MINISTRY OF SCIENCES AND HIGHER EDUCATION OF THE REPUBLIC OF KAZAKHSTAN
M.O. AUEZOV SOUTH KAZAKHSTAN UNIVERSITY

«APPROVED»
Chairman of the board -
Rector _____
Doctor of historical sciences,
Academician, Kozhamzharova D.P.
«___»_____2022

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EDUCATIONAL PROGRAM

6B06140-« Virtual Reality Modeling and Construction»

Registration number	6B06100280
Code and classification of the field of education	6B06 Information and Communication Technologies
Code and classification of areas of study	6B061 Information and communication technologies
Group of educational programs	B057 Information technologies
Type of EP	acting
Level by IEQS	6
Level byNQF	6
Level bySQF	6
Language of instruction	Kazakh, Russian
Labor intensity of EP	240 credits
Distinctive features of the EP	-
Partner university (JEP)	-
Partner university (DDEP)	-

Shymkent, 2022

Developers:

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The EP was considered in the direction of training information and communication technologies at a meeting of the academic committee, protocol №___ «_____» _____ 2022 y.

Chairman of the Committee _____ Shertayev E.T.
signature

The EP was considered and recommended for approval at Educational-methodical meeting of M. Auezov SKU
protocol №____ « » _____ 2022 y.

The EP was approved by the decision of the Academic Council of the University
protocol №____ « » _____ 2022 y.

CONTENT

1. CONCEPT OF THE PROGRAM

University mission	Generation of new competencies, preparation of a leader who translates research and entrepreneurial thinking and culture
University values	• Openness – open to change, innovation and cooperation. • Creativity - generates ideas, develops them and turns them into values. • Academic freedom - free to choose, develop and act. • Partnership – builds trust and support in relationships where everyone wins. • Social responsibility - ready to fulfill obligations, make decisions and be responsible for their results.
Graduate Model	• Deep subject knowledge, its application and constant expansion in professional activity. • Information and digital literacy and mobility in a rapidly changing environment. • Research skills, creativity and emotional intelligence. • Entrepreneurship, independence and responsibility for their activities and well-being. • Global and national citizenship, tolerance for cultures and languages.
Uniquenessof EP	• Orientation to the regional labor market and social order through the formation of professional competencies of the graduate, adjusted to the requirements of stakeholders. • Practice orientation and emphasis on the development of critical thinking and entrepreneurship, the formation of a wide range of skills that will allow you to be functionally literate and competitive in any life situation and be in demand in the labor market.
Academic Integrity and Ethics Policy	The university has taken measures to maintain academic honesty and academic freedom, protection from any kind of intolerance and discrimination: • Rules of academic integrity (protocol of the Academic Council No. 3 dated October 30, 2018); • Anti-corruption standard (Order No. 373 n/k dated December 27, 2019). • Code of Ethics (Protocol of the Academic Council No. 8 dated January 31, 2020).
Legal framework for the development of EP	• Law of the Republic of Kazakhstan "On Education"; • Model rules for the activities of educational organizations implementing educational programs of higher and (or) postgraduate education, approved by order of the Ministry of Education and Science of the Republic of Kazakhstan dated October 30, 2018 No. 595; • State compulsory standards of higher and postgraduate education, approved by order of the Ministry of Education and Science of the Republic of Kazakhstan dated October 31, 2018 No. 604; • Rules for organizing the educational process on credit technology of education, approved by order of the Ministry of Education and Science of the Republic of Kazakhstan dated April 20, 2011 No. 152; • Qualification directory of positions of managers, specialists and other employees, approved by order of the Minister of Labor and Social Protection of the Population of the Republic of Kazakhstan dated December 30, 2020 No. 553. • Guidelines for the use of ECTS. • Guidelines for the development of educational programs for higher and postgraduate education, Appendix 1 to the order of the director of the Central Library and Medical Academy No. 45 o/d dated June 30, 2021
Organization of the educational process	• Implementation of the principles of the Bologna Process • Student-centered learning • Availability • Inclusiveness
EP quality assurance	• Internal quality assurance system • Involvement of stakeholders in the development of the EP and its evaluation • Systematic monitoring • Updating content (updating)
Entry requirements	Established in accordance with the Model Rules for Admission to Education in Educational Organizations Implementing Educational Programs of Higher and Postgraduate Education Order of the Ministry of Education and Science of the Republic of Kazakhstan No. 600 of 10/31/2018

2. EP PASSPORT

Purpose of the EP	The purpose of the EP is to train highly qualified and in-demand specialists in the field of Virtual reality modeling and construction that meet the requirements of the labor market.
EP tasks	- formation of socially responsible behavior in society, understanding the importance of professional ethical standards and following these standards; -providing lifelong learning skills that will enable them to successfully adapt to changing conditions throughout their professional careers; - providing conditions for acquiring a high general intellectual level of development, mastering literate and developed speech, a culture of thinking and the skills of scientific organization of labor in the field of information technology; - formation of the competitiveness of graduates in the field of information and communication technologies to ensure the possibility of their fastest possible employment in their specialty or continuing education at subsequent levels of education; - providing knowledge on mathematical and computer modeling, planning and conducting numerical experiments, interpreting results, using the latest achievements of science and practice; - provision of multilingual education.
EP harmonization	• Level 6 of the National Qualifications Framework of the Republic of Kazakhstan; • Dublin Descriptors 6 skill levels; • •1st cycle of the Qualification Framework of the European Higher Education Area (A Framework for Qualification of the European Higher Education Area); • Level 6 of the European Qualification Framework for Lifelong Learning.
Communication of the EP with the professional sphere	• 1.Sectoral qualifications framework "Information and communication tech №logies" (Approved by the minutes of the Meeting of sectoral commissions on social partnership and regulation of social and labor relations in the field of information and communication tech №logies dated December 20, 2016, №. 1). • 2. Professional standard "Database Administration", approved by order №. 171 of July 17, 2017 by the Deputy Chairman of the Board of the National Chamber of Entrepreneurs of the Republic of Kazakhstan "Atameken" (Appendix №. 9). • Professional standard "Creation and management of information resources", approved by order №. 171 of July 17, 2017 by the Deputy Chairman of the Board of the National Chamber of Entrepreneurs of the Republic of Kazakhstan "Atameken" (Appendix №. 8). • Professional standard "Development of technical documentation" approved by order №. 171 dated July 17, 2017 by the Deputy Chairman of the Board of the National Chamber of Entrepreneurs of the Republic of Kazakhstan "Atameken" (Appendix №. 4). • Professional standard "Business analysts and IT project management", approved by order №. 330 of December 5, 2018 of the Deputy Chairman of the Board of the National Chamber of Entrepreneurs of the Republic of Kazakhstan "Atameken" (Appendix №. 5). • Professional standard "System analysis in information and communication tech№logies", approved by order №. 171 dated July 17, 2017 by the Deputy Chairman of the Board of the National Chamber of Entrepreneurs of the Republic of Kazakhstan "Atameken" (Appendix №. 2). • Professional standard "Software maintenance", approved by order №. 171 of July 17, 2017 by the Deputy Chairman of the Board of the National Chamber of Entrepreneurs of the Republic of Kazakhstan "Atameken" (Appendix №. 6). • Professional standard "Business analysis in information and communication tech№logies", approved by order №. 171 of July 17, 2017, Deputy Chairman of the Board of the National Chamber of Entrepreneurs of the Republic of Kazakhstan "Atameken" (Appendix №. 10). • Professional standard "Software Maintenance" (Appendix №. 29 to the order of the Deputy Chairman of the Board of the National Chamber of Entrepreneurs of the Republic of Kazakhstan "Atameken" dated December 24, 2019 №. 259). • 10. Professional standard "Creation and management of information tech№logies" (Appendix №. 40 to the order of the Deputy Chairman of the Board of the National Chamber of Entrepreneurs of the Republic of Kazakhstan "Atameken" dated December 24, 2019 №. 259).
List of qualifications and positions	Specialist in the creation and management of information resources (content manager 2529-0-003); database administration specialist (database administrator 2521-1-002); Database Management System Specialist (2521-1-004); business intelligence in the field of IT (2511-2-001); administrator of information systems (2523-0-002) in research institutions, design, design and other organizations without presenting requirements for work experience in accordance with the qualification requirements of the National Classifier of the Republic of Kazakhstan (NKZ), approved by order of the Committee for Technical Regulation and

