, expressing and interpreting concepts, facts and opinions in the professional field, both verbally and in writing (listening, speaking, reading, writing) in the relevant range of social and cultural contexts, mastering skills mediation and intercultural understanding;

(CC3)*fundamental mathematical, scientific and technical training*

- the ability and willingness to apply educational potential, experience and personal qualities acquired during the study of mathematical, natural science, technical disciplines at the university, to determine ways of monitoring and evaluating the solution of professional problems, the development of mathematical and natural science thinking;

(CC4)*computer*

- the ability to confidently and critically use modern information and digital technologies for work, leisure and communications, mastering the skills of using, restoring, evaluating, storing, producing, presenting and exchanging information through a computer, communicating and participating in collaborating networks using the Internet for professional activities;

CC5 *social*

- the ability to own social and ethical values ​​based on public opinion, traditions, customs, norms and to be guided by them in their professional activities; know the cultures of the peoples of Kazakhstan and abide by their traditions; observe the basics of the legal system and legislation of Kazakhstan, know the trends of social development of society; be able to adequately navigate in various social situations; be able to find compromises, relate your opinion with the opinion of the team; own business ethics, ethical and legal standards of conduct; strive for professional and personal growth; work in a team, correctly defend their point of view, propose new solutions; demonstrate tolerance towards other individuals;

CC6 *economic, managerial and entrepreneurial*

- the ability to know and understand the goals and methods of state regulation of the economy, the role of the public sector in the economy; master the basics of economic knowledge; possess the skills of critical thinking, interpretation, creativity analysis, drawing conclusions, evaluation; manage projects to achieve professional goals, manage staff, demonstrate entrepreneurial skills.

***Professioanal competencies***

PC1 – Knowledge of modern methods of information technologies and their means in the development and design of automated control systems

PС2 - Application of mathematical models and methods for in-depth analysis of scientific calculations and optimization of deterministic and random phenomena and processes in control systems

PC3 - Application of modern and advanced methods of analysis of control systems, algorithms of formation of theoretical and experimental studies in automated control systems

PС4 - Knowledge of skills and methods of organization and research in the selection of control systems, practical description and implementation of complex technological systems

PС5 - Knowledge of modern methods of identification of control systems and the ability to analyze scientific and practical problems in the implementation of high-tech automation objects

PС6 - Proficiency in the application of modern methods of analysis of organizational and technical structures of automation systems

PC7 - Proficiency in the use of optimal criteria for the analysis of structures of technical and information systems, control objects, basic methods and algorithms of information conversion using microprocessor and controller systems

PC8 - Skills of analysis and application of mathematical modeling methods in the study and design of automation systems, intelligent control of automation systems

PC9 - professional mastering of University pedagogy and teaching approaches with the use of active learning methods.

PС10 - Knowledge of the state and foreign language in the volume, for the full information of professional content from scientific sources

PС11 - Possession of skills of logical and analytical thinking at the decision of objectives and their correct documenting

PС12 - Possession of methods of ensuring high reliability of technical means of automation, safety and activity of the service personnel at operation of the automated control systems

**3.2Matrix of correlation of EP learning outcomes in general with modules formed by competencies**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Formed competencies** | **LO1** | **LO 2** | **LO 3** | **LO 4** | **LO 5** | **LO 6** | **LO 7** | **LO 8** | **LO 9** | **LO 10** |
| CC1 | + |  |  |  |  |  |  |  |  |  |
| CC2 | + |  |  |  |  |  |  |  |  | + |
| CC3 |  | + |  | + | + | + | + |  | + |  |
| CC4 |  |  |  |  | + | + |  | + |  |  |
| CC5 |  |  | + | + |  |  |  |  |  |  |
| CC6 |  |  |  |  |  |  |  |  |  | + |
| PC1 | + | + | + |  |  | + |  |  |  |  |
| PC2 |  |  |  |  | + |  | + |  |  |  |
| PC3 | + | + |  |  | + | + |  |  | + |  |
| PC4 |  |  |  |  | + | + |  | + |  | + |
| PC5 |  |  |  |  |  |  | + |  | + |  |
| PC6 |  | + |  |  |  | + |  | + |  |  |
| PC7 | + |  |  |  |  |  |  | + |  | + |
| PC8 |  | + |  |  | + | + | + |  | + |  |
| PC9 |  |  | + | + |  |  |  |  |  |  |
| PC10 | + |  |  |  |  |  |  |  |  |  |
| PC11 |  |  |  | + |  | + |  |  |  | + |
| PC12 |  |  | + |  | + |  |  |  | + | + |