	Metrology of the Ministry of investments and development of the Republic of Kazakhstan dated December 30, 2020 No. 553.
Sphere of professional activity	The sphere of professional activity is the field of information technology.
Objects of professional activity	The objects of professional activity of graduates are enterprises and organizations of various forms of ownership, developing, implementing and operating information technologies in various areas of human activity.
Subjects of professional activity	The subjects of professional activity of a bachelor in EP 6V06141 - Modeling and construction of virtual reality are theoretical and practical knowledge of – creation of virtual animation; – modeling 3D objects; – creating projects without knowledge of the code; – development of a multiplayer comLOnent; – creating projects for Windows, Android, iOS platforms.
Types of professional activity	- simulate various simulators and virtual games for medicine, industry, education; - create tools for automating and optimizing various processes; - to perform software implementation of the tasks of modeling and designing virtual reality; - conduct testing of virtual reality systems; - commercialize ICT services; - provide maintenance and technical support for virtual systems; - carry out the integration of software modules and their components
Learning Outcomes	LO1 Communicate freely in the professional environment and society in Kazakh, Russian and English, taking into account the principles of academic writing and the culture of academic honesty. LO2 Apply natural science, mathematical, social, socio-economic and engineering knowledge in professional activities, methods of mathematical data processing, theoretical and experimental research, regulatory documents and elements of economic analysis. LO3 Manage information processes, test, operate and maintain hardware and software in the field of VR systems. LO4 Simulate and design virtual reality; create virtual animation. LO5 Implement and operate ready-made software interface products in the field of VR systems, develop instructions for working with these systems. LO6 Develop mathematical models in various fields with innovative approaches to achieve specific results in mathematical and computer modeling. LO7 Design VR and interactive 3D modeling systems. LO8 Apply the capabilities of VR and AR systems based on interactive 3D graphics, platforms for creating these applications, the features of their software implementation; LO9 Construct virtual reality projects using the resources of mathematical and computer models with a preliminary feasibility study of design calculations. LO10 Develop and create effective algorithms for virtual and augmented reality applications, taking into account modern methods. LO11 Lead a healthy lifestyle, apply the ability of self-learning and self-education throughout life. LO12 To be able to work effectively individually and as a team member, to defend one's point of view correctly.

3. COMPETENCES OF THE OP GRADUATE

SOFTSKILLS (behavioral skills and personal qualities)	
SS 1. Competence in managing one's own literacy	SS 1.1. The ability to self-learn, self-develop and constantly update their knowledge within the chosen trajectory and in an interdisciplinary environment. SS 1.2. Ability to express thoughts, feelings, facts and opinions in the professional field. SS 1.3. Ability for mobility in the modern world and critical thinking.
SS 2. Language competence	SS 2.1. Ability to build communication programs in the state, Russian and foreign languages. SS 2.2. Ability to interpersonal social and professional communication in the context of intercultural communication.
SS 3. Mathematical and scientific competence	SS 3.1. The ability and willingness to apply the educational potential, experience and personal qualities acquired during the study of mathematical, natural science, technical disciplines at the university to solve professional problems.
SS 4. Digital competence, technological literacy	SS 4.1. The ability to demonstrate and develop information literacy through the mastery and use of modern information and communication technologies in all areas of their lives and professional activities. SS 4.2. The ability to use various types of information and communication technologies: Internet resources, cloud and mobile services for searching, storing, protecting and disseminating information.
SS 5. Personal, social and academic competencies	SS 5.1. Ability to physical self-improvement and focus on a healthy life to ensure full-fledged social and professional activities through the methods and means of physical culture. SS 5.2. Ability to social and cultural development based on the manifestation of citizenship and morality. SS 5.3 The ability to build a personal educational trajectory throughout life for self-development, career growth and professional success. SS 5.4. The ability to successfully interact in a variety of socio-cultural contexts during study, work, home and leisure.
SS 6. Entrepreneurial competence	SS 6.1. Ability to be creative and entrepreneurial in a variety of environments. SS 6.2. The ability to work in a mode of uncertainty and rapidly changing task conditions, make decisions, allocate resources and manage your time. SS 6.3. Ability to work with consumer requests.
SS 7: Cultural Awareness and Expressiveness	SS 7.1. The ability to show worldview, civil and moral positions. SS 7.2. The ability to be tolerant of the traditions and culture of other peoples of the world, to have high spiritual qualities.
HARD SKILLS	
Theoretical knowledge and practical skills specific to this area	HS 1. – the ability to recognize trends and prospects for the development of modern information technologies;
	HS 2. – the ability to apply application programs for solving problems in the field of mathematical and computer modeling; carry out numerical simulation; to analyze the obtained results; check the adequacy of the models; make predictive decisions;
	HS 3. – the ability to develop complex algorithms for virtual and augmented reality; to formulate a problem and apply methods of mathematical and systems programming in research activities, in project management for multimedia and virtual reality systems; use mathematical models in the design of VR systems;
	HS 4. – the ability to analyze and evaluate the effectiveness of the development, implementation of maintenance and functioning of mathematical and computer models of virtual reality systems using modern tools;
	HS 5. - the ability to create, test and debug virtual and augmented reality applications using modern tools and technologies; work with hardware and software of VR systems; the ability to develop technical documentation for the design of virtual reality, prepare technical documents for informational and methodological purposes, manage technical information;
	HS 6. Design and develop, maintain components of virtual reality systems in the field of business, medicine and scientific research;
	HS 7. the ability to solve all issues related to the stages of the technological process, labor safety in production, environmental protection

3.1 MATRIX OF CORRELATING THE LEARNING OUTCOMES OF THE EP IN GENERAL WITH THE FORMED COMPETENCIES

	LO 1	LO2	LO3	LO4	LO5	LO6	LO7	LO8	LO9	LO10	LO11	LO12
SS1			+	+			+					
SS 2	+		+		+		+	+				
SS 3		+		+		+			+			+
SS 4	+		+	+			+	+	+	+	+	+
SS 5		+			+	+						+
SS 6		+	+			+			+		+	+
SS 7	+	+	+	+	+	+			+		+	+
HS1	+		+	+		+	+	+		+	+	
HS 2	+		+			+	+	+	+	+		+
HS 3	+			+	+	+	+	+	+	+		
HS 4	+		+	+	+	+			+	+		
HS 5			+		+			+		+		+
HS 6	+			+			+	+	+	+		
HS 7		+		+		+		+	+			