**4.SUMMARY TABLE REFLECTING THE VOLUME ASSIMILATED CREDITS OF EDUCATION PROGRAM MODULES**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Course of Study | Semester | The number of mastered modules | The number of studied disciplines | Number of KZ credits  | Total hours | TotalKZ credits | The number of |
| VC | EC | Theoretical training | Pedagogical practice | Research practice | SRWMS | Finalexamination | exam | dif.offset |
| 1 | 1 | 4 | 5 | 2 | 29 |  |  | 1 |  | 900 | 30 | 6 | 2 |
| 2 | 5 | - | 4 | 23 | 4 |  | 3 |  | 900 | 30 | 4 | 2 |
| 2 | 3 | 5 | - | 4 | 21 |  | 7 | 2 |  | 900 | 30 | 4 | 2 |
| 4 | 1 |  |  |  |  |  | 18 | 12 | 900 | 30 |  | 1 |
| Total  | 8 | 5 | 10 | 63 | 4 | 7 | 24 | 12 | 3600 | 120 | 14 | 7 |

**5**

**5. Information about disciplines**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Module name** | **cycle** | **VC/EC** | **Component Name** | **Brief course description****(in 30-50 word)** | **Number of credits** | **Formed LО (codes)** |
| Module of Scientific and Pedagogical Training | BD | VC | History and Philosophy of Science | The questions of history, as well as theoretical problems associated with the process of scientific knowledge are considered. The problems of modern science are critically analyzed. Various philosophical directions are analyzed in the context of the methodology of modern scientific knowledge. | 3 | LO2, LO4 |
| BD | VC | Foreign Language (Professional) | The principles of teaching and requirements to the level of foreign language proficiency, the nature of the educational language material: phonetics, vocabulary and word formation, grammar. | 3 | LO1, LO10 |
| BD | VC | Psychology of Management | The study of the basic approaches and principles of modern psychological science, which can be useful in the professional activities of highly qualified specialists. Psychological knowledge and skills are analyzed in the context of their application in the practice of self-knowledge, communication, professional and personal growth. | 3 | LO2, LO3 |
| Methodical Bases of Teaching | BD | VC | Higher School Pedagogy | Modern trends of humanization and democratization of the educational process in higher education, new technologies of training and education are studied, focuses on the individual creative style of teaching. | 3 | LO4, LO8 |
| BD | VC | Teaching Metods of Special Disciplines | The tasks and content of vocational training, General didactic principles of training in relation to the system of vocational training, vocational training system, the main organizational forms of vocational training, the structure and types of training, methods of vocational training, control, assessment of knowledge, skills and accounting of student performance, educational and material base of vocational training. | 5 | LO4, LO8 |
| BD | VC | Pedagogical Practice | During the practice is considered to conduct lectures, practical and laboratory classes in various special disciplines of automation and control. Visiting lectures of leading teachers of the Department. Familiarization and preparation of educational and methodical complex of the major discipline. Planningofeducationalwork. | 8 | LO4, LO8, LO6 |
| Modern and integrated technologies of control and automation | PD | VC | Automation of technical systems | General information on automation of technical systems is studied. Stages of automation development. Review of the current level and prospects of development. Level of automation. Classification of control systems by levels of automation. Control objects in technical systems. Classification of control objects in technical systems and their types. Featuresoftechnologicalprocessesasobjectsofmanagement. | 4 | LO5, LO7, LO9 |
| BD | EC | Integrated technologies of automation and control | The concept of integrated technologies for creating automation and control systems, the basic concepts, composition and structure of the integrated control system. Models of flexible automated production and their components. Scientific, engineering and industrial experiment as a means of construction or refinement of the mathematical models of the object or phenomenon under study | 5 | LO5, LO6, LO9 |
| BD | EC | Systems Theory and Systems Analysis  | Examines the variance of reproducibility, testing statistical hypotheses, testing the significance of regression coefficients by student's criterion Test for the homogeneity of the measurement results by Cochran criterion |  | LO5, LO6, LO9 |
| PD | VC | Research Practice | Acquaintance with the latest technological achievements of domestic and foreign science; acquaintance with the international and domestic standards of the corresponding performed work within the specialty; research and the analysis of modern means and systems of automation and control; research of methods of mathematical modeling and systems of computer-aided design of software and hardware and systems of automation and control is conducted | 12 | LO2, LO3,LO5, LO6, LO8 |
| Problems of mathematical modeling and information processing | BD | EC | Modern problems of mathematical modeling and optimization of automation objects | Discusses the problems of mathematical modeling and optimization of automation objects, ecosystems, basic concepts classification of the contents and volume of the outputs of industrial and household crawls, the existing methods for treatment of industrial and domestic emissions. | 6 | LO5, LO7, LO8, LO9 |
| BD | EC | Synthesis of new optimal control systems | The formulation of the optimal control problem, the Lagrange problem in Pontryagin’sform, linear optimal control problems are considered, the methods of variational calculus are discussed, the linear problem of optimal speed and control synthesis problems, the principle of optimality are introduced |  | LO5, LO7, LO8, LO9 |
| BD | EC |  theories and methods of processing and transmitting information | Statistical characteristics of the measured processes models. Stationary model of measured processes. Non-stationary model of measured processes. Representation of realizations of random processes by discrete samples. Orthogonal functions. Time sampling methods. Reconstruction errors of measured processes. Application of the Kotelnikov theorem to determine the sampling rate. Application of the Kotelnikov theorem for stochastic processes. The choice of the sampling rate according to the Zheleznov sampling principle. | 5 | LO6, LO9, LO10 |
| BD | EC | Modern digital signal processing in automation systems | General information about information technologies of automation systems design, stages of development of information technologies of automation systems design, classification of information technologies of automation systems design, software of information technologies of automation systems design are considered. |  | LO6, LO9, LO10 |
| Module of intellectual and computer control systems  | PD | EC | Intellectualcontrolsystems | Models and algorithms of intelligent systems are investigated. Differential model the concept of knowledge bases for intelligent systems. Dynamic expert systems in management. Control systems with fuzzy logic. Creation of knowledge bases of intelligent systems. Representation of knowledge base in modern intelligent systems. | 5 | LO5, LO8, LO9 |
| PD | EC | Neuralnetworktechnology | Single-layer and multi-layer perceptron, networks based on radial basis functions, associative machines, models based on information theory, neurodynamic networks, dynamic controlled recurrent networks, mathematical foundations of fuzzy systems are investigated. |  | LO5, LO8, LO9 |
| PD | EC | Specialized hardware and software means and automation systems | Brief information about software and hardware complexes (SHC) of automation systems (AS) is considered. Automated workplaces (AWP) of operators. Servers for various purposes. Industrial network. SHC software. Programmable control devices. Small-channel and multi-channel microprocessor controllers. Controllersfordistributedcontrolsystems. | 4 | LO5, LO8, LO10 |
| PD | EC | Computer automation and control technology | General concepts of construction of complex automated control systems with a developed computing architecture are considered. Real-time human-machine systems. Functional, organizational, informational and software aspects of process control in the framework of computer technology. Implementationofcomplexcontrolsystemsbasedoncomputertechnology. |  | LO5, LO8, LO10 |