4. MATRIX OF THE INFLUENCE OF DISCIPLINES ON THE FORMATION OF LEARNING OUTCOMES AND INFORMATION ON LABOR INTENSITY

№	Name of the module	cycle	component	Name of the discipline	Brief description of the discipline	Quantity Credits	Formed learning outcomes (codes)										
							LO1	LO2	LO3	LO4	LO5	LO6	LO7	LO8	LO9	LO10	LO11	LO12
	Module of the Social Sciences	GED	OC	Modern history of Kazakhstan	Classifications of the conceptual foundations of national history, origins, continuity of Kazakh statehood and topical problems of the history of modern Kazakhstan are considered. The activities of the national intelligentsia in the formation of the ideology of the liberation movement and stages of socio-economic modernization of Kazakhstan are characterized. The question of creating a democratic state governed by the rule of law is being formulated. Application of knowledge to assess the contribution of the First President to the theory and practice of public administration	5		**v**										**v**
		GED	OC	Philosophy	The foundations of the emergence of philosophy are considered, the features of the emergence of the culture of thinking are revealed, the concepts of "philosophy", "worldview", the essence and content of the concepts of "being", "consciousness" are revealed. The relationship between the concepts of "cognition" and "creativity" is considered, the essence and content of the category of philosophy of freedom are revealed, the skills of highlighting the essence of a philosophical problem, critical thinking, skills of researching philosophical aspects, problems of practice and cognition are developed	5		v									**v**	
	Module of Socio-political knowledge Module of the Social Sciences	GED	OC	Sociology and Political Science	Theories of sociology, social structure and stratification of society are studied, the role and place of politics in society are explained, the main stages of the formation and development of political science, including youth policy, the role of politics in the system of public life, the essence of the state is revealed, the correlation of the state is revealed and civil society. The skills of sociological research, analysis of socio-political information are developed	4		**v**										**v**

		GED	OC	Cultural Studies and Psychology	The foundations of the morphology of culture are studied, a characteristic of the anatomy of culture is given and its semiotic nature is revealed, ideas about archaic culture on the territory of ancient Kazakhstan are given, the main stages of the formation of Kazakh culture are considered, the essence of Kazakh culture in the context of modern world processes is revealed and an idea is given about the foundations of cultural politics of Kazakhstan	4		**v**										**v**
	Socio-Ethnic Development Module	GED	HSC	Ecosystem and Law	Formation of integrated knowledge in the field of economics, law, anti-corruption culture, ecology and life safety, entrepreneurship, scientific research methods. Fundamentals of safe human-nature interaction, ecosystem and biosphere productivity. The entrepreneurial activity of society in conditions of limited resources, increasing the competitiveness of business and the national economy. Regulation of relations in the field of ecology and human life safety. Knowledge and compliance of Kazakhstan's law, obligations and guarantees of subjects, state regulation of public relations to ensure social progress. Application of scientific research methods.	5		**v**							**v**			**v**
		BD	EC	Actual Problems and Modernization of the General Consciousness	Topical problems of science and education, spiritual revival in the framework of the implementation of the main directions of the "Rukhanizhagyru" Program are considered. Studied: mechanisms of protecting the economic interests of Kazakhstan in the context of social modernization; prospects for the development of IT in science, education and practice in the framework of the State Program "Digital Kazakhstan-2020". Practical experience and knowledge are used to solve urgent problems of our time, patriotism and ideological, spiritual guidelines in modern society.	3		**v**										**v**
		BD	EC	Mukhtar Study	The life, work, biography in the context of the work of M.O.Auezov are considered. A review of the writer's creative laboratory is being conducted; perception of MOAuezov as the creator of the science of Abay studies, the researcher of the Manas zhyr, a prominent public figure. Practical skills are used to analyze the literary heritage of M. Auezov in world and oriental literature. Feelings of patriotism and love for the homeland are instilled.	3		**v**										**v**

		BD	EC	Abay Study	The work of Abay Kunanbayev, the artistic values of individual works of the poet are considered, their values and roles in the upbringing of the future generation are revealed, and ideas about the development of Abay studies in general are formed. Practical skills are used for comparison and classification, scientific analysis and evaluation of the literary and artistic works of Abai Kunanbayev	3		**v**										**v**
	Communication and physical education module Socio-Ethnic Development Module	GED	OC	Kazakh (Russian) language	Cognitive and communicative activity in Russian (Kazakh) language in the spheres of interpersonal, social, intercultural communication is considered. Instilling the skills of discussing ethical, cultural, socially significant norms in discussions, the ability to work in a team, team interaction, flexibility, creativity. Development of practical skills in interpreting text information, explaining their style, genre specifics in various spheres of communication.	10		**v**									**v**	
		GED	OC	Foreign language	Mastering the language system and ways of using it in intercultural and communicative activities: - fluently conduct a conversation on various topics: general, educational and professional and related to free time - to perceive and understand messages by ear and when reading within the studied areas and speech topics -understand the materials sounding in the recording -express your opinion about events, actions of characters -read correspondence on issues of interest and catch the main meaning - write an official letter, essay, etc. in compliance with the regulatory requirements for registration	10		**v**									**v**	
		GED	OC	Physical education	The social significance of physical culture and its role in personality development and preparation for professional activity are considered; methods of control, assessment of physical development and fitness. Application of the acquired knowledge and skills in practical activities to improve performance, preserve and strengthen health, prepare for professional and creative activities to form a healthy lifestyle.	8		**v**									**v**	

		BD	HSC	Professional Kazakh (Russian) language	Development of skills for extracting the necessary information from the text, its interpretation in educational and professional communication. Development of the ability to establish contacts at a professional level, competently build communications, based on the goals and situation of communication. Instilling the ability for creativity, innovation, collegiality in the process of building a program of speech behavior in the Russian (Kazakh) language in the field of professional communication.	3											**v**	**v**
		BD	HSC	Professionally oriented foreign language	The technologies of a professionally oriented foreign language for using knowledge of a foreign language in the process of studying other university subjects are considered, foreign language competencies are used in further professional activities. Practical skills are formed in the study and application of special foreign terminology. Ability to work effectively in a team and individually, to correctly defend their point of view when performing exercises, test tasks.	3											**v**	**v**
		GED	OC	Information Technologies of Virtual Reality	Knowledge of computer systems, software. Development of skills in the use of information resources to search and store information, work with spreadsheets, work with databases. Application of methods and means of information protection; design and creation of websites, multimedia presentations. Skills of using e-government and e-textbooks, various cloud mobile technologies, management of SMART technologies.	5			**v**		**v**							
	Natural science fundamentals of the specialty	BD	HSC	Physics	The laws of classical and modern physics are considered; modern scientific equipment and methods of physical research; techniques of modern physical experiment. The degree is assessed	4		**v**				**v**						
		BD	HSC	Algebra and Geometry	The reliability of the results of theoretical and experimental research; an experiment is planned and its results are processed. The knowledge gained is used to solve specific problems from various fields of physics: mechanics, thermodynamics and molecular physics, electrodynamics, optics, etc.	4		**v**				**v**			**v**			
		BD	HSC	Mathematical Analysis	Ability to explore SLAEs, carry out matrix calculations, own methods for calculating determinants, in-depth solution of geometric problems, create geometric images found in other	4		**v**				**v**			**v**			

					mathematical and computer disciplines and apply the acquired skills in professional activities													
		BD	EC	Introduction to Specialty	Knowledge and understanding of the theory of the limit of a number sequence and the limit of a function, the theory of number series, the properties of derivatives and the indefinite integral. In-depth study of the differential calculus of functions of one real variable. Apply methods of differential calculus to study functions. Skills of calculating indefinite integrals and methods of integration, definite integrals and their application in professional activities.	4	v	**v**	**v**									
		BD	EC	Fundamentals of Academic Writing	Issues related to analytical textual activity are considered, taking into account the peculiarities of academic genres (annotations, abstract, analytical and scientific reviews, reports, etc.). Practical skills related to the search for information in scientific databases, analysis and abstracting of texts, citing various genres of academic writing on professional topics are formed, the principles of professional topics are instilled, the principles of Academic honesty are inculcated.	4		**v**										**v**
	Mathematical and computer fundamentals of the specialty	BD	EC	Mathematical analysis 2	Demonstrates the skills of calculating definite integrals and their application in geometry, mechanics and physics; improper integrals, own the theory of functions of many variables; numerical, functional and power series, signs of their convergence; differential calculus of functions of many variables and their application in professional activities.	4		**v**				**v**			**v**			
		BD	EC	Surface integrals	Skills of calculating surface integrals of the first and second kind are demonstrated; methods for calculating surface integrals; concepts of surface, surface area, normal and tangent plane to a surface. The acquired knowledge and skills are applied in the process of virtual reality modeling.	4		**v**				**v**			**v**			
		BD	EC	Differential Equations	They are proficient in the theory and methods of solving differential equations that have fundamental theoretical value and are used as basic mathematical models in natural science, technology and other fields, using the models contained in differential equations.	5		**v**				**v**						**v**
		BD	EC	Differential Equations in the Mathematical Modeling	Demonstrate skills in using mathematical models describing physical, chemical, economic processes and phenomena, and leading to differential equations; formulation of the main types of problems in	5		**v**				**v**			**v**			

					mathematical physics and properties of simulated processes, for various types of problems of partial differential equations. Ability to analyze the solutions obtained, as well as interpret these solutions. Differential equations are used in the development of mathematical models.														
		BD	HSC	Algorithmization and Programming	Possess the general principles of building algorithms, basic algorithmic constructions; concepts of programming systems; basic elements of a procedural programming language, program structures, operators and operations, control structures, data structures, files, subroutines, program libraries; programming models, concepts of classes and objects, their properties and methods. The acquired knowledge is applied in the process of developing programs in the professional field.	5		**v**			**v**					**v**		
		BD	HSC	Object Oriented Programming	They are proficient in the basics of object-oriented programming in the C ++ language, develop practical skills in the environment of an object-oriented programming language for solving mathematical, economic and applied problems using the C ++ language.	5					**v**		**v**			**v**		
		BD	EC	Applying IT in Math	Possess the basic capabilities and principles of using modern IT, develop skills in using applied computer programs in solving mathematical problems using technologies for parallelizing tasks in the mathematical package Mathcad when performing laboratory work in a group and individually.	4			**v**		**v**	**v**						
		BD	EC	Applied Computions in Matlab	They have the ability to calculate mathematical problems by means of the Matlab environment using methodologies and construction techniques. Demonstrating the skills of analyzing mathematical modeling, organizing program structures using program control operators, designing MATLAB modules in the form of script files and function files.	4			**v**		**v**	**v**						
		BD	HSC	Educational practice	Possess the basics of compiling computer programs for applied problems; practical skills in algorithmization and programming are consolidated in the process of solving problems on modern computers and theoretical knowledge gained in the process of studying disciplines is applied. Acquisition of practical skills in reporting and administration of office work.	2			**v**		**v**				**v**			

	Mathematical and computer	ChD	EC	Basics of Mathematical Modeling	To form an idea of mathematical models and their theoretical foundations, their practical implementation. Ability to linearize mathematical models. Apply the fundamental laws of nature and in the fields of knowledge to establish the adequacy of mathematical models of processes of different nature. Evaluate models when solving applied problems.	4				**v**		**v**		**v**				
		ChD	EC	Introduction to Mathematical Modeling	Knowledge of the basic methods of developing mathematical models. Application of fundamental laws of nature, laws of technology and technology. Experiments with data processing in the form of analytical dependencies. Formation of practical skills in choosing a mathematical apparatus for modeling and methods for implementing models. Evaluation of methods for establishing the adequacy of model results.	4				**v**		**v**			**v**			
		BD	EC	Business process simulation technology	Study of the theoretical and practical foundations of management, simulation of business processes. Gaining skills in the development of simulation models and conducting experiments with them, allowing to solve the problems of assessing and optimizing the parameters of economic, production and technological systems.	4		**v**				**v**			**v**			
		BD	EC	Simulation of Algorithms for Virtual Reality Objects	Mastering the methods of conducting system analysis of basic algorithms. The discipline "Simulation in the AnyLogic environment" involves the formation of knowledge about modern technologies of simulation of systems in the AnyLogic environment for forecasting, planning and making management decisions. Formation of practical skills in the field of modeling algorithms for virtual reality objects.	5		**v**					**v**		**v**	**v**		
				Imitation Simulation in AnyLogic Environment	Mastering the basic principles of developing simulation models based on various approaches, such as system dynamics, discrete-event and agent-based modeling. The discipline "Simulation in the AnyLogic environment" involves the formation of knowledge about modern technologies of simulation of systems in the AnyLogic environment for forecasting, planning and making management decisions.	4		**v**				**v**			**v**			
		ChD	EC	Virtual Modeling of Physical Processes	Knowledge and understanding of basic concepts and definitions of models of physical processes; basic physical laws and their application to create virtual models of various processes. Ability to create an	5				**v**		**v**					**v**	

					adequate model of the system and analyze the influence of various parameters on the behavior of a virtual system. Apply the knowledge gained in the development and debugging of effective algorithms for solving physical problems. Evaluate ways of visualizing solutions to problems in the environment of computer (virtual) mathematical systems														
				Bases of Modeling of Physical Processes	Knowledge and understanding of the basic computational methods used in solving physical problems and in processing experimental data. Own the methods of their optimal implementation on a computer, assessing the error of the result of the calculations. Application of practical skills in programming basic mathematical algorithms in modeling physical phenomena, as well as in creating a numerical model of a real physical phenomenon.	5				**v**		**v**					**v**	
		ChD	EC	Mathematical and computer modeling immersive technologies	Use mechanisms and patterns in the development of conceptual and theoretical models of scientific problems to be solved and problems in the design of VR / AR. Apply modern methods of mathematical and computer modeling to solve the problems of operating immersive technologies.	5						**v**			**v**		**v**	
		ChD	EC	Bases of Modeling Immersive Technologies	Study of the theoretical aspects of modeling virtual and augmented reality technologies. Formation of skills and abilities of modeling the hardware and software components of the formation of immersive content with varying degrees of immersion in the virtual space. Practical skills are used to establish the adequacy of mathematical models of VR objects using experimental data in the process of completing individual and group tasks.	5						**v**			**v**		**v**	
	Virtual Reality Development Processes	BD	EC	Applied virtual reality technologies	Knowledge in the field of application of virtual reality systems, basic concepts, principles and tools for developing systems, as well as equipment for implementation, stages and technology for creating VR systems and its components. Possess and apply basic skills in developing hardware and software components of user interfaces for interacting with immersive content.	5				**v**						**v**		
		BD	EC	VR / AR content creation platforms	Be able to choose tools and platforms for the development and creation of virtual and augmented reality applications. Apply VR / AR content creation platforms. Conduct a selection of popular tools for	5				**4**						**4**		

					creating augmented and virtual reality applications, taking into account their scope. The ability to create AR content using modern platforms.													
		BD	EC	Virtual Research of Technology Process	Knowledge and understanding of modern possibilities of designing simple software algorithms using modern programming tools, analyzing technological processes and equipment as objects of automation and control, drawing up structural diagrams of production, their mathematical models as control objects, defining performance criteria, developing algorithms for centralized control of technological coordinates. object.	5					**v**					**v**	**v**	
		BD	EC	Virtual research of industrial safety problems	Formulation of the basic concepts of the theory of industrial safety problems research. The ability to critically analyze modern industrial safety problems, set tasks and develop a research program, choose appropriate methods for solving experimental and theoretical problems, interpret, present and apply the results obtained using virtual research is being studied.	5					**v**					**v**	**v**	
	VR / AR technology solutions	ChD	EC	Virtual reality in education	Build an understanding of the use of VR in education. Have an idea of large educational VR projects: Education "," Digital school "," Modern digital educational environment "," Digital economy ". Ability to characterize the advantages and disadvantages of an immersive approach in education. To generalize the idea of the possibilities and prospects of using virtual reality in education.	4			**v**		**v**							
		ChD	EC	VR / AR journalism	Have an idea of VR and AR projects in the media. Apply the specifics of immersive journalism, content production technologies in virtual and augmented reality from the planning stage to presentation. Evaluate the effectiveness of using VR / AR technologies in media and advertising.	4			**v**		**v**							
		ChD	EC	Mobile Application Development	Knowledge and understanding of issues related to the creation of a workspace for developing Android OS applications, installing and configuring the SDK. Formation of practical skills in the development of software for mobile devices, as well as the user interface on mobile devices and their models. Practical skills in adherence to the basic principles of design and development of mobile applications, mastering the AdvancedReality technology.	4		**v**						**v**				

		ChD	EC	Cloud computing technologies in business	Application of technologies for creating cloud services, working with existing cloud services, as well as the possibility of using cloud computing in solving problems of optimizing IT processes in business. Formation of practical skills in realizing the benefits of cloud technologies in modern business, as well as the widespread use of tools of these technologies in professional activities.	4		**v**	**v**								
		ChD	HSC	Internet technologies	Knowledge and understanding of the principles and technologies of the organization of the global computer network Internet. Using and evaluating methods for developing Internet applications using the hypertext markup languages HTML and XHTML, cascading CSS stylesheets using application programming technology for the Internet from the point of view of ensuring information security. Ability to work effectively in a team and individually, correctly defend your point of view when working with Internet technologies.	5								**v**	**v**		**v**
		ChD	HSC	Industrial practice II	Knowledge and understanding of the elements of mathematical and computer modeling in terms of making specific production decisions and their implementation. Application of practical skills in installing network operating systems, working with the Internet and network technologies to solve production problems. Making report.	6			**v**		**v**				**v**			
	Basic programming and databases	BD	EC	Java programming language	Knowledge and understanding of the classification of programming languages, the concept of data types, operations and operators of the Java language, principles of developing programs for solving problems in the Java language. Practical skills of developing programs using functions, strings and files, processing symbolic information in the Java language are formed. A programming style is being developed.	4					**v**				**v**	**v**		
		BD	EC	Distributed Java Systems	Knowledge and understanding of issues related to distributed systems and their areas of application. Assessment of basic knowledge of Java technologies for implementing distributed applications. Application of the knowledge gained to solve practical problems. Study of technologies for implementing distributed Java applications. Practical skills in working with tools and methods of building and organizing	4					**v**				**v**	**v**		

					distributed systems.														
		BD	EC	Programming technology	Knowledge and understanding of issues related to familiarization with the basics of programming. Studying the principles of designing and developing programs in a high-level programming language. Formation of practical skills in: creating console applications in C ++, developing programs using functions, strings and files in C ++, self-solving problems by developing and debugging complex programs in C ++.	5									**v**	**v**	**v**	
		BD	EC	Design in AutoCad	Knowledge of the basic commands and tools of AutoCAD in the mode of dialogue between the user and the computer. Acquisition of skills in performing basic geometric constructions, orthogonal and isometric drawings on a plane and in three-dimensional space. Formation of practical skills in 2D design, 3D modeling and visualization in AutoCAD.	5									**v**	**v**	**v**	
		BD	EC	Pattern recognition systems	Knowledge and understanding of issues on the use of basic laws and provisions of the theory of pattern recognition: conceptual foundations of approaches and methods of pattern recognition; algorithms used in the analysis of images, acoustic signals or other types of sensors; linguistic analysis or machine learning. Formation of practical skills in the development and operation of image recognition systems.	5					**v**				**v**	**v**		
		BD	EC	Pattern recognition and image processing	Knowledge and understanding of issues related to digital representation of images, as well as methods of spatial and spectral image processing. Construction of mathematical models used to assess the quality of images. Practical skills in pattern recognition and image processing are formed.	5					**v**				**v**	**v**		
		ChD	HSC	Database management system	Knowledge and understanding of the principles of database design, classification of database management systems. Evaluating database development and management methods. Practical skills are formed on: technologies for working with data in a specific system, designing databases for specific subject areas using modern DBMS.	5			**v**	**v**					**v**			
		ChD	HSC	Industrial practice I	Knowledge and understanding of design and management of databases in the Delphi environment, Case technologies and other database management	4									**v**	**v**	**v**	

					systems. Formation of practical skills and core competencies in: specialty; drawing up algorithms and programs of tasks arising in the process of studying specialized disciplines; solving professional problems related to the activities of practice bases; development of mathematical and computer models, processes related to the activities of enterprises (base) of practice.													
	Graphic tools in modeling and protection of information	BD	EC	3D modeling	Knowledge and understanding of the principles of work in the software package 3D Studio MAX, the composition and structure of hardware and software used in multimedia systems, as well as the construction of animation models. Evaluation of methods and techniques for working on a three-dimensional scene. Formation of practical skills in the use of professional graphics and graphic editors in professional activities based on 3D Studio MAX.	4	v						**v**	**v**				
		BD	EC	3D Design	Application of knowledge on the effective use of basic tools for creating objects, modifying, changing and editing objects or their individual elements. Use of fundamental and applied knowledge in the field of three-dimensional computer graphics in professional activities. Combining the created objects into functional groups. Formation of practical skills in creating simple three-dimensional models of real objects.	4	v						**v**	**v**				
		BD	EC	Digital Twin Development Technologies	Understanding the concept of digital twins; knowledge of software decisions made in the Concept; Highlight the problems of introducing Digital Twins in the world. Ability to characterize and evaluate the stages of digital twin operation, factors of digital twin technology. Apply technical means of collecting and primary analysis of information by digital twins. Formation of digital layouts and work with them within the platform of digital production twins. Formation of practical skills on the issue of artificial intelligence as a tool for ensuring the performance of digital twins.	5				**v**		**v**	**v**					
		BD	EC	Cryptographic Methods of Information Security	Knowledge and understanding of the fundamental principles of cryptographic methods and algorithms for information security. Analysis of the peculiarities of the use of cryptosystems, as well as the formation of the mathematical culture of students and a	5				**v**		**v**	**v**					

					systematic approach to the organization of information security. Fundamental training in the basics of professional knowledge. The ability to apply knowledge in practice in the field of information security is being formed.													
	Modern technologies and models in specialization	ChD	EC	Solving problems in the MAXIMA system	To form knowledge about the MAXIMA computer mathematics system. To study and master the capabilities of the program for transforming expressions, working with parts of expressions, solving problems of linear algebra, mathematical analysis, combinatorics, number theory, tensor analysis, statistical problems, plotting graphs of functions on a plane in space in various coordinate systems. Apply knowledge in professional activities.	5			**v**	**v**			**v**					
		ChD	EC	Data analysis based on the software package statistica	Knowledge and understanding of the main fundamental provisions and methodologies for the application of modern statistical methods for the analysis of experimental data using the Statistica software package. Ability to select and evaluate tools for data processing in accordance with the task, analyze the calculation results and substantiate the conclusions. Formation of practical skills in solving analytical and research problems using modern technical means and information technologies.	5			**v**	**v**			**v**					
		ChD	EC	Virtual reality technologies in medicine	Knowledge and understanding about modern devices and software of virtual reality in medicine. Conducting a review of virtual and augmented reality technologies in healthcare, used for training doctors and patient rehabilitation. Formation of practical skills in the development and operation of VR development cases in the healthcare sector: VR heart model, VR therapy, VR simulators and others.	5			**v**	**v**					**v**			
		ChD	EC	Application of virtual technologies in business	Knowledge and understanding of the principles of development and use of visualization devices for virtual objects: VR helmets, augmented reality glasses, panels and monitors for displaying virtual objects. The use of devices for interacting with virtual objects in immersive environments: systems for tracking the head, eyes, body movements; gloves, 3D controllers, feedback devices, platforms, sensors. Formation of practical skills in the operation of virtual technologies in various areas of business.	5		**v**				**v**						

	Special courses for selection of chair	BD	EC	Multimedia and virtual reality systems	Possession of the skills of software implementation of multimedia virtual reality systems using various equipment, taking into account the user's biopsychoparameters. Demonstrate the ability and willingness to apply the acquired knowledge in the design of VR systems, import 3D models into the VR / AR development environment.	4	v			**v**			**v**	**v**				
		BD	EC	Information Technologies of Virtual Realit	To form an idea of the types of virtual reality information technologies and how to use them. To assess the degree of demand for IT virtual reality in various fields of human activity. Formation of practical skills in the use of virtual reality information technologies	4		**v**				**v**						**v**
		BD	EC	Support of Virtual Reality Projects	Knowledge and understanding of basic concepts about equipment, leading VR development companies, platforms for developing AR applications. Ability to apply and evaluate development stages: choice of environment, taking into account the peculiarities (mobile application, industrial or corporate context), choice of tools, design development, coding (display, interaction, support), testing. Practical skills are applied within the framework of AR application development technology in Unity.	5			**v**				**v**					
		BD	EC	Virtual Reality Application Development	Formation of theoretical knowledge and practical skills in the development of virtual reality applications. Master the terminology of a virtual reality application developer, as well as the skills of developing VR / AR systems. Apply the knowledge gained in the design of VR systems.	4		**v**				**v**		**v**				
		BD	EC	Bases of Production Technology for AR Objects	Own the main stages of development of AR objects: selection of an environment taking into account the peculiarities (mobile application, industrial or corporate context), selection of tools, design development, coding (display, interaction, support), testing. Evaluate the technology for developing an AR application in Unity. Develop practical skills about creating a graphical user interface, designing menus, creating multiple scenes in one project	4	v		**v**				**v**	**v**				
	Module of new professional competencies acquisition	BD	EC	Disciplines for an additional educational program	The use of an additional educational program (Minor), which defines a set of disciplines and (or) modules and other types of educational work defined by a student in order to form additional competencies. Allows you to determine the degree of mastering by	12	v			**v**							**v**	

					bachelors of the volume of training modules, professional competence and readiness of the graduate for professional activity. Allows you to show and evaluate the acquired knowledge, skills and competencies, including those with in-depth specialization within the framework of the main program.													
	Module of Final certification	ChD	HSC	Undergraduate or industrial practice	Develops the ability to: correctly represent the structure of the practice base, describe the production processes of the enterprise; discuss the use of software products, computer equipment of the enterprise; analyze the technical condition, production process, measures to ensure the safety of life; offer their own developments, create virtual reality applications on the instructions of the enterprise for implementation in production; Understanding and application of system concepts: to determine the problem under study in the course of the graduation work; collection of material; subject area and construction of mathematical and computer models of virtual reality; preparation of technical documentation for the developed VR / AR systems. Practical skills are applied in the development and implementation of VR / AR systems.	8				**v**	**v**	**v**						
				Writing and defending a thesis, graduation project or preparation and passing of a complex exam	Knowledge and understanding of methods for conducting research on an object in order to collect the necessary materials for the development of a mathematical model. Analysis of components for the development of mathematical and computer models. Practical skills are used to develop databases of a mathematical model; writing program code and debugging it. With this work, students show that they have the ability to independently represent complex computer scientific technical problems and their relationship with other industries, to combine and apply the acquired knowledge of software tools, programming systems, information technologies in further labor and professional activities.	12	v												**v**

5. SUMMARY TABLE SHOWING THE VOLUME OF DISPUTED LOANS BY EP MODULES

Course of study	Semester	Number of acquired modules	Number ofstudied disciplines			Number of KZ credits					Total hours	Total KZ credits	Ammount	
			CC	UC	OC	Theoretical training	Physical culture	Educational practice	Industrial, pre-diploma practice	Final certification			exam	diff. offset
1	1	4	5	1		28	2				900	30	6	1
	2	4	2	3	1	26	2	2			900	30	5	3
2	3	4		2	5	28	2				900	30	6	2
	4	5	2	1	2	24	2		4		900	30	5	2
3	5	4		1	5	30					900	30	6	
	6	4			4	24			6		900	30	3	1
4	7	4		1	3	20					600	20	4	-
	8	3		1	3	20					600	20	4	-
	9	1		1					8	12	600	20	-	1
total		15	9	11	22	200	8	2	18	12	7200	240	39	10

6. STRATEGIES AND METHODS OF TRAINING, MONITORING AND EVALUATION

Learning Strategies	**Student-centered learning: the learner is the center of teaching/learning and an active participant in the learning and decision-making process.** **Practice-oriented learning: focus on the development of practical skills.**
Teaching methods	Conducting lectures, seminars, practical and laboratory work with: • application of innovative technologies: • problem learning; • case study; • work in a group; • discussions and dialogues, intellectual games, competitions, quizzes; • software development; • presentations; • rational and creative use of information sources: • multimedia educational programs; • electronic textbooks; • virtual laboratory work; • digital resources. Organization of independent work of students, individual consultations.
Monitoring and assessing the achievability of learning outcomes	Current control on each topic of the discipline, control of knowledge in classroom and extracurricular activities (according to the syllabus). Assessment Forms: • survey in the classroom; • testing on the topics of the academic discipline; •test papers; • protection of independent works; • discussions; • trainings; • colloquia; • essays, etc. Midterm control at least two times during one academic period within the same academic discipline. Intermediate certification is carried out in accordance with the working curriculum, academic calendar. Conduct forms: • exam in the form of testing; •oral exam; •a written exam; • combined exam; • defense of term papers; • protection of practice reports. Final examination.

7. TRAINING AND RESOURCE SUPPORT OF THE EP

Information Resource Center	The structure of the EIC includes 6 subscriptions, 16 reading rooms, 2 electronic resource centers (ERC). The basis of the network infrastructure of the JRC is 180 computers with Internet access, 110 workstations, 6 interactive whiteboards, 2 video doubles, 1 video conferencing system, 3 scanners of A-4 format, 3. The software of the JRC is AIBS "IRBIS-64" under MS Windows (basic set of 6 modules), stand-alone server for uninterrupted operation in the IRBIS system. The library fund is reflected in the electronic catalog available to users on the site http://lib.ukgu.kz on-line 24 hours 7 days a week. Thematic databases of their own generation have been created: "Almamater", "Proceedings of SKSU scientists", "Electronic archive". Online access from any device in 24/7 mode via an external link http://articles.ukgu.kz/ru/pps. Working with catalogs in electronic form. EC consists of 9 databases: "Books", "Articles", "Periodicals", "Proceedings of the teaching staff of SKSU", "Rare Books", "Electronic Fund", "SKSU in Print", "Readers" "SKU". The JIC provides its users with 3 options for accessing its own electronic information resources: from the “Electronic Catalog” terminals in the catalog hall and in the JIC subdivisions; through the information network of the university for faculties and departments; remotely on the library website http://lib.ukgu.kz/. Open access to international and republican resources: "SpringerLink", "Polpred", "Web of Science", "EBSCO", "Epigraph", to electronic versions of scientific journals in the public domain, "Zan", "RMEB", "Adebiet" , Digital library "Aknurpress", "Smart-kitar", "Kitar.kz", etc. For people with special needs and disabilities, the library website has been adapted to the work of visually impaired users
Material and technical base	**Specialized Audiences:** Computer classes and lecture halls equipped with modern functional and presentation equipment. Modern hardware and licensed software are installed in computer classes. All laboratory rooms are equipped with new generation computers that are in working order, allow for scientific and laboratory work, and are used in full. Computers are united in a local network and connected to the high-speed network of the university. Lecture halls are equipped with computers, multimedia projectors, which allow teaching at a high level. **Laboratory instruments and installations** Standard kit - "Molecular Physics" (Processing the results of multiple direct measurements, Maxwell's Pendulum) - Installation "Electricity and magnetism" (Modeling, Determination of the specific charge of the Electron by the magnetron method, Hall effect) Standard kit - "Optics" (Dispersion, Diffraction, Polarization, Interference) - Installation for studying the electric hole transition - Installation for studying the external photoelectric effect - Installation for determining the resonant potential of an atom of an inert gas (mercury) with an oscilloscope - Installation for determining the width of the sealing layer of the P-n junction and the concentration of impurities in the region of avalanche breakdown - Devices and equipment

REVIEW
for the educational program
6V06141 - "Virtual reality modeling and construction"
(code and name)
developed in NJSC " M. Auezov SKU, Shymkent

1. Brief description of the enterprise and the profile of its activities

The implementation of the proposed EP will be carried out on the basis of the Higher School of Information Technologies and Energy of the NAO M. Auezov South Kazakhstan University. The University is the leading multidisciplinary university of the Turkestan region. Responsible for the implementation of the educational program was determined by the graduating department "Information Systems and Modeling".

2. The relevance and relevance of the EP

The educational program 6V06141- «Virtual reality modeling and costruction» was created in accordance with the needs of the regional labor market for personnel with higher professional education. In the context of the formation and development of professionally oriented education, the problem of training highly qualified personnel for the implementation of managerial and analytical functions in the field of modeling and designing virtual reality becomes urgent. Currently, in the information space of the region, the number of business facilities, medical, educational and government, research organizations that need to develop, implement and maintain VR / AR systems is increasing. This circumstance imposes certain obligations on higher educational institutions in terms of personnel training.

3. Learning outcomes and competencies, their relationship with the demands of the labor market

The learning outcomes and competencies proposed in the EP fully correspond to the modern qualification requirements for specialized specialists with a bachelor's qualification, and also contribute to the formation of integral theoretical knowledge, practical skills and professional skills.

4. The presence of components that develop practical skills

The educational disciplines of EP provide the formation of the necessary practical skills of a specialist with fundamental and applied knowledge in the field of mathematical and computer modeling, design and maintenance of virtual systems, possessing modern methods of collecting, storing and processing information used in his professional activities.

All internship programs are developed taking into account the requirements of the professional standard, as well as taking into account the opinion of employers. The types of practices included in the educational program are determined in accordance with the types of activities that the educational program is focused on. Their content, goals and objectives testify to the orientation of the educational program to the development of practical skills and abilities of students.

5. Content of the educational program (modules, disciplines)

The modules "Modern technologies and models in specialization", "Special courses at the choice of the department" introduced disciplines that contribute to the formation of the competence of a modern specialist in the fields of application of virtual reality technologies.

One of the advantages is taking into account the requirements of employers in the formation of major disciplines, which, by their content, allow ensuring the competence of the graduate. The quality of the content of the curriculum is beyond doubt.

All types of educational activities are provided for the preparation of highly qualified specialists with the skills of research work - theoretical training, industrial practice, registration and defense of diploma theses.

The distribution of disciplines over academic periods is rational and logically grounded. The planned volume and time resource for academic disciplines and types of training meet the qualification requirements for the level of graduates.

In accordance with the credit technology of education, the curriculum includes compulsory academic disciplines, disciplines of the university component and an optional component.

The structure of the educational program is generally logical and consistent. Evaluation of the section of academic disciplines allows us to conclude about their high quality and sufficient level of methodological support. The content of the disciplines corresponds to the competence model of the graduate.

6. The quality of the modular guide

The content of the modular reference book of the educational program corresponds to the accepted competence model of the graduate. The composition of educational modules covers all relevant areas of training specialists in the field of modeling and design of VR / AR systems.

7.The quality of the modular guide

The content of the modular reference book of the educational program corresponds to the accepted competence model of the graduate. The composition of educational modules covers all relevant areas of training specialists in the field of modeling and design of VR / AR systems.

8. Opinion on EP

Based on the above, I believe it is possible to assert that the goals and content of the presented educational program meet the modern qualification requirements for training bachelors specializing in the field of Virtual reality modeling and construction.

Director of «IT Business Group» LLP _____Tuyimebek Beibars Myktybekovich

REVIEW

for the educational program
6V06141- " Virtual reality modeling and construction "
(code and name)

developed in NJSC M. AuezovSKU, Shymkent

1. Brief description of the enterprise and the profile of its activities

The implementation of the proposed educational program will be carried out on the basis of the NAO South Kazakhstan University. M. AuezovSKU is one of the brightest brands in the sphere of higher education in the republic. Responsible for the implementation of the EP is the graduating department "Information Systems and Modeling" of the Higher School of "Information Technology and Energy".

2. The relevance and relevance of the EP

The educational program 6V06141- "Virtual reality modeling and construction" was developed with the active and systematic involvement of employers and students. The content of the EP, its goals, expected learning outcomes, planning of the educational process, competencies are created in accordance with the needs of the regional labor market in personnel with higher professional education. Taking into account the needs of the labor market and the prospects for its development, highly qualified engineers, specialists in the development, implementation and maintenance of VR / AR systems will be in demand among IT specialists. These specialists will be in demand in various spheres of business, education, medicine, in government agencies, as well as in research organizations. In this regard, the development, implementation of this EP is relevant and in demand.

3. Learning outcomes and competencies, their relationship with the demands of the labor market

The learning outcomes and competencies offered in the EP contribute to the formation of theoretical, practical knowledge and skills, and also fully cover the modern qualification requirements for specialized specialists with a bachelor's qualification.

4. Availability of components that develop practical skills

In the educational program, there is a focus on the expected learning outcomes: competencies, competencies and practice-orientedness. Learning outcomes correspond to the graduate's competence model according to professional competencies.

The content, goals and objectives of the educational program are focused on the development of practical skills and abilities of students.

I believe that the practical skills formed by students in this EP contribute to the preparation of qualified, competitive personnel who meet modern quality requirements for specialists with higher education for independent work in the direction of modeling and designing virtual reality

5. Content of the educational program (modules, disciplines)

The structure of this educational program is based on a modular principle, contains learning outcomes and competencies: key and professional.

The content of the educational program is focused on innovative (distance, interactive, etc.) learning technologies, various categories of students, as well as inclusive education.

The disciplines of the curriculum for the peer-reviewed EP form the entire necessary list of general cultural, general professional and professional competencies.

The structure and content of the EP is made taking into account the requirements of employers, as well as individual abilities and requests of students

The requirements for the volume of the academic load, measured in credits acquired during the academic year for each academic discipline or type of academic work, have been fulfilled. The distribution of disciplines by modules, the volume of the academic load is rationally and logically justified.

The content of the disciplines of the optional component takes into account the specifics of the socio-economic development of the region and the needs of the labor market, the established research areas of the Higher School of Information Technology and Energy, as well as the individual interests of the student himself.

The disciplines of the university component take into account the specifics of the requirements for professional competencies (qualification characteristics, qualification requirements), established scientific schools at the University.

The content of the disciplines corresponds to the competence model of the graduate.

In general, the educational program has a logical and consistent structure.

6.Quality of the modular reference

The quality of the modular reference book of the peer-reviewed educational program corresponds to the accepted competence model of the graduate. The content of educational modules covers all relevant areas of training specialists in the field of modeling and design of VR / AR systems.

7.Conclusion on EP

Evaluation of the peer-reviewed educational program from the point of view of its relevance and content meet the qualification requirements for training bachelors specializing in virtual reality modeling and design.

Director of Balance Service LLP _____ Turmakhanova Luiza Nurmakhanovna

Expert opinion
for the educational program
6V06141- " Virtual reality modeling and construction"

1. The relevance of the EP

The relevance of this educational program lies in the fact that the modeling and construction of virtual reality is widely used in modern life and has many areas of application.

The rapid development of interactive multimedia technologies requires the emergence of specialists of a new formation. In Kazakhstan, there is a significant shortage of specialists who are able to create and successfully operate modern ICT in the field of Virtual reality modeling and construction systems. Due to the dynamic development of the industry and the rapid obsolescence of information technologies, constant updating and improvement of educational programs in this area is required.

The development of the sphere of information and telecommunication technologies largely depends on the choice of the concept of training specialists of higher professional education.

2. Compliance of the EP with the formulated goals, consistent with the mission of the university, the requests of employers and students

In the educational program 6V06141- "Virtual reality modeling and construction" formulated: the concept of the educational program, goals and objectives and training of specialists, requirements for the organization of the educational process and for applicants, the results of EP training, and also contains a description of the qualification characteristics of the graduate of the educational program and professional information about the discipline. The list of educational disciplines and their content fulfillment meet the modern qualification requirements for specialists of the direction "Modeling and construction of virtual reality".

The selection of academic disciplines, the laid down requirements for the knowledge, practical skills and professional competencies are fully consistent with the mission of the university "Formation of the country's intellectual elite based on the generation of new knowledge and transformation of the university into an entrepreneurial university", meet the needs of employers and students.

1. Compliance with the National Qualifications Framework of the Republic of Kazakhstan

1. The objectives and content of the EP correspond to the 6th level of the National Qualifications Framework of the Republic of Kazakhstan.

2. Reflection in the EP of learning outcomes and competencies based on Dublin descriptors, laid down in professional standards / industry frameworks

The educational program is aligned with the Dublin descriptors, cycle 2 of the Qualifications Framework for the European Higher Education Area (AFramework for Qualifications of the European Higher Education Area), level 6 of the European Qualifications Framework for Lifelong Learning (The European Qualifications Framework for Lifelong Learning).

3. Compliance with the classifier of areas of training with higher education

The structure and content of the EP meet the requirements of the classifier of areas for training personnel with higher education of the educational program 6V06141 "Virtual reality modeling and construction".

4. The structure and content of EP, the use of the modular principle of their construction

The curriculum includes the disciplines of the university component and the disciplines of the optional component.

The disciplines of the university component ensure the formation of general and professional competencies.

Disciplines of the optional component expand and deepen the training of students, contribute to the acquisition of additional competencies, knowledge and skills necessary to ensure the competitiveness of the graduate to the requirements of the labor market.

The modular design of the educational program allows you to obtain integrated knowledge in modules containing interrelated disciplines. The modular approach is designed to ensure the gradual development of the educational program.

The composition of educational modules covers all relevant areas of training highly qualified specialists in the field of mathematical and computer modeling, competitive in the domestic and international labor markets.

5. The presence in the EP of components for preparation for professional activity, developing key competencies, intellectual and academic skills, reflecting the changing requirements of society, including the implementation of the presidential program for mastering three languages: Kazakh, Russian and English

The program examines the technological aspects of the implementation of virtual and augmented reality systems: specialized devices, stages of creating VR / AR reality systems, their components, 3D graphics for modeling environments, objects, characters, software tools for managing the model interactively in real time. for

consideration of the OP is executed efficiently, competently. Its focus on the unity of theory and practice, focus on training a competent specialist in the field of modeling and designing virtual reality is important. The included academic disciplines cover the entire range of topical issues and problems in the profile of training, are fully capable of forming the necessary specialized knowledge, skills and abilities in the field of mathematical and computer modeling of VR systems

The logical sequence of disciplines and the reflection of the basic requirements in curricula and training programs

Disciplines for study periods are placed in a logical sequence. Structural parts of the educational program: interrelated, aimed at achieving the planned result, successive, fully disclosed.

The content of the disciplines of the educational program corresponds to the accepted competence model of the graduate.

The educational program is fully provided with educational and methodological documentation and related materials.

In order to train highly qualified specialists, all types of educational activities are provided. The planned volume and time resource for academic disciplines and types of training meet the qualification requirements for the level of graduated specialists, and also contributes to the comprehensive satisfaction of their educational needs.

The methodological equipment of the educational program contributes to the successful solution of problems in key areas of training, education and development of students

1. Reflection in the EP of the system of accounting for the teaching load of students and teachers in credits, its compliance with the parameters of the credit education system.

The content of the EP fully complies with the requirements of the credit technology of education, including in terms of accounting for the teaching load of teachers and students in credits. The study of 240 credits is envisaged.

2. The presence in the programs of industrial practice to consolidate the theoretical material, expressed in the workload in credits

The educational program provides for three types of internships: educational in the amount of 2 credits, industrial practice I in the amount of 4 credits, industrial II in the amount of 6 credits and pre-diploma in the amount of 8 credits.

3. Information about the teaching staff involved in the implementation of the EP

The EP reflects information about the teaching staff involved in its implementation. The qualification requirements for teaching staff are met.

4. Qualifications obtained as a result of mastering the EP

Upon mastering the EP, it is envisaged that the graduate will be awarded a bachelor's degree in the field of information and communication technologies for the educational program 6V06141- "Virtual reality modeling and construction"

5. Recommendations

In accordance with the above, it seems possible to assert that the goals and content of the EP correspond to the modern qualification requirements for training bachelors specializing in information and communication technologies.

It is recommended to accept the presented educational program for implementation.

Expert Musabekova L.M.
Doctor of Technical Sciences, Professor of the Department of "Computers and software "

APPROVAL SHEET

for Educational program code

6V06141- "Virtual reality modeling and construction"

Director Dof AA _____ Naukenova A.

signature

Director Dof AS _____ Nazarbek U.B.

Signature

Director Dof E and C_____ Bazhirov T.S.

signature