|  |  | MasterResearch | The research of problems of specialty and subject according to the theme of master's work is considered. Research of modern achievements of science, technology and production with the study of practical recommendations and methods for solving management problems. The use of modern mathematical models, technical and technological systems, computer software and the results of experimental data in the performance of final qualifying work. | 24 | LO1, LO2, LO5, LO6, LO7 |
| Module of the theory of management and scientific research | PD | EC | Moderncontroltheory | The concept of modern control theory is covered. Transient state matrix. Transient state matrix of linear stationary and nonstationary systems for continuous and discrete time. The fundamental matrix of the system. Methods for calculating the matrix exponent. Symbolic-numericalgorithmsforgenerationofdiscretemodels | 5 | LO5, LO7, LO8, LO9 |
| PD | EC | Theory and methods of control in the state space | The concept of object uncertainty, classification of uncertainties, control problems under uncertainty, basic control methods, analysis of systems with uncertainties, roughness of properties of control systems, the concept of roughness and robustness are covered. |  | LO5, LO7, LO8, LO9 |
| PD | EC | Automationofscientificresearch | The main types of scientific research are considered. The importance of mathematics and computer science in research. Scientific, engineering and industrial experiment as a means of construction or refinement of the mathematical models of the object or phenomenon under study. Typical scheme of experimental studies. Typical block diagrams and basic functions of scientific research automation. | 4 | LO5, LO8, LO9 |
| PD | EC | ExperimentPlanning | Discusses the role of automation in a modern experiment in chemical and food industry, an automated system, the object of the research, Executive, information and computing subsystem, the quantization of a continuous signal, analog-to-digital and digital-to-analog converters, structure and types of software of automated systems for scientific research |  | LO5, LO8, LO9 |
| Technologies of identification and control software means  | PD | EC | Elements and devices of computer control systems | The review of existing computer control systems, software and information support is considered. Purpose, architecture, elements and device of programmable logic controllers, converters, sensors and actuators. Thesoftwareofcontrollersofmanagementoftechnologicalprocesses. | 5 | LO6, LO8, LO9 |
| PD | EC | Technical support of computer control systems in oil refining and oil production | The review of computer control systems used in the automation of petrochemical processes is carried out. The purpose, architecture, elements and device of programmable logic controllers are considered. Сontrollers’ssoftware. |  | LO6, LO8, LO9 |
| PD | EC | Modern methods of objects identification and control systems  | The problem statement of identification and estimation is covered. The model identification problem. Classification of identification methods Adaptive control and identification. Criteria of adequacy of mathematical models. Identification of dynamic systems. Formalization of mathematical models of dynamic systems. Wiener-Hopf Equation. | 4 | LO5, LO7, LO9, LO10 |
| PD | EC | Identification of objects and systems in oil refining and oil production  | The features of modeling objects in oil refining and oil production are considered. Modeling as a means of knowledge and analysis of complex systems. Purpose and functions of models. The concept of mathematical model, technical and software modeling. Technical support of mathematical modeling. Digital, analog and hybrid computers, their characteristics and applications for modeling. |  | LO5, LO7, LO9, LO10 |
| ModuleofFinalAttestation |  |  | Execution and Defense of Master Thesis | Familiarization with the latest technological achievements of domestic and foreign science; familiarization with international and domestic standards relevant to the work performed in the specialty; research and analysis of modern means and systems of automation and control; research methods of mathematical modeling and computer-aided design of software and hardware and automation and control systems | 12 | LO10, LO3, LO5, LO7, LO8, LO9 |

**AGREEMENT SHEET**

by Education Program code «7М07110 – Automation and control»

Director of the Institute of Postgraduate Education \_\_\_\_\_\_\_\_\_\_\_\_\_ Ybyraiym A.O.

